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Leigh B. Boske

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Foreword

The Lyndon B. Johnson School of Public Affairs has established interdisciplinary research on policy problems as the core of its educational program. A major part of this program is the nine-month policy research project, in the course of which two or more faculty members from different disciplines direct the research of ten to twenty graduate students of diverse backgrounds on a policy issue of concern to a government or nonprofit agency. This "client orientation" brings students face-to-face with administrators, legislators, and other officials active in the policy process and demonstrates that research in a policy environment demands special talents. It also illuminates the occasional difficulties of relating research findings to the world of political realities.

This report is the product of a policy research project conducted in the 1999-2000 academic year with funding from the U.S.-CIDI Specific Fund of the Organization of American States (OAS)–the primary client–and the William and Flora Hewlett Foundation through the Center for Inter-American Policy Studies at The University of Texas at Austin. Also participating was the Center for Environmental Management in Latin America of the Institute of Latin American Studies at The University of Texas at Austin. The purpose of the study is to examine the role of efficient transportation systems in fostering international trade, economic integration, and sustainable development throughout the Americas.

The curriculum of the LBJ School is intended not only to develop effective public servants but also to produce research that will enlighten and inform those already engaged in the policy process. The project that resulted in this report has helped to accomplish the first task; it is our hope that the report itself will contribute to the second.

Finally, it should be noted that neither the LBJ School nor The University of Texas at Austin nor the Organization of American States necessarily endorses the views or findings of this report.

Edwin Dorn
Dean

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Executive Summary

Introduction

This research report provides a comprehensive overview and examination of the role played by transportation in the Americas in fostering international trade, economic integration, and sustainable development. Over the past two decades, the Western Hemisphere has simultaneously experienced trade liberalization, formation of regional trade blocs, governmental deregulation of key sectors of national economies, and privatization of former government-owned and -operated industries (such as energy, transportation, and telecommunications). The result of these cumulative actions has been rapid growth in international trade and regional economies. Most countries have pursued economic development as their primary path to raising living standards without taking environmental issues into account. Yet, if done wisely, transportation holds the promise of being able to foster economic integration and sustainable development by facilitating the movement of people and goods in ways that are friendly to the environment.

Contents

This report is composed of five chapters. Chapter 1 examines trends in global trade liberalization and the formation of regional trade blocs, with special emphasis paid to the Americas. Five regional trade blocs–the Southern Common Market (Mercado Común del Sur, or MERCOSUR), the North American Free Agreement (NAFTA), the Andean Community, Caribbean Community Common Market (CARICOM), and the Central American Common Market (CACM)–are discussed in detail in terms of their histories, institutional structures, key provisions in their agreements, and transportation policies. Also discussed in detail are the proposed Free Trade Area of the Americas (FTAA) and the roles played by the Organization of American States (OAS), Inter-American Development Bank (IADB), Latin American Integration Association (ALADI), International Maritime Organization (IMO), and other international governmental organizations (IGOs).

Chapter 2 consists of two parts. The first part presents an overview of global trends in maritime commerce. The second part focuses on trade in Latin America and the Caribbean in terms of port privatization, expansion of containerization, intermodal developments, consolidations and new alliances in liner services, technological developments, and obstacles to the establishment of seamless maritime transport systems. Case studies are provided of seaports in Argentina, Brazil, Mexico, and Panama.

Chapters 3 and 4 discuss transportation in MERCOSUR and NAFTA, respectively. Addressed are external and intraregional trade flows, regional development policies, modes of transportation, primary transportation corridors, infrastructure needs, public and private investment, government-led initiatives for privatization and deregulation of the transport sector, integration projects, the role of private-sector logistics, sustainable development initiatives, environmental policies and problems, and environmental impact assessments.

Finally, Chapter 5 presents a framework for examining transportation-related environmental impacts. Each mode of transportation (and its corresponding infrastructure) is identified in terms of its economic characteristics, service characteristics, and construction/maintenance/operations impacts. Individual environmental impacts are then associated with these various characteristics to enable analysis. The effects of human error and natural disasters are also considered. The chapter concludes with a discussion of prevention and mitigation techniques that have applicability in transportation planning.

Highlights

Trade Liberalization and Regional Trade Blocs

The global economic system established in the aftermath of World War II has witnessed the emergence of a global trend toward the integration of neighboring countries into regional trade blocs. Though far from universal acceptance, the trend toward global trade liberalization has influenced the formation of 80 regional trade agreements since the creation of the General Agreement on Tariffs and Trade (GATT), the precursor to the World Trade Organization (WTO), in 1947. MERCOSUR and NAFTA are examples of regional trade agreements in the Western Hemisphere while the proposed Free Trade Area of the Americas (FTAA) is an example of a trend toward global trade liberalization.

In addition to countries individually seeking further economic and trade integration with regional neighbors, IGOs have been instrumental in facilitating the process of international trade and movement toward global trade liberalization. The WTO, established in 1995, is the main IGO dealing with trade liberalization that monitors trade policies and encompasses all the provisions previously agreed to in the various rounds of GATT. The IMO and the International Monetary Fund (IMF) are other important global IGOs that help facilitate the global trade liberalization process by providing institutionalized trade guidelines and policies among member countries.

Countries in the Americas have sought to expand their integration schemes in a variety of ways. The establishment of ties with other Latin American and Caribbean (LAC) neighbors, negotiations to create the FTAA, and further developments in establishing links with Europe and Asia have resulted in increased trade liberalization in the Americas. Furthermore, Western Hemispheric IGOs such as the OAS, IADB, and ALADI, have further facilitated the hemispheric integration process by developing common agendas that seek to accelerate and expand the economic and trade integration of countries in the Americas.

In addition, regional trade blocs at varying stages of integration have different institutional frameworks that may also pose different challenges to policymakers concerned with reducing barriers to trade. The three primary types or levels of integration are free-trade areas, customs unions, and common markets.

The two largest, most complex regional trade agreements in the Americas are MERCOSUR and NAFTA. Other trade blocs in the Western Hemisphere that play a major role in the integration process of LAC countries include the Andean Community, CACM, and CARICOM. There is also a growing trend of bilateral trade agreements in the Americas, and extraregional trade agreements with other countries or regional trade blocs outside the Americas, such as with the European Union (EU).

Maritime Transportation in the Americas

The inextricable link between maritime trade and economic growth has been a driving force behind the expansion in global trade. As the cost of shipping goods via waterborne transport declines, maritime transport is becoming the most cost-effective option for shipping goods to new markets in many areas of the world. Changes in the maritime industry have both expanded and revolutionized the scope of maritime trade. Evolutionary forces such as deregulation and carrier consolidation have incited a massive expansion in maritime commerce, while other trends like containerization, intermodalism, and transshipment have revolutionized the industry by augmenting the way in which agents along the distribution chain interact with one another. For instance, the vessel-port interface has changed to incorporate land-based modes of transport; seaport labor employment levels have diminished to take advantage of labor-saving technologies; and new management structures, operating under market-based principles, have emerged to coordinate the diverse responsibilities and functions of the modern seaport.

By applying a regional lens to these trends and changes in maritime commerce, it is evident that trade and transportation corridors in various regions will be affected in different ways. Notably, the east-west trade lanes stand to gain the most from these trends because of the high volume of trade and levels of port modernization already in existence in ports along the service routes. Nevertheless, these trends will also have an indirect impact on regions along the north-south trade corridors. Specifically, trends in maritime trade will force seaports in Latin America to concentrate resources on potential areas in which they can achieve real gains in trade. Although Latin ports may never be serviced by megaships, these ports stand to gain from the increased reliance on hub-and-spoke systems of distribution. Small- to medium-size ships will increase their service frequencies along the north-south trade lanes as they distribute goods from regional hubs in Panama or Brazil.

Possibly the greatest benefits to be derived from expanding maritime trade will be realized by Panama in which are located the ports of Cristobal, Colón, Balboa, the Manzanillo International Terminal, and the Colón Free Trade Zone. Because of their strategic position in global trade lanes, Panama's ports could develop into some of the world's most efficient hub/transshipment ports, especially as larger carriers increasingly rely on equatorial service routes to increase efficiency and reduce transit times.

Latin ports will face challenges other than from hub port expansion and megaship services. Ports must increase investment in port infrastructure and services to maintain their competitiveness. For the Mexican port of Lázaro Cárdenas, this means coordinating investment with industries with which the port enjoys a comparative advantage, such as steel and fertilizer. Its ability to coordinate investment activities and increase port efficiency will enable the port to capture real gains in trade to Asian and other growing markets. Also, as evidenced by the Port of Santos in Brazil, ports must effectively manage an unwieldy labor structure that is often unresponsive to market-based principles. Only if Latin ports can divest themselves from these swollen and unproductive labor regimes will they be able to garner the necessary private investment needed to update and maintain infrastructure as well as facilitate port competitiveness.

In short, global trends in maritime trade will have a significant impact on the maritime industry in Latin America. Only through the adoption of market-based principles and through increases in port investment will these ports exceed their current potential to realize significant growth in Latin American trade.

MERCOSUR Transportation

MERCOSUR has experienced a sizable increase in trade activity, both within MERCOSUR and with the rest of the world. Between 1990 and 1998, total imports, including intra-MERCOSUR trade, increased 249.1 percent, while exports increased 75.4 percent.

In 1998, Argentina and Brazil accounted for 95.2 percent of exports and 93.1 percent of imports within the trade bloc. With such large shares of exports and imports, Argentina and Brazil are the most influential member countries in efforts to integrate the individual national economies. In order to facilitate integration, MERCOSUR member countries face enormous challenges in coordinating macroeconomic policies, exchange rates, trade rules and legal frameworks for development. Moreover, continued integration has caused problems of economic interdependence. For example, the devaluation of the Brazilian currency (the Real) in 1999 caused a substantial decrease in trade within the trade bloc, which led to a general recession and strained relations between Brazil and the other MERCOSUR countries.

In addition to facing challenges in integrating fiscal and legal policies, MERCOSUR also faces challenges in maintaining and constructing transportation infrastructure that physically connects all member countries. In general, there are major deficiencies and gaps in transportation infrastructure that hinder integration. Argentina and Brazil have taken steps to modernize transportation infrastructure through concessions and privatization, which have led to improvement of some highways, railroads, and ports. However, the region still faces challenges in integrating various modes of transportation.

Infrastructure development and maintenance is the most critical factor for eliminating the deficiencies in regional transportation systems. Without adequate roads, expeditious customs clearance or appropriate use of transportation modes, transportation systems will fail to move goods efficiently.

Finding solutions to address infrastructure needs is the most complex and challenging component of creating efficient transportation corridors. Mechanisms for financing infrastructure investment must come in ways that use public and private resources. Privatization through the granting of concessions for highways, railroads and ports are the first steps to developing efficient transportation systems in the MERCOSUR region. A second step for creating efficient transportation systems is the use of integrated logistics systems that coordinate every step of the movement of goods. Both infrastructure investment and the use of logistics must develop within the context of macroeconomic policies that foster economic growth and create investor confidence. These policies must be established, implemented, and coordinated by all countries affected by MERCOSUR trade.

Advanced logistics services are available, but only a few local mid- and large-sized companies and multinational firms located in the region can take full advantage of them. Indeed, the expansion of logistics in MERCOSUR has been caused to a large extent by the growth of the automobile industry. Trade in automobiles and automotive-related goods account for roughly one-third of trade between Argentina and Brazil. In this sense, the automobile industry has acted as a catalyst in attracting international logistics firms and technology. Smaller companies, unable to take advantage of advanced logistics services, still benefit indirectly because large companies require less space in common warehouses and less time of customs agents to inspect cargoes due to the adoption of in-house customs clearance arrangements.

The advent of MERCOSUR has created enormous challenges and opportunities for regional economic development within the Southern Cone region. The opportunities provided by MERCOSUR stem from the vast resources that, when combined, form a powerful economic community. However, maximization of regional resources and a competitive advantage can only emerge with integrated and efficient transportation systems. These transportation systems, or transportation corridors, must develop in ways that eliminate barriers to the free flow of goods. All governments affected by MERCOSUR trade must adopt macroeconomic and political policies that foster integration and eliminate historical barriers to free trade. Beyond this, public and private entities must work together to address the transportation infrastructure needs of the MERCOSUR region. The combined efforts of public and private organizations, coupled with a focused vision for integration, can provide the greatest economic benefits of trade within the region. As a final step, integration must also take into account provisions for economic development that are sensitive to the environment and are sustainable over time.

The countries that constitute the MERCOSUR trade bloc encompass a wide range of ecosystems. For example, Argentina contains rich plains of the Pampas in the northern half and flat to rolling plateau of Patagonia in the south with the Andes, which it shares with Chile on its western border. Brazil has flat to rolling lowlands in the north, some plains, hills, mountains and a narrow coastal belt. Paraguay is mostly made up of grassy plains and wooded hills east of the Rio Paraguay, while west of the river there are mostly low marshy plains near the river and dry forest further from the river. Uruguay has mostly rolling plains and low hills and fertile coastal lowland. While some of these ecosystems are present or concentrated in one country, much of the ecological and natural resource diversity extends beyond national borders.

The impacts of international trade on the environment are almost exclusively related to the transportation of goods. The region has become increasingly aware of the impacts of transportation on the environment. Some of the environmental problems caused by transportation that have been identified by MERCOSUR member countries include gas emissions, noise pollution, green house effect, energy use and accidents.

Environmental impact assessment (EIA) procedures have not been incorporated into MERCOSUR's system for evaluating infrastructure projects. Each country has its own procedures and regulations regarding the completion of EIAs. And the respective regulatory regimes are reflections of differing governmental structures and planning mechanisms.

NAFTA Transportation

NAFTA has made clear strides in increasing trade, promoting integration, and stimulating economic growth in the United States, Mexico, and Canada. As a developing nation, these benefits have perhaps been most noticeable for the Mexican economy. Since the implementation of NAFTA in 1994, employment has risen by 7 percent in the United States, 10 percent in Canada, and by 22 percent Mexico as of the end of 1999. In addition, Mexico has increased its world exports by 125 percent and imports by 79 percent, while Canada experienced 58 percent export and 57 percent import growth rates, and the United States 36 percent export and 54 percent import growth rates over the same time period.

The majority of this export growth has been the result of increased trade with the United States under NAFTA. In addition, co-production, or maquiladora manufacturing and trade, has realized enormous growth under the agreement. As a result, the United States and Mexico have made substantial progress toward integrating their economies. In some respects, the United States serves as an anchor in NAFTA, providing greater stability for the Mexican economy in times of economic downturn. Indeed, this integration has been credited with aiding in the economic recovery of the Mexican economy after the December 1994 devaluation of the peso. However, considering Mexico's heavy dependence on the United States for its export markets, it remains to be seen what kind of effects a recession in the United States would have on the Mexican economy. Its successful negotiated agreement with the European Union represents one attempt by Mexico to diversify its export markets.

Clearly, the high priority that the Mexican government has placed on developing and updating its transportation infrastructure has played a large role in the benefits the country has derived from NAFTA. Much of this development has occurred through privatization. Mexico has almost completely privatized the former state-owned rail system (Mexican National Railways), beginning with the first rail concession granted to Transportación Ferroviaria Mexicana in December 1996. Privatization has resulted in dramatic increases in investment and dramatically improved service resulting in increased market share for the Mexican rail industry. Privatization in the area of port management and airport concessions has resulted in similar benefits. These efforts are ongoing, and include a current bidding process for 13 airports. Finally, while attempts to privatize Mexico's highway system have been less successful, increased investment and road improvements are occurring, with plans for new concessions in the works according to officials at the Secretariat of Communications and Transportation.

Privatization and increased investment in Mexico's transportation infrastructure have been further abetted by improvements in logistics technology in the Mexican marketplace. These advancements have occurred primarily from the demand for advanced logistics from transnational corporations doing business in Mexico, including maquiladora operations serving as just-in-time suppliers to U.S. industries. Much of this demand has been met through partnerships between U.S. logistics firms and Mexican transportation providers. Mexican transportation companies, such as Transportación Marítima Mexicana, are increasingly focusing efforts on providing door-to-door logistics services to meet the demand of the Mexican market. Only the larger and more sophisticated shippers use advanced logistics in Mexico. However, the use of advanced logistics can be expected to grow as domestic industries realize the importance of these technologies in facilitating and expediting timeliness and efficiency in the transport of goods within the country and across the border.

While NAFTA has stimulated increased trade and economic integration, significant strides still need to be made. Private- and public-sector entities need to continue to work together to ensure that necessary investments are made to meet critical infrastructure needs, such as improved highways and increased multimodal facilities. In addition, congestion at ports of entry continue to plague exporters and importers in both the United States and Mexico who seek to move goods across the border in a timely manner. Greater cooperation must begin to occur within and between the numerous administrative agencies of both nations involved in the border-crossing process if progress is to be made. In addition, implementation of NAFTA's cross-border trucking provisions and greater integration of emerging technologies will aid in reducing border congestion.

Environmental degradation imposes another serious problem for the NAFTA accord. Increased manufacturing and industrialization resulting from NAFTA, as well as ever-growing increases in traffic along congested trade corridors, have resulted in increased environmental damage. These problems are especially acute along the border region. Although the Commission for Environmental Cooperation and other trinational and binational working groups continue to make strides to identify and address the most pressing issues, additional progress needs to be made. Some of this work is occurring unilaterally by both government and nonprofit organizations in member countries. Mexico's program of the 100 cities, administered by the Secretariat of Social Development, provides a starting point for government to integrate transportation and urban planning, promote sustainability, and reduce environmental degradation. An increased emphasis on monitoring and evaluating environmental impacts, enforcement of existing environmental regulations, and improvements in the collection of environmental data will greatly benefit the myriad of organizations working to promote environmental sustainability while promoting economic growth.

Finally, strides must be made to ensure that the benefits of increased trade and investment resulting from NAFTA extend not only to industrialized and prosperous regions but also to those regions in dire need of economic development. While the maquiladora program has promoted economic development along the border, poverty still remains acute in Mexican border states and increased manufacturing has introduced new environmental concerns. Although the northeast and central regions of Mexico have experienced significant economic growth under Mexico, southern states such as Chiapas and Guerrero have been largely excluded from this increase in prosperity. Improvements in transportation infrastructure in these states may provide one method to extend the economic benefits of NAFTA to underdeveloped regions.

Transmodal Environmental Effects

The goal of any transportation corridor over which trade occurs is to contribute to economic prosperity by facilitating the movement of people and goods. Transportation projects can raise social and economic standards and improve the quality of living for surrounding communities. However, this development comes with an environmental cost. The biggest challenge for transportation planners is to design, build, and operate corridors that achieve their goals, without causing irreparable damage to the surrounding environment. Greater economic wealth is welcomed in any city, region, or country; but if the people have to breathe polluted air or drink degraded water supplies, those developments are not in the best interest of the general population.

As transportation projects multiply, and roads, rail, and canals are constructed, the natural resiliency of the environment is affected. Deforestation, environmental degradation, and the irrational use of land create precarious conditions that multiply the effects of disasters. Potential for natural and man-made disasters increases as land is developed for rights-of-way and other infrastructure needs. As the natural landscape is altered, the ecosystems may be less resilient and less able to absorb or cope with a disaster. As concentrations of people grow around these areas, the numbers of those affected when a disaster occurs increase.

Fortunately, various techniques can be employed to mitigate or prevent adverse environmental effects. Alteration of corporate culture and formation of contingency plans for natural phenomena can have a significant impact on reducing the number of accidents attributed to man-made and natural disasters. Streamlining operations to reach optimal efficiency is the single most effective measure transportation planners can incorporate in environmental impact prevention.

Because financial resources are limited in Latin America, it is more economically beneficial to spend money in design and implementation than to spend money in cleanup, disposal, and rehabilitation. The main conclusion is that transportation planning involves weighing long-range prosperity versus short-term gains, human health versus human wealth, and environmental quality versus environmental degradation. Transportation planners need to set priorities and environmental objectives and enact those measures that are feasible and most effective for the effort expended.

Note: Unless otherwise specified, all references to currencies are in U.S. dollars.

Chapter 1. Trade Liberalization and Regional Trade Blocs

Global Trade Liberalization

Mainstream economists have long argued that the greatest gains from trade are to be realized through a system of global free trade. Acceptance of global free trade has been far from universal. Within every country, one finds powerful domestic forces that feel threatened by free trade and, therefore, have been opposed to it. On a more pragmatic level, given the absence of a global free-trade system, many nations have been reluctant to make the first move, even if they recognize its advantages. The initial efforts of countries to forge a multilateral international economic framework took place as World War II raged.

In 1944, representatives from 44 countries met at Bretton Woods, New Hampshire, to devise a plan by which a regime of fiscal and monetary cooperation could be implemented–underwritten by the vast economic resources of the United States.[1] It must be remembered that, in the immediate aftermath of the war, the American economy accounted for nearly one-half of the world's total economic output; thus the United States was in a position of unchallenged economic supremacy.[2] The Bretton Woods accords established a system of fixed currency exchange rates based on the U.S. dollar, which was convertible at a rate of $35 per ounce of gold. This international monetary system maintained relative stability in world financial markets, until it collapsed in 1971 and was replaced by a system of floating exchange rates.[3]

The planners at Bretton Woods developed a blueprint for an institutional framework in order to manage this new regime. The International Monetary Fund (IMF) was then established to "maintain orderly exchange arrangements among members" and to provide assistance in the event of short-term currency crises.[4] The International Bank for Reconstruction and Development (IBRD), or World Bank, would provide funds in the form of loans to assist with economic development projects.[5] Also envisioned was the establishment of the International Trade Organization (ITO) to regulate trade. The U.S. Senate, however, did not ratify the ITO, and in its place the General Agreement on Tariffs and Trade (GATT) was created. GATT was a provisional agreement in which a process aimed at trade liberalization was established under a series of rounds of negotiations, beginning with the Geneva Round in 1947 and concluding with the Uruguay Round in 1986-94, which culminated with the establishment of the World Trade Organization (WTO).

General Agreement on Tariffs and Trade

While GATT is a complex document containing numerous articles and annexes, including tariff schedules listing the thousands of concessions negotiated by member countries, it essentially comprises four basic elements: the rule of nondiscrimination with respect to trade between member countries, commitments to observe negotiated tariff concessions, prohibitions against the use of quantitative restrictions on imports and exports, and special provisions to promote trade in developing countries.[6] Other provisions outline conditions under which exceptions can be made to such general principles as nondiscrimination, as in the case of regional trade blocs. On the whole, GATT is concerned with maintaining and expanding a multilateral framework.

The heart of GATT is contained in Article I, which deals with the most-favored-nation (MFN) principle of nondiscrimination. Under MFN, any tariff concession negotiated between two countries must be automatically extended to all other member nations.[7] Thus, a bilateral agreement to lower tariff rates is extended to all members, so that all benefit from the new, lower tariff. There is an escape clause whereby a member may modify or withdraw a tariff concession if it can demonstrate serious injury to domestic producers resulting from any given concession. Other exceptions to the principle of nondiscrimination include arrangements reached by regional trade blocs and the generalized system of preferences extended by developed countries to developing countries.

In general, GATT prohibits the use of quantitative restrictions, or quotas, on imports and exports. However, there are several exceptions to this general principle. The most common pertain to agricultural products, as well as to issues of national security, balance-of-payment safeguards, and economic development.[8] While GATT negotiations have been extremely successful in reducing tariff levels worldwide, there continue to be examples of concealed barriers to trade. Disputes continue to arise between nations over trade issues, which are taken up for resolution by the WTO.

WTO and other International Governmental Organizations (IGOs)

The global economy of the last half-century is also responsible for the birth of international governmental organizations (IGOs). These global organizations, such as the International Maritime Organization (IMO) and the IMF, have been instrumental in facilitating the process of international trade and moving toward global trade liberalization. The most important and influential IGO in the process and practice of international trade is the just-mentioned WTO.

The establishment of the WTO on January 1, 1995, ranks as perhaps the single most important development in the global economy in the 1990s. The *Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations*, a 550-page document signed on April 15, 1994, marked the successful conclusion of negotiations on the most recent round of GATT, begun in September 1986.[9] The agreement establishing the WTO calls for a single institutional framework encompassing all the provisions previously agreed to in the various rounds of GATT since its inception in 1947.

Located in Geneva, Switzerland, the WTO has a membership of 135 countries (as of November 13, 1999) and an operating budget of $73,895,000 (for fiscal year 1999). Its administration is headed by a director general (Mike Moore as of April 13, 2000) and a secretariat staff of 500 (see Table 1.1). The body's structure is headed by a Ministerial Conference, which meets at least once every two years. A General Council oversees operation of the agreement and ministerial decisions on an ongoing basis. The General

Council also acts as the Dispute Settlement Body (DSB) and the Trade Policy Review Mechanism, which are involved in all aspects of the organization's monitoring and dispute-resolution activities.[10]

Table 1.1
Global IGOs That Influence Trade

World Trade Organization (WTO)

Estab./Members:	January 1, 1995; 135 member countries.
Purpose:	The successor of GATT, the WTO is responsible for enforcing the global rules of trade. Its main function is to ensure that trade flows as smoothly, predictably, and freely as possible with the goal of a more peaceful, prosperous, and accountable economic world.
Role in Western Hemispheric Trade:	The WTO is used as a baseline for Latin America and Caribbean (LAC) trade agreements, including the Free Trade Area of the Americas (FTAA) where the WTO is the focus of many workshops and presentations in order for FTAA delegations to be fully exposed to WTO guidelines.

International Monetary Fund (IMF)

Estab./Members:	December 27, 1945; 182 member countries.
Purpose:	The IMF promotes international monetary cooperation and serves as the vehicle for collaboration on international monetary problems. The IMF also promotes exchange stability and assists in the establishment of a multilateral system of payments.
Role in Western Hemispheric Trade:	The IMF facilitates the expansion and balanced growth of international trade in LAC countries by promoting, among other economic policies, high levels of employment and real income.

International Maritime Organization (IMO)

Estab./Members:	March 6, 1948; 157 member countries.
Purpose:	The IMO provides the machinery for cooperation among governments in the field of regulation relating to technical matters of all kinds affecting shipping engaged in international trade. The IMO also focuses on maritime safety, efficiency of navigation, and prevention and control of marine pollution from ships.
Role in Western Hemispheric Trade:	The IMO plays an important role in seaborne trade by preventing unnecessary delays in maritime traffic; securing a practical degree of uniformity in procedures in connection with the arrival, stay, and departure of ships at ports; and establishing regimes of liability for pollution.

Source: World Trade Organization. Online. Available: http://www.wto.org. International Monetary Fund. Online. Available: http://www.imf.org. International Maritime Organization. Online. Available: http://www.imo.org. Accessed: March 7, 2000; (international trade and monetary organizations website).

A fundamental difference between the WTO and GATT is that, while GATT served in a de facto capacity as an international organization of contracting parties, this role was always ad hoc without a clear legal institutional status recognized by international law.[11] The WTO qualifies as a genuine global supranational organization, with an institutional status paralleled only by the United Nations (UN). Under the "single undertaking approach" embodied in the WTO framework, membership entails accepting all provisions of GATT as modified by the Uruguay Round without exception.[12] Thus, WTO's decisions could well have greater impact on the international system and the behavior of member nations than resolutions passed by the UN, if for no other reason than the fact that the global economy is far more interdependent and interconnected than the political order of sovereign nations. Economic integration, both on a global and regional basis, is being driven by market forces that seek greater efficiency and by the increasing returns that are only possible by sweeping away the barriers to trade that inhibit the free flow of the factors of production (i.e., capital, labor, and resources). International trade represents the most dynamic component of the global economy.

Unfortunately, acceptance of an idea in principle is not the same thing as putting it into practice. While the GATT process has been extremely successful in reducing barriers to trade in the form of tariffs, there are any number of nontariff barriers (NTBs) to trade. In a system encompassing 135 nations and nearly two dozen regional trade blocs, as well as nonstate actors such as multinational corporations (MNCs), disputes are bound to arise over issues such as market access, antidumping and countervailing duties, infringement of intellectual property rights, violations of rules of origin, and others.[13]

International Maritime Organization (IMO)

The IMO is another IGO that is inherently involved in the trade liberalization process. The IMO, established in 1948 and entered into force in 1958, is an agency within the UN that is focused mainly on the shipping industry's safety and mitigation of pollution in the oceans. However, recent agreements of cooperation with regional trade blocs in the Americas, and IMO involvement in the facilitation of maritime commerce have made the IMO an important player in the actual function of trade agreements.

For instance, the IMO has had an "Agreement of Co-operation" with the Caribbean Community (CARICOM) since 1985.[14] Aside from closely working with regional trade blocs such as CARICOM on many issues including trade, the IMO also has "Agreements of Co-operation" with IGOs in the Americas, such as the OAS and the Latin American Integration Association (Asociación Latinoamericana de Integración, or ALADI) (see Table 1.3).

The IMO may be perhaps one of the smallest agencies within the UN with a staff of only 300 people, but it is instrumental in influencing countries to adopt IMO standards. It is the responsibility for the governments to implement and enforce these recommendations, known as the IMO Convention. One major obstacle that the IMO faces is that many countries lack the expertise, experience, and resources necessary to enforce these recommendations properly. Yet others put enforcement fairly low down their list of priorities.[15]

International Monetary Fund (IMF)

Another post-World War II creation, the IMF is an IGO that seeks to promote international monetary cooperation. A major player in global and regional trade liberalization, the IMF helps to maintain global financial stability through several mechanisms: by facilitating the expansion and balanced growth of international trade, by promoting exchange stability, by assisting in the establishment of a multilateral system of payments, and by making its general resources temporarily available, under adequate safeguards, to members experiencing balance of payments difficulties. The IMF also helps to maintain global stability by shortening the duration and lessening the degree of disequilibrium in the international balances of payments among its members.[16] The IMF regards itself as a cooperative institution that 182 countries have voluntarily joined. Member countries see the advantage of consulting with one another in this forum to maintain a stable system of buying and selling national currencies so that payments in foreign currencies can take place between countries smoothly and without delay.

One of the most important operations that the IMF conducts in regard to trade liberalization is being the nucleus of currency and money exchange by member countries. On joining the IMF, a member country undertakes to keep other members informed about its arrangements for determining the value of its money in relation to the money of other countries. Aside from supervising a cooperative system for the orderly exchange of national currencies, the IMF lends money to members to reorganize their economies so as to cooperate better within the system. Furthermore, the IMF provides other services such as technical assistance and training in order to assist members in implementing policies beneficial to the whole membership of the organization.[17]

Global Formation of Regional Trade Blocs

The global economic system established in the aftermath of Bretton Woods, while based on the premise of multilateral trade liberalization, has witnessed the emergence of a simultaneous parallel trend toward the integration of neighboring countries into regional trade blocs. Article XXIV of GATT permits such arrangements provided that all trade between member countries is liberalized and that external tariffs imposed by these countries are not higher, on average, than those prevailing before the formation of the regional arrangement or bloc.[18]

It is important to note that regional trade liberalization does constitute an exception to the GATT system in that member countries are treated more favorably than nonmember countries. There is a considerable debate among economists whether regional trade blocs represent a complement to the multilateral system or a substitute for global trade liberalization because of their discriminatory nature.[19] Nevertheless, between 1947 and 1990, more than 80 regional arrangements were registered with GATT (in its de facto institutional role) as specified under Article XXIV. While many of these blocs have failed, generally for political reasons, at the establishment of the WTO nearly two dozen regional trade blocs, at varying levels of integration, were in existence with more being planned.

Ensuring that these regional trade blocs play a complementary role to global trade liberalization will fall to the WTO as a forum for trade negotiations and in its role of monitoring national trade policies. Trade barriers between and within regional blocs must be lowered, in order to maximize the potential benefits of trade.

The rationale for the formation of regional trade blocs is fairly straightforward: there are undeniable benefits resulting from market expansion, as well as the increasing gains from trade. Economic integration facilitates the creation of larger competitive markets, which permit greater specialization, greater allocative efficiency of production factors, and the realization of economies of scale.[20] Economic integration is particularly attractive to smaller nations, where domestic markets for manufactured goods are simply insufficient to absorb the output necessary to establish a cost-effective industrial base or to attract the necessary private foreign direct investment in cases in which inadequate savings mean inadequate capital formation.

By removing external barriers and extending the market base, industrial manufacturing can be established at a level conducive to the realization of economies of scale, that is, a lower cost per unit of output and greater productivity per worker or unit of capital input. This action will not only achieve a more rational pattern of production but will also result in an increase in trade within the region. Secondary benefits include greater specialization through comparative advantage as well as more favorable terms of trade in a highly competitive global economy.[21] Nations enter into regional arrangements because they believe the outcome will be higher levels of welfare and improved standards of living. These potential gains outweigh any that might be realized through protectionist measures erected against neighboring countries. In effect, many of the same arguments used to advocate global free trade are used to justify regional integration. However, while regional integration serves to improve welfare within a region, does it increase global welfare? At the heart of the debate is the issue of trade creation versus trade diversion.

Forms of Regional Trade Blocs

Regional trade blocs at differing levels of integration have different institutional frameworks, posing different challenges to policymakers concerned with reducing barriers to trade. Three types of regional trade blocs are free-trade areas, customs unions, and common markets.

Free-Trade Areas

A free-trade area is established when a group of nations agree to abolish restrictions on mutual trade between countries, while each country maintains its own external tariff system on trade with nonmember countries. The North American Free Trade Agreement (NAFTA) represents such a system. In a free-trade area, tariffs are eliminated on the trade in goods and services. However, there is no common external tariff, and there continues to be restrictions on the movement of labor and capital. Furthermore, there is no harmonization of economic policies among member countries, and there are no supranational institutions.[22] As barriers to trade are lowered, facilitating greater trade between member nations, disputes that do arise have few established institutional arrangements to provide a dispute-settlement mechanism. The governments of member nations must try to resolve the disputes as best they can, subject to considerable domestic pressures. In the case of NAFTA, there are disputes over labor and wage policy as well as environmental issues. Interest groups, such as labor unions and environmental advocacy organizations, have no means of redress except to apply pressure on domestic lawmakers. Thus, a certain level of continual uncertainty exists because the gains from free trade may be obscured in acrimonious partisan debate.

Customs Unions

A customs union is created when a group of nations agrees not only to remove restrictions on mutual trade but also to establish a common external tariff system with respect to nonmember countries. Again, restrictions remain in place on the movement of labor and capital, member nations do not harmonize their economic policies, and there are no supranational institutions.[23] It is at this level of integration where the trade-diversion problem begins to manifest itself. It is the common external tariff that provides the incentive for trade to shift from low-cost nonmember countries to high-cost member countries. The Southern Common Market (Mercado Común del Sur, or MERCOSUR) represents an example of a customs union. Related to the customs union issue is the dilemma of Chile, which in general maintains a lower tariff rate than does the MERCOSUR customs union. Both NAFTA and MERCOSUR would like to bring Chile into their respective trade blocs.[24] There are both political and economic ramifications either way Chile decides to go. If a hemispheric free-trade area is established, then of course the issue is resolved. Latin American governments are very sensitive to the possibility of the United States, disrupting their current arrangement, where, in effect, Latin American economies would become part of the domestic U.S. market. For its part, the United States has some reservations over negotiations between MERCOSUR and the European Union (EU). The newly liberalized Latin American markets offer huge future trade potentials, which both the United States and EU recognize.

Common Markets

A common market is created with the removal of all restrictions on the movement of factors of production, such as labor, capital, and resources. This free flow of factors of production represents the most efficient allocation and production possibilities, allowing the greatest gains from trade to be realized. Common markets can then move toward full economic union, with the establishment of supranational authorities responsible for economic policymaking. Of course, this arrangement requires a considerable loss of national sovereignty. When full economic union has been reached, virtually all restrictions on trade have been removed. The EU is currently in a transitional phase from common market to full economic union. European integration has required a difficult 40-year process in which the whole arrangement has been threatened with collapse at each new step forward. An economic union involves creation of a single monetary system, a central bank, a unified fiscal system, and a common foreign economic agenda. The next step will involve political union or the creation of some type of federal system for which Europe has already created an institutional framework, including a European Parliament, a Court of Justice, the European Council, and Council of Ministers.[25]

Trade Liberalization in the Americas

Latin American and Caribbean (LAC) countries and regions have sought to expand their integration schemes in a variety of ways (see Table 1.2). First, they have established closer ties within their region, expanding existing subregional groups or negotiating new trade agreements with their Latin American and Caribbean neighbors. Second, they launched negotiations to create a Free Trade Area of the Americas (FTAA). Last, LAC countries also pursued closer commercial links with Europe and Asia. The result has been a proliferation of trade agreements among LAC countries and between these and their extra-regional partners.

One recent trend regarding trade agreements in the Americas is the collaboration of individual countries with regional trade blocs. Out of the thirteen trade agreements between 1994 and 1999, six trade agreements have involved single-member countries with multinational trade blocs (see Table 1.2). Brazil, for example, signed a free-trade agreement with the Andean Community in 1999 to come into effect in 2000. Additionally, some countries that have a limited role in regional trade blocs have signed their own agreements with either individual countries or regional trade blocs. Chile, for example, is not a formal member of any trade bloc but has signed a total of eight trade agreements, seven being bilateral trade pacts with other individual countries. Finally, extraregional organizations, most notably the EU and South Korea, have established trade agreements with LAC countries or trade blocs.

International Governmental Organizations (IGOs) in the Americas

The Inter-American Development Bank (IADB), Organization of American States (OAS), and the Latin American Integration Association (ALADI) are examples of IGOs with a hemispheric agenda, as opposed to the global IGOs such as the WTO and IMF (see Table 1.2). One main common trait that these organizations share is the economic and social development and integration of the region, which is manifested through the proposed FTAA where a "Tripartite Committee" was established to provide assistance during the process. This committee consists of three "hemispheric" organizations: IADB, OAS, and the United Nations Economic Commission for Latin America and the Caribbean (ECLAC).

Inter-American Development Bank (IADB)

The IADB is an international financial institution created in 1959 to help accelerate the economic and social development of its member countries in Latin American and the Caribbean. Based in Washington, D.C., the IADB's cumulative lending and technical cooperation amounted to more than $95 billion by the end of 1998. The IADB also

Table 1.2
Trade Agreements in the Americas in the 1990s

Current Agreements in Force	Date of Signature	Entry Into Force
Central American Common Market (CACM)	1960	1961
Andean Community	1969	1969
Caribbean Community (CARICOM)	1973	1973
Chile-Mexico	1991	1992
Southern Cone Common Market (MERCOSUR)	1991	1995
CARICOM-Venezuela	1992	1993
North American Free Trade Agreement (NAFTA)	1992	1994
Chile-Venezuela	1993	1993
Bolivia-Chile	1993	1993
Colombia-Chile	1993	1994
Costa Rica-Mexico	1994	1995
Group of Three (G-3)*	1994	1995
CARICOM-Colombia	1994	1995
Bolivia-Mexico	1994	1995
Chile-Ecuador	1994	1995
Chile-MERCOSUR	1996	1996
Canada-Chile	1996	1997
Bolivia-MERCOSUR	1996	1997
Mexico-Nicaragua	1997	1998
Chile Peru	1998	1998
CACM-Dominican Republic	1998	1999
CARICOM-Dominican Republic	1998	1999
Andean Community-Brazil	1999	2000

Agreements under discussion

Regional	Extra-regional
Andean Community-Panama	CARICOM-EU
CACM-Chile	Chile-EU
CACM-Panama	Chile-South Korea
Chile-Panama	MERCOSUR-EU
Free Trade Agreement of the Americas (FTAA)	Mexico-EU
Mexico-Ecuador	
Mexico El Salvador-Guatemala-Honduras	
Mexico-Panama	
Mexico-Peru	

*Group of Three includes Mexico, Colombia, and Venezuela

Source: Inter-American Development Bank (IADB), *Integration and Trade in the Americas*, October 1999, p. 40.

includes the Inter-American Investment Corporation (IIC) and the Multilateral Investment Fund (MIF) aimed to promote private-sector development in the region. The bank is "owned" by its 46 member countries. Known as "regional members," 28 of these countries, are in the Western Hemisphere. The remaining 18 countries are known as "nonregional members" and represent regions in Europe, Asia, and the Middle East.

The main functions of the IADB include the promotion of public and private capital investment in the region and the mobilization of funds for high-priority economic and social projects. The IADB also provides technical cooperation for preparing, financing, and carrying out development plans. These functions represent the foundation of the IADB, which has allowed it to be the main source of multilateral financing for Latin America and the Caribbean.

The IADB has been instrumental in the regional trade liberalization by its support of regional and subregional economic integration as a way to expand trade, increase competitiveness, and diversify exports. Furthermore, the IADB helps Latin America adapt to a global economy by supporting customs reform and regional and subregional trade agreements, designed to attract productive investment and access to international markets. This support is reflected by the IADB's financing of the Institute for the Integration of Latin America and the Caribbean (INTAL), an institution established in 1964 specifically designed to tackle regional integration issues in Latin America. In 1996, the focus of INTAL shifted more toward the present, in the rapidly changing global condition of new emerging economies, changes in communication, and integration.

Organization of American States (OAS)

Made up of 35 member states, the OAS is the region's premier political forum for multilateral dialogue and action. This dialogue includes a wide range of issues from strengthening democracy and advancing human rights, to promoting peace and security. One of these issues is the expansion of trade and economic integration among its members. The OAS serves in this capacity through the Foreign Trade Information System (Sistema de Información sobre Comércio Exterior, or SICE).

In terms of international trade, the SICE of the OAS is extremely valuable to the development and maintenance of free-trade agreements. SICE is the information technology arm of the Trade Unit within the OAS where it seeks to provide the most complete information and documents on trade in the Western Hemisphere. Thus, SICE aids the integration and free-trade liberalization process in the Americas as a primary resource that centralizes information of public documents, many very difficult to find, in the four official languages of the OAS: Spanish, Portuguese, English, and French.

Latin American Integration Association (ALADI)

The Latin American Integration Association (ALADI) is a hemispheric IGO whose mission is the economic integration and social development of the Latin American region. The ultimate objective of ALADI is the establishment of a common market encompassing the entire region of the Americas (i.e., FTAA). ALADI is the largest "integration" organization in Latin America and includes the 12 largest LAC countries in the region, including Cuba, and represents more than 430 million people.[26] ALADI, established in 1980 by the Treaty of Montevideo, mainly focuses on several instruments that facilitate commerce between its members.

Table 1.3
Types of "Hemispheric" Organizations that Influence Trade

	Inter-American Development Bank (IADB)
Estab./Members:	December 1959; 46 member countries.
Purpose:	The main purpose of the IADB is to accelerate the economic and social development in Latin America and the Caribbean by, among other means, supplementing private investment when private capital is not available and providing technical assistance for the preparation, financing, and implementation of development plans and projects.
Role in Western Hemispheric Trade:	Besides serving in the Tripartite Committee in the FTAA process, IADB, through INTAL, is involved in research activities, technical cooperation for governments, and training in support of the integration and regional cooperation processes such as free trade in the Americas.
	Organization of American States (OAS)
Estab./Members:	April 30, 1948; 35 member countries.
Purpose:	The OAS works for the well-being of the 800 million people living in the Western Hemisphere by strengthening democracy, advancing human rights, promoting peace and security, expanding trade, and tackling complex problems caused by poverty, drugs, and corruption.
Role in Western hemispheric trade:	The OAS plays a key role in international trade by providing information and documents on trade in the Western Hemisphere through SICE (Foreign Trade Information System). In addition, the OAS supports the process of the FTAA by providing technical support to the negotiating groups of the FTAA.
	Latin American Integration Association (ALADI)
Estab./Members:	August 12, 1980; 12 member countries.
Purpose:	The main purpose of ALADI, a Latin American IGO, is the full economic integration and secure economic and social development with the goal of establishing a common market (FTAA).
Role in Western hemispheric trade:	ALADI is one of two models used in the 1990s (the other being NAFTA) by LAC countries in negotiating trade agreements. Under the popular ACE trade accord of ALADI, trade in goods is liberalized either for some goods only or for the entire tariff universe. ALADI is much more informal model than the NAFTA model.

Source: IADB. Online. Available: http://www.iadb.org. OAS. Online. Available: http://www.oas.org. ALADI. http://www.aladi.org. Accessed: March 7, 2000 (Hemispheric international governmental organization web sites).

ALADI is an integral player in the trade liberalization process mainly because it represents one of two models that LAC countries adopt when negotiating trade agreements (the other being the NAFTA model). Under the ALADI model, trade in goods is liberalized either only for some goods or for the entire tariff universe. The most prominent type of agreement under ALADI is called the "Economic Complementary Agreement" (ECA). Thus, many, but not all, ECAs among ALADI members are free-trade agreements.[27] Further, nontariff measures, safeguards, and exceptions are all defined according to the provisions set forth in ALADI's 1980 Treaty of Montevideo. Recently, some of these accords have included provisions on services, sanitary and phytosanitary measures, and other issues that were added to the GATT agenda in the Uruguay Round. The NAFTA model, on the other hand, is patterned after its namesake. Its rules of origin are highly detailed, and its dispute settlement provisions are very formalized. Such an agreement contains sophisticated and distinctive provisions on services, intellectual property, investment and government procurement, and a myriad of other issues.

In the 1990s, LAC countries and regions sought to widen their integration schemes in a variety of ways. First, they established closer ties within their own region, expanding existing regional groups or negotiating new trade agreements with their LAC neighbors. Second, they launched negotiations to create a FTAA, a process discussed later in this chapter. And, third, LAC countries also pursued closer commercial links with Europe and Asia.

Integration widening among LAC countries has also come in a number of forms. In some cases, already existing integration arrangements have been expanded to include new members, who have joined the group whether as a full member or under some form of associate status. In other cases, individual countries have also used group-to-group discussions to formalize trade links between already existing integration schemes.

Regional Trade Blocs in the Americas

Presently, before the possible implementation of a hemispheric-wide free-trade agreement, two major regional trade blocs currently exist in the Americas: MERCOSUR and NAFTA. NAFTA, composed of Mexico, the United States, and Canada, covers a combined area of 21 million square kilometers, a population of 406 million people, and over $10 trillion in gross domestic product (GDP) (see Table 1.4). MERCOSUR consists of four South American countries, including the region's largest in Brazil, and covers an area of nearly 12 million square kilometers, 220 million people, and a GDP of $1.5 trillion. These two agreements, as well as the proposed Free Trade Area of the Americas (FTAA) agreement will be examined in this chapter.

It is also worth examining three other notable regional trade blocs (also see Table 1.4):

- *The Andean Community*: A regional organization that maintains a trade agreement, the Andean Community is composed of five South American countries with an area of more than 4.5 million square kilometers, and 110 million inhabitants and in 1999 generated a combined GDP of $640 billion.

- *The Caribbean Community Common Market (CARICOM)*: Fifteen members in the Caribbean basin represent CARICOM. This trade bloc covers a region of more then 450,000 square kilometers, includes more than 13 million inhabitants, and produced a combined GDP of over $40 billion.

- *The Central American Common Market (CACM)*: Five Central American member countries constitute the entire Central American region with the exception of Panama and Belize. CACM covers a region of more than 420,000 square kilometers, 32.5 million people, and a collective GDP of over $110 billion.

MERCOSUR: The Southern Common Market

Overview

As of January 1995, the Southern Common Market (Mercado Común del Sur, or MERCOSUR) integrated a large regional market uniting Argentina, Brazil, Paraguay, and Uruguay. The four countries signed the Treaty of Asunción on March 26, 1991, establishing an imperfect customs union to accomplish the following goals:

- elimination of tariff and nontariff barriers;

- adoption of a common external tariff (CET) and a common external tariff policy;

- coordination of macroeconomic and sectoral policies; and

- member country commitment to the free movement of services, labor, and capital.

It functions within the greater frameworks of ALADI and GATT, which permit members to provide preferential treatment within customs unions, while prohibiting additional tariffs to be levied on outside countries. In targeting the end of duty requirements and nontariff restrictions, the trade-opening program eliminated customs rights on foreign trade and prohibited the member countries from unilaterally impeding mutual trade.

MERCOSUR's Atlantic coast stretches 3,500 miles along eastern South America, and the combined geographic area of 11,861,825 square kilometers is considerably larger than that of the United States. It is the fourth largest integrated market in the world after NAFTA, the EU, and Japan.

The current CET covers 85 percent of all traded goods. The normal average external tariff is 11.3 percent. In December 1997, the maximum external tariff was temporarily raised to 23 percent. All goods entering any of the MERCOSUR countries are subject to a uniform tariff. Since its implementation on January 1, 1995, the members adopted a CET ranging between 0-20 percent that counts approximately 9,000 items. Not all items are included in this list, as some are subject to specific negotiations, such as in the case of sugar and automobiles.

Foreign enterprises are increasing investment in the region, and there are attractive opportunities for new investment in the infrastructure sector, particularly in areas that will require huge building projects, such as energy, telecommunications, transportation, and tourism.

Table 1.4
Different Trade Blocs in the Americas 1999

Trade Bloc	Area Km²	Inhabitants	GDP $
NAFTA			
Canada	9,976,140	31,006,347	688.3 Bn
United States	9,629,091	274,639,608	8.511 Tr
Mexico	1,972,550	100,294,036	815.3 Bn
MERCOSUR			
Argentina	2,766,890	36,737,664	374 Bn
Brazil	8,511,965	171,853,126	1.0352 Tr
Paraguay	406,750	5,434,095	19.8 Bn
Uruguay	176,220	3,308,523	28.4 Bn
CARICOM			
Antigua and Barbuda	440	64,246	503 Ml
Belize	22,960	235,789	700 Ml
Guyana	214,970	705,156	1.8 Bn
Montserrat	100	12,853	36 Ml
St. Vincent and the Grenadines	340	120,519	289 Ml
Suriname	163,270	431,156	1.48 Bn
St. Kitts and Nevis	269	42,838	235 Ml
Haiti	27,750	6,884,264	8.9 Bn
Dominica	750	64,881	216 Ml
Barbados	430	259,191	2.9n Bn
Grenada	340	97,008	340 Ml
Jamaica	10,990	2,652,443	8.8 Bn
Saint Lucia	620	154,020	625 Ml
Trinidad and Tobago	5130	1,102,096	8.85 Bn
The Bahamas	13,940	283,705	5.3 Bn
CACM			
Guatemala	108,890	12,335,580	45.7 Bn
El Salvador	21,040	5,839,079	17.5 Bn
Honduras	112,090	5,997,327	14.4 Bn
Nicaragua	129,494	4,717,132	11.6 Bn
Costa Rica	51,100	3,674,490	24 Bn
Andean Community			
Colombia	1,138,910	39,309,422	254.7 Bn
Venezuela	912,050	23,203,466	194.5 Bn
Bolivia	1,098,580	7,982,850	23.4 Bn
Peru	1,285,220	26,624,582	111.8 Bn
Ecuador	283,560	12,562,496	58.7 Bn

Source: U.S. Central Intelligence Agency, *The World Factbook, 1999.* Online. Available: http://www.odci.gov/cia/publications/factbook. Accessed: March 8, 2000.

The Asunción Treaty provides for the possibility of other nations joining the Common Market. The MERCOSUR members can examine applications for any such nations provided that the interested parties are not already a part of any subregional integration or extraregional associations. MERCOSUR has brought in associate members in the hopes of building a South American coalition. Chile signed a free-trade agreement with MERCOSUR that went into effect in October 1996, and Bolivia signed on in March 1997. These new agreements point to the creation of a customs union in a maximum of 18 years and establish the framework for integration, commercial safeguards, and dispute settlement.

MERCOSUR had its foundations when Latin America started to take steps toward regional integration. The treaty that created the Latin American Free Trade Association (Asociación Latinoamericana de Libre Comércio, on ALALC), signed in 1960, provided for the creation of a free-trade zone by means of periodic and selective negotiations between its member states. The negotiations at the discretion of the member states rather than automatic reduction of import duties made the ALALC trade-opening program develop reasonably well in its first years, lose impetus from 1965, and almost come to a complete standstill in the 1970s.[28]

The Latin American Integration Association (Asociacion Latinoamericana de Integracion, or ALADI) was created in 1989 to replace ALALC. This organization used means other than those previously adopted to attempt greater member state integration. In place of the free-trade zone established by ALALC, an economic preference zone was established, creating conditions favorable to the growth of bilateral initiatives as a prelude to the initiation of multilateral relationships in Latin America. ALADI thus made possible agreements and joint actions between countries in the region, which until then had only limited previous ties. The establishment of a common market, however, was still far off in the horizon.[29]

Under the ALADI system, Brazil and Argentina signed 12 commercial protocols in 1986. They were the first concrete steps taken toward bringing the two countries closer together. In order to improve on their former agreements, Brazil and Argentina signed a Treaty for Integration, Cooperation and Development in 1988. This set the stage for a common market between the two countries within ten years. It contemplated the gradual elimination of all tariff barriers and the harmonization of the macroeconomic policies of both nations. After the addition of Paraguay and Uruguay, all four countries signed a new treaty on March 26, 1991, in Asunción, Paraguay, providing for the creation of a common market among the participants, to be known as the Southern Common Market (MERCOSUR).[30]

Since the four-member structure was cemented, MERCOSUR has been actively pursuing expansion. With Chile and Bolivia already associate members, talks with other prospective members are getting under way. Peru made a formal application for membership. Mexico and Venezuela also have been considered for future membership.[31]

Since 1996, representatives of the Andean Community have held various rounds of talks with MERCOSUR officials to prepare for a biregional free-trade accord. The most-recent discussions took place in March 1998, at which a target date of October 1 was set for the first phase of a free-trade pact between the two groups. However, differences regarding tariff reductions and export exclusions made this deadline difficult to meet.[32]

The final goal of negotiations with other South American countries is to create a type of South American Free Trade Agreement (SAFTA), an entity first proposed by Brazil in 1992. This type of agreement is considered to be an important step in the eventual creation of a hemispheric free-trade area.

Institutional Structure

The institutional structure of MERCOSUR consists of seven different bodies, which are discussed in the following sections.

Common Market Council

The governing body of MERCOSUR is the Common Market Council, consisting of the Ministers of Foreign Affairs and the Economy (or its equivalent) of each member country. The Common Market Council is responsible for decision making, scheduling, and setting objectives, as well as ensuring compliance.[33] All decisions are based on consensus with full representation from all member countries. They rotate the responsibility for presiding over the Common Market Council alphabetically on a six-month schedule. Council members meet whenever necessary but at least once a year with the president of each member country in attendance.

Common Market Group

Formally, the executive body of MERCOSUR, the Common Market Group, comprises 16 permanent members (4 from each country) and 16 alternates (4 from each country). The 4 permanent members represent the Ministry of Foreign Affairs, the Ministry of the Economy (or from Ministries of Industry, Foreign Affairs, and Economic Coordination), and the Central Banks.[34] The group meets on a quarterly basis, rotating location alphabetically. It falls to the Common Market Group to take measures to bring compliance to the Treaty of Asunción and the decisions and policies rendered by the Common Market Council. The group may also initiate trade opening, coordination of macroeconomic policies, and negotiations with nonmember countries.[35] The Common Market Group may appoint working groups to focus on specific issues.

MERCOSUR Trade Commission

The MERCOSUR Trade Commission is charged with implementing the CET and technical trade policy issues. Each country appoints a permanent member and an alternate. This body monitors trade regulation among members and other countries, with the authority to review claims and mediate disputes. It also supervises and proposes changes in import duties, proposing new guidelines if necessary.[36] The MERCOSUR Trade Commission meets at least once a month and may be convoked if necessary by a member country, the Common Market Group, or the Common Market Council.

To better achieve its objective, the Trade Commission can create technical committees targeting direction and supervision of the work in which it engages. It can also adopt internal operating regulations.[37] These committees change from time to time, depending on current needs of the Trade Commission. Presently, there are ten technical committees that oversee different matters related to their jurisdiction:

- Tariffs
- Customs Matters
- Trade Norms
- Anti-competitive Practices
- Competition Policy
- Fair Trade
- Consumer Protection
- Nontariff Barriers
- Automotive Sector
- Textiles

Joint Parliamentary Commission

Comprising 64 permanent members (16 from each country) and 64 alternates (16 from each country) from each country's legislative branch, the Joint Parliamentary Commission (JPC) has both advisory and decision-making authority. From the pool of 64 active members, 4 are selected to preside over the JPC (one from each country). The JPC must communicate the decisions of the Common Market Council to the legislative branches, adjust resolutions to harmonize with the laws of member countries, approve the budget, and manage technical assistance accords with private- and public- sector entities.[38] JPC members are appointed by their Congresses to serve two-year terms. Normally, the JPC meets twice a year or whenever summoned by one of the presidents.

Socioeconomic Advisory Forum

The Socioeconomic Advisory Forum is responsible for advising the customs union from the private-sector perspective and providing pertinent socioeconomic analysis for member countries.

Administrative Secretariat

Located in Montevideo, the Administrative Secretariat is the permanent administrative headquarters of the group. It is where legislative acts are deposited and the official

MERCOSUR bulletin is published. A director, appointed by the Common Market Council, who serves for a two-year, nonrenewable term, heads the secretariat.[39] It provides logistical support, documenting all pertinent decisions and relaying information in both Spanish and Portuguese to member countries.[40]

Additional entities govern specific aspects of the integration process. Ministerial meetings provide a forum for the Common Market Council to review specific policy research aiding policy coordination. Working groups provide the main technical advising to the Common Market Group. MERCOSUR uses specialized meetings and ad hoc groups to advise on particular issues, including the development of transportation, technical standards, tax and monetary policy, and labor matters.[41] Such an ad hoc group, created at the August 1997 meeting in Montevideo, serves to specifically monitor transportation services in MERCOSUR.[42]

Dispute Settlement

Conflicts among MERCOSUR countries follow procedures set by the Brasília Protocol of 1991. First, disputes are negotiated directly among the parties involved. In the absence of a solution from direct negotiations, the issue is brought to the attention of the MERCOSUR Trade Commission. If that fails, the Common Market Group may be petitioned to rule on the dispute. Within 30 days of hearing a dispute, the Common Market Group must render a decision that is acceptable to the disputing parties. If the decision is deemed to be unacceptable by one of the parties, the dispute is sent to a panel of three arbitrators. The arbitrators are chosen from a list of 40 persons nominated by the member countries, and their decisions are binding.[43] If a member country does not comply with the decision within 30 days, the offended party can demand compensation.[44]

Key Provisions

Common External Tariffs

All goods entering any of the four MERCOSUR countries are subject to common tariff rates. Since its implementation on January 1, 1995, the members adopted a CET ranging between 0-20 percent that covers approximately 85 percent of the tariff schedule (approximately 9,000 items).[45]According to the "Business Guide to MERCOSUR" (1998), approximately 90 percent of intraregional trade among MERCOSUR members is already duty free.

Special schemes apply to certain sensitive items, notably sugar and cars. Each member country may exclude a series of goods. These exclusions end on January 1, 2001. The purpose of permitting exceptions in the free-trade area was to give member countries the time to adjust to the new competitive pressures inherent in intraregional free commerce. These items are subject to annual automatic reductions in their tariff levels under a specific tariff-cutting timetable.

Rules of Origin

In the absence of a CET, the rules of origin determine whether or not particular goods can qualify for preferential rates. These rules apply to

1. goods exempted from the CET;

2. goods subject to the CET produced with raw materials or parts that are in the transition regime, except when the value of the non-MERCOSUR raw materials and parts is under 40 percent for the free on board (FOB) value of the final good; and

3. goods subject to different commercial policies in different MERCOSUR countries (such goods whose production is subsidized).[46]

Any goods produced wholly within MERCOSUR qualify as originating products and may circulate at the prevailing preferential rate. Products with non-MERCOSUR components must meet a 60 percent MERCOSUR content requirement to claim originating status.[47]

Macroeconomic Policy Coordination

MERCOSUR intends to harmonize fiscal, monetary, capital, and external trade policies to the extent possible, but economic disparities among MERCOSUR countries make this a contentious path.

Because of Brazil's significant currency devaluation in January 1999, relations with other members in the regional bloc have remained tense. Brazilian products became quite inexpensive in other MERCOSUR countries, which had a marked effect in Argentina. As a result of this currency crisis, Argentina experienced a dramatic decline in its exports to Brazil.[48]

Brazil's move surprised Argentina, which in turn unilaterally announced it was looking at replacing its currency with the U.S. dollar. It also has responded to the uncertainty by moving up investor friendly reforms, such as reducing tariffs on capital goods from non-MERCOSUR countries from 14 to 6 percent.

This currency crisis has highlighted one of MERCOSUR's most visible weaknesses: the lack of strong overarching institutions. Unlike the EU, there is no central bank for member countries, and, unlike NAFTA, none of the member countries has the financial resources to bail out other troubled members.

This minimal institutional structure has been one of the major concerns. Discussions have been held regarding the need to create more formal, permanent institutions to handle matters, such as dispute resolution and judicial issues, in order to foster greater investor confidence.

Macroeconomic and political risks and, in particular, the proportionately large role of Brazil in the group could also represent roadblocks to MERCOSUR's further consolidation. Infrastructure bottlenecks, an extensive customs bureaucracy and high production cost, particularly in Brazil, are other hurdles that must be overcome. [49]

Uruguay is also trying to catch up after years of lagging behind the rest of Latin America in market reforms. Now the wealthiest member of the trade bloc, measured in terms of GDP per capita, Uruguay is positioning its capital, Montevideo, as the neutral ground where Argentines and Brazilians can negotiate. Its current president has opened up the economy to more local and foreign private investment.

Paraguay, according to *World Trade* magazine, is "the least attractive market in MERCOSUR," because of a combination of weak infrastructure and political uncertainty. For any strong and long-term economic growth and development, it is essential that these uncertainties are removed or lessened to a considerable degree.[50]

Transportation

The demographics and geography of MERCOSUR highlight the importance of relative transport costs. Much of the inland space is sparsely populated, with the coastal regions being densely populated. Most of the economy centers on three regions:

1. the northeast region of Brazil,

2. the south-southeast Brazilian coastal region, and

3. the River Plate region comprising Greater Buenos Aires and Uruguay.

The great increase in trade among the MERCOSUR countries has highlighted problems posed by inadequate transportation infrastructure in the region. The geographic size of the trade bloc and the correspondingly long distances between its various industrial and urban centers generate substantial long-distance transportation flows.[51]

It is estimated that 80 percent of all trade within the MERCOSUR region is carried over highways. Bottlenecks, such as the two bridge crossings near the falls at Iguazú, where most of the highway cargo must pass, can be extreme and time consuming. The delays should become less severe with more-liberal customs procedures and liberalized shipping policies.[52]

Much of the effort in improving transportation infrastructure has been devoted to upgrading existing roadways within the customs union. For the future, efforts are being focused on harmonizing rail standards within MERCOSUR, improving access to highways from more remote regions, and continuing the development of inland waterways.

The MERCOSUR inland waterway, which serves all four MERCOSUR member countries, holds the potential to carry large volumes of freight in the future. However, environmental and sociological concerns over the impacts of its development on the land and its habitants may delay its role as a major component of the transportation system.

Most of the transportation projects underway in MERCOSUR are specific to the country in which they are located. However, several key efforts involve the development of binational or multinational transportation corridors that integrate the development of inland waterways, railways, and highways.

MERCOSUR's inland waterway brings freight and passenger travel to Brazil, Argentina, Paraguay, and Bolivia. Several rail projects seek to consolidate freight traffic creating corridors that connect the Atlantic and Pacific Oceans. Some existing institutions, such as the Brazilian Development Council of the South and the Northeast Argentina Commission for Foreign Trade, have added a supranational planning and coordination component to their functions. These institutions lobby their governments for a regional approach to transportation infrastructure investment.

While mechanisms for integrated policymaking on regional bases are not fully developed within MERCOSUR, the member countries realize the importance of reducing barriers to trade and improving interregional transportation infrastructure.

The challenges require cooperation not only among member countries but also within the countries themselves. Not every Brazilian state and Argentine province can have its own cross-border route. Decisions will have to be based on logistics, financing, and common sense that take into consideration political pressures.

NAFTA

Overview

The North American Free Trade Agreement (NAFTA), which took effect January 1, 1994, is a detailed, broad-based pact governing trade between the United States, Mexico, and Canada. The objectives of the agreement are to eliminate barriers to trade, promote conditions of fair competition, increase investment opportunities, provide adequate protection of intellectual rights, and establish effective procedures for implementation of the agreement and for resolution of disputes.

NAFTA's 22 chapters are consistent with the General Agreement on Tariffs and Trade (GATT) and incorporate most of the provisions of the 1989 U.S.-Canada Free Trade Agreement.[53] Each nation affirmed its rights and obligations under the GATT (now superseded by the World Trade Organization) and other international agreements. For purposes of interpretation, NAFTA establishes that it takes precedence over other international agreements to the extent that conflict arises but provides exception to this general rule. As an example, the provisions of certain environmental agreements take precedence, subject to a requirement to minimize inconsistencies with NAFTA.

Congress passed NAFTA in 1993, linking the United States, Canada, and Mexico in the largest free-trade area in the world. Building on the success of the U.S.-Canada Free Trade Agreement, NAFTA has helped to forge a market with a combined annual output of more than $10 trillion.[54]

NAFTA shares with GATT the aim of reducing tariff and nontariff barriers, but unlike GATT, NAFTA focuses on the North American region consisting of Canada, Mexico and the United States. However, NAFTA goes beyond GATT in some significant respects. It grants national treatment not only for imported goods (as under GATT) but also for investments and services as diverse as banking, brokerage, insurance, law, and transportation.[55] In 1996, U.S. exports to Mexico set a record of $57 billion. Even during the severe downturn in the Mexican economy in 1995, NAFTA served to prevent Mexico from closing its market, as it did during the last Mexican financial crisis in 1982.

By 1999, trade between the three countries has grown by about 75 percent since NAFTA came into force. From less than $289 billion in 1993, trilateral trade has now reached $507 billion. Investment between the three economies has also significantly increased, with more than $189 billion invested in each other's economies in 1997. Moreover, total foreign direct investment into NAFTA countries has meanwhile reached $864 billion and job creation has surged in all three NAFTA countries, with employment levels now at record highs. Since NAFTA was implemented, employment has grown by 10.1 percent (1.3 million jobs) in Canada, by 22 percent (2.2 million jobs) in Mexico, and by over 7 percent (12.8 million jobs) in the United States.[56]

Institutional Structure

The central institution in NAFTA is a trilateral Free Trade Commission (FTC), comprising ministers or cabinet-level officers designated by each country. The FTC regularly reviews trade relations among member countries and discusses specific problems. To assist the FTC, NAFTA created a secretariat, as well as other subsidiary bodies, to provide administrative and technical support. In turn, the FTC is authorized to create bilateral or trilateral panels, as appropriate, of private-sector experts to resolve disputes over the interpretation of the agreement. [57]

The dispute-settlement procedures are designed to provide resolution of disagreements. Whenever any matter arises that affects a country's rights under NAFTA, that country may request consultations involving member countries. If consultations fail to resolve the matter within 30 to 45 days, any member may call a meeting of the FTC to use its neutral position to resolve disputes through mediation, conciliation, or other means of alternative dispute resolution. If a mutually satisfactory resolution cannot be reached on any of these matters, then any consulting country may initiate panel proceedings.

Unless the disputing parties decide otherwise, within 90 days of a panel's selection, the panel will present a confidential initial report, after 14 additional days are allotted to provide comments to the panel. Within 30 days of the initial report, the panel will present its final report to the countries concerned. Countries that win a dispute may demand trade compensation, if the losing country does not comply with the panel's recommendation.[58]

Side Agreements

Three side agreements were negotiated in addition to NAFTA. The side agreements focus on environmental cleanup enforcement, labor rights, and snap-back provision (provision against national industry demise due to imports).

The Commission for Environmental Cooperation (CEC) is an international organization created by Canada, Mexico, and the United States under the North American Agreement on Environmental Cooperation (NAAEC). The CEC is responsible for monitoring compliance with environmental laws in each country. The side agreement also established the North American Development Bank and the Border Environment Cooperation Commission (BECC). The former's purpose is to finance projects certified by the BECC and to provide support for community adjustment and investment. The BECC's purpose is to work with affected states, local communities, and nongovernmental organizations in developing effective solutions to environmental problems in the U.S.-Mexico border region.[59]

The side agreement on labor established a commission for labor. This commission is responsible for monitoring compliance with labor laws. The commission can appoint special panels to investigate complaints and recommend sanctions or fines if a country refuses to enforce its own laws. Sanctions or fines can be imposed only if a long process of consultation fails to resolve a dispute.[60]

The third side agreement, the snap-back provision, pertains to import surges as a result of NAFTA. This provision permits a member country to "snap-back" reverting to pre-NAFTA tariff rates for up to three years, if increased imports seriously threaten to injure domestic industry[61]

Key Provisions

Tariffs

NAFTA provides for the progressive elimination of all tariffs on goods qualifying under its rules of origin. For some sensitive items, tariffs are to be phased out over a period of up to 15 years. For most goods, however, customs duties were either phased out immediately or in five or ten equal annual stages. Indeed, on January 1, 1994, Mexico eliminated tariffs on roughly 50 percent of all industrial goods imported from the United States. This action included some of the most competitive U.S. products, such as machine tools, medical devices, semiconductors, computer equipment, and telecommunications and electronic equipment.

The agreement also provides for the elimination of nontarriff barriers and restrictions that distort trade, such as import licenses and quotas. Nevertheless, each member country maintains the right to impose restrictions, in limited circumstances, to protect the life or health of humans and animals and in the energy and textiles industries.[62]

Rules of Origin and Customs Administration

NAFTA requires that "duty free goods be produced in North America and not assembled from imported components."[63] These rules of origins benefit U.S. workers and firms. Mexico and Canada cannot be used as export platforms for the U.S. market. This provision prevents parties from benefiting through minor processing or transshipment of non-NAFTA goods.

Another provision commits the three parties to change their customs administration, so as to implement uniform customs procedures and regulations. These new procedures ensure that exporters, who market their product in more than one country, do not have to adapt to multiple customs administrations.[64]

Investment

NAFTA eliminates investment conditions that restrict the trade of goods and services to Mexico. For the first time, U.S. investments in Mexico are accorded the same treatment as foreign investments are in the United States. Before NAFTA, Mexican law subjected U.S. investors to significant performance requirements, including "geographic location restrictions, financial and foreign-currency-balancing requirements, and the requirement to generate permanent employment and use adequate technology." In addition, Mexico is required to liberalize its former scheme of having the Mexican Foreign Investment Commission screen all foreign investments; foreign investments of only $25 million or more will be screened, rising to $150 million after a decade.[65]

Intellectual Property

The intellectual property chapter of NAFTA establishes a new international standard for protection of trademarks, copyrights, patents, trade secrets, industrial designs, and the like. Member countries are required to provide adequate and effective protection of intellectual property rights on the basis of national treatment and to implement effective enforcement of those rights against infringement.[66]

Government Procurement

NAFTA also regulates government procurement. It gives U.S. suppliers access to the Mexican government procurement market. In addition, government procurement provisions apply to contracts for services and construction, which is particularly important because continued growth in Mexico will result in infrastructure upgrading. Therefore, many new opportunities will be created for U.S. companies to participate in modernization efforts. NAFTA also provides the commitment for fair and open procurement competition. It guarantees this commitment through transparent and predictable procurement procedures.[67]

Transportation

Motor Carrier Access and Ownership

NAFTA created a timetable for the removal of barriers to the provision of cross-border trucking services. On December 18, 1995, the United States and Mexico were scheduled to allow U.S. and Mexican motor carriers access to other country's border states for the delivery and back-haul of international cargo. And, by the year 2000, U.S. and Mexican motor carriers were to be allowed cross-border access to any point in the respective countries. This liberalization process, however, does not extend to lifting prohibitions against participation of foreign motor carriers in the domestic cargo markets of member countries.[68]

December 18, 1995, also marked the date on which U.S. and Canadian motor carriers were to be allowed to make investments, equivalent to 49 percent equity ownership, in Mexican motor carriers that transport international cargo. Permitted foreign equity ownership in Mexican trucking operations is scheduled to rise to 51 percent in the year 2001 and to 100 percent in the year 2004. Moreover, on December 18, 1995, the United States was scheduled to permit Mexican motor carriers to form Mexican-owned/controlled subsidiaries in the United States to transport international (but not domestic) cargo.[69]

Neither government has carried out the provisions scheduled for implementation on December 18, 1995.. Shortly before the implementation date, former U.S. Secretary of Transportation Federico Peña announced that the U.S. government was taking unilateral action to postpone increased cross-border access until U.S. concerns were addressed over the safety and security of Mexican trucks. Hence, Mexican trucks engaged in cross-border operations will continue to have access only to U.S. commercial zones along the border. While NAFTA permits the U.S. government to restrict Mexican trucks for safety reasons after December 18, 1995, many believe that the postponement decision was made to gain support of organized labor for the Clinton administration in an election year. Moreover, making progress on implementing the investment provisions is, in all probability, dependent on resolving the delay in cross-border motor carrier access.[70]

Bus Access

At the beginning of 1994, the United States and Mexico eliminated all cross-border restrictions on charter and tour buses. The elimination of restrictions on regularly scheduled buses was to have occurred in January 1997, but this action also awaits resolution of motor carrier access to border states. Similarly, the Mexican government has delayed implementation of the bus investment provisions, which permit U.S. and Canadian investment in Mexican bus companies that follows the same NAFTA investment timetable applicable to motor carriers.[71]

Rail Transport

NAFTA grants U.S. and Canadian firms the right to own and operate rail terminals and some private spur lines, bring in their own locomotives, market their services, and finance infrastructure in Mexico. Mexico will continue to have full access to U.S. and Canadian rail systems. On the other hand, "Mexico retains the exclusive right to operate, administer, and control traffic within the Mexican railway system; supervise and manage railway right-of-way; and operate, construct, and maintain basic railway infrastructure."[72]

Ports

Mexico agreed to immediately allow 100 percent U.S. and Canadian ownership in, and operation of, Mexican port facilities: cranes, piers, terminals, and stevedoring companies that handle their own cargo. As for companies handling cargo belonging to others, 100 percent U.S. and Canadian ownership is allowed after screening by the Mexican Foreign Investment Commission. In turn, Mexico continues to be allowed full participation in the U.S. and Canadian port activities.[73]

Land Transportation Standards Subcommittee

NAFTA established a Committee on Standards-Related Measures to help the three countries monitor and implement the agreement's four subcommittees, including the Land Transportation Standards Subcommittee (LTSS). These subcommittees were formed to address specific issues. The LTSS, which meets once a year to discuss overall progress, was formed to examine land transport regulatory regimes of member countries and to seek to make certain standards more compatible. The first plenary session was held on July 12, 1994, in Cancún, Mexico.[74] The LTSS established five working groups to harmonize rules and procedures in the following areas:

- Compliance and both driver and vehicle standards
- Vehicle weights and dimensions standards
- Traffic control devices for highways
- Rail safety standards
- Hazardous materials standards

Accomplishments

Major accomplishments of the LTSS as of October 1999 include the following:

1. Commercial Driver's Licenses. Agreement on a common age for operating a vehicle in international commerce (21 years).

2. Driver's Logbook and Hours of Service. Agreement to develop a common format and contents for a North American logbook for recording driver's hours of service and

agreement on safety performance information each country will require from motor carriers.

3. Driver Medical Standards. Recognition of several binational agreements as the basis for achieving reciprocity of driver medical standards.

4. Language Requirements. Agreement on a common language requirement; that is, the driver is responsible for being able to communicate in the language of the jurisdiction in which the operation is being conducted.

5. Rail Safety. Completion of a comprehensive analysis of regulations affecting rail safety in the three countries. Through this work, it has been determined that regulatory differences among countries will not significantly affect the safety of rail operations in cross-border service.

6. Vehicle Weights and Dimensions. Completion of a side-by-side comparison of the three countries' national, state, and provincial requirements with respect to truck sizes and weights. Significantly, this work identified vehicle configurations, commonly in use, which can be used in cross-border service.

7. The North American Emergency Response Guidebook. Issued the *North American Emergency Response Guidebook* in three languages (English, Spanish, and French) to ensure that authorities engaged in responding to accidents involving hazardous materials will have consistent and adequate information.

8. Hazardous Materials Transportation Regulations. Substantially harmonized regulations regarding the land transport of hazardous materials in the three countries and coordinated development of a North American position on a number of key issues. These issues are related to dangerous goods that will be submitted for consideration by the United Nations Committee of Experts on the Transport of Dangerous Goods.[75]

Andean Community Common Market

Overview

The Andean Community is a regional organization comprising Colombia, Ecuador, Peru, Bolivia, and Venezuela with various institutions and "organs" that work toward the common goal of regional "Andean" integration.[76] This integration process recently celebrated its 30th anniversary in 1999, after establishing the Andean Community (formerly known as the Andean Group) in 1969. Located primarily in the northwestern portion of South America, the five-member countries constitute a population of more than 110 million. There are four principal objectives of the Andean Community:[77]

1. Promote and foster stable economic development.

2. Accelerate growth by means of integration and economic and social cooperation.

3. Encourage participation in the process of regional integration toward a gradual formation of a common market.

4. Increase the quality of life in the total population of the Andean Community.

The decision by the presidents of the member countries of Bolivia, Colombia, Ecuador, Peru, and Venezuela in establishing broad guidelines for transforming the Andean Community into a common market by the year 2005 was a fundamental step in the long integration process of the community. Although the Andean Community has been in existence since 1969, free trade did not come into existence until the early 1990s. On November 11, 1990, the presidents from the five-member countries implemented plans to accelerate the establishment of a free-trade zone. On December 5, 1991, the Andean Community approved the adoption of the Barahona Act where it sought to gradually phase out the common external tariff by 1994.[78] The first two Andean countries to achieve free-trade status were Colombia and Venezuela in January 1992 when they finalized their tariff-elimination program *(Arancel Externo Comun)*. By October of the same year, Bolivia joined and was followed by Ecuador in January 1993. By January 31, 1993, the "free-trade zone" was in full effect for Bolivia, Colombia, Ecuador, and Venezuela.

Peru, on the other hand, has been slow to liberalize its tariff lines. On August 8, 1992, Peru was temporarily suspended from its member obligations in respect to the Andean Community's trade liberalization program. In 1998, however, Peru, marred with border disputes for many years, signed a peace agreement with Ecuador that led to their bilateral free-trade agreement in 1999. This action not only gave Peru credibility within the Andean Community but also solidified Peru's plan to gradually eliminate Peru's tariffs with 85 percent completion by 2000 and full liberalization by 2005.[79]

Institutional Structure

The Andean Community's institutional structure is called the Andean Integration System (AIS). This institutional structure is composed of a series of bodies and institutions that work in close coordination and whose efforts are oriented toward the same objective of regional integration.[80] The "bodies" of the Andean Community are the governing and organizational element that include the supervision of the Andean Common Market.

There are six bodies, each having a particular distinct agenda toward regional integration. The Court of Justice of the Andean Community focuses on the judicial and legality aspect of the region. The Andean Presidential Council is responsible for issuing guidelines about different spheres of Andean regional integration. The Andean Council on Foreign Ministers is responsible for ensuring that the objectives of Andean regional integration are attained, as well as for making and carrying out the Andean Community's foreign policy.[81] The Commission of the Andean Body, the main policymaking body of the AIS, makes, implements, and evaluates Andean regional integration policy in the areas of trade and investment and is responsible for implementing the guidelines of the Andean Presidential Council. The General Secretariat of the Andean Community administers the process of Andean regional integration, resolves issues submitted for its consideration, and ensures that Andean Community commitments are fulfilled. Finally, the Andean Parliament is the deliberative body of the AIS that represents the people of the Andean Community. Its functions are to participate in the legislative process by putting forward to the bodies of the AIS draft provisions of common interest.

The institutions of the Andean Community are intergovernmental institutions created to complement integration efforts in the economic and trade sectors with actions in other fields, as well as help to promote integration and investment in the region. Institutions in the Andean Community include the Andean Business Advisory Council, the Andean Labor Advisory Council, the Andean Development Corporation (CAF), the Latin American Reserve Fund, and the Simón Bolívar Andean University.

Key Provisions

On November 11, 1994, the Andean Community, except for Peru, approved and passed the common external tariff (CET) and thus replaced the antiquated common tariff model created in the 1970s. On February 1, 1995, the new and approved CET was activated creating considerably lowered rates of protection compared to the older tariff structure. The impetus of the new CET was for a more comprehensive and less-protective scheme with fewer exceptions.[82]

Under the new CET, products from the Andean Community are subject to external tariff rates of 5, 10, 15, or 20 percent. These rates are applied according to a product's value added. Primary goods are subject to the lowest rate, and finished manufactured consumer goods are subject to the highest. In fact, 34 lines of products are subject to a zero tariff rate.

The current CET system, however, is not perfect and exhibits some glaring imbalances. Venezuela and Colombia, highly active in bilateral affairs, have 87 percent of tariff lines under CET provisions. Furthermore, Bolivia maintains a separate tariff system and Peru is inactive in CET programs. Therefore, the current imposition of unilateral trade measures by Andean countries has resulted in what amounts to a three-country CET composed of Colombia, Venezuela, and Ecuador.

Nonetheless, protection barriers have indeed declined significantly since the establishment of the CET. In 1997, average tariff rates for the countries in the region were 10 percent for Bolivia and Ecuador, 11 percent for Colombia and Venezuela, and 13 percent for Peru. During the mid-1980s, on the other hand, rates exceeded 40 percent for all countries with the exception of Bolivia (23%).[83]

Current Conditions and Future Trends

The Andean Community has undertaken a serious effort in liberalizing its markets both intraregionally and through "third" countries. Trade has nearly doubled from $49 billion in 1990 to $96 billion in 1997. While total imports grew by an average of 15 percent between 1991 and 1997, total exports grew at a much slower pace of 7 percent during the same period principally because of the Asian financial crisis. In fact, during the height of the crisis, total exports declined by 11 percent. Intra-Andean trade consists of mostly manufactured exports, accounting for more than 90 percent of total trade.[84]

Colombia and Venezuela are the largest, most productive members of the Andean Community, accounting for 35 percent and 40 percent respectively of intra-group exports. Moreover, trade between these two countries accounts for the most vigorous trade within the region. Conversely, Bolivia is by far the smallest market in inter-Andean exports at 3 percent, exhibiting very little change in proportion to the rest of the region between 1990 and 1998. The same story applies to intraregional imports, where Bolivia has only accounted for 5 percent within the region during the same period.

The overall regional destinations of Andean Community exports have also remained relatively unchanged during the 1990s. The U.S./Canada region, the largest recipient, accounting for 45 percent of Andean exports in 1990, dipped to 40 percent in 1998. Other important destinations of exports include the European Union (EU) (15% in 1998), other Latin American and Caribbean countries (17%), and within the Andean region (12%).[85]

Imports to the Andean region have witnessed some significant change from its own subregion during the 1990s, having almost doubled the level of imports proportional to the rest of the world. In 1990, the Andean Community imported only 6 percent while the U.S./Canada region was a robust 37 percent. In 1998, however, the Andean subregion swelled to 11 percent while the U.S./Canada region dropped slightly to 34 percent. EU imports also deceased in relation to the rest of the world from 22 percent in 1990 to 18 percent in 1998.[86]

The liberalization of merchandize trade and the CET have been instrumental in making progress toward the eventual formation of a common market.[87] But expanding the Andean Community's influence outside the region has been equally as important in reaching important integration goals. The Andean Community has focused on deepening its intraregional links in recent years, such as the Andean-MERCOSUR initiative. Free-trade agreements with Mexico and Chile and current negotiations with Panama have also illustrated the Andean Community's flexibility in entering into agreements with individual countries.

Transportation

The Andean Community has oriented its efforts in the 1990s toward progressively liberalizing transport services. Changes adopted in this area provided for the elimination of reserved cargo in sea transport, the application of the "open sky policy" in air transport, and the incorporation of the principles of freedom of operation and free competition in land transport.

The Andean Community has aggressively undertaken the development of infrastructure projects, particularly highway infrastructure that interconnects its members. The Andean Community developed an action plan outlining the goals of this endeavor, entitled the "Action Plan for the Participation of the Andean Development Corporation in Physical

Infrastructure and Border Integration Projects."[88] This plan contains a diagnosis of the state of the road infrastructure in the Andean countries and delineates about 45 integration projects that, if fully implemented, will make it possible to establish a stable communication system among the Andean countries.

The Ministries of Transportation and Communication of the five countries, in three successive meetings held in 1993, selected 14 priority projects from the 45. Under CAF sponsorship and at a cost of $650 million, almost all of the 14 projects are being currently executed. These transportation projects are categorized into land, ocean, air, and multimodal transportation areas. Some examples of these projects include the establishment of a Registry of Multimodal Transport Operators, the elimination of reserved cargo in maritime transportation, and the harmonization of ocean transportation policies.

Caribbean Community Common Market (CARICOM)

Overview

Established more than 25 years ago, CARICOM is one of the oldest integration organizations in the hemisphere. The largest trade bloc in terms of membership, CARICOM is also the smallest in economic and geographic size. After experiencing relative stagnation in its integration process during the 1980s, CARICOM member countries have actively sought to revitalize their regional links, leading to a more outward-development, export-led growth process in the 1990s. Today, CARICOM is a multilingual, multiethnic organization of 15 member countries experiencing the challenges of transforming its customs union into a common market economy.[89]

The foundation of CARICOM is based on its three objectives:

- Economic cooperation through the Caribbean single market economy.
- Coordination of foreign policy among the independent member countries.
- Common services and cooperation in functional matters such as health, education and culture, communications, and industrial relations.[90]

Touching on a wide array of issues from key elements in CARICOM's single market economy, from industrial policy to rules of competition, CARICOM is a very inter-dependent regional organization bound by common natural ties.

The establishment of CARICOM was the result of a 15-year effort to fulfill the hope of regional integration, which surfaced with the establishment of the British West Indies Federation in 1958. During the federation's four years of existence, much of the economic aspects of the region were placed in the backburner, where plans for a customs union never materialized and free trade was not even discussed. Although the British West Indies came to an abrupt end in 1962, it has been widely regarded that this was the real beginning of what is now CARICOM.[91]

On December 1965, the heads of government of Antigua, Barbados, and British Guiana signed "The Agreement at Dickenson Bay" to set up the Caribbean Free Trade Association (CARIFTA). In the interest of close cooperation among all the Commonwealth Caribbean territories, the actual start of the Free Trade Association was deliberately delayed in order to allow the rest of the region (Trinidad and Tobago, Jamaica, and all the Windward and Leeward Islands) to become members of the newly formed Free Trade Association.[92] The Fourth Heads of Government Conference agreed to establish CARIFTA formally and to include as many Commonwealth of Nations countries as possible in a new agreement of December 1965. It was also agreed that the Free Trade Association was to be the beginning of what would become the Caribbean Common Market, which would be established through a number of stages for the achievement of a viable economic community of Caribbean territories. At the same time, in recognition of the member state's special development problems, several special provisions were agreed on for the benefit of the seven "Member States," which now made up the Organization of Eastern Caribbean States (OECS) and Belize. The new CARIFTA agreement came into effect on May 1, 1968, with the participation of Antigua, Barbados, Trinidad and Tobago, and Guyana. The original idea to permit all territories in the region to participate in CARIFTA was achieved later that year with the entry of Dominica, Grenada, St. Kitts/Nevis, Anguilla, St. Lucia, and St. Vincent in July and Jamaica and Montserrat on August 1, 1968. British Honduras (Belize) became a member in May 1971.[93]

At the Seventh Heads of Government Conference held in October 1972, the Caribbean leaders decided to transform CARIFTA into a common market and establish the Caribbean Community of which the Common Market would be an integral part. At the Eighth Heads of Government Conference a year later, the decision to establish CARICOM came to life when eleven members of CARIFTA (with the exception of Antigua and Montserrat) voted and signed for its inception through the Georgetown Accord.[94] This accord provided for its coming into effect on August 1, 1973, among the four then-independent countries (Barbados, Jamaica, Guyana, and Trinidad and Tobago), thus culminating 15 years since the first effort at integration with the birth of the British West Indies Federation in 1958. The Georgetown Accord also provided that eight other territories become members of by May 1, 1974, bringing the total number of member states to twelve. The Bahamas became the 13th member state on July 4, 1983, and Suriname the 14th on July 4, 1995. In July 1991, the British Virgin Islands and the Turks and Caicos became associate members of CARICOM. Twelve other states from Latin America and the Caribbean enjoy "Observer Status" in various institutions of the community and in CARICOM ministerial bodies.[95]

From its inception, CARICOM has concentrated on the promotion of the integration of the economies of member countries, coordinating the foreign policies of the independent member countries, especially in relation to various areas of social and human endeavor. Some of the principal issues currently on the regional agenda include restructuring the office of Regional Organs and Institutions; analysis of the impact of NAFTA on existing arrangements such as the Caribbean-Canada Trade Agreement (CARIBCAN) and the Caribbean Basin Initiative (CBI); resolution of the Haitian crisis; strengthening of relations with the wider Caribbean through the establishment of trade and economic agreements with Venezuela, Colombia, and the Association of Caribbean States; and deepening the integration process in the Community through the formation of a common market.[96]

Institutional Structure

There are two principal organs of CARICOM, he Conference of Heads of Government, commonly called "The Conference," and the Community Council of Ministers, commonly called "The Council." The Conference is the main ruling body of CARICOM, which consists of the heads of government of the member states and is the final authority for CARICOM. The main responsibility of The Conference is to determine and to provide the policy direction for CARICOM. The Conference, where decisions are generally made unanimously, is also the final authority for the conclusion of treaties on behalf of CARICOM and for entering into relationships between CARICOM, international organizations, and countries. Furthermore, The Conference is responsible for the financial arrangements to meet the expenses of CARICOM but has actually delegated these functions to The Council, the second highest organ in CARICOM. The Council is made up of ministers responsible for CARICOM's affairs and of any other minister designated by member countries. The Council is also responsible for the development of strategic planning and coordination in the areas of economic integration, functional cooperation, and external relations for CARICOM.[97]

There are four CARICOM organs, called the "Ministers Councils," that assist the principal offices of the Conference and the Council:

- The Council for Trade and Economic Development promotes trade and economic integration of CARICOM and oversees operations of its common market.

- The Council for Foreign and Community Relations determines relations with international organizations and third states.

- The Council for Human and Social Development promotes human and social development.

- The Council for Finance and Planning coordinates economic policy and financial and monetary integration of member states.

Institutions, like the Andean Community, also exist within the Caribbean Community. Some of the most important institutions within CARICOM include the Caribbean Food Corporation ,the Caribbean Agriculture Research and Development Institute, and the Caribbean Center for the Development Administration. Associate institutions of CARICOM include the Caribbean Development Bank, the University of Guyana, and the University of the West Indies.[98]

Key Provisions

CARICOM has undertaken steps to improve its free-trade area in goods. Most tariffs on intraregional trade and a significant number of nontariff measures (NTMs) have now been eliminated. Member countries are also working to establish regional product standards to facilitate cross-border transactions in CARICOM. Furthermore, it has made considerable progress with respect to lowering external protection and simplifying the structure of its common external tariff (CET). In fact, member countries approved a new CET structure in 1992 in which CARICOM implemented a gradual tariff- reduction process to be completed in four phases over a five-year period. By mid-1999, several countries had completed Phase IV of the new CET program.[99] Implementation of the new CET program is expected to be complete before the end of the year 2000. The final tariff rates of the CET range from 0 to 20 percent, with exceptions for some products, mostly agricultural. The CET process has, therefore, represented a significant market-opening effort for CARICOM. When the process is complete, the unweighted average tariff rate will be around 10 percent, down from 20 percent in 1991.[100] However, rapid global trade liberalization and the forming of new trade alliances worldwide have eroded some of the important trade preferences long enjoyed by CARICOM and its traditional export markets.

Current Conditions and Future Trends

The growing challenges faced by CARICOM in international markets are reflected by the group's modest export performance in recent years. Between 1990 and 1998, CARICOM's total merchandise exports expanded from $5.8 to $7.5 billion for an average annual growth of 3 percent. In 1990, the U.S./Canada region, easily the Caribbean region's largest export market, accounted for 44 percent of CARICOM's exports in proportion to other regions in the world, whereas in 1998 the same North American region accounted for 40 percent for a slight decrease of 4 percentage points. Other major markets to which the Caribbean Community exported in 1990 were the EU (25%), and within its own Caribbean region (8%). Though there were some slightly minor changes by 1998, the 1990 figures have relatively remained consistent.

Other major markets include the EU (24%), CARICOM's own region, which nearly doubled (15%), and other LAC countries (5%). In terms of importing to the Caribbean Community during the last decade, the U.S./Canada region has also been the largest importer. In 1990, the U.S./Canada region accounted for 46 percent of the Caribbean Community's imports. In 1998, the same region imported a proportionally lower amount (42%) in respect to the rest of the world. Other major markets that import into CARICOM include the EU (20% in 1998, a 4 percentage point increase from 1990), and Japan (8% in 1998, down from 11% in 1990). One of the group's main trade initiatives was concluded in August 1998, when CARICOM signed a comprehensive free-trade agreement with the Dominican Republic based on the NAFTA model.[101]

Transportation

Transportation is a key issue in the Caribbean Community. In fact, it is one of nine protocols outlined under the Single Market for Competitive Production Treaty. The primary type of transportation that is performed within CARICOM is sea-based, unlike within other trade blocs in the Americas where the transportation infrastructure is mainly land-based. In fact, in an effort to increase the safety and efficiency of seaborne trade, the International Maritime Organization (IMO) has concluded an agreement of cooperation with CARICOM by adopting the IMO convention.

CARICOM's 1998 Work Program emphasized the role of transportation. Its focus on transportation aims to facilitate quality technical services, policy advice, and information and to improve the transportation environment with respect to commercial aviation and maritime transportation. Key aspects include the civil aviation infrastructure within member states and, similarly, the standards of the maritime small-vessel fleet of the region. Finally, CARICOM also aims to focus on the provision of assistance to achieve increased capacity and efficiency in the handling of special agricultural commodities at sea ports.[102]

Central American Common Market (CACM)

Overview

Much like the Andean and Caribbean Communities, the Central American region also possesses a common market. But unlike the other inter-American trade agreements, the Central American Common Market (CACM) is a relatively new model, displacing the region's 1960 founding treaty.[103] The CACM seeks to unify the economies of Central American countries and to jointly promote the development of Central America in order to improve the living conditions of their peoples.[104]

In 1993, the five members of the CACM (Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua) signed the Protocol of Guatemala. In force since 1995, the Guatemala Protocol represents a pragmatic renewal of the integration spirit that prevailed in the region throughout the 1960s and 1970s. The protocol also emphasizes the importance of a customs union and a common market. It does not establish dates or terms and thus establishes a flexible framework designed to accommodate the different rates of integration among the group's members.[105]

The road toward integration in the 1990s has been accentuated by an extensive liberalization of trade in goods that stimulated a quick recovery in the ailing regional market. In 1993, El Salvador, Guatemala, Honduras, and Nicaragua established the Central American Group of Four and announced the creation of a customs union by April 1994. Guatemala and El Salvador then created their own bilateral customs union in 1996, which was reaffirmed by their governments in 1999.

Key Provisions

Intra-CACM trade liberalization has advanced significantly in the 1990s, particularly because of the reestablishing of the CET. The new CET structure was to range from a minimum of 5 percent to a maximum of 20 percent. In 1995, the governments of CACM member states agreed to accelerate tariff reduction, with the goal of reaching a CET level of 0-15 percent in the year 2000. CACM member states also agreed to sign the Uniform Central American Customs Code in 1993 to iron out the details in regards to customs procedures.[106]

Customs procedures within the CACM are critical to trade and investment protocol. These customs procedures are really divided into two relevant articles. The first article emphasizes the procedure of goods by the customs offices of exit and of entry in the contracting states. The second article focuses on the inspection by the central customs office of exit in the importing country.

Current Conditions and Future Trends

In 1998, total CACM exports and imports reached $15.6 and $19.4 billion, respectively, causing a trade deficit of $3.8 billion (about 8% of the region's GDP). The Central American region's total exports grew in 1995-98 at an average annual rate of 22 percent compared to the 13 percent in the previous four years. Imports, on the other hand, maintained their average rate of growth of around 15 percent throughout the 1990s.

The aggressive growth in trade has been very evident for the Central American region during the last decade. In 1990, for example, global exports rose past $4 billion. In 1998, however, global exports for CACM topped $15.6 billion, almost four times the amount in 1990. The same story applies to imports, where global imports in 1990 accounted for over $6.5 billion. Eight years later, global imports passed $19 billion, also about three times as much as in global exports.

CACM is pursuing agreements with other trade organizations, particularly within the Western Hemisphere. The CACM has initiated free-trade talks with Panama, where, for historical reasons, Panama has never been a member of a regional integration scheme. In April 1998, the presidents of Central America and Chile met to negotiate a comprehensive free-trade agreement among their countries. Finally, countries within the CACM region have also initiated their independent free-trade agreements with other countries outside the Central American Community. El Salvador, Guatemala, and Honduras, otherwise known as the "Northern Triangle," are negotiating a free-trade agreement with Mexico.[107]

Free Trade Area of the Americas (FTAA)

Overview

The Free Trade Area of the Americas (FTAA) was first proposed and immediately initiated at the 1994 Summit of the Americas in Miami, Florida. The heads of states of 34 democracies in the region agreed to construct a "Free Trade Area of the Americas" and to complete negotiations for the agreement by 2005. There are three basic components of the effort to establish the FTAA:

- "Trade Ministers" of all Western Hemisphere countries, have developed the overall work plan for the FTAA.

- 12 FTAA "Working Groups," established by the Trade Ministers, are gathering and compiling information on the current status of trading relations in the hemisphere.

- "Vice Ministers of Trade of the Western Hemisphere" are coordinating the effort of the Working Groups and making policy recommendations to the Trade Ministers.

Since the Miami Summit, the hemisphere's Trade Ministers have met four times to formulate and execute a work plan for the FTAA.

The FTAA is an ongoing process that seeks to complete negotiations by 2005. The ambitious goal set by the leaders of the Western Hemisphere at the 1994 Summit of the Americas in Miami to create a free-trade area has been given a significant push forward by the completion of the San José Declaration on March 19, 1998. This declaration, agreed to by the Trade Ministers of the 34 participating democracies in the FTAA process, served as the basis for the launch of the hemispheric trade negotiations by heads of state and governments in Santiago, Chile, on April 18-19, 1998.[108]

The San José Declaration can be compared to the 1986 Punta del Este Declaration, which launched the Uruguay Round of multilateral trade negotiations, and represents a commitment by 34 countries to the most ambitious undertaking for trade liberalization since that time. It also represents the largest regional integration effort ever undertaken involving both developed and developing countries in a common objective to realize free trade and investment in goods and services, on a basis of strengthened trading rules and disciplines.

Current Conditions

Progress in establishing the FTAA has slowed, especially since the Santiago Summit in 1998. However, since the Miami Summit in 1994, the hemisphere's Trade Ministers have met four times to formulate and execute a work plan for the FTAA. The first meeting was held in June 1995 in Denver, Colorado; the second in March 1996 in Cartagena, Colombia; the third in May 1997 in Belo Horizonte, Brazil; and the fourth in March 1998 in San José, Costa Rica.

During the Belo Horizonte Ministerial, it was agreed that the formal negotiations leading toward a FTAA would begin in March 1998, at the Second Summit of the Americas in Santiago, Chile. The 12 Working Groups (7 were established in Denver, 4 in Cartagena, and 1 in Belo Horizonte) have met on numerous occasions, at locations throughout the Americas. In addition to gathering information, each working group was directed by the

Trade Ministers to examine trade-related measures in its respective area, in order to determine possible approaches to negotiations.[109]

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Chapter 2. Maritime Transportation in the Americas

Trade and the Maritime Industry: A Worldview

Between 1980 and 1997, the value of worldwide merchandise exports (which exclude trade in services) increased from $2.03 trillion to $5.53 trillion.[1] This 172 percent increase was greater than the corresponding increase in worldwide productivity over the same period of time. Seaborne trade accounts for the largest share of the volume (tonnage) of global trade. Overall, seaborne trade increased by 3.8 percent annually (on a tonnage basis) during the 1993-97 period to a total of 5.3 billion metric tons in 1997. It is projected to grow 3 to 4 percent per year over the 1998-02 period.[2]

The importance of the maritime industry's role in global trade can be illustrated by its relationship to national economic growth. A strong correlation between the size of a country's economy and its share in maritime trade exists, which renders seaborne trade an important tool in sustaining economic growth as well as in averting resource depletion. Certain economic sectors have a high propensity to trade. Because seaborne trade depends heavily on material-intensive industries, growth in the manufacturing, agriculture, mining, and construction industries causes an increase in the use of seaborne transportation for shipping goods.[3]

The relationship between maritime transportation and trade growth can be further explained by reductions in overall maritime transport costs. The distribution chain integrates the activities of seaports, carriers, shippers, and land-based transport systems. Efficiency and cost savings gained by any one of those agents affects the efficiency and cost savings realized by each of the other agents along the chain.

The introduction of information exchange and vessel-loading technologies, in conjunction with economies of scale in shipping, caused maritime costs to decline 21 percent from 1980 to 1995. In turn, the cost efficiencies realized by new maritime transport technologies have increased demand for maritime transport services, thereby increasing global trade flows.[4] As maritime shipping becomes faster, more efficient, and more reliable, it has been estimated that a 10 percent reduction in maritime transport costs can amount to a $30 billion increase in global trade.[5]

Emphasizing the importance of maritime transport costs, as a determinant of trade growth, is the overall share of transport costs in the total cost function of producing and distributing goods to markets. Although the marginal costs of maritime transport have declined with increasing economies of scale, the rising value of goods being traded has induced an increase in inventory carrying costs. This increase in inventory carrying costs has, in turn, increased the proportion of transport costs in the total cost function, accentuating the role that cost savings play in maritime transport in facilitating trade.[6]

Because seaports are conduits for interregional and intraregional trade, they often are the focus of national efforts to increase trade competitiveness. Thus, regional plans to increase trade flows should concentrate on ports within the maritime transport chain. The focus of this chapter is three-pronged. The first section describes the infrastructural and operational characteristics of ports, which subsequently make them competitive trade facilitating entities. It also examines current trends in the maritime industry that have had a significant effect on seaports and their ability to reduce costs. The second section presents an overview of Latin American ports and describes how they are affected by current trends in maritime trade. The last section focuses on case studies of ports in the Panama Canal Zone, Argentina, Brazil and Mexico. These case studies emphasize the position strategically placed ports have in acting as gateways to major transportation corridors and sea lanes.

Seaports as Conduits to Trade

Seaports function as the conduit between ocean and land-based modes of transport.[7] In its basic operations, ports provide the necessary harbor, terminal facilities, and equipment that coordinate the transfer of cargo between ocean carriers and land transportation. In addition, ports provide storage areas to assist shippers in the transfer of goods. However, ports are more than simply an "interface" between the shipping vessel, rail, and/or truck. The modern port has the power to initiate commercial activity by organizing and coordinating customs, financial and banking, drayage, and maintenance services to make the distribution process frictionless and time efficient.[8] Hence, both infrastructural characteristics as well as operational functions determine a port's productivity and ability to handle cargo in a time-efficient manner, which, in turn, determines a seaport's ability to attract cargo.

Necessary to the basic functioning of a seaport, the physical infrastructure is typically described in terms of location, marine access, equipment and handling, and intermodal access capability. Depending on whether a port serves containers or breakbulk (dry cargo), each one of these infrastructural attributes can influence port competitiveness.

Location and the Importance of Hinterland

The location of a port in relation to concentrated areas of commercial activity, referred to as "hinterland," is an important cost-reducing factor because it reduces transport distances between markets, giving the seaport a comparative advantage in transporting goods from that region. Through easier access to roads, rail, and land bridges, a port can benefit from close proximity to its hinterland by being able to reach commercial markets quickly. For example, the geographic centrality of the Port of Rotterdam, where 80 percent of the European markets can be reached within 24 hours, gives it a significant comparative advantage over other seaports in Europe. Ports naturally located in areas close to commercial centers will have a natural advantage over ports located in more distant, less-central regions.[9]

Marine Access

In terms of marine access and port design, carriers select ports whose infrastructures have been designed to meet the productivity goals of vessel operators. For instance, Panamax vessels (vessels of less than 4,000 TEUs) have a fully loaded draft of 38 feet, which requires a channel depth of 42 feet. As ships grow in size (see Table 2.1), the channel depth and berth width required for a seaport to be serviced must increase to accommodate larger vessels. Notably, a seaport must also have the resources with which to maintain its channel depth; depending on the regulatory environment, ocean dredging can be an economically and environmentally costly activity.

Table 2.1
Typical Drafts and Minimum Channel Depths for Containerships

Ship Size*	Draft (fully loaded)	Required Channel Depth
Panamax Vessel (<4,000 TEUs)	38 feet	42 feet
Post-Panamax Vessel (4,000-6,000 TEUs)	42 feet	46 feet
Beyond-Post Panamax (6,000 TEUs)	46 feet	50 feet

*TEU refers to "twenty-foot equivalent unit," which is the standard unit for counting containers of various lengths and for describing the capacity of containerships or terminals.
Source: Jane Vickerman, "VZM/TransSystems Report on Texas City Mega-Port Facility" (paper presented at a conference at the J. J. Pickle Research Campus, The University of Texas at Austin, November 9, 1998.)

Port design is equally as important as channel depth. In order to maximize efficient port-vessel interface, a port's pier design will affect the number of container lifts per ship per hour, thereby determining port productivity.[10] Continuous cargo-handling systems can further improve port productivity by integrating operations with design concepts and spacing arrangements. For example, finger piers or parallel berths make it easier for vessels to be serviced from both sides.[11] Consequently, pier designs that optimize on-dock rail and gantry crane systems permit a port to service more vessels simultaneously and more efficiently.

Cargo Handling Equipment

A port's stock of handling equipment and technology can also determine a port's competitive position. A containerport facility performs the function of loading, unloading, storing, and transferring containerized cargo. The amount of time taken to move the container from the containership to storage or staging area depends on the ability of the seaport to coordinate its cargo handling and port operations effectively.[12] Reducing the length of time a ship remains moored in port means that it can spend more time servicing additional ports and transferring more cargo, consequently maximizing the revenue-earning potential of the shipping line.

Gantry cranes, chassis (trailers on wheels used to move containers), sideloaders (forklift trucks) top loaders, reach stackers, and vessel load technologies, such as Electronic Data Interchange (EDI), each have an effect on the speed with which shipping vessels are moved in and out of port. For example, the reach, speed, and capacity of a gantry crane to move containers from ship to shore or vice versa will affect both the length of time a ship remains in port as well as the number of stops a ship will make in order to unload its cargo. Ports whose cranes cannot extend across the width of the ship to retrieve or move containers will only be able to partially load/unload the ship, causing the line to make additional stops at alternate ports to unload its cargo. Most modern cranes have the ability to extend across 17 rows of containers.[13]

Electronic Data Interchange Technology

Information technology has become increasingly important in helping seaports and vessel operators organize cargo-handling activities to facilitate more time-efficient cargo distribution. One way in which seaports effectively coordinate cargo-handling activities is through electronic information technology, such as EDI technology. EDI systems standardize information, such as cargo identification, a container's location on the vessel or in the storage area, and cargo destination to render port activity more fluid and time efficient. EDI reduces information costs by streamlining information about cargo and vessel loads, rendering logistical information readable by any port or location.[14] "In 1995 the authorities at the Chilean port of Valparaíso authorized shipping agencies to submit cargo manifests electronically, which meant an immediate annual savings of about $75,000 in documentation, internal procedures, and reporting."[15]

Port Storage Area

Port storage capacity can be an added advantage to some ports. For ports that rely on intermodal distribution, port storage area is an important factor, as it will determine the size of loads that may be discharged at a single port. Greater staging areas and storage capacities increase a port's ability to load/unload higher volumes of cargo from multiple vessels simultaneously. Thus, larger ships are able to fully discharge their cargo load for transfer to another vessel or transport mode in one stop.

Storage capacity and terminal backland areas depend on the average size of cargo loads transferred from ship to ship or ship to rail, the frequency of vessel activity at the wharf, and the amount of daily activity a port sees in terms of truck and rail service.[16] Ports that operate solely for transshipment purposes, known as "pure transshipment ports," on the other hand, do not have as great a need for storage area, as cargo does not remain in the staging area for long before it is transferred to an alternate vessel.

Operational Characteristics

Although, the physical characteristics described above may be necessary for a port to carry out its functions effectively, they are far from sufficient. Because the operational superstructure of a seaport organizes the activities of its physical infrastructure in a manner that promotes productivity and efficiency, it has more of a powerful impact on the productivity and efficiency of a seaport. Aside from the necessary physical characteristics that a liner or carrier will evaluate when considering servicing certain seaports, four other factors are usually examined: seaport management and productivity, private-sector influence, seaport labor structure, and seaport services and cargo-handling activity.[17]

Seaport Management and Productivity

Port management is often a controversial issue when the social and political goals of the government clash with the commercial objectives of the port itself. Administrations composed of governmental officials compared with administrations composed of port professionals will have varying effects on port productivity and, consequently, port competitiveness should the administration fall prey to public pressure groups or corruption. Moreover, port productivity is not determined independently by each stage of the process but, rather, by the integration of each stage of the process.[18] Even though a gantry crane can move 30 containers per hour, productivity gains cannot be realized unless the on-dock rail system, truck drivers, and customs officials are operating at an equal capacity.

Because of the nature of port productivity, an effective and efficient management structure is vital to the successful operation of the port. Most seaports are operated as "service ports," where the government owns all land and infrastructural assets, has the sole responsibility for providing port services, and maintains complete administrative and regulatory authority.

Effective seaport management not only concerns how strategic decisions concerning port commercial operations are made but also refers to the transparency of the decision-making process and the independence of that process from outside parties, such as labor groups or governmental officials. In "service ports," pressure groups and labor unions can exert "such strong pressures on the national port administration, that they can decide hours of work, the cargoes to be considered dangerous, investments to be made, and where merchandise can be distributed."[19] The ability of public pressure to affect the management decisions of elected or appointed officials constrains the ability of port administrations to successfully coordinate their activities in relation to outside market forces.[20]

In terms of governmental regulation, excessive regulation that inhibits the operation of commercial market-based principles of supply and demand can also weaken a port's competitive position. Larry Burkhalter, a former staff member for the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), asserts that port technologies and seaport regulations, which govern ports, have a dichotomous relationship. "The regulatory framework for cargo-handling operations," he argues has the power to either maximize or undermine efficiencies realized through technological innovation, whereas innovative, cost-reducing technologies cannot circumvent outdated regulatory structures to achieve efficiency gains. Furthermore, Burkhalter contends that in a more competitive global economy, the role of government in port administration needs to be "decoupled" from entrepreneurial activities to realize a market-based balance between commercial goals and social policy.[21]

Private-sector Influence

Increasingly, governments are seeking to decrease their role in bulk port and containerport operations by allowing greater private participation. From private participation in port services to the full privatization of port facilities and terminals, greater private-sector influence in seaports has emerged as a result of several factors.

First, seaports face greater competition in their role in turning raw materials and components into intermediate and final products; current regulations have more of a negative effect on a port's ability to compete. Added costs associated with labor regulations, poor management, and inadequate infrastructure prevent certain ports from attracting on-site assembly and production facilities that could boost regional economic growth.[22] Privatization of seaport operations frees the port from inefficient government management structures, making it more attractive to private-sector investment.

Second, by encouraging nongovernmental participation in the port sector, nations can alleviate public-sector financial stress caused by committing funds to port labor, management, and investment activities. The modernization and technological advances offered by EDI, coupled with the more-specialized needs of shipping lines, require expensive investments in infrastructure and equipment. Public entities simply do not have the capital to keep pace with technological advance whereas private companies do.

Third, governments seek to privatize public port authorities as a means of encouraging greater commercial discipline. As explained in a privatization module taught by ECLAC, privatization means "reducing costs, improving productivity, and rationalizing staffing while at the same time achieving growth targets by enhancing the competitiveness of exports on international markets."[23]

But how are seaports changing their administrative structures to encourage greater private-sector participation? Increased private-sector influence in seaport facilities is most commonly being achieved by changing port administration and management into a "landlord" seaport model. In the landlord port model, the government retains regulatory authority and ownership of the land and superstructure (berths, breakwaters, warehouses) of the seaport but privatizes the port management and services. Because governmental regulation of labor, tariff, and investment adds significantly to shipping costs, shipping lines are pressuring governments and ports to allow privately owned companies, called global terminal operators (GTOs), to operate and manage seaports.[24] GTOs are contracted out to operate and manage port terminals through concessionary agreements. These agreements require significant investment and modernization of existing port infrastructural assets, divesting the government of the financial and commercial responsibilities associated with operating port terminals and intermodal connections.

Rudolph Ramm, vice president of the Columbus Line, believes that port facilities are better managed by GTOs like Hutchinson Port Holdings, Stevedoring Services of America (SSA), and P&O Ports. These companies have the capital reserves needed to make infrastructural upgrades, such as the purchase of new gantry cranes, and to install communication systems that allow ports to interface with liner communications systems.[25]

It must be noted that seaport privatization is not sufficient to provide a solution to inefficient and noncompetitive ports. In a module taught to port administrators and governmental officials concerning port privatization, ECLAC emphasizes that the combination of the following legal measures must be in place to promote competitive private-sector participation:

- *Deregulation*: Eliminate rules and institutions that disrupt free-market mechanisms, such as subsidies and governmental bailouts. Introduce regulations that facilitate customer and seaport response to market demand.

- *Decentralization and Financial Autonomy*: Remove government from decision making while making agents involved in port operations responsible for planning, investment, and operations. Give investors the authority to implement planning and investment activities, for which public port administration provides oversight authority.

- *Antimonopoly Laws*: Organize antimonopoly commissions to protect competition, ensure property right protection, and adjudicate allegations of abuse and dispute.

- *Specific Legislation*: Define areas or sectors in which private sector may participate and expressly state services to which private companies may have access.[26]

Therefore, privatization should be combined with reforms that stabilize seaport labor-management relations as well as deregulate and decentralize port decision making. Following privatization, governments should remain solely responsible for the implementation and enforcement of regulatory institutions that forestall private monopoly abuses. Governmental bodies should also be responsible for creating policy that encourages economic development in commercial areas surrounding the seaport.[27]

Seaport Labor Structure

Seaport labor structure can also determine seaport competitiveness because seaport labor is a function of market supply and demand. Initially, port activities were extremely labor intensive during each stage of the cargo-handling process. However, with the advent of new labor-saving, cost-reducing technologies like the container, demand for labor has declined. Seaports now require a smaller-size, more highly skilled staff to perform the various port activities.

Typically, a containerport consists of longshore labor staff, yard staff, and administrative staff. Longshore staff, who are grouped into teams of 20 longshoremen and deployed one team per gantry crane, usually consists of a foreman, crane operators, checker staff, equipment operators, truck operators, lashers (rope attendants), and hostler drivers.[28] Because the number of dockworkers usually employed depends on the volume and frequency of deliveries at the port, longshore labor may not be full time.

The labor structure within a seaport is a significant proportion of a seaport's operating costs. For instance, inventory and storage labor needs require an average of 20-25 storage and inventory laborers to be employed full-time in a 200,000-TEU-per-year terminal. These workers include container yard operators, equipment handlers, clerks, and mechanics. Finally, administrative staff, such as clerks, secretaries, managers, and port security, is needed. Thus, depending on whether or not a port supports unionized labor, a seaport's labor operations will be a significant portion of the port's overall operating budget.[29]

Seaports have generally been a large source of employment in developing countries. Consequently, the declining need for port labor has generated frequent conflicts between the commercial goals and social responsibilities espoused by the port. When governmental authority and public pressure dominate port decision making, technologies are either not adopted or labor-saving policies and job-creating schemes evolve that increase costs to shippers, offsetting the benefits provided by new technology. In this situation, dockworkers pressure the port authority to create a stratified labor system in order to create the demand for a certain size of labor force. This practice mitigates the cost savings realized by new technology by generating a high wage bill.[30] Such a labor environment does not reflect market conditions, resulting in low productivity, overstaffing, and increased costs.

In a more globalized economy, port administrations are finding it more costly to dictate port labor activities than to influence "market mechanisms" through port modernization plans and privatization. New modernization plans, reflecting market-based commercial goals and market-based labor regimes, will be vital to building future competition among ports. Market-oriented mechanisms should consist of the "laws of supply and demand, profit and loss, economies of scale, management autonomy, freedom of entry and exit for private investors," customer demand, and fear of bankruptcy.[31] Market mechanisms are critical because they determine cargo volumes and allow carriers to assess the real cost efficiency of seaport services.

Port Services and Activities

A final criterion becoming more important to carriers when considering a seaport for liner service involves port activities and services. In order to coordinate cargo-handling operations, seaports provide a range of services to ensure that shippers, liners, and land-based transport units have ready access to port facilities and that cargo-transit times are kept low to minimize cost to the shippers. By organizing customs units, intermodal access operations, and/or transshipment activities, seaports can facilitate a rapid port turnaround time, causing the volume of cargo going through the port to increase.

Customs

Customs offices fulfill several functions. Foremost, customs collect duties on goods coming into the seaport, providing a significant source of national revenue. Second, customs attempt to protect nations from illegal product distribution through documentation and inspection procedures.

The coordination of customs requirements and cargo verification processes are an important part of the distribution process and can affect the competitive position of seaports. Despite efficiencies in cargo-handling technology, delays in customs checks will result in slower, less-efficient transit times, which will consequently cause cargo volumes to diminish.[32] If customs delays at a seaport are significant and cause financial losses due to lengthy product distribution times, shippers may seek alternate routes to ship their goods. Poor coordination of cargo handling, intermodal operations, dock labor, and hours of service can cause delays, which create long queues at customs checkpoints.

Delays at customs are also the result of excessive and complex documentation procedures, which emphasize the need for simplified documentation procedures and a computerized system that is able to provide cargo information with customs units in real time.

Intermodal Operations

Intermodal access is an important concern to shippers who seek low-cost means of penetrating inland markets. Intermodal access refers to the ease of transferring goods from ship to either truck or rail for the final distribution of the cargo. The productivity of land-based transport systems functioning at a port depends on several factors. Because a truck operator's income depends on the number of loads or the volume of cargo the truck is able to transfer in and out of the port, carriers prefer seaports that are able to coordinate operations to facilitate a rapid turnaround time. An efficient seaport should be able to coordinate cargo handling and customs activities as well as provide adequate infrastructure to meet the efficiency needs of intermodal operators.

Transshipment

Transshipment is a service-oriented criterion that has become increasingly important to large carriers who seek to minimize transport costs realized by large fuel loads and long sea legs. Transshipment or the rehandling of goods en route requires the transfer of goods from one vessel to another, in a ship-to-ship distribution process. Shippers or carriers who rely on transshipment services utilize large megaship vessels on short distance routes to shuttle goods from one port to another. This method of shuttling containers from port to port invokes a hub-and-spoke system of ports where large vessels transship to smaller vessels at the hub port and then the small vessels distribute the goods to other ports in the region. Thus, draftage, feeder service frequencies, and on-dock handling equipment availability are important concerns to carriers or shippers who are selecting transshipment ports.

Trends in Maritime Commerce

In his farewell essay, "Strategic Vision for Ports: The Year 2010," Larry Burkhalter, former chief of the Transportation Unit at ECLAC, wrote, "In a world subject to perpetual technical and institutional advances, the future is not merely an extension of today."[33] In maritime commerce especially, the future is a function of evolutionary trends that have allowed the maritime system to expand, as well as revolutionary forces and technological innovations that have changed "the systems linkages and the related expansion of its scope."[34]

Containerization and the Containership

Revolutionizing the face of maritime trade in the early 1950s, containerization has produced significant growth and expansion in maritime trade and propelled changes in the nature of seaports and ocean liner carriers. Containerized transport allows goods to be shipped in large, sealed storage containers of standardized size. Although worldwide growth in containerized trade slowed during the Asian currency crisis, growth was expected to rebound during 1999. Growth in container trade in 1998 topped 10.3 percent as compared with an 8.5 percentage growth rate in 1997.[35]

The introduction of the shipping container primarily benefited shippers by reducing theft and damage to goods being shipped. However, aside from reductions in loss, the physical design of the container also enabled cost reductions by streamlining the cargo-handling process. Goods could be transferred between different modes of transportation more easily and quickly because of the boxlike design of the container. For example, containers could be easily double-stacked on railcars to increase the volume of goods being transported. Additionally, cargo volumes increased as containers enabled vessels to be loaded to maximize available space.

How did containerization affect ports and carriers? Containerization required significant technological advancement in cargo-handling equipment available to load/unload containers. Initially, vessels managed cargo-handling operations by carrying a gantry crane and handling equipment onboard. But the fact that the equipment was idle during the sea journey and that cargo-handling equipment detracted from the space allowed for container carriage, carrier management of vessel load/unload operations was extremely inefficient. Thus, maximizing the potential efficiencies of containers and containerships, seaports assumed the responsibility of providing gantry cranes, forklifts, and other load equipment to free up space on liners for an expanded container load.

As a consequence of greater time efficiencies and cost reductions, shippers have been encouraged to expand vessel carrying loads by investing in larger containership designs. As a result, ports must modernize their infrastructures to accommodate larger ships and greater cargo volumes. In the last few decades, the typical capacity of a containership has grown from 1,700 TEUs to more than 6,500 TEUs in 2000. The new megaship or "post-Panamax" and "beyond post-Panamax" carriers can transport cargo loads ranging from 6,000 to 8,000 TEUs. Of the 36 megaships currently deployed, 4 vessels carry more than 6,500 TEUs, and plans have been designed for carriers with capacities of 15,000 TEUs.[36]

Although megaships account for only 1 percent of the world's container fleet, they are increasing their share of container fleet capacity. Megaship orders in 1997 accounted for almost 20 percent of ordered capacity. Assuming port infrastructure keeps pace with the growth of the containership, some studies indicate that by the year 2000, some 500,000

TEU slots or 9 percent of total liner capacity will be carried on 6,500+ TEU capacity containerships.[37]

The cost structure of a megaship has characteristics associated with economies of scale because fixed costs are extremely high and marginal costs are low. Megaships reduce transport costs on the margin because they are able to ship a greater volume of goods at a lower cost. The advantages offered by scale economies in ocean liner shipping provide incentives to develop more efficient cargo-handling systems and information technologies to minimize the length of port stays. Drewry Shipping Consultants found that the "per-TEU expenses of a 6,000-TEU vessel, compared with a 4,000-TEU ship, should result in a 30 percent savings in crew costs, a 20 percent savings in fuel costs, a 15 percent savings in port and canal duties and a 10 percent savings in insurance costs."[38]

Because the megaship container vessel operates at a high fixed cost, its ability to achieve economies-of-scale returns render it an optimal design only in certain circumstances. In spite of producing a downward pressure on the marginal cost of transporting goods, it is important to understand that the high fixed costs associated with larger container vessels inflate the share of transportation costs in the overall cost function. Thus, megaship container vessels are economically viable only when demand is sufficient to cover the high fixed costs. Therefore, unless utilization covers the high fixed costs of economies of scale, megaships will not be cost-effective means of transporting goods.

A study conducted by the Institute of Shipping Logistics investigated the costs of post-Panamax and megaship maritime transport by studying variables such as ship size and speed, the number of ports visited, and the distance between ports. The study found that, by reducing the length of the sea-leg, fuel load costs can be significantly reduced and affect transport costs. The study also concluded that forming a megaship "shuttle" between two hub ports or markets reduced per-TEU costs. (The effects of megaships on transshipment will be discussed below.) The study also found that the number of port visits had an upward effect on megaship costs, while land-based costs at seaports prevented megaships from realizing any cost reductions from fewer port stops.[39]

Expansion of megaship technology and carrying capacity will remain concentrated only on the trans-Pacific and trans-Atlantic east-west trade routes as a result of the inability of certain ports to make the necessary infrastructural adjustments required to service larger vessels. Megaships require terminal dimensions of 350 meters of berth line, 20 hectares of storage area, and almost 200 hectares of waterfront.[40] Given the future trends in transshipment, however, smaller, less-modern seaports can remain competitive by serving feeder vessels in a hub-and-spoke style system.

Intermodal Developments

The next major revolutionary force in the maritime industry relates to the ship-to-rail or ship-to-ship distribution pattern called intermodal distribution. Intermodal distribution allows containerized trade to penetrate inland markets by creating "land bridges," specialized land-based container transport modes (containerized rail and trucking services) and on-dock intermodal terminals to facilitate a frictionless transfer of containers from ship to land-based transport mode.[41]

How did the intermodal revolution change the face of maritime commerce? Port design was altered to incorporate intermodal access routes and operations. A 1993 Transportation Research Board study concluded that five major land-based problems affected port intermodal productivity and efficiency: congested truck routes due to gate delays and customs stops, inadequate land area to provide land-based access routes, the lack of on-dock rail capability, low clearance levels for double-stack container railcars, and congestion at grade rail/highway crossings.[42] Hence, seaports have to change the physical layout of their operations, make investment in equipment stock, and coordinate service operations to make intermodal access function efficiently.

For example, if a seaport requires trucks to go though a large number of customs checkpoints and inspection areas, then greater truck space will have to be provided lest highway and land access routes become congested. Moreover, if a seaport has failed to invest in efficient infrastructural assets like on-dock railing systems, then it will have to invest in more costly and less-efficient land and highway equipment to transfer goods between transport modes.[43]

The ability of a seaport to adapt to the changes brought on by the intermodal revolution has become a significant determinant of transport costs and the effectiveness of intermodal transport. Illustrating the costs that can result from inefficient inland transport and intermodal access points, both the United States and Argentina ship grain from farm to port at 15 percent of CIF (cost, insurance and freight) value. Whereas average distance for grain transport is 2,000 kilometers in the United States, the average distance grain is shipped in Argentina is only 250 kilometers. This example underscores the need for seaports to initiate modernization of inland transport systems and to upgrade existing infrastructural assets to include intermodal capability.[44]

Intermodalism also emphasizes the importance of port storage areas. As containers are moved quickly from ship to shore, they are often held in storage facilities until they can be loaded onto trucks or rail. In order to keep up with incoming vessels, ports require ample storage capacity to hold cargo until intermodal transfer can take place. Should a seaport be located in an urban area, or some other location that prevents seaport expansion, then intermodal capability may be degraded as cargo volumes increase.

Shipping Conferences

Since the late 1800s, shippers formed themselves into associations known as "conferences." Shipping conferences stabilized maritime freight rates by creating publicly shared agreements among members that harmonized rates, limited liner service schedules or frequencies, and pooled cargo and revenue among members. Conferences were viewed as the panacea to high operating costs and to volatile, preferential freight rates, which made it difficult for shipping firms to compete. Although shippers were not required to join a conference, the stability offered by published freight rates and set service schedules ensured earning potentials for member shipping firms.

The cartel-like conference system also assured freight forwarders and customhouse brokers payments (or commissions) amounting to 1.25 percent of freight rates.[45] Carriers also benefited from antitrust immunity. Consequently, by the 1950s the conference system comprised more than 350 separate conferences that established rates and fixed schedules on particular routes for the transport of containerized goods.[46]

Dismantling the system of shipping conferences has been one of the more notable trends in maritime commerce. Deregulation, which has fomented consolidation among shipping agents, has been an revolutionizing force in maritime trade. Both shipping deregulation and consolidation have helped the shipping industry expand to new markets, increase volume capacities, and provide new services to customers. The increased power these agents have in determining the overall distribution costs of goods has instigated changes in the nature of the industry itself.

Deregulation

As trade flows increased and as maritime commerce became more competitive, shippers pressured for changes in maritime regulations. In 1998, shippers negotiated with carriers in an attempt to

- receive competitive rates,
- be made aware of pricing information,
- know availability of space, and
- acquire the right to engage in confidential contracting.[47]

After months of negotiations, carriers finally agreed to shippers' demands as long as shipping deregulation preserved carrier antitrust immunity protections. The passage of the Ocean Shipping Reform Act (OSRA) of 1998 dismantled the system of published rates and open contracts while maintaining carrier antitrust immunity. Specifically, OSRA created an environment in which carriers can establish confidential rates with shipping firms. Because contracts and rates can be kept private, importers and exporters pay "special" rates to shipping firms for added services, creating a more competitive environment in which shippers now operate. With confidential contracting arrangements, large shipping firms are joining efforts in shipping associations that allow them to "leverage cargo volumes to get better rates and services without sharing those terms with competitors."[48] This increase in bargaining power resulted in reduced freight rates and shipping costs, thereby eliminating the need for conference membership. Hence, as a consequence of the deregulation of maritime commerce, conference membership diminished in favor of more-powerful carrier alliances and shipping associations.

One of the more controversial issues surrounding the OSRA debate was antitrust immunity. Initially, a leading justification for antitrust immunity was the protection of American-owned carriers who would not have been able to compete with foreign lines without such immunity. However, now that the U.S.-based Sea-Land has been acquired by Maersk, a Danish carrier, the justification for antitrust immunity has diminished.

Nevertheless, complaints of carrier rate abuses have prompted Rep. Henry Hyde (R-Illinois) to question the necessity for carrier antitrust immunity in the U.S. Congress. Representative Hyde's new proposal calls for the elimination of carrier cooperation, including carrier alliances and other cooperative agreements between shippers and carriers. In a statement addressed to Delmond Won, a member of the Federal Maritime Commission, Representative Hyde asserted that "container shipping would become more competitive if carriers were not allowed to discuss and agree on rates."[49] Carriers and the National Industrial Transportation League support a wait-and-see approach, giving the new law time to adjust to market conditions.[50]

If large shipping firms benefit most from the deregulation arrangements of OSRA, freight forwarders and customhouse brokers lose out significantly. OSRA has made it more difficult to obtain rate information, squeezing forwarders and non-vessel operating carriers (NVOCs), who depend on rate commissions, out of business. NVOCs support the proposal initiated by Rep. Hyde as they were excluded from OSRA's confidential contracting provisions.

Although OSRA has made it more difficult for intermediaries to operate, ports have not been directly affected by OSRA deregulation. In fact, due to port anti-immunity protections, ports can discuss and set tariff and freight rates. For this reason, the American Association of Port Authorities supports the "appropriate balance between antitrust immunity and effective regulatory oversight by the Federal Maritime Commission," in order to show that port antitrust immunity is working as intended.[51] Nevertheless, the greater bargaining leverage realized by shipping associations and carrier alliances in the face of expanding trade, has made seaports more competitive in terms of providing services and meeting customer needs.

Consolidation, Conferences and Alliances

By the late 1990s, expansions in transport technologies enabled carriers to achieve greater economies of scale in regard to vessel size. In conjunction with maritime deregulation, these changes rendered conferences obsolete and caused conference membership to shrink significantly. Following an increase in carrier competition and vessel carrying capacity, carriers reduced the number of port calls in their weekly schedules. Established systems of rates and service frequencies offered by conference membership were rendered ineffectual; and, one result was that in the year following the passage of OSRA, conference membership in the Trans-Atlantic Conference Agreement (TACA) diminished from 15 to 9 members.

Replacing conferences as a form of cooperation between carriers and shippers, a new type of cartel, the shipping alliance or consortium, has evolved. Alliance members share a compatibility of interests or common goal served by different service routes and capabilities. Keeping their individual corporate identities, alliance members will cooperate on port investments, feeder and ocean liner contracts, insurance, and legal activities, as well as vessel and container maintenance and repair.[52] Alliances operate with a common goal to transport goods at the lowest cost, which, unlike conferences, allow individual shipping firms to formulate associations that pool cargo on larger vessels through "space-charter agreements."[53] Space-sharing agreements pare down the number of carrier service calls along a particular route, enabling the vessel to operate closer to capacity.

Maritime deregulation also has resulted in continuing consolidation of major ocean carriers. Table 2.2 shows 1999-2000 consolidation activity in terms of company acquired, market niche/region served, and purchaser. The most prominent acquisitions in 1999 were Maersk's purchases of Sea-Land for $800 million and Safmarine Container Lines for $240 million. Such consolidations are not likely to end soon.

Table 2.2
Liner Industry Consolidation, 1999-2000

Company Acquired	Market Niche/Region	Purchaser
Safmarine Container Lines	North-South	Maersk
Tasman Express Line	Regional (Australasia)	P&O Nedlloyd
Barbican Line (part)	South-South	Hamburg-Sud
Barbican Line (part)	South-South	Safmarine
Grupo Line*	North-South (S. America)	CSAV
Montemar*	North-South (S. America)	CSAV
Transroll International	North-South (S. America)	Hamburg-Sud
South Pacific Container Line	Pacific Islands	Hamburg Sud
Sea-Land	Global	Maersk
Crowley American Transport (part)	North-South (S. America)	Hamburg Sud
Harrison Line (part)	North-South (E. Africa)	P&O Nedlloyd
OTAL	North-South (w. Africa)	Delmas
Americana Ships**	2nd tier East-West & North-South	CP Ships

* Liner interests only.
** Purchase of 50% of company not already owned.
Source: Charles Wesley Orton, "Container Carrier Consolidation Continues," *World Trade*, Vol. 13, no. 8 (August 2000), p. 50.

As consolidation continues to occur, an alliance's entry into new markets becomes easier.[54] Because carriers are able to employ a greater percentage of vessel capacity, the high fixed costs associated with economies of scale and megaship vessel designs can be recovered. The failure of carrier alliances to reduce underutilization will result in the failure to reduce overall shipping costs.

In regard to port operations, consolidation has increased the stakes for which ports must compete because alliance membership enables shipping lines to bargain for more services at lower costs. In order to attract cargoes from alliances, seaports must provide the diverse range of services discussed earlier in the chapter in a cost-efficient manner. The consolidation of carriers into a few large agents will further increase and expand maritime commerce by encouraging larger vessel designs and the adoption of hub-and-spoke port systems to recover costs. For example, as shipping firms and carriers rely more and more on alliances and consortiums, they will call on fewer ports, cutting down the number of schedules servicing certain ports altogether. As alliances continue to cut costs and consolidate business, a small number of ports will emerge as regional hub ports to coordinate the transshipment of goods.

Notably, the trend for shippers and carriers to form alliances has failed to capture a part of the industry with the most potential for gain, the land-based transport network. Because of the uncertainty toward alliance commitments, efforts to include land-based transport systems, which account for 40-75 percent of shipping costs, have been unorganized.[55]

Transshipment

Perpetuated by expanded trade and economies of scale in shipping, as well as by the consolidation of carriers, transshipment has revolutionized maritime commerce by altering the linkages between shipper, carrier, and seaport. Following the revolution in intermodal capabilities, transshipment has yet to develop to its full potential. For ports with no room to expand, transshipment provides an alternative to intermodal activity, which subsequently requires significant storage area capability. Transshipment is also an option for megaships that tend to call on fewer ports in order to increase cost efficiency.

In terms of costs, transshipment allows vessels to incur lower unit costs by using larger vessels, increasing services per week per port destination and the number of port calls. Table 2.3 illustrates the effect transshipment has on ship miles, port calls, and container moves by comparing transshipment to direct services. Although trade movements are not changed, the use of larger vessels and transshipment services increases the number of port container moves by 75 percent while reducing the number of ship miles by 73 percent. Services per week per destination and per origin also drastically increase, meaning that seaports must expand their operations to meet greater demand.

Transshipment has revolutionized the manner in which goods are distributed at seaports because it has changed the way in which vessels interface with ports. Specifically, increasing reliance on transshipment has created the hub-and-spoke port system. This method of shipping goods transfers containers from a "mother" vessel or main line to smaller "feeder" vessels at a centrally located "hub port." The smaller feeder vessels then transport goods to and from other smaller "feeder" ports in the region. Because of the characteristics of the mainline/feeder vessel interface at a hub port (low storage needs, cargo-handling equipment with capacity to work with larger vessels), hub ports are divesting themselves of intermodal activities and focusing purely on transshipment. In order to become a viable hub port, the seaport must

- experience a large volume of containerized imports and exports and a "balanced cargo baseload";
- charge market-based dues and tariffs;

- be located near or on major trade routes and the hinterland of alternate ports;
- offer adequate infrastructural capability: berth width 900-1,100 feet, 3-4 gantry cranes with post-Panamax capability, 40-50 acres of berth storage area, on-dock railway systems, and at least 14-15-meter draftage;
- have access to available feeder services that are able to provide the necessary frequencies of service, technologies, and freight rates; and
- ensure labor stability.[56]

Table 2.3
Comparison of Direct Services Using Transshipment

	Direct Services	Transshipment Services	% Change
Trade movements	16,000	16,000	-
TEU miles	80,308,000	87,416,000	+9
Ship miles	80,308	21,854	-73
Port calls	32	56	+75
Port container moves, TEU	32,000	56,000	+75
Services per week per destination.	1	2	+100
Services per week per origin	1	4	+400
TEU per vessel for majority of voyage	1,000	2,000	100

Source: United Nations, Economic Commission for Latin America and the Caribbean (ECLAC), *Concentration in Liner Shipping: Its Causes and Impacts for Ports and Shipping Services in Developing Regions*, by Jan Hoffman, LC/G. 2027 (Santiago de Chile, August 17, 1998), p. 78.

In order for ports to make the investment decision to provide transshipment services, however, ports need to take the competitiveness and the volatility of transshipment into consideration. A factor is that transshipment is not dependent on any hinterland market or commercial area in and around a port. Transshipment centers also tend to handle greater proportions of nonlocal cargo. Thus, the nature of transshipment itself is a risky investment for a port as the transshipment cargo is not bound to continuing carrier service to any port. Increased competition among ports for transshipment cargo means that ports must maximize productivity at the lowest possible cost to warrant significant transshipment activity.[57]

Winners and losers in transshipment will be diverse. In terms of winners, the transshipment port, exporters and importers, and port operators will win because of the increase in the volume of cargo from other nations and the wider range of transport options for trade distribution. Also benefiting in the transshipment revolution are the east-west carrier routes. Because of the volume of trade on these routes, transshipment will call for the use of economies-of-scale vessel technology, such as megaship vessel deployment, decreasing transport costs and increasing carrying capacity. In turn, however, demand for north-south service will fall.[58]

Privatization

Similar to maritime deregulation and consolidation, privatization of seaports has been a revolutionizing force as it has facilitated an expansion in maritime commerce. Since the early 1950s, the public sector has controlled most of the common user and containerport facilities in the world, whereas private-sector activity managed most of the bulk port facilities. In the late 1990s, however, governments sought to privatize ports in an effort to reduce public-sector deficits and to free the use of port subsidies for other activities.

Between 1990 and 1998, 112 port privatization projects were undertaken and secured involving more than $9 billion of investment commitments from the private sector in 28 developing countries.[59] Of these projects, the World Bank's Private Participation in Infrastructure (PPI) database shows several distinct patterns. First, privatization contracts are most often carried out to produce a landlord seaport model. Contracts comprise long-term concession contracts involving private participation in the management and operation of port facilities. These contracts require significant investment commitments in existing public infrastructural assets, while the public port authority retains ownership of the land.[60]

Second, the PPI database has also identified regional trends in privatization. Aside from focusing on developing countries, new efforts to increase private participation in port facilities have been concentrated in East Asia and Latin America. Within these regions, the database also shows that privatization projects are concentrated in only a few countries; on average, five countries account for roughly half of all privatization projects in the Latin American region.[61]

Third, in terms of privatization project types, 49 projects have been operations and management contracts with capital expenditure requirements, while 20 projects do not require capital investments in existing infrastructure (mostly lease projects) and 35 projects have been "greenfield developments," or new port facilities.[62]

Revolution in Services

Dr. Asaf Ashar of the National Ports and Waterways Institute in Arlington, Virginia, predicts that there will be another revolution in maritime transport, concentrated in shipping services and service patterns. He argues that the expansion of the Panama Canal's lock system and the emergence of an equatorial round-the-world (ERTW) trade pattern will perpetuate this trend. With the emergence of ERTW, Dr. Ashar asserts that vessel size will further expand to almost 15,000 TEUs and that special ports will function purely as transshipment centers.[63]

Providing the most efficient round-the-world service, an ERTW trade pattern would call for ships to sail between Gibraltar and Panama, bypassing North American and European ports. Feeder services would then shuttle to and from ports along this route. Such a route will only be possible, however, if the Panama Canal can expand its lock system to handle megaship dimensions.[1] A daily feeder frequency of 84 ships in two directions, in conjunction with six 15,000-TEU ships (which make stops at seven pure transshipment ports), will realize a capacity of 10 million TEUs per year, per leg.[2]

Maritime Trade in Latin America

Long distances, low population densities, and poor inland infrastructural capability make maritime commerce the preferred method of transporting goods to and from Latin America. Despite its dominance in terms of transport, maritime trade in Latin America is not seamless. Ports differ from state to state in terms of infrastructural capability, technological expertise, governmental regulations, tariff requirements, and customs procedures, making it difficult for liners to operate efficiently on a north-south trade route in Latin America.

However, in light of global maritime trends, Latin American seaports have started to respond to calls for modernization and liberalization of their maritime systems. The impacts of global increases in containerization and economies of scale in shipping, in addition to revolutions in intermodal transport, transshipment, and privatization, will ultimately shape the manner in which Latin American seaports develop to take advantage of a more competitive shipping environment.

Overview of Latin American Trade

Although developed and developing countries alike have exhibited growth in trade, Latin America holds the greatest potential to benefit from the dynamic relationship between transportation and trade. As a percentage of global trade flow, Latin American trade accounted for 5 and 6 percent of the total value of world imports and exports, respectively, in 1998. While the value of exports to Latin America has increased almost $200 billion from 1980 to 1998, the value of imports to Latin America has almost tripled to $340 billion in 1998.[3]

But how do seaports configure into Latin America's rapidly expanding markets? In Latin America, seaborne trade is especially important, as it is the most cost-effective means of transporting goods. Not only are Latin American markets separated by significant distances, but also the interior land-based transportation infrastructures, such as highways and railways, are inadequate to service the needs of expanding markets. For instance, highway transportation costs in Brazil are more than 60 percent higher than highway transport costs in the United States.[4]

Because of the high costs of surface transportation, maritime transport remains the preferred method of shipping goods to and from Latin America. More than 95 percent of goods traded in Latin America pass through seaports and of that trade, 30-40 percent is carried on major ocean carriers. (see Table 2.4 for the largest Latin American seaports).

Illustrating the imbalance in Latin American sea trade, roughly five nations account for most of the region's trade. The East Coast, north-south market in Latin America, is the second largest north-south market in the world. Brazil alone accounts for two-thirds of this corridor's total trade. In terms of containerized throughput, greater containerization and transshipment rates give Caribbean and Central American markets 63 percent of the total regional container trade, whereas South American markets account for only 37 percent.[68]

Table 2.4
Ten Largest Latin American Seaports by Volume

(thousand metric tons)

Port	1998	1997
Tubarao (Brazil)	69,575	72,713
Itaqui (Brazil)	50,267	51,271
San Sebastiao (Brazil)	42,370	41,990
Santos (Brazil)	40,419	38,472
Sepetiba (Brazil)	24,908	26,575
Aratu (Brazil)	19,139	15,895
Paranagua (Brazil)	19,127	18,935
Buenos Aires (Argentina)	18,788	15,705
San Lorenzo (Argentina)	18,643	14,501
Angra dos Reis (Brazil)	18,389	12,898

Source: ECLAC's Perfil Maritimo, as reported in Jan Hoffmann "After the Latin American Privatizations: The emergence of a 'Latin American Model'"(paper presented at a conference on "Latin Ports and Shipping", Miami, FL, October 1999), p. 6.

Latin American markets also exhibit extreme volatility because of the sensitivity of Latin American economies to global economic changes. Currently, for example, economic problems in Brazil have affected southbound cargo volumes. The Port Import/Export Reporting Service (PIERS) reported that southbound cargo volumes fell 32 percent in the first nine months of 1999, whereas northbound cargo volumes rose 23.8 percent.[69] Yet, the market is expected to recover by 5 percent in both north- and southbound cargoes in 2000. An inconstant rate of return makes it difficult for carriers to continue and expand investment opportunities in Latin American seaports.

The evolutionary and revolutionary trends in maritime trade have not been isolated to the most advanced markets in the world, but they have penetrated the most underdeveloped markets, such as in Latin America, inciting changes in the way in which regional seaports operate.

Containerization and Expansion

Container trade in Latin America has increased concurrent with global trade, although trade has not increased to the point to warrant the penetration of megaships into Latin American ports. As a percent of global container trade, Latin American container trade accounts for 6.4 percent of the world total, amounting to a projected 11.7 million TEUs in 2000.[70] Expected to grow over the next decade, the World Sea Trade Service predicts that Latin America will generate from 3.35 million TEUs of container trade in 2000 to 6.73 million TEUs in 2010.

Latin American markets are the second most important markets to U.S. container trade compared to Asian markets, which command the greatest proportion of U.S. container trade. Expanding its share of the percentage of gulf container traffic from 1986-96, Latin American container traffic increased 292 percent, comprising 19 percent of total U.S. container traffic in 1996.[71] As a percentage of U.S. container trade, exports to Latin America are forecast to grow by 6.9 percent in 1999, while imports are expected to grow by 8.8 percent.[72]

Accentuating the importance of the north-south trade route along Latin America's Atlantic coast, PIERS found that in terms of containerized cargo, "The fastest growing containerized trade routes have been to and from Latin America. The success of MERCOSUR and other market-opening measures have resulted in a flood of capital equipment and industrial inputs south-bound, and consumer and agricultural goods north-bound."[73] As volumes increase, Latin America will become a significant market for liner companies seeking to capture a greater share of that trade. Serviced by the largest number of carriers on any trade route, more than 30 liner companies presently compete for service along the U.S.-Brazil, north-south Atlantic route.[74]

Despite the growth in container trade to Latin America, transport costs have not been minimized completely, because total capacity for containerized trade on all trade lanes have not yet been realized. Nearly one-fifth of all shipped containers are empty; in Latin America, this amounts to almost 30 percent of port volume.[75] In terms of trade-lane capacity, the Atlantic north-south trade lane uses only 48 percent of its import capacity for containerized trade, while utilizing only 61 percent of its export capacity. The north-south lane for the Pacific coast of South America does slightly better, utilizing 60 percent of its import and export capacity.

Aside from the fact that infrastructural inadequacies and shallow-draft depths preclude Latin American ports from attracting megaships, the volume of cargo necessary to offset fixed costs and fuel expenditures is not justified. Currently, most ships servicing Latin American ports lie in the 1,500- to 2,500-TEU range. To illustrate this point, consider that a 1,500-TEU carrier operating at 80 percent capacity in Latin America would support 107 weekly vessel sailings in 2000 if the present growth trend were to continue. If the size of the carrier were to increase to more than 4,000 TEUs at 80 percent capacity in 2010, Latin American markets could only support 40 sailings.[76] This conjecture illustrates the fact that as ship sizes increase, the number of port calls will fall. At current modernization levels and feeder frequencies, megaship use for transshipment purposes is not justified.

Intermodal Developments

Intermodal development in Latin America is riddled with several challenges. Foremost, poor internal highway infrastructure, long distances, and cargo hijackings make it extremely difficult for shippers to rely on intermodal transport as a means of shipping goods. Highlighting the problems faced because of poor in-country transit, the city of Bogotá, Colombia, lies more than 200 miles away from the major Colombian ports of Buenaventura and Cartagena. Significant insurance risks are undertaken then when relying on in-country transit, such as trucking over rugged and insecure terrain.[77]

Additionally, disparities within the region in regard to rail gauge, custom restrictions, and highway tolls make in-country transit a real problem for many shippers. Intermodal access for product distribution is thus retarded by the lack of coordination between Latin American nations in terms of land transportation investment projects, which are needed to provide better, more secure service to hinterland markets.

Consolidation, Deregulation, and Transshipment

Consolidation, in terms of the use of larger shipping vessels, the increased influence of shipping and carrier alliances, and fewer port calls, will have a significant effect on seaports in Latin America. Seaports will be forced to compete more intensely for liner cargoes, especially in smaller markets like Latin America. As the industry becomes more consolidated, seaports in Latin America will increasingly rely on a hub-and-spoke system with an extensive feeder network that is serviced by smaller vessels. In this system, liner services will be added and port traffic will increase.

Supporting evidence of expansion and consolidation of maritime trade, Latin America liner services are changing. For instance, its purchase of Crowley American Transport's South American service will enable Hamburg-Sud to carry a 30 percent share of the South American market. Liner services from Europe to the Mediterranean and then on to the Atlantic coast of North America continue service to both coasts in Central and South America through Hamburg-Sud's Crowley American Transport, Columbus, Alianca, Transroll International, and Hamburg-Sud lines. The liner now carries 300,000 TEUs per year on its North America-South America service route.[78] Notably, the expansion of Hamburg-Sud's South American service follows the decision by Evergreen to cancel 50,000 TEUs of its South American liner service.

Additionally, the Australia-New Zealand Direct Line (ANZDL) has added liner service to the Port of Manzanillo in Mexico. Port calls in Manzanillo are expected to cut transit times from Mexico to Australia by nine days. Robert Beilin, ANZDL's senior vice president, believes that expansion in Manzanillo will be a starting point to greater investment in Central and South America. ANZDL's decision to transship at Manzanillo was based on scheduling problems and liner space availability.[79]

Even if Latin America does not attract megaship carriers, seaports in Latin America will feel the effects of consolidation and expansion in shipping. Consolidation will reduce the number of port calls and service frequencies at ports, increasing competition between regional ports to attract cargo. Therefore, regional ports and carriers are relying more on increasing the transshipment potential for local and nonlocal cargo in regional ports.

Additionally, because many Latin American ports are located close to urban areas, available land for expansion possibilities is scarce. The ports of Buenos Aires, Valparaíso, Callao, and Montevideo are good examples of ports with almost no expansion potential. To overcome shortages in land space, ports must increase productivity with existing resources and governments need to encourage the design of new ports, or greenfield developments. For most of these existing ports with scarce land resources, there exists potential to garner transshipment cargo in order to be competitive.

The search for a prominent regional hub port or transshipment center and feeder service has been fueled by the expansion in vessel size, which subsequently requires fewer and fewer port calls than direct service. Hub ports within the transshipment system are also a real possibility for several Latin American ports and will provide a place for smaller ships to remain competitive as feeder vessels. The most likely candidate for a hub port is in Panama, where some shippers want to see the Panama Canal become more than simply a shipping lane. However, the potential for Panama to become a hub port depends in large part on the expansion of the lock system to accommodate vessels of larger sizes. The hub potential for the Panama Canal and existing ports in Colón, Balboa, Cristóbal, and Manzanillo will be explored in the case studies section of this chapter.[80]

Other possibilities for hub ports include the Puerto Limón (Costa Rica), Suape (Brazil), Sepetiba (Brazil), and Santos (Brazil). Although ports in Argentina meet the criteria for volume and feeder frequencies, they will not mature into candidates for hub ports because of their insufficient channel depths.[81]

Seaport Privatization, Investment, and Competition in Latin America

Leading the trend in private-sector participation in seaports, Latin America has improved its position as a region where the private sector plays a substantial role in port operations. More than 48 privatization projects with investment commitments of over $2.5 billion have been completed. By 1998, Argentina, Brazil, the Bahamas, Colombia, Jamaica, Mexico, and Panama privatized publicly owned seaport facilities and operations. For example, investment in Panama's four new private container facilities in Balboa, Colón, Cristóbal, and Manzanillo International Terminal totaled more than $380 million. Likewise, substantial private investment has also been made in Mexico's four major container facilities at Manzanillo, Ensenada, Altamira, and Veracruz.[82] Consequently, privatization in Panama and Buenos Aires realized increases in volume as well as productivity gains. Attracting more containerized trade, the newly privatized seaports of Cartagena, Veracruz, and Santos have realized volume and productivity increases, as well as decreases in employment.[83]

Future developments increasing private-sector access have also been planned. Although the seaports located on the Atlantic coast of Latin America have been the most successful in completing privatization projects, seaports on the Pacific coast are planning to increase private-sector investment in port operations. Buenaventura, Callao, and Guayaquil have already begun the privatization negotiation process. On the Atlantic coast, the next ports scheduled for privatization are Puerto Cabello and Montevideo.

As the trend for privatization in Latin American seaports is increasing, several characteristics unique to the region have been identified. In a presentation made to the

Latin Ports and Shipping Conference (October 1999), Dr. Jan Hoffmann described the "Latin American Model."[84]

The model of the typical port illustrates that most privatized ports in Latin America have adopted a landlord port management model with significant private investment in seaport infrastructure and private operation of seaport services. Private companies are usually granted 12- to 30-year concessions. In terms of TEU throughput, the major Latin American landlord ports in 1998 were Buenos Aires, Exolgan, Colón, Santos, Kingston, and Puerto Limón. Concerns over labor disputes, tariff fixing between private operators and government involvement requiring seaports to remain active providers of certain social services remain as obstacles to fully realizing the benefits offered by privatization.

In contrast to containerports, most specialized bulk terminals have historically been privately owned and operated. Out of the ten largest Latin American seaports, more than two-thirds of regional imports and exports are handled by privately owned or run specialized bulk terminals.[85]

Also, aside from the privatization of existing port facilities, private-sector investment in maritime transport has begun to concentrate on building new private ports and terminals called "greenfield developments." Available land resources, political liberalization, and growth in foreign trade have prompted private companies to establish new terminals or ports in many Latin American countries. For instance, Stevedoring Services of America (SSA), a large U.S.-based port management firm, established the Manzanillo International Terminal (MIT) in the Port of Colón.[86]

In regard to port operations, there is a significant presence of foreign companies that have been contracted to oversee seaport management. The lack of local technical knowledge has encouraged governments to attract greater participation by foreign companies by contracting out port operations. Companies like SSA and Hutchinson Port Holdings have been contracted to operate port and terminal facilities in Panama.

In spite of greater governmental encouragement for participation by foreign companies, problems still exist. Maersk has also attempted to invest in a private terminal in Montevideo, and Evergreen Marine Corporation has invested in the operation of a private terminal at MIT in Panama. Attesting to the continued difficulties with privatization, Maersk's acquisition of a concessionary agreement in Montevideo has been negated by the national port administration because of pressure from the local company that had lost the concessionary bid to Maersk. Evergreen, too, faces problems at its terminal in Panama as it has failed to realize sufficient cargo volume to offset investment costs. Thus, restrictions to foreign participation remain in terms of land ownership, low rates of investment returns, uncertainty of reneging on concessionary agreements, and local companies who hold a significant market share.[87]

Small competitive seaports also typify the Latin American port. Most Latin American ports are described as small ports that engage in intra- and inter-port competition. Because of geographic obstacles, low population densities, and low average investment per port privatization project ($52 million per project compared with $106 million elsewhere in the world), many small ports still operate in the region.[88]

Most of these private-sector projects have involved investment commitments in existing public infrastructural assets, allowing the port to refurbish and modernize cargo-handling equipment. As a result, port privatization activities have been successful in improving the quality of service and have been able to reduce transportation costs.

Sustaining competition will be a function of a market-based regulatory framework that encourages competition among terminals, ports, and land-based modes of transportation. Furthermore, competition policies should be coordinated at a regional level to prevent domination by port operators and to equalize the competitive environment in which ports must operate.[89]

Sal Litrico, vice president of Operations at Gulfcoast Transit, contends that liners servicing Latin American seaports continue to face challenges posed by outdated infrastructures, complex regulatory regimes, high import duties, poor labor relations, and lengthy customs delays. For a shipper to operate in Latin America, he argues that a liner must operate with a complete understanding of weather conditions, regulatory structures specific to each nation, work-stoppage histories, and inspection requirements, as each of these factors will affect the costs of doing business. In addition, the disparities in infrastructural capability between ports in Latin America make it extremely difficult for liners to service a particular route. For instance, Litrico indicates low channel depths and poor labor relations have kept Gulfcoast Transit from servicing ports in Argentina. An unstable history of labor relations and complex regulatory regimes make it equally difficult for liners to service ports in Brazil.[90]

Tom Boyd, spokesman for Maersk Inc., indicates that aside from the physical challenges, the most important factors taken into consideration when selecting seaports in Latin America concern local investment commitments and labor relations. Liner companies look for assurances that local port authorities will continue to make necessary infrastructural upgrades needed to handle larger cargo volumes in an expedient manner.[91]

Case Studies: Seaports in Argentina, Brazil, Mexico, and Panama

As previously mentioned, Latin American seaports share certain common characteristics. Most privatized seaports are managed through a landlord port infrastructure, and port infrastructures usually accommodate vessels in the 1,500- to 2,000-TEU range. However, distinct differences also exist in terms of intermodal capability, labor relations, and space for future development. The following case studies of seaports in Argentina, Brazil, Mexico, and Panama illustrate the potential for growth in maritime trade throughout Latin America. They also typify some of the challenges that ports face as gateways for transportation corridors.

The Panama Canal

Panama possesses the world's largest open registry of ships (9,796 in 1998) and four new containerports representing a total investment of over $4.5 billion. About 14,000 ships, 192.2 million tons of cargo, and 100,000 passengers transited the Panama Canal in 1998.[92] The ports, combined with the trans-Isthmian railroad, are projected to move two million TEUs in cargo containers by 2002, as compared to the one million TEUs that were projected for 1999. Major opportunities for development of new businesses include additional ports; shipyards and maritime services, such as the storage, distribution, and transport of cargo; financial and administrative services; insurance coverage; ship supplies and maintenance; and tourism enterprises. Because of increased traffic and modern port facilities, Panama is expected to become the region's principal multimodal logistics center in coming years.

In 1903, Panama and the United States signed a treaty by which the United States undertook to construct an inter-Oceanic ship canal across the Isthmus of Panama. The following year, the United States purchased from the French Canal Company its rights and properties for $40 million and began construction. The monumental project was completed in ten years at a cost of about $387 million and the lives of thousands of laborers. Since 1903, the United States has invested about $3 billion in the canal enterprise, approximately two-thirds of which has been recovered.[93]

The building of the canal involved three main problems: engineering, sanitation, and organization. Its successful completion was due principally to the engineering and administrative skills of such men as John F. Stevens and Col. George W. Goethals and to the mitigation of health- and sanitation-related problems by Col. William C. Gorgas. The engineering problems involved digging through the Continental Divide, constructing the largest earth dam up to that time, designing and building the most massive canal locks ever envisioned, and solving environmental problems of enormous proportions.[94]

More than 80 years after the first official ocean-to-ocean transit of the waterway, the United States and Panama embarked on a partnership for the management, operation, and defense of the canal. Under two new treaties signed in a ceremony at Organization of American States headquarters in Washington, D.C., on September 7, 1977, the canal would be operated until the turn of the century under arrangements designed to strengthen the bonds of friendship and cooperation between the two countries. The treaties were approved by Panama in a plebiscite on October 23, 1977, and the U.S. Senate gave its advice and consent to its ratification in March and April 1978.[95] The new treaties went into effect October 1, 1979. As a result of the new treaties, the Panama Canal Commission was created to manage, operate, and maintain the canal, its complementary works, installations, and equipment and provides for the orderly transit of vessels through the Canal. The commission replaced the former Panama Canal Company, which was disestablished on October 1, 1979. The commission was supervised by a nine-member binational board with a Panamanian serving as administrator and a U.S. citizen as deputy from January 1, 1990, until December 31, 1999. At that time, the United States transferred the canal to Panama as required by treaty and the Panama Canal Commission became the Panama Canal Authority.

Management and Administration

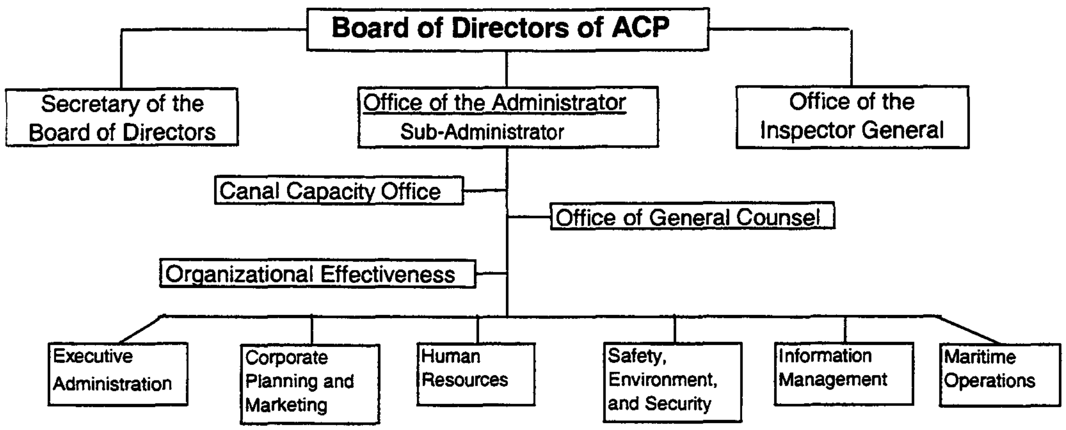
The Panama Canal Authority (Autoridad del Canal de Panama, or ACP), an autonomous legal entity established under public law, is exclusively in charge of the administration, operation, conservation, maintenance, and modernization of the Panama Canal.[96] An administrator and a deputy administrator, under the supervision of an 11-member Board of Directors, lead the Panama Canal Authority. The administrator is the canal's chief executive officer and legal representative of the Panama Canal Authority and is responsible for the administration and implementation of the policies and decisions of the Board of Directors. The administrator is appointed to a seven-year term and can be reappointed for an additional term.

In accordance with the political constitution of the country and the Panama Canal Authority Organic Law, the Panama Canal Authority Board of Directors has the primary responsibility of establishing policies for the operation, improvement, and modernization of the Canal, as well as supervising its management. The appointment of the first Panama Canal Authority Board of Directors was done for staggered periods to guarantee its independence from any given governmental administration. The 11 members of the Panama Canal Authority Board of Directors are appointed as follows:

- The president of the Republic of Panama appoints nine directors, who must be approved by the Cabinet Council and the Legislative Assembly by a majority vote.
- The Legislative Assembly designates one director.
- The president of the republic designates one director, who shall chair the Board of Directors and carry the rank of Minister of State for Canal Affairs. The minister shall have a say and may exercise voting rights in the Cabinet Council.

An advisory group has been formed consisting of the presidents of several shipping lines and other represented interests to assist the Panama Canal Authority with safeguarding the future of the Panama Canal. The 11-member board provides advice on canal business matters and on future development and modernization plans.[97] The board includes the presidents of Maersk Sea-Land, Evergreen Marine Corporation, Mobile Shipping and Transportation Company, Embiricos Shipbrokers Ltd., and Orient Overseas Container Line. Other represented interests include the Port of New York and New Jersey, the International Maritime Organization, and the United States-Panama Business Council.[98] The board's first president is William O'Neil, secretary general of the International Maritime Organization.

Figure 2.1
Organization of the Panama Canal Authority



Source: Panama Canal Authority, "General Information." Online. Available: http://www.pancanal.com. Accessed: February 5, 2000 (Panama Canal Web site).

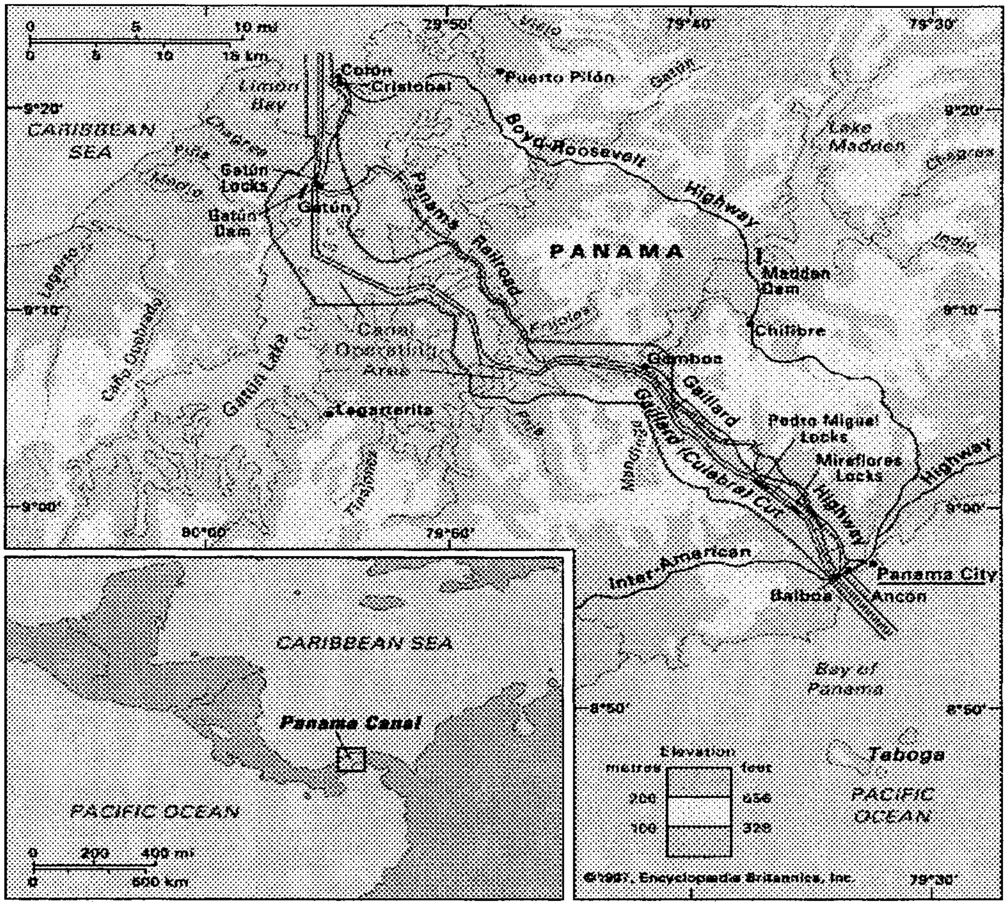
Physical Features of the Waterway

The Panama Canal is 80 kilometers (50 miles) long from deep water in the Atlantic Ocean to deep water in the Pacific Ocean. It was cut through one of the narrowest and lowest saddles of the long mountainous isthmus that joins the North and South American continents. The original elevation was 95 meters (312 feet) above sea level, where it crosses the Continental Divide in a rugged mountain range.[99]

The canal runs from northwest to southeast with the Atlantic Ocean entrance 54 kilometers (33.5 miles) north and 43.5 kilometers (27 miles) west of the Pacific Ocean entrance. The air distance between the two entrances is 69 kilometers (43 miles). It requires about 8 to 10 hours for an average ship to transit the canal. A ship that transits the canal from the Atlantic to the Pacific enters the channel from Limón Bay at the Cristóbal breakwater. This sea level section of the canal channel on the Atlantic is 10.5 kilometers (6.5 miles) long and 152.4 meters (500 feet) wide and runs through a mangrove swamp that is only a few feet above sea level in most places.[100]

A ship is raised or lowered 26 meters (85 feet) in a continuous flight of three steps at Gatún Locks. Each lock chamber is 33.5 meters (110 feet) wide and 306 meters (1,000 feet) long. The length of Gatún Locks, including the two approach walls, is 1.9 kilometers (1.2 miles).[101]

Figure 2.2
Panama Canal



Source: Encyclopedia Britannica. Online. Available:
http://search.eb.com/bol/topic?tmap_id=155995000&tmap_typ=ii. Accessed: March 9, 2000.

Future Plans and Sustainability

The Panama Canal established a new office in February 1998 to study options for improving canal operating systems. This office will address long-term water supply requirements, added flexibility for providing time to accomplish needed maintenance of major facilities, and project options for meeting projected increases in traffic.

These options must be evaluated to allow the Panama Canal to continue providing reliable, efficient, and competitive services for the next 50 years and beyond. This action follows several events over the past few years that reflected water limitations and the need to improve canal capacity. The severe impact of the El Niño phenomenon showed that existing water supplies would not be sufficient to meet future demand and canal capacity. A recent long-term traffic demand forecast indicated during the next 50 years the number of (ships) transits could grow to almost double the current average of 13,100 transits per year with total tonnage passed increasing even further.[102]

Table 2.5
Transit Statistical Information

Fiscal Year ending 9/30	Northbound (Pacific-Atlantic)		Southbound (Pacific-Atlantic)		Total		Total Tolls (in $)
	Vessels	Cargo	Vessels	Cargo	Vessels	Cargo	
1983	5,540	57,762,250	6,167	87,828,509	11,707	145,590,759	287,791,023
1984	5,455	62,211,519	5,775	78,259,299	11,230	140,470,818	289,155,035
1985	5,612	64,492,298	5,903	74,150,945	11,515	138,643,243	300,807,914
1986	5,712	67,229,841	6,214	725,80,652	11,926	139,810,493	322,734,202
1987	5,766	61,683,921	6,464	87,006,459	12,230	148,690,380	329,858,775
1988	5,807	65,504,306	6,427	90,978,335	12,234	156,482,641	339,319,326
1989	5,678	63,360,524	6,311	88,275,589	11,989	151,636,113	329,696,838
1990	5,667	66,107,105	6,274	90,965,873	11,941	157,072,978	355,557,957
1991	6,015	63,235,558	6,557	99,460,328	12,572	162,695,886	374,624,737
1992	6,080	62,426,847	6,374	96,845,771	12,454	159,272,618	368,662,504
1993	5,874	60,490,204	6,212	97,213,706	12,086	157,703,910	400,884,033
1994	5,985	67,943,926	6,352	102,594,511	12,337	170,538,437	419,218,757
1995	6,526	69,456,785	6,933	120,846,280	13,459	190,303,065	462,754,053
1996	6,634	73,861,964	6,902	124,206,026	13,536	198,067,990	486,688,265
1997	6,351	74,232,475	6,692	115,545,381	13,158	189,864,205	493,385,737

Source: Panama Canal Authority, "General Information." Online. Available: http://www.pancanal.com. Accessed: February 5, 2000 (Panama Canal Web site).

The Canal Improvement Program, of the Panama Canal Authority, covers three major areas: capacity, modernization and expansion, and major maintenance.[103] Capacity includes the Gaillard Cut widening, a new Miraflores Mooring Station, the Enhanced Vessel Traffic Management System, additional new locomotives and new tugboats, relocation of Paraiso Tie-up Station, and the widening of the Atlantic canal entrance. Modernization and expansion involves the locks machinery conversion and control system, upgrading and construction of locks' buildings, and expansion of the Gatún Lake anchorage. Major maintenance and replacement comprises rehabilitating locomotives, repairing concrete around locks machinery tunnels, overhauling additional miter gates, purchasing replacement tugboats, rehabilitating tow track system, replacing a caisson, restoring the SIP-3 water distribution system, dredging a part of the Cristóbal anchorage, and reactivating emergency dams. The money to cover the canal's capital improvement program will come entirely from canal revenues. The Board of Directors approved a two-step toll rate increase for the canal, with an 8.2 percent increase going into effect on January 1, 1997, and an additional 7.5 percent increase taking place on January 1, 1998. In addition, a measurement rule change to cover on-deck container ship capacity went into effect on July 1, 1997.

Ongoing improvements, including the Gaillard Cut widening program scheduled for completion in 2002, will provide short-term relief by increasing capacity and allowing more time for maintenance. Projected traffic demand is expected to exceed this increased capacity during the second decade of the new century, and plans will be evaluated to meet future capacity requirements beyond 2002.[104] Advance planning is now necessary to prepare for the future. The Canal Capacity Projects Office, of the Panama Canal Authority, will prepare a long-term master plan that will address capacity limitations and identify viable options. The plan will be a progressive time-phased program of project implementation to parallel traffic growth. The plan will provide for continuous and expanded service to the customer and keep the canal at the forefront of world trade routes. It is the vision of the Panama Canal to conceptually develop an enhanced future waterway in terms of facilities, technology, and capability that will provide more-efficient services to its customers.

By 2005, the Panama Canal Authority will have spent nearly $1 billion on canal modernization and improvement projects that will increase sustainable canal operating capacity by more than 20 percent.[105] The aggressive plan includes widening the 8.5-mile-long Gaillard Cut, expanding the tugboat fleet, increasing the number of towing locomotives, enhancing the vessel traffic-management system, and modernizing locks control and machinery. Much of this activity is part of the canal's traditional, ongoing program of maintenance, modernization, and improvements. However, record canal performances in 1995 and 1996 made it clear that some serious acceleration of programmed work had to be done before the canal was turned over to Panama to ensure a viable canal at the end of the century. At the same time, officials are taking advantage of the opportunity to incorporate applicable elements of the world's rapidly evolving technological advances into the projects.

Engineering studies are still months from completion, and officials are noncommittal about what the future will hold, but there is a growing feeling that Panama wants to widen the Panama Canal. A widened Panama canal would have the potential to fundamentally alter trade flows of both containerized and bulk cargoes. It could greatly expand the all-water route from Asia to the United States, for example, allowing shippers and carriers to bypass the U.S. West Coast. A widened canal could trigger the development of a "fourth revolution" in container shipping (ship-shore, ship-rail, and ship-ship transfers being the first three).[106] It would also offer a more competitive route for bulk cargoes, such as oil, coal, and iron ore, that now move from the Americas to Asia via the Cape of Good Hope.

Container traffic will be the fastest-growing segment of world maritime commerce, but most ships being built to carry that cargo are already too large to transit the Panama Canal. About 60 percent of the container ships ordered since January 1999 are "post-Panamax," which means they are too wide and deep to fit through the canal's 110-foot-wide locks, which allow for a maximum draft of 39.5 feet.[107] Building a new set of locks, a project originally planned in the 1930s, would cost an estimated $6 billion to $10 billion and take more than a decade to complete.[108] Panama will almost certainly have to turn to multilateral lending institutions and foreign companies for funding, and convincing them will require canal authorities to demonstrate the project is economically viable.

Intermodal Systems

Panama Railroad Company

The Panama Canal Railway Company (PCRC), a joint venture of Kansas City Southern Railroad (KCSR) and MI-Jack Products in conjunction with consulting engineers Bridgefarmer Panama, will provide ocean-to-ocean transshipment service between the Atlantic and Pacific Oceans on a railway that runs parallel to the Panama Canal.[109] During the bidding process, KCSI and MI-Jack were the only group to bid exclusively for the railroad, while Bechtel and Hutchinson Port Holdings bid for the combined port and the railroad privatization. The terms of the concession agreement are the following: PCRC will pay 5 percent of total income to the government until the total amount invested in the project (a minimum of $30 million) is recouped, and from then on 10 percent of the total income will be conceded. The term of the concession is 25 years, with the option of renewal for an additional 25 years.[110]

PCRC is finalizing plans to rehabilitate and modernize the 143-year-old transcontinental railroad. When fully operational in 2001, the 47.6-mile railroad will serve as an efficient intermodal link for world commerce and complement the existing transportation infrastructure provided by the canal, the Colón Free Trade Zone, and the port terminals.[111] A single-line, 47.6-mile track will link the port cities of Balboa and Colón with two-way traffic at strategic locations, making it possible to move freight in 1.5 hours.[112] The three to four weekly trains that currently use the track operate at speeds of less than 5 kilometers per hour. The company intends to modernize the roadbed and track to enable it to operate trains at 65-100 kilometers per hour. Continuously welded rails, new concrete ties, crushed granite ballast from Nova Scotia, and improved signaling will all contribute to reduced transit times. The gauge of the track will be changed to the U.S. standard, in order to facilitate purchases of locomotives and other rolling stock. The intermodal rail terminals will be equipped with rubber-tired gantry cranes with 90,000-pound capacity each.[113] PCRC expects to start service by the second quarter of 2001 and will provide ocean-to-ocean transshipment service with bi-directional trains running daily.[114] The 20 trains with which the line will begin to operate could be expanded to 32. KCSR plans to build a parallel rail line later that will allow trains to simultaneously move in both directions. Operations will be coordinated with port terminal operations, consignees and shippers, the Panama Canal Authority, ocean carriers, Panamanian governmental agencies and institutions, and the Colón Free Trade Zone.

The railway will serve Stevedoring Services of America's Manzanillo International Terminal, Evergreen Marine Corporation's Colón Container Terminal, Hutchinson Ports Holdings at Cristóbal on the Atlantic Ocean, and Hutchinson Ports Holdings at Balboa on the Pacific Ocean. The Balboa terminal is expected to begin operations during the first quarter of 2000. Since the Balboa and Colón terminals are free-trade zones, the railway will carry cargo in-bond between them. Although the Colón Free Trade Zone is the dominant free-trade zone, the Balboa zone could attract substantial business from Colón once the rail system is in operation.

Large ships unable to utilize the canal will be able to move materials from ocean to ocean via rail. The system will allow containers to be unloaded at port terminals and be transshipped over land in 1.5 hours, providing secure in-bond, port-to-port service. The railroad will use the new ports already in operation around the Panama Canal, including Evergreen's Colón Container Terminal, Stevedoring Services of America's Manzanillo International Terminal and Hutchinson's Balboa and Cristóbal ports and link them in a single-line track with two-way traffic at strategic locations. PCRC expects to schedule 20 train runs per day, 320 days per year, handling up to 307,200 containers per year. At maximum operation capacity (100% load factor, 365 operating days), the company plans to move 397,120 containers per year by double-tracking and double-stacking. The railroad plans to handle 220,000 TEUs in container cargo in 2002, the first full year of operation. The railway's capacity, when phase one is complete, will be 500,000 TEUs; once phases two and three are complete, the company could handle one million TEUs a year.[115]

No further blasting or excavation will be required to create the new route. Despite the original engineers' lack of technology, the alignment is good. Although the current track is in very poor condition, engineers are using locomotives to make the preliminary geographic and topographic surveys. The existing track will be used later to carry materials and personnel during the construction process. Although some of the details of the proposed railway have yet to be decided on, the concept is clear. The trains will haul double-stacked containers and will run on a single track with passing sidings. The current estimate is that the railway will carry some 220,000 TEUs annually, although the possibility of a parallel track with a higher capacity still exists.[116] The total cargo transit time, including loading, will be approximately 1.5 hours from Balboa to Colón. The total time the train is in motion will be less than an hour, making it the most rapid mode of cargo transportation between the two oceans. The train terminals will be constructed adjacent to the port cargo facilities, which will speed up cargo transfer from boat to train.

Kansas City Southern Railroad's assistant general counsel, Jay Nadlman, has noted that his company hopes to take advantage of the hundreds of thousands of freight containers that arrive on both sides of the isthmus each year and that "our goal is to move a percentage of them via land rather than via canal or truck."[117] He stated that his company was looking for opportunities to expand in Latin America and that "this opportunity was brought forward by our partners at Mi-Jack....We have a clear strategic vision of what we want to do – we want to shuttle containers back and forth" across the isthmus. "We saw a chance to develop an inter-modal business along the Panama Canal that was fairly small, fairly self-contained and seems to have a great potential opportunity," Nadlman said.[118]

Shippers and shipping companies may have to rewrite their logistics programs when the project is complete. There has been about $1 billion of investment in various types of terminals in Panama over the last five years, and with this new capability, shippers will have all kinds of choices. It is going to affect all the shipping companies' matrixes in terms of ship deployment and vessel sharing. The World Bank's private-sector lending arm, the International Finance Corporation (IFC), announced on November 30, 1999, that it is taking a $5 million equity stake in the project, making a $15 million loan, and syndicating another $30 million loan from ABN AMRO Bank, Deutsche Verkehrs Bank and Dresdner Bank, according to Jannette Esguerra, an IFC spokeswoman.[119] Since the Balboa and Colón terminals are free-trade zones, the railway will carry cargo in-bond between them. Colón is the largest free-trade zone in Latin America, but the Balboa zone could attract substantial business from Colón once the rail system is in operation.

Those plans in all probability will dash hopes that other countries have had to establish competing rail lines linking the Atlantic and the Pacific Oceans. Alternatives have been considered for a number of years in Colombia, Costa Rica, and Nicaragua, where the distances between oceans are greater than that of the Panama project. "When this one (in Panama) is done, there is no way that any other country's option will be cost-justified, based on our costs," said David Starling, president of the Panama Canal Railway Company.[120]

Corredor Norte (Northern Corridor) and Corredor Sur (Southern Corridor)

The Northern Corridor and Southern Corridor are toll highway projects built by the Mexican construction company PYCSA.[121] The Northern Corridor toll highway links Panama City on the Pacific Coast with Colón on the Caribbean coast at a construction cost of $325 million. PYCSA estimates that around 2,200 vehicles will use the Northern Corridor daily with a toll per vehicle from $.25 to $1.50. According to PYCSA calculations, a car will consume half a gallon of gasoline (cost of roughly $0.85) on the current roads from one extreme area to another that the corridor covers. With the new corridor, those automobiles will save more than half that amount of gasoline and arrive at their destinations faster. Currently, the highway extends from Panama City to Tinajitas and from Tinajitas the highway merges with the old highway to Colón.

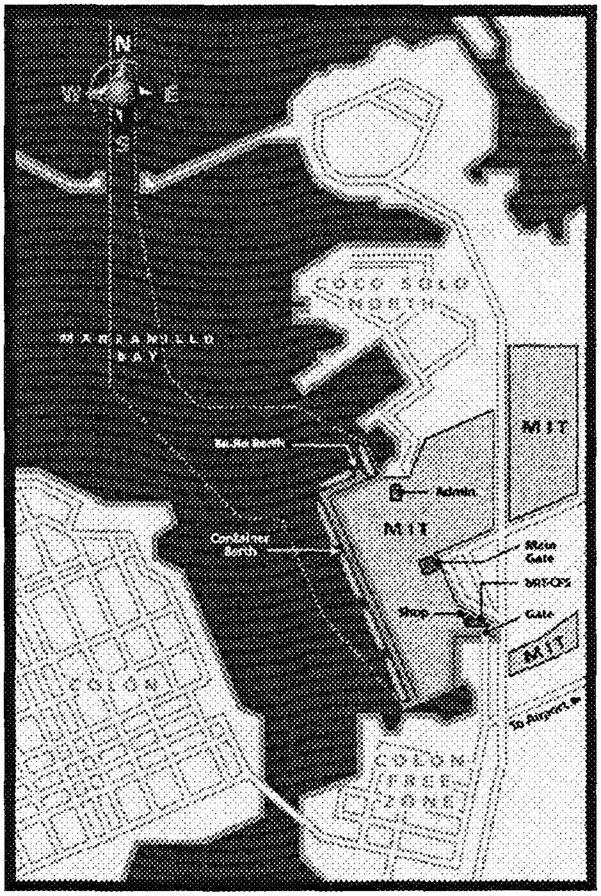
ICA, another Mexican construction company, is currently building the Southern Corridor, with a project investment of $222 million. This second toll highway will connect Panama City with the international airport at Tocumen and will provide a transportation link to the export processing zones (EPZs), which will provide an efficient and rapid corridor between the international airport and EPZs and the Pacific Port of Balboa.[122]

Ports and Terminals

Manzanillo International Terminal

Manzanillo International Terminal-Panama, S.A. (MIT) is strategically located on the Atlantic side of Panama adjacent, with a direct access gate to the Colón Free Trade Zone, to the largest free-trade zone in the Western Hemisphere. Only 2.5 kilometers from the canal entrance, MIT offers efficient, reliable port services to the many shipping lines transiting the Panama Canal. Sophisticated computer systems managing all aspects of vessel and terminal operations, a workforce of more than 675 employees, and new facilities and equipment have helped make MIT the largest and most productive container transshipment hub in Latin America. MIT has been named one of the top ten most efficient ports in the world by *Containerization International.*

Figure 2.3
Manzanillo International Terminal



Source: Manzanillo International Terminal, "General Information." Online. Available: http://www.mitpan.com. Accessed: December 5, 1999 (Manzanillo Port Web site).

The project area, known as Coco Solo Sur, was a U.S. Navy seaplane base during the World War II era. The base reverted back to Panama under the Carter-Torrijos treaties of 1977. In 1983, a large Panamanian trading company began to use the area as a storage facility and distribution center for the vehicles it imported and exported through the Port of Cristóbal, some 10 kilometers away. As the sole distributor of these vehicles in Latin America, this company was handling more than 61,000 cars annually by 1992. In that year, wanting to avoid the additional costs and logistics associated with moving the cars to and from Cristóbal, the owners decided to build a Ro-Ro (roll-on/roll-off) berth at their distribution/storage facility and thereby directly import and export their vehicles on site. Thus, the original concept of MIT was born.

By August of 1993, the original Ro-Ro berth concept grew into a project to create a world-class container transshipment facility, fully equipped with more than 800 meters of berth, ship-to-shore gantry cranes, and modern terminal management computer systems. The total cost of the first phase, including expenses for dredging, was in excess of $115 million.

MIT is in position to maximize intermodal transportation with future plans to integrate access with the soon-to-be-opened Panama Canal Railroad. As part of the original concession agreement, MIT is exploring options to develop another terminal on the Pacific side of the isthmus, and the transshipment between the two terminals via the Panama Canal Railroad would offer cost-efficient alternatives to the canal and encourage the development of Panama as a center for major transshipment.

Port of Cristóbal

The Port of Cristóbal is operated by Panama Ports Company, S.A. (a subsidiary of Hutchinson Port Holdings), and is located at the entrance to the Panama Canal. The Port of Cristóbal is protected by two breakwaters with a mean variation of about 1 foot (0.30 meters), which offers excellent shelter for vessels awaiting canal transit. Port facilities include a container terminal with two gantry cranes (Dock 9AB) and bunkers, fresh water, harbor tugs, and pilotage, which are normally all readily available. Cargo operations operate 24 hours a day, 7 days a week, and working shifts have start and finish times that are adjustable in order to suit the vessel's and customer's requirements. To improve efficiency in the port and help meet future requirements of customers, a major modernization project is underway.

Table 2.6
Port of Cristóbal Facilities

Total area (hectares)	8.5
Ship berths	9
Total area (square meters)	
Container yard:	450
General cargo:	2,855
Mobile harbor cranes	1
Quay cranes	2
Annual handling capacity	
Container (TEUs per annum)	280,000
Conventional cargo (tons)	1,500
Stacking capacity	5,400

Source: Panama Ports Company, "General Information." Online. Available: http://www.hph.com.hk/ppc/index.asp. Accessed: March 10, 2000 (Panama Ports Web site).

The modernization program will include the refurbishment of the port's two Panamax container-handling cranes, the installation of up-to-date computer systems, and the purchase of new yard-handling equipment. In addition to 480 meters of quay, the container storage area will be extended to 18 hectares, increasing the port's annual capacity to more than 500,000 TEUs. The port will offer 2,400 meters of quay for self-sustained operations of containerized cargo, general cargo, bulk cargo, vehicles, and passengers. A CFS (container freight station) of 6,110 square meters is available for the storage of cargo and the stuffing/stripping of containers. The port will also make use of advanced computer systems for yard and vessel planning, providing cargo information to its customers through EDI links. Ships calling at Cristóbal can save time, as northbound vessels leaving the canal can be berthed directly by the canal pilot, avoiding the need to exit the breakwater, change pilots and reenter and carry out loading/discharging operations.

Port of Balboa

Operated by Panama Ports Company, S.A, and located at the Pacific Ocean entrance to the Panama Canal, Balboa offers a large and safe anchorage for vessels awaiting transit. The mean tide variation is about 13 feet (3.96 meters) and offers harbor tugs and pilotage, fresh water and bunkers. The present port facilities include berths for handling containers, general cargo and bulk. Cargo operations are carried out 24 hours a day, 7 days a week; and a major modernization program for the port is underway.

Table 2.7
Port of Balboa Facilities

Total area (hectares)	2.6
Ship berths	4
Total area (meters)	
Container yard:	
General cargo:	1,288
Mobile harbor cranes	
Quay cranes	
Annual handling capacity	
Container (TEUs per annum)	48,000
Conventional cargo (tons)	2,000
Stacking capacity	900

Source: Panama Ports Company, "General Information." Online. Available: http://www.hph.com.hk/ppc/index.asp. Accessed: March 10, 2000 (Panama Ports Web site).

There is an extensive modernization program planned for the Port of Balboa. The first phase, which became operational at the end of 1998, includes the construction of 350 meters of deepwater quay (16 meters) and 8.4 hectares of container storage area, equipped with three post Panamax container-handling cranes and six rubber-tired gantry cranes, providing an annual capacity of 400,000 TEUs. In addition, Balboa will offer 950 meters of quay for self-sustained operations of containerized cargo, general cargo, bulk cargo, vehicles, and passengers. The port uses computer systems for park and vessel planning, providing cargo information to its customers through EDI links. After completing all phases of the modernization program, Balboa will have 1,500 meters of deepwater quay, 50 hectares of container storage area equipped with 12 post-Panamax container handling cranes, and 28 rubber-tired gantry cranes. The annual capacity will be in excess of 1.5 million TEUs. Additionally, Balboa will offer 550 meters of quay for self-sustained operations of general cargo, bulk cargo, vehicles, and passengers as well as CFS facilities.

Colón Container Terminal

The Colón Container Terminal is a containerport operated by Evergreen Marine Corporation at the Atlantic entrance to the Panama Canal. The terminal opened in October 1997, with an investment of more than $100 million and a four-phase development plan aimed to increase annual capacity to 1 million TEUs by 2002.[123] Currently, the sole owner of the terminal, the Taiwanese group, has shown an interest to open a joint venture at the terminal but insists that the Evergreen group's investment in Panama will remain.

Colón Free Trade Zone

The Colón Free Trade Zone is the largest free-trade zone (FTZ) in the Western Hemisphere and the second largest in the world. Three to four miles away from the principal ports on the Caribbean, the FTZ provides local manufacturers with an international market for their goods.

Created in 1948, the FTZ houses 1,751 merchants, receives more than 250,000 visitors yearly, and generates exports and re-exports valued at more than $11 billion annually.[124] The FTZ provides local manufacturers with an international market for their goods. Any person or company may set up operations in the FTZ by applying to the administration and supplying commercial and bank references, a Panamanian governmental tax clearance, and articles of incorporation.[125] FTZ laws establish that businesses may operate with a minimum of taxes. For example, there are no taxes or duties on imports or exports to or from foreign countries. Goods destined for the domestic market, however, must pay duties. Income tax on profits derived from export businesses are based on a scale between 2.5 percent and 8.5 percent; however, companies established in the FTZ have a five-year tax holiday.[126]

The Association of Users (AU) of the Colón Free Trade Zone was formed November 5, 1979, to promote and defend the interests of the businesses operating in the FTZ.[127] The AU maintains communication with all sectors of private Panamanian enterprises, governmental authorities, and civic groups with the mission to improve services and gradually improve the economic and social contribution to Panama.

Trade Routes, Transshipment, and Economy

Strategic Location

The Panama Canal, with its unique location at the narrowest point between the Atlantic and Pacific Oceans, has had a far-reaching effect on world economic and commercial developments throughout most of this century. By providing a short, relatively inexpensive passageway between these two bodies of water, the canal has influenced world trade patterns, spurred growth in developed countries, and been a primary impetus for economic expansion in many remote areas of the world. For example, a vessel laden with coal sailing from the East Coast of the United States to Japan via the Panama Canal saves about 4,800 kilometers (3,000 miles) versus the shortest alternative all-water route; and for a vessel laden with bananas sailing from Ecuador to Europe, the distance saved is about 8,000 kilometers (5,000 miles).

By far, most of the traffic through the canal moves between the East Coast of the United States and the Far East, while movements between Europe and the West Coast of the United States and Canada comprise the second most heavily traveled route. Other regions and countries, however, such as the neighboring countries of Central and South America, are proportionately more dependent on this vital artery to promote their economic development and expand trade. Of the thousands of vessels transiting the canal each year, about 27 percent of the total oceangoing transits are by PANAMAX-size vessels, the largest vessels the waterway can accommodate. An optional transit reservation system is available upon request to provide a guaranteed priority transit. The nature of improvements to the canal keenly reflects the ever-increasing role that PANAMAX vessels play in the movement of world commerce.

New Trade Routes and Services

The predicted increases of trade through the Panama Canal can be made in part by alliances among carriers and new trade route services, which consider Panama a crucial link. The China Ocean Shipping Company of China (COSCO), Yangming Marine Transport Corporation of Taiwan, and Kawasaki Kisen Kaisha ("K" Line) of Japan recently announced a consortium led by COSCO of a service connecting Asia to the East Coast of the United States through the Panama Canal.[128] The all-water route to the East Coast is slower than trans-Pacific services that put cargo on eastbound railroads in Southern California or the Pacific Northwest. The cargo tends to be less time sensitive, but the services have the advantage of allowing carriers to transship South and Central American cargo in Panama.

The fastest route to the East Coast from Asia is through the Panama Canal, not through the Suez Canal and across the Atlantic. The trends also point to a potential shift in all-water volumes from the Suez Canal to the Panama Canal. China favors the Panama routing versus the Suez for shippers that choose to move goods that way. The reason is trade patterns. East Asian nations, led by China, are expected to be the main engine of growth in U.S. trade with Asia in coming years, which is partly due to China's accession into the World Trade Organization.

Transit times are an important element in the decision to shift from the Suez to Panama routing for Asia-U.S. shipments. Shanghai to New York through the Suez is a 36-day voyage, compared with 30 days through the Panama Canal.[129] Hong Kong to New York through the Suez is a 33-day voyage, versus 26 days through the Panama Canal.[130]

The provisional port rotation for the new COSCO/Yangming/"K" Line all-water service will be as follows: Tokyo, Kobe, Shanghai, Yantian, Hong Kong, Panama Canal, New York, Norfolk, Charleston or Savannah, Panama Canal, and Tokyo.[131] Nine ships, each around 3,000-TEU capacity, will be deployed. Six of them are already in use by the carriers, and the other three will be chartered.[132] COSCO will provide five vessels, and Yangming and "K" Line will provide two each. The new service will mean another 150,000 TEUs of annual capacity in the all-water trade through the Panama Canal.[133]

A second all-water service between Asia and the U.S. East Coast through the Panama Canal is being formed by France's CMA-CGM and China Shipping Group. Taiwan carrier Kien Hung Line, which was initially intended as a vessel provider on the new service, will take slots on the service. CMA-CGM will provide seven vessels, and China Shipping Group will provide another two.[134] The capacity of the vessels is expected to be in the 2,500-TEU range.[135] The ships represent an additional 130,000 TEUs in annualized capacity on the all-water route through the Panama Canal.[136] Together with the new service offered by COSCO/Yangming/"K" Line, this service will mean an expected increase of more than 280,000 TEUs annually for the Panama Canal.

There has been recent interest in expanding Panama's influence in the field of air cargo, due to Panama's strategic central location to every country in Latin America, making it an ideal hub for an all-cargo operator. DHL Worldwide Express uses Tocumen International Airport as its regional hub, with five freighters serving 32 countries.[137] United Parcel Service is looking to build its business in Latin America and has chosen Panama to serve as the regional hub, taking advantage of the intermodal transport links and the growth of developing manufacturing and distribution operations.[138] While Federal Express already has a hub in Miami, the reverted Howard Air Force Base could be an attractive option if the company decides to build a second regional hub. Federal Express has followed that strategy in Asia, where it has its main regional hub at Subic Bay in the Philippines and a second hub at Chiang Kai-shek Airport in Taiwan.[139]

Export Processing Zones

Taking advantage of Panama's key location, the government and business communities have long promoted it as an international trading, banking, and services center. Recent trade liberalization and privatizations have added substance to these assertions. Panama's dollar-based economy offers low inflation and zero foreign exchange risk. Panama's economy is based primarily on a well-developed services sector that accounts for 76 percent of GDP. Services include the Panama Canal, banking, the Colón Free Trade Zone, insurance, containerports, and flagship registry. The government is actively looking for investment in the fields of tourism, marine services, and in-bond assembly, and manufacturing.

Panama has taken steps toward promoting economic zones that are compatible with international trade and for building on the future of Panama as key player in container traffic. On November 30, 1992, Panama passed Law No. 25, allowing for the establishment and development of EPZs within the country.[140] EPZs are well-defined areas for establishing industrial, commercial, and service facilities, for operation in a free-trade system. All or most of the production must be intended for export. A range of incentives has been established to attract companies into the EPZs.

Presently, there are six EPZs approved by the government of Panama (see Table 2.8). Some of them are in operation and others in early stages of development.

Table 2.8
Export Processing Zones (EPZs) Operating in Panama

Export Processing Zone	Special Characteristics	Location	Size
Fort Davis Export Processing Zone	The government of Taiwan is the main promoter, although it is open for companies from any country	10 minutes from ports of Cristóbal and MIT and 15 minutes from the Colón Free Trade Zone and France Field Airport	21 Hectares
Telepuerto Panama	Designed to be high-tech; the emphasis is on computer services, telecommunications, biotech and other scientific and educational activities	Next to Tocumen International Airport, 45 minutes to the Pacific Port of Balboa	3 Hectares
Parque de Las Américas Export Processing Zone		Next to the cargo section of Tocumen International Airport; Port of Balboa is 28 km from the zone	51 Hectares
Proinexport Processing Zone		Las Mañanitas, Pedregal in Panama City; 10 km to Tocumen International Airport	15 Hectares
Tocumen Export Processing Zone		Tocumen International Airport is 5 minutes away, Pacific Port of Balboa is 20 minutes	4 Hectares
Panexport Export Processing Zone		San Miguelito, 20 minutes to Tocumen International Airport, 30 minutes to Pacific Port of Balboa	31 Hectares

Source: International Trade Administration, "International Market Insight/Export Processing Zones, Panama." Online. Available: http://www.usatrade.gov/Web site/ForOffices.nsf/WebProspect/Panama. Accessed: February 7, 2000 (government information Web site).

Companies allowed to establish operations in EPZs are those engaged in light manufacturing, assembly, high technology, and specialized and general services, for example, computer data entry and reinsurance. Companies establishing operations in an EPZ are offered the following benefits: exemption from taxes, duties, and other charges related to the importation of machinery, equipment, raw materials, semiprocessed goods, and other materials, such as packaging, fuel, and lubricants used in the manufacturing process. The EPZ law includes 100 percent exemption from income taxes, no import duties on purchase of equipment, and no taxes on repatriation of profit.[141] The EPZ law also includes specific labor and immigration provisions for employees of EPZ firms, which are more favorable than the current Panamanian Labor Code.

Hub Port and Transshipment Center

All the above-mentioned trends in Panama: EPZ, air-cargo hub, additional all-water route services, and the concept of Panama as a regional transshipment hub, plus the benefits drawn from the Panama Canal, modern and expanding terminal facilities, the Colón Free Trade Zone, and the Panama Canal Railway Company, are transforming Panama into a formidable link in world trade.

The EPZs encourage exportation and are strategically located near either the Tocumen International Airport, the Panama Canal Railroad, or the ports and terminals of Balboa, Cristóbal, and MIT. Increased all-water route shipment services between Asia and the U.S. East Coast via the Panama Canal offers Panama opportunities as a regional hub, where goods from the north and south trade routes can meet in Panama to participate in the equatorial trade route. This strategic location translates into an increase in the volume of containers that will pass through Panama. The ports and terminals of Balboa, Cristóbal and MIT are expanding services and developing intermodal links with the Panama Canal Railroad Company to support this increase in traffic and provide efficient and swift transfer of containers.

Dr. Asaf Ashar of the National Ports and Waterways Institute in Arlington, Virginia, envisions an interlocking set of megatransshipment ports along the equator for the transfer of east-west cargo to ships headed north and south to population centers.[142] Panama factors heavily into this equation. Ashar sees a global container shipping system emerging, based on an equatorial round-the-world service where 15,000-TEU ships circulate eastbound and westbound, stopping only at seven transshipment ports.[143] With Panama serving as one of these "seven gigantic transshipment ports," ships would connect with north-south services using today's Panamax-size ships.

There is an ever-increasing trend of maritime lines providing shipment services that travel predominately east-west. Hub centers develop where these east-west trade routes intersect with north-south shipment services, such as is in the case of Panama. This trend toward an increase in shipments along these trade routes is reflected in statistics that describe a major growth of port traffic in comparison with maritime scheduled trips: each shipment of a container between the exporting and importing country is seen as one maritime shipment; meanwhile, they could make two, four, or more shipments between ports, depending on the number of shipments or the length of the voyage.[144]

Panama factors into this equatorial trade because of its location and services, such as the five weekly scheduled trips that leave from Manzanillo International Terminal in Panama and then connect with more ports in Europe, while the west South American coast has only three direct scheduled trips that leave between one and three times a month.[145] The consequences, for example, are that an exporter from Peru, who does not want to wait for one of the three direct services from the west South American coast, could possibly transship in Panama and take advantage of the next scheduled voyage from one of the five weekly scheduled trips to Europe.[146]

Given the frequency of alliances and mergers between shipping lines, there are more combinations of shipment services and increasingly more-frequent voyages. In the Asian market, there already exist various established trade routes that connect north-south shipments in South America with east-west shipments in Panama or Los Angeles. Panama would be able to serve as a hub port in this system where shipments form north-south routes would transfer cargo that is destined for markets along the east-west trade route. This equatorial system would thereby act as the meeting place for exchanges between north-south and east-west container trade and Panama would factor into this system for it to be a success.

The economy of Panama further encourages the development of Panama as a transshipment hub by providing an economy based on the stable U.S. dollar and services in banking and insurance. Panama has a balanced economic sector where existing and diverse industries, such as telecommunication equipment, computers and peripherals, computer software, and management and consulting, are considered good economic prospects in the coming years, which will provide a valuable resource and foundation in serving the container trade community. Ships will have options to upgrade information technology as they are transshipping goods or waiting for passage through the Panama Canal. An economy with strong and growing information services will be more adept to provide service to a sophisticated and complex transshipment system and increase the efficiencies in container trade.

Each of the transportation links in Panama raises the quality and increases the potential of the others involved. The Panama Canal Railway Company benefits because of the terminals and ports, which, in turn, will increase activity because of the railroad. The Panama Canal provides a trade route that encourages transshipment at the terminals and ports. Existing and expanding ports and terminals promote more traffic through the Panama Canal. Add in the potential from the Colón Free Trade Zone, air cargo, and a "business friendly" environment and Panama is transforming itself into a world-class association of container trade.

The Port of Buenos Aires

The Port of Buenos Aires plays a significant role in Argentina's international trade. More than 60 shipping companies serve the port with roughly 70 ships per week making port calls. Fully 96 percent of all container traffic in Argentina comes through the Port of Buenos Aires, as does 40 percent of the value of the country's international traffic.[147]

Infrastructure

The modern Port of Buenos Aires consists of five cargo terminals operated by licensees and a grain terminal also run by a private concern. At present, one additional terminal is not operational and is being reconverted. The cargo terminals cover an area of 92 hectares with 5,600 meters of docks and 23 moorings for vessels over 180 meters in length. The grain terminal covers 4 hectares with a 1,040-meter dock and 4 mooring stations and has a maximum capacity of 170,000 metric tons. The cargo terminals have a theoretical capacity of 1.2 million TEUs. The port possesses the following number and types of cranes: 10 portainer cranes, 16 transtainer cranes, 7 mobile cranes, and 4 portal cranes. The depth of the channel at the docks averages 9.75 meters.[148]

Terminales Río de la Plata

The number 1 and 2 terminals are known as Terminales Río de la Plata (TRP) and cover an area of 28.5 hectares with 1,813 meters of dock length. It has the following equipment: 5 portal cranes, 11 transtainer cranes, 1 35-ton rail crane, 14 mobile container cranes, 7 empty container handlers, 30 forklifts ranging from 2.5- to 7-ton capacity, 22 tractors, 23 trailers, and 120 intakes for reefer containers. Dock 1 is 365 meters long, has two mooring places and two portal cranes. Dock 2 is similar to Dock 1 but is 450 meters long and has an additional portal crane. There is also a 151-meter dock with a mobile crane for smaller ships and feeder barges. For ships with their own derrick equipment, there is a 235-meter dock. The terminals have seven access lines for trucks with two more being built. Two railway lines cross the terminals near their boundaries. Approximately 20 trains a month with container cargo for export come to the terminals from Mar del Plata, Valle de Río Negro, and other cities. There are currently 20 barges handling transshipment duties.[149]

The terminal is operated by a consortium of London P&O Steam Navigation and a number of Argentine partners. The license granted to the group lasts for 25 years. The group performed massive amounts of construction and modernization. The projected maximum capacity for the two terminals will be 1 million TEUs after the development is completed. More than 25 shipping lines operate in the TRP. The terminals earned the ISO-9002 quality certificate, which covers their customer service, loading, delivery and storage of containers, and other services.[150]

Terminales Portuarias Argentinas

Terminales Portuarias Argentinas (TPA) consists of one terminal covering 15 hectares with 1,397 meters of dock and 6 mooring stations. It has 2 portal cranes, 2 transtainer cranes, and two mobile cranes. The terminal also has 7 mobile container cranes, 12 forklifts and tractors, and 20 trailers. There are also 120 intakes for refrigerated containers. [151]

TPA is a joint venture between ATA of Argentina and MI-Jack of the United States with additional funding from the International Financial Corporation. ATA operates a trucking concern in Argentina, distributing dry goods. MI-Jack manufactures container-handling equipment. The teaming of ATA's trucking operations with its operation of TPA provides a multimodal capability. TPA provides services for containers, general cargo, and passengers. The terminal also maintains a refrigerated container facility for storage of reefer containers.[152]

Terminal 4 S.A.

Terminal 4 covers 11 hectares and has a 750-meter dock and teams with a section named EMCYM for the handling of agricultural products. The two terminals work with Angel Gabriel S.R.L, a transport company, to provide multimodal service. Terminal 4 has 600 meters of railway within its boundaries connected to the dock, which allows access to the whole of the Argentine national railroad system. The terminal has a 250-meter dock and four 80-ton electric scales. Total storage capacity is 7,500 tons with 2,500 being in three horizontal silos.[153]

BACTSSA

BACTSSA is a terminal that covers 21.5 hectares and 885 meters of dock. It has 3 portal cranes, 2 mobile cranes, 7 transtainer cranes, 4 side loaders, 7 container cranes, and 10 mobile container cranes. It is operated by a joint venture between BISA of Argentina and ICTSI of the Philippines. BISA manages a logistics firm in Argentina, and ICTSI controls nearly 70 percent of the container traffic in the Philippines and also operates in the port of Veracruz, Mexico. The terminal has 160,000 square meters of parking area and container-handling space and 6,500 square meters of covered space for the storage of goods. A computer tracking system allows the terminal and its clients to manage the flow of goods.[154]

Sea and Land Access

Waterborne access to the Port of Buenos Aires comes through a 200-kilometer series of dredged channels in the Río de la Plata. The channels are divided into six areas: Canal Norte, Canal de Acceso, Rada Exterior, Paso Banco Chico, Canal Intermedio, and Canal Punta Indio. The artificial aspect of the channel ends at 205 kilometers at the Ponton Practicos Recalada. From here, ships can travel on the river to Buenos Aires, Dock Sud, or to ports on the Paraná River. Towing begins near the sixth kilometer into the channel. The access channel is 9.75 meters deep and 100 meters wide. A private licensee handles the maintenance of and navigation in the channel.[155]

The Port of Buenos Aires is fully connected with Argentina's national highway system. Lanes 1, 2, and 3 serve the southern part of the country. Lanes 5 and 7 reach the west, while 8 and 9 travel to the central and northern areas. Five rail lines also serve the port: Mesoptamico, Nuevo Central Argentina, Ferrosur, Buenos Aires al Pacífico, and Belgrano Cargas.[156]

Operations

Pedro de Mendoza established the first port in the area in 1536 with the name Puerto de Nuestra Senora de Santa María del Buen Ayre. The first Port Development Act was passed in 1821. As the port expanded, extensive warehousing and embarkation facilities sprang up. By 1880, three piers existed, allowing the offloading of cargo and passengers though only from small- and medium- size ships. Docks were constructed in the next decade to allow larger ships to call. By 1910, the port saw 32,000 ship visits, transporting 30,000 tons of grain per day. A massive expansion and construction began and continued for fifteen years. By its completion, the Port of Buenos Aires had established itself as a major port in Latin America and the Southern Hemisphere.[157]

Traffic

Buenos Aires specializes to a large degree in containers. The quantity of container traffic at the port has increased dramatically in the last decade (see Table 2.9). Since 1990, container traffic has increased a total of 275 percent for an annualized rate of nearly 35 percent. This growth however has been sporadic. After the initial privatization of terminals, container traffic grew rapidly, then stalled, and in the past few years has again expanded dramatically.

Table 2.9
Growth of Container Traffic in Buenos Aires

Year	TEUs
1990	218,452
1991	241,608
1992	278,125
1993	448,219
1994	532,681
1995	504,630
1996	530,346
1997	720,247
1998	818,334

Source: Port of Buenos Aires, "Statistics." Online. Available: http://www.bairesport.gov.ar/english/e-comerci/estadist-e.htm. Accessed: December 12, 1999 (port information web site).

While Buenos Aires earns a sizable majority of its business from containers, other types of traffic are handled, too (see Table 2.10). As is true for other Argentine ports, grains are shipped from Buenos Aires. A relatively small amount of general bulk cargo also travels through the port.

Table 2.10
Breakdown of Tonnage by Category for Buenos Aires, 1998

Type of Cargo	Tons
Bulk	1,047,969
Containers	5,652,954
Liquid grains	758,915
Solid grains	1,257,692
Total Tons	**8,717,531**

Source: Port of Buenos Aires, "Statistics." Online. Available: http://www.bairesport.gov.ar/english/e-comerci/estadist-e.htm. Accessed: December 12, 1999 (port information web site).

Labor

Labor issues have not been as significant a problem in Buenos Aires as in other ports in Latin America. While in the past, the port suffered from the same high labor costs typical of a Latin port, the privatization of all five terminals in the port brought about a significant change. Labor costs fell from $520 per container to $100 per container.[158] The number of personnel needed to move containers currently ranges between 14 and 19. These numbers compare very favorably with those at other Latin ports.[159]

Customs

Customs officials nationwide are implementing new systems to handle taxation. The Argentine Customs Authority and the Federal Tax Administration are working together to catch tax evaders importing and exporting goods into the country. The Maria computerized system should increase the speed and efficiency of the inspections process. In the past, customs inspected 30 percent of all containers. The new system should reduce that number by half. Using a 10-day notice of importation and preshipping inspection will be the primary methods.[160]

Issues and Developments

Competition

The port faces no real competition domestically for container traffic. As stated earlier, 96 percent of all Argentina's containers come through the port. In the area of bulk and agricultural products, other ports in the country provide those services to a larger degree. The Port of Bahía Blanca handled nearly 8 million tons of bulk goods (agricultural, fuels, etc.) in 1998.[161] This amount nearly equals the total tonnage handled by Buenos Aires but consists of no container cargo.

The Port of Buenos Aires handles more containers than the Port of Santos in Brazil, the port long known as the largest in Latin America. Buenos Aires has more attractive fares and is increasing its cargo movement.[162] If this trend continues, the Port of Buenos Aires could come to dominate the container market for all of MERCOSUR.

Issues

One of the biggest issues facing the Port of Buenos Aires is the relatively narrow and shallow channel that provides it access to the world. A project to widen part of the access channel leading to Dock Sud is currently in the final bidding process. Five companies remain in the competition for the $18 million contract to widen the channel to 136 meters.[163] At its current depth, the channel is too shallow to accommodate the largest merchant vessels. If Buenos Aires wants to become a hub port for the region, this problem should be addressed.

The largest terminal in Buenos Aires, TRP, renegotiated contracts with its shipping lines, which could lead other terminals to do the same. At issue is the charge per TEU handled. Under the old contracts, the price ranged from $102 to $137 per container. The new contracts fix the price at $120 per container. This new approach could lead to a reduction in volume at the port and a shift to other ports in the region.[164] Private companies do not generally like having the rules of the game changed. Though motivated by higher-than-expected operating cost, the terminal operators run risks when renegotiating contracts. It remains to be seen whether this action carries negative consequences.

Congestion in general continues to be a problem in the port as it expands into Rio de la Plata. An additional 740 acres are being added to the port. Terminal operators are both pleased and concerned. Pleased because the new space is much needed. The concern stems from the perception that there is too much competition in the port already and the extra space will simply attract more operators. However, the port's privatization laws protect the five original winners of the bids to operate the terminals, meaning the new space will be distributed to the current operators in accordance with the amount of volume they move. This policy has the potential of creating private monopolies, or at least oligopolies, which can be just as inefficient and difficult to manage as government-owned operations, thus possibly negating the advantages of privatization.[165]

The Port of Santos

The Port of Santos in Brazil is currently the largest port in Latin America and serves as the main port for the city of São Paulo, which is the largest city in Brazil. The port handles nearly 40 million tons of cargo a year and accounts for 50 percent of the container traffic for all Brazil.[166]

Infrastructure

The port covers 7.76 square kilometers. There are 9,436 meters of public docks.[167] There are also the following quantities of support facilities:[168]

- 500,000 square meters of roofed warehouse space
- 980,000 square meters of yards

- 585,000 cubic meters of tanks

Terminals

There are four container terminals and numerous specialized terminals to handle grains, fertilizers, salt, and other bulk cargoes:

- Tecon 1 is a container terminal currently operated by the private company Santos Brazil SA.
- Tecon 2 is a new container terminal.
- Tefer specializes in transporting fertilizer.
- Tegran ships grains.

Sea and Land Access

The port has access to the sea through a channel. A project underway will deepen the channel to 17 meters to allow deeper draft ships direct access to the port.[169] Additionally, two large rock formations in the estuary will be removed. With a size of 57,000 cubic meters and 24,000 cubic meters, respectively, these rocks blocked expansion of the port in the past. Their removal will allow easier navigation and improved wharfing positions.[170]

The port has access to four major highways. Highway BR-101 runs from Santos to Rio de Janeiro. Other highways are Anchieta-Imigrantes System (ECOVIA), Piacaguera-Guaruja, and SP-55. Three different rail lines serve the port: M.R.S. Logística S.A., Ferrovias Bandeirantes S.A., and Ferronorte S.A.[171]

Operations

The birthday of the port and the city of Santos goes back to Bras Cubas in January 1531. For nearly three centuries, the port grew slowly but steadily. Importantly, low mechanization and a heavy reliance on labor characterized this growth. A group under the control of Candido Garrfee and Eduardo Guinle won the bid to build and operate the Port of Santos for 39 years starting in 1888. The term was extended for another 90 years. In 1980, after the original concession expired, the federal government created Cia Docasdo Estado de São Paulo (Codesp), which was a mixed investment company charged with owning and running the port. The government held the majority of the stock. Under Law 8.630/93, the privatization of the port's facilities began with the granting by Codesp of leases won through a bidding process.[172]

Traffic

Santos ships more than 40 million tons of cargo. Growth has been modest but steady. In 1997, total tonnage moved was 38,472,130. By 1999, the number rose to 42,675,507 for a 10 percent increase.[173] Container traffic at the port has declined in recent years from

580,592 TEUs in 1997 to 546,972 TEUs in 1999.[174] However, the privatization of the Tecon 1 and the opening of the Tecon 2 container terminals should increase container traffic through the port.

Though the port hopes to increase its container traffic, bulk products will remain a significant part of the port's total business (see Table 2.11). Currently, bulk cargo accounts for well over half of the total tonnage of the port. As the modernization of the port continues, containers will increase in importance. However, the large agricultural sector of the Brazilian economy will ensure that bulk products remain significant cargoes for all Brazilian ports, and Santos will be no exception.

Table 2.11
Type of Goods Moved in Santos
(tons)

Goods	1997	1998	1999
Sugar	2,378,348	3,668,613	6,965,010
Coffee	702,750	467,898	524,463
Orange juice	1,175,488	932,353	1,053,110
Soy grains	1,866,622	2,089,040	2,560,863
Bran	1,318,186	1,700,687	2,157,873
Paper	194,825	210,966	311,625
Wheat	1,006,624	1,537,145	1,713,105
Salt	555,109	662,726	690,142
Fertilizer	2,402,846	1,304,185	1,880,331
Meat	84,851	94,732	144,043
Liquefied gas	1,061,862	976,421	989,041
Fuel oil	530,178	1,407,940	1,369,445

Source: Port of Santos, "Port of Business: Historical Movement." Online. Available: http://www.portodesantos.com/negocios/historico-carga-i.html. Accessed: March 1, 1999 (port information Web site).

Labor

Labor stands as one of the port's biggest obstacles. Santos has some of the highest labor costs of any Latin American port. The current labor cost per TEU is $330. That number compares to $250 in Rio de Janeiro and $180 in Rio Grande do Sul, both in Brazil, and $120 in Buenos Aires in Argentina.[175] Unloading containers requires 50 workers in Santos, while in Buenos Aires the unloading can be done with as few as 14.[176] A law passed in 1993 allows for port administrative bodies known as OGMOs to determine the size of work gangs on vessels, a task that was performed by unions. There has been widespread discontent by the unions with the new law, and Santos has been no exception where there are nearly 12,000 union workers. Workers have rioted and sacked the local OGMO offices in Santos.[177] However, the OGMO has succeeded in gaining the power to hire truckers and administrative workers, though these two categories account for only 2 percent of the labor force of the port.[178]

One of the major friction points occurs over the issue of who determines work gangs. Historically, the unions exercised virtual total control over those decisions and decided who to hire, how many to hire, and so forth. OGMO wants to have the power to set the size of the gangs. A possible compromise would let OGMO set the gang size but allow the unions to monitor. The labor situation remains tense, and any progress will likely be slow and fitful.[179]

Customs

The federal government in Brazil has implemented a new customs system called the Foreign Trade Information System (Siscomex). Initiated three years ago, Siscomex should dramatically improve the ease with which importers and exporters do business in Brazil. Before Siscomex, the country relied on a complicated and obtuse system of import licenses. Cumbersome to administer, slow to respond, and oftentimes expensive, the old paperwork-based system proved highly unpopular. The new system resulted in the elimination of import license requirements for nearly 3,000 items. Whereas some products, such as agriculture and pharmaceuticals (for health and safety reasons mainly) still require licenses, Siscomex is widely viewed as an improvement.[180]

Despite the new system, problems with customs remain. In December 1999, customs officials staged a one-day strike protesting planned cuts in their bonuses. The inspectors also want their numbers tripled to allow for a more through inspection of cargoes. According to the unions, only 7 percent of containers in Santos are inspected. The 24-hour strike delayed the movement of more than 4,000 containers. Though airports in Viracopos and São Paulo have a new system called Blue Line that speeds the customs clearance process for large importers, Santos has had to delay indefinitely the implementation of a similar system partly because of customs officials' resistance.[181]

Law Enforcement

New police squads are being established to combat piracy and narcotics trafficking in Brazilian ports. The federal program consists of teams of agents known as Nucleo Especial de Polociamento Maritimo (Nepom). Rio de Janeiro and Santos were the first ports to receive these specialized teams.[182]

Issues and Developments

Competition

Santos faces significant competition from other seaports in Brazil. The most significant or likely to become significant competitors are detailed below.

The Port of Sepetiba is often cited as a port with great potential to challenge Santos. It serves the same general area of São Paulo and Rio de Janeiro and currently moves more than 30 million tons of bulk a year, an amount almost as much as Santos. The current focus is on increasing the port's container capability and transforming it into a hub port. The U.S. Commercial Service/Brazil identified Sepetiba as having the most potential for sales and development.[183] However, it failed to attract international bids for a concession offered last year to operate the port.[184] The port also endured an embarrassing delay in a dredging project funded by a German mining concern. The delay was over environmental concerns, but dredging eventually did begin.[185] Sepetiba's biggest hurdle remains intermodal access. Julian Thomas of Hamburg-Sud stated that the port's "rail access from the state of São Paulo is very precarious" and that other "infrastructural problems" would have to be solved.[186]

Rio Grande do Sul bills itself as the "Gateway to MERCOSUR" because of its proximity to Argentina and Uruguay. The port has a "sister port" agreement with Quonset/Davisville Port in Rhode Island. Rio Grande do Sul privatized its terminals in 1997 and ships more than 10 million tons, though 90 percent of this tonnage is bulk.[187] The port has also reigned in its labor costs, and throughput costs per container have fallen to $180.[188] This port could become a serious competitor for Santos. The same holds true for the port of Rio de Janeiro, which has also recently brought its labor costs down to $250 per container.[189]

Issues

The main issue facing the port is its continuing labor difficulties. These high costs and work stoppages contribute mightily to what is colloquially and euphemistically known as "Custo Brasil," or Brazil costs. This term applies especially to Santos. As Hans-Peter Zint of Santos Brasil S.A. says, "Santos is the port, and the port is Santos with every second family directly or indirectly earning its living from the port's activities."[190] While this social environment causes labor changes to be more difficult, Santos must confront these difficulties or risk losing its preeminent position in the region to other ports.

While the port as a whole faces labor problems, Codesp faces budgetary difficulties. The reductions in port fees since 1996 led to more than $170 million in budget shortfalls since that time. The deficit was $60 million in 1998 despite the mass privatization that took place in the port in 1997.[191] This deficit led Codesp to announce that it would not reduce its fees in 1999. The financial crisis in Brazil further heightened the port authority's monetary troubles. There have been calls by some port users for an audit of Codesp's books.[192] If such troubles continue, confidence in Codesp's competency could weaken. Additionally, the deficits could lead to an increase in fees, which would put the port at a competitive disadvantage.

Santos 2000

Santos 2000 is a project developed by Codesp to prepare the port for the new century. The goal is to have a publicly managed port, through Codesp, that is privately operated. Nearly 75 percent of the port already has been licensed or is in the bidding process. It is expected the port shall receive R$1.5 billion in investment with R$850 million of that guaranteed by the end of the privatization process (Brazil's currency is the real, denoted as R$). The Port 24 Hours program will shift the port to operating in four, six hour shifts a day, 362 days a year.[193]

A significant element of the Santos 2000 program centers on the Santos Port Leasing and Partnership Program. This aspect of the project is nearly complete. Well over 1 million square meters of the port have already been licensed out to private operators. A contract for the construction of a tunnel under the estuary of Santos has been granted for R$115 million. That project should be completed in two and a half years. There are also plans for improving rail access to the port.[194] Privatization will continue with the bidding of new areas for wheat, salt, containers, general cargo, and warehousing. Also, the Itatinga Power Station that provides power for the port and the state electric utility, Eletropaulo, will be privatized.[195]

The Port of Veracruz

The Port of Veracruz services most of the states in Mexico. It is the main port for handling containers (loaded with equipment, electrical appliances and electronics, machinery, etc.) agricultural products, general cargo, and liquid products from the states of Sinaloa, Durango, Cohahuila, Nuevo León, San Luis Potosí, Veracruz, Campeche, Yucatán, Chiapas, Oaxaca, Puebla, Tlaxcala, Morelos, Hidalgo, Querétaro, Guanajuato, Jalisco, and Michoacán. It is estimated that the influence zone of the Port of Veracruz encompasses an economic region that includes 80 percent of the Mexican population and 75 percent of the nation's GNP.[196] The Port of Veracruz's external influence zone consists of the countries with which Mexico has trade relationships. Specifically, the shipping lines that serve Veracruz also make port calls in the United States, Canada, Venezuela, Argentina, Spain, Belgium, England, Netherlands, and Russia, as well as with other Western hemispheric and European countries.[197]

Infrastructure

To date, the Port of Veracruz has nine specialized terminals, which are those for containerized cargo, naval vessels, agricultural bulk, fluids and mineral bulk, sugar, ship repair and construction, general cargo, automobiles, and petroleum and derivatives. The privatization of facilities in 1996 and competition for market share among Mexico's main port operators have given rise to improvements in the Port of Veracruz's handling capacity and services. From 1996 to the end of 2000, port administrators plan to spend about $200 million to triple berthing capacity from 7 million to 22 million tons and increase warehouse capacity on nearby cleared land. This spending plan includes the construction of a 1.9-mile breakwater on the north end of the harbor and an enlargement of various port areas.[198] A new pier for a multipurpose terminal, warehouse demolition, and upgrading of a grain terminal were also scheduled for construction. Several liquid-bulk terminals were expected to come on line, bringing the total to five terminals. Three of the four existing warehouses were torn down and reconstructed, including a refrigerated warehouse, which was expanded to be suitable for ships of up to 328 feet in length.

The port administration, since decentralization, has cleared approximately 247 acres for land-side construction that will provide value-added services. In addition, various improvement projects, such as the construction of an all-purpose dock, equipping 73 hectares with shipyard facilities, and a trailer-parking site are currently underway to enhance the overall structure and efficiency of the deep-sea port. Likewise, new docks for bulk agriculture and general cargoes, as well as additional internal roads and a new access to the port, are presently being built.[199] Since 1999, for example, Internacional de Contenadores Asociados de Veracruz (ICAVE) and Terminales de Cargas Especializadas (TCE), two of the Port of Veracruz's main concession holders, now operate berths with a minimum depth of 35 feet, compared to the former government berth, which had a depth of only 31 feet. In addition, TCE's storage capacity rose from 36,000 tons to 72,000 tons with the building of six new silos in addition to the original warehouse. Table 2.12 displays the terminals and docks currently operational at the Port of Veracruz.

Sea and Land Access

The Port of Veracruz is directly connected to all of Mexico's central and southern states with extensive rail and road networks. The port has double-stack container rail service in operation with dry bulk and fluids being transported to and from the port through two railway trunk lines. The rail line operated by Transportación Ferroviaria Mexicana (TFM) connects the port directly to Mexico City and from there to the rest of the central and northern states. The second rail line operated by Ferrosur connects Veracruz with Orizaba, Oaxaca, and the rest of the southeast of Mexico.[200] The Port of Veracruz is a key link in the southeast portion of Mexico's railway network. Among other services to the port, the rail line provides vehicle transport, multilevel closed cars, and container transport between Veracruz and Mexico City, which is the principal source and destination for the port's cargo.[201] Federal Highway 150, a double-lane superhighway, connects the port to Mexico City. Highway 180 extends along the Gulf of Mexico west to connect Veracruz to Altamira/Tampico and the Texas border.[202]

Operations

Traffic

In 1993, the port handled 43 containers per hour of operation. As of 1999, it handled an average of 74 containers per hour and, for certain other vessels, it surpassed 100 containers per hour of operation.[203] In the monthly port traffic report for August 1999, the Port of Veracruz recorded 1,104,862 tons in total operated vessel load. Of that, 893,728 tons consisted of imports and 211,133 tons, exports. The total container TEUs for that month was 40,897.[204] Since privatization of the port administration, Veracruz experienced relatively steady growth in traffic (see Table 2.13).

International Container Terminal Services, Inc., based in Manila, Philippines, teamed up with Mexican engineering giant Grupo ICA to win a 20-year concession to operate the Veracruz box terminal. The terminal is being operated by a joint venture known as Internacional de Contenadores Asociados de Veracruz, or ICAVE. In 1991, port traffic was at 741 vessels; by 1994, the number rose to 1,245. The port handled 121,682 TEUs in 1991; it handled 256,055 TEUs, or 47 percent, of Mexico's container traffic in 1999. The port handled 1.2 million tons of general cargo in 1994 operating at 118 percent capacity. Agricultural and liquid and mineral bulk products also moved at over 100 percent of capacity, creating the need for expansion of port infrastructure. ICAVE's modernization program will double the terminal-handling capacity at their facilities from 360,000 TEUs to 520,000 TEUs. Stacking capacity will increase from the existing 400,000 to 540,000 TEUs. ICAVE is also in the process of building a second berth, which will bring the total length for the company's two berths to 507 meters, compared to the 360-meter-long original berth left behind by the government.[205]

Table 2.12
Facilities at Port of Veracruz

Facility	Load/Activity	Longitude (m)	No. of Positions in Berth	Operators
Dock 1	General, cars	180	2	CICE, CTV, OPG
Dock 2	General, containers	182	2	CICE, CTV, OPG
Dock 4	General, agricultural bulk	314-80	5	CICE, CTV, OPG
Dock 6	General, steel pipes without seam	302	5	CICE, CTV, OPG
Dock 7 (multipurpose)	General, containers	250	2	CICE, CTV, OPG
Container terminal	Containers	340	1	ICAVE
Multipurpose terminal	Agriculture products and fluids	302	1	TCE
Grain terminal	Agriculture bulk	168	1	ALSUR
Aluminum terminal	Mineral bulk	180	1	ALUDER
Cement terminal	Cement in bulk	207	1	ALPASCO
Fluids terminal	Vegetable oils, molasses, chemical products	180-207	1	Latex, Van Ommerem TMM Terminals, Astro
Ship shop	Vessel repair	-	5	Talleres Navales del Golfo

Source: Infoport, "Mexico Seaports Transportation: Port of Veracruz Terminal, Docks and Equipment." Online. Available: http://www.infoport.com.mx/Veracruz/2/vera_terminalw.htm. Accessed: December 1, 1999 (port information Web site).

Administration

Since 1993, management of Mexico's ports resides with autonomous port operators known as Integral Port Administrations (Administraciones Portuarias Integrales, or APIs). These APIs are responsible for day-to-day operation of ports, which was intended to result in increased flexibility with port operations and policies that would attract more carrier calls.[206] By law, the port's assets (water zones, infrastructure, terminals, facilities, and land areas) must remain under federal ownership; only the employment, utilization, and exploitation of port assets are granted to the independent APIs.[207] The general administration, port master plans, as well as the supervising of services that are offered by the private port operators, are still the responsibility of the federal government through the APIs.[208] Every API at each Mexican port is granted the right to acquire 49 percent foreign private investment capital in order to develop services, terminals, and other port infrastructure and development activities.[209] The private sector is allowed to take charge of the port development, maintenance, dredging, and basic infrastructure construction. In reality, private firms manage almost all the services offered by the terminals in the main commercial ports. More than 630 firms manage terminals and render services on the ports.[210]

Table 2.13
Commercial Cargo Load by Thousands of Tons, 1994-98

Year	Tonnage
1994	6,884
1995	6,481
1996	9,546
1997	9,946
1998	12,505

Source: Infoport, "Mexico Seaports Transportation: Port of Veracruz Trade Load." Online. Available: http://www.infoport.com.mx/Veracruz/3/vera_cargacomercw.htm. Accessed: December 1, 1999 (port information Web site).

Issues and Developments

Competition

The Port of Veracruz, in terms of cargo traffic, surpasses all other Mexican ports. Veracruz faces no serious competition from other Mexican ports on the Gulf of Mexico coast. However, the Port of Tuxpan has been often touted as a potential alternative to the Port of Veracruz, which some shippers and carriers say is becoming extremely congested and where fees are high at the container terminals.[211] Nevertheless, Veracruz continues to be the leader in containerized cargo in that region and is regularly included in the trade lanes of most major shipping lines.

The port, nevertheless, faces enduring U.S. competition for cargo, specifically from the ports of Houston and New Orleans. In 1998, all Mexican ports moved approximately 1 million TEUs across their docks, doubling the number of containers moved in 1993. In contrast, the Port of Houston alone moved nearly 1 million TEUs through its terminals in 1999, most of those through its Barbours Cut Container Terminal.[212] Periodic congestion and less-advanced infrastructure at Veracruz continue to be barriers to closing the gap between Veracruz and its primary competition.

Issues

Despite its expansion plans, Veracruz faces a major hurdle in attracting import cargo from the United States and Europe that moves into Mexico through intermodal connections. Once a container leaves the port, shippers are faced with the high costs of truck and rail transport. Overall point-to-point costs have to be competitive with trucking costs. Rates have been structured so that they are competitive with intermodal movements through Laredo, Texas. A continuing difficulty is that the state subsidizes rates from Laredo to Mexico City and has higher rates for lower-density routes like Veracruz to Mexico City. Consequently, rates are 30 percent higher on the railroad out of Veracruz.

Future Developments

A strategy being employed at the Port of Veracruz to increase its competitive advantage is developing niche markets for automobiles and coffee shipments. The port intends to increase its automobile vehicle-handling capability. It already has a specialized terminal with a static capacity for handling 2,200 automobiles. The terminal is being enlarged to handle 4,000 automobiles.[213] In August 1999, the automobile movement in the port amounted to 16,187 vehicles, a 13.3 percent increase over August 1998.[214] Presently, Nissan and Volkswagen export to Chile and Peru through Pacific ports like Manzanillo and Acapulco, but Veracruz is establishing itself as an export point for sales to Brazil, Argentina, Central America, the Caribbean, and even some points in the United States like Boston, Brunswick, New Jersey, and Wilmington, Delaware.

In 1997, the ports of Veracruz and New Orleans formed a joint-marketing agreement to boost coffee shipments between the two cities across the Gulf of Mexico, persuading coffee shippers, who had been moving beans from Mexico to the United States by truck, to send the cargo by ship.[215] In 1997, 77,000 tons of coffee were exported through Veracruz, compared to almost 200,000 tons over land via Laredo. One important factor the port is using to sway coffee shippers away from the land border is Mexico's rising truck-trailer theft rate. Guards needed for truck convoys and inadequate insurance coverage in Mexico for loss and theft make moving coffee difficult, and a seagoing option is increasingly attractive.[216] In fact, the Port of Veracruz offers a cabotage Ro-Ro (roll on/roll off) service between the central zone of Mexico and the Yucatán Peninsula, via Veracruz to Progreso, which represents an important savings in transport costs and offers more security for cargo than by highway.

However, during most of February 2000, severe congestion at the port caused a large number of coffee shipments to be delayed. Processing was so slow that of the 300 shipments booked, only 80 arrivals had been registered by mid-February, causing serious delays to contract deliveries.[217] Part of the congestion problem was relieved by sending some shipments over land to avoid further delays, which defeated the purpose of encouraging use of seagoing routes rather than land.

Another important niche market for the port is the handling of perishable products in specialized warehouses with refrigeration equipment. Thus, the port takes advantage of the fact that Veracruz is geographically located in the middle of zones that produce fruits and vegetables and is proximate to the inland of Mexico, where there is high traffic for this type of product.[218]

The Port of Lázaro Cárdenas

The Port of Lázaro Cárdenas services a commercial hinterland formed mainly by the states of Michoacán, Guerrero, Morelos, the Federal District, Estado de México, and Querétaro. It is estimated that the influence zone of the Port of Lázaro Cárdenas encompasses an economic region that includes 33 percent of the Mexican population and 42 percent of the nation's GNP.[219]

Because of its location on the Pacific coast of Mexico, the port has direct access to the Pacific Rim markets of Asia. In addition, the port provides easy accessibility to the European market, and to the East Coast of the United States and South America through the Panama Canal.[220]

Infrastructure

At present, Lázaro Cárdenas has eight terminals with 20,385 square meters of stacking yards and 3,420 square meters of warehouse space.[221] The terminals specialize in coal, fertilizers, fluids, bulk agriculture, metal and minerals, and containers. There are also two multipurpose terminals and one boat facility. Table 2.14 lists the main terminals at the port.

The port's infrastructure allows for steel pipe production areas and has yards to store coal that is used to generate the power for the thermoelectric complex in the region of Petacalco, which belongs to the state of Guerrero. In addition, the port has yards to store the ashes generated by the coal used in the production of power. Facilities for the distribution and storage of oil derived products and fertilizer production also exist at the port.

Sea and Land access

Lázaro Cárdenas has access to the northeast rail line, operated by TFM, that provides rail service to the southern markets of the United States. However, facilities for handling double-stacked container rail service are inadequate. Investments have been made to adapt bridges and tunnels from Lázaro Cárdenas to Corondiro-Las Truchas in order to improve intermodal transportation efficiency. In particular, TFM plans to invest more then $50 million by the year 2002 to rehabilitate the track on its route from Celaya in central Mexico to the port.[222]

Federal Highway 37 connects the port with Mexico City and to the Gulf Coast to the port of Tampico-Altamira.[223] In addition, a new highway from Lázaro Cárdenas to Morelia is currently under construction.[224]

Table 2.14
Facilities at Port of Lázaro Cárdenas

Facility	Load/Activity	Longitude (m)	No. of Berths	Operators
Coal terminal	Coal ashes	355	1	C.F.E.
Container terminal	General, containers	286	1	APILAC
Fertilizers terminal	General, fertilizer	497	2	GRUPO FERTINAL
Fluids terminal	-	650	2	PEMEX
Agriculture terminal	General, agricultural bulk	678	2	ALMER
Multipurpose terminal (TUMI)	-	253	1	ISPAT
Multipurpose terminal (TUM II)	-	253	1	SICARTSA
Metals and minerals	-	650	2	SERSIINSA
Boats facility	-	72	2	APILAC

Source: Infoport, "Mexico Seaports Transportation: Port of Lázaro Cárdenas Terminals, Docks and Equipment." Online. Available: http://www.infoport.com.mx/Cardenas/2/car_terminalw.htm. Accessed: December 1, 1999 (port information Web site).

Operations

Traffic

In 1998, there were 8,739,000 metric tons of imports and 3,114,000 metric tons of exports moving through the port.[225] During the same year, container traffic amounted to 71,676 TEUs,[226] of which, 33,000 metric tons were exports. The major goods and products moved through the port are 8,819,000 metric tons of ore and agricultural bulk at 383,000 metric tons.[227] Table 2.15 shows the cargo load by thousands of tons from 1994 to 1998.

Table 2.15
Commercial Cargo Load in Thousands of Tons, 1994-98

Year	Tonnage
1994	8,884
1995	10,542
1996	10,707
1997	12,241
1998	13,652

Source: Infoport, "Mexico Seaports Transportation: Port of Veracruz Trade Load." Online. Available: http://www.infoport.com.mx/Cardenas/indexw.htm. Accessed: December 1, 1999 (port information Web site).

Administration

As with Veracruz, management of the Port of Lázaro Cárdenas resides with APIs. The port's assets (water zones, infrastructure, terminals, facilities, and land areas) are federally owned, and only the employment, utilization, and exploitation of port assets are granted to the independent API of Lázaro Cárdenas. [228]

Issues and Developments

Competition

On the Pacific coast of Mexico, the ports of Ensenada and Manzanillo are Lázaro Cárdenas' main local competitors. However, Lázaro Cárdenas is Mexico's largest port on the Pacific, with an annual traffic of more than 13 million tons, most of which are petrochemical products. However, while Lázaro Cárdenas is in the process of expansion, it is not expected to reach levels close to becoming competition for rival ports in the United States, such as Los Angeles and Long Beach.[229]

Nevertheless, U.S. port engineers have recently cited the port the most suitable on the West Coast of Mexico for large-scale development.[230] As Mexico's Pacific Rim trade grows, ports like Lázaro Cárdenas are being expanded to serve the manufacturing and population centers of Mexico City, Guadalajara, and Monterrey.

Future Developments

The Port of Lázaro Cárdenas has had a significant market development in comparison to the other Mexican ports, experiencing an annual growth rate of 15 percent in the last eight years. The port represents a strategic development site, not only for the region's economy but also for the influence area it serves. It is especially closely bound to the iron and steel industry, the mainstay of the region's economy. Over the last 30 or so years, port activities, such as the fertilizer and steel production industry, power generation, raw material derived from the oil distribution and storage, and installation of silos with great capacity for agricultural in bulk handling, have been increasing the added value to the region that is the principal portion of the Mexican west Pacific.

Unlike the limited land expansion possibilities in the Port of Veracruz on the East Coast, Lázaro Cárdenas is one of the two ports in Mexico with large land and water extension areas for developing new industries. The port currently occupies only about 20 percent of its total available area.

Other key factors to the port of Lázaro Cárdenas' competitive advantage over other Mexican ports include its convenient access to Pacific Rim markets, with navigation routes to ports such as Hong Kong, Yokohama, Singapore, Australia, and Calcutta and in the same littoral with the ports of Vancouver, Los Angeles, Long Beach, and Valparaiso.

Some potential markets identified by the port's administration that have serious potential to increase the port's competitiveness in the global maritime arena in encouraging growth are in the steel production, fertilizer, and oil industries. These industries constitute 95 percent of the total of the load handled through the port. [231]

Notes

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Chapter 3. MERCOSUR Transportation

Trends in Trade

MERCOSUR: Trade with the World

There was a substantial increase in trade to and from the Southern Common Market (Mercado Común del Sur, or MERCOSUR) during the 1990s. Total exports from the region almost doubled from $46.4 billion in 1990 to $81.4 billion in 1998 (a 75.4% increase), with an average rate of growth of approximately 6.4 percent a year. Imports grew at a faster pace, from $27.4 billion to $95.6 billion (249.1% increase) in the same period, with an average annual growth rate of 14.9 percent.[1]

Argentina and Brazil are responsible for most of the trade bloc's exports. In 1990, 94.3 percent of total exports originated in these countries; by 1998, they accounted for 95.2 percent of exports. Brazil and Argentina also accounted for most of the total imports: 89.9 percent of imported goods were imported by them in 1990, climbing up to 93.1 percent in 1998. Argentina led the increase in both exports and imports during the period, with an average annual growth rate of 8.8 percent in exports and 25.5 percent in imports. Brazil followed at more modest rates of 5.6 percent and 12.1 percent, respectively, for exports and imports. Table 3.1 presents total exports and imports in 1990 and 1998, and the average annual growth rates for the trade bloc during the 1990-98 period.

Table 3.1
Total MERCOSUR Export and Import Growth during 1990-98
(millions of dollars and percentages)

	Exports				**Imports**			
Country	1990	1998	Total Growth	Avg. Annual Growth	1990	1998	Total Growth	Avg. Annual Growth
Argentina	12,352	26,433	114.0%	8.8%	4,078	31,405	670.1%	25.5%
Brazil	31,413	51,120	62.7%	5.6%	20,536	57,549	180.2%	12.1%
Paraguay	959	1,103	15.0%	1.6%	1,350	2,790	106.7%	8.4%
Uruguay	1,708	2,770	62.2%	5.5%	1,404	3,807	171.2%	11.7%
TOTAL MERCOSUR	46,432	81,427	75.4%	6.4%	27,367	95,551	249.1%	16.9%

Source: Centro de Economía Internacional (CEI), Ministerio de Relaciones Exteriores, Comércio Internacional y Culto, Secretaría de Relaciones Económicas Internacionales, República de Argentina, "Panorama del MERCOSUR No. 4" (Sección Sexta, Anexo Estadístico, Buenos Aires, Argentina, November 1999).

Exports from the region's most important partner, Brazil, grew 62.7 percent during the period, while Argentina's exports doubled (growing 114.0%). Uruguay had a similar performance as Brazil, with a trade increase of 62.2 percent. Lagging behind was Paraguay, whose exports only grew 15.8 percent during the period. Brazil's imports rose more than its imports, rising 180.2 percent, while Argentina's imports grew dramatically, at a 25.5 percent annual rate, the highest in the region.

Brazil is the prime exporter of the region. In 1998, its exports accounted for almost two thirds (62.8%) of the bloc's total; Argentina's exports accounted for 32.5 percent; Paraguay and Uruguay represented 4.8 percent. During the 1990-98 period, a reconfiguration in the relative importance of the member countries in the region's total exports took place. In 1990, Brazil had 67.7 percent, while Argentina accounted for 26.6 percent. Paraguay and Uruguay accounted for 5.8 percent of the bloc's exports. Brazil's share of total imports fell from 75.0 percent to 60.2 percent over the nine-year period, while Argentina's more than doubled, from 14.9 percent in 1990 to 32.9 percent in 1998. Meanwhile, Paraguay's and Uruguay's combined import share fell from 10.0 percent to 6.9 percent.

MERCOSUR Intraregional Trade

As the commercial ties between the four countries increased during the 1990s, intraregional trade powered the export and import growth of the trade bloc. Table 3.2 presents extra- and intra-MERCOSUR total exports for selected years, and the average annual rate increases during the 1990-98 period of intraregional trade. As mentioned in the previous section, MERCOSUR's total exports grew at a 6.4 percent average annual rate. Nevertheless, intraregional exports grew three times as fast, at a 22.2 percent rate, while exports to the rest of the world grew at a 4.7 percent rate during this period.

Higher growth rates of exports between partners changed the structure of the export markets of each country. Intraregional exports grew from 8.9 percent in 1990 to 25.2 percent in 1998, while the proportion of exports to the rest of the world fell from 91.1 percent to 74.8 percent in those same years. The two main destinations of exports for the trade bloc in 1990, the European Union (EU) (31.1%) and the United States (20.7%), became proportionally less important by 1998, EU 24.7 percent and United States 15.1 percent, losing ground to intra-MERCOSUR trade.

Growth in relative importance of trade has been unequal for each country. Brazil's export dependence to the rest of the trade bloc grew from 4.2 percent in 1990 to 17.4 percent in 1998; Argentina's dependence grew from 14.8 percent to 35.6 percent; Paraguay's, from 39.6 percent to 61.2 percent; and Uruguay's, from 34.8 percent to 55.3 percent in the same period. Brazil became Argentina's principal market for exports; a little under one-third (30.1%) of the latter's exports were to Brazil in 1998, up from 11.5 percent in 1990. Meanwhile, the EU (30.8%) was Argentina's main export market, followed by the United States (13.8%). On average, Argentina's exports to Brazil have grown at a 24 percent rate during this phase.

Brazil's main destination is still the EU, which purchased 29.1 percent of its exports in 1998; the United States comes in second with 18.4 percent. Argentina accounted for 13.2 percent of Brazil's exports, growing from a meager 2.1 percent in 1990 (an average growth rate of 34.1%). Although not significant regarding total value of trade, both Argentina and Brazil's exports to Paraguay and Uruguay grew steadily during the 1990-98 period, with average growth rates significantly higher that those for the rest of the world.

Table 3.2
Trends in Intra- and Extraregional MERCOSUR Exports
(millions of dollars and percentages)

	1990	1994	1998	Annual Growth 1990-98	Total Growth 1990-98
		Argentina			
Total exports	12,352	15,839	24,433	10.0%	114.0%
Exports to MERCOSUR	1,833	4,804	9,411	22.7%	413.4%
Exports to rest of world	10,519	11,035	17,022	6.2%	61.8%
MERCOSUR share of total	14.8%	30.3%	35.6%	----	----
		Brazil			
Total exports	31,413	43,560	51,120	6.3%	62.7%
Exports to MERCOSUR	1,320	5,922	8,877	26.9%	572.5%
Exports to rest of world	30,093	37,638	42,243	4.3%	40.4%
MERCOSUR share of total	4.2%	13.6%	17.4%	----	----
		Paraguay			
Total exports	959	814	1,103	1.8%	15.0%
Exports to MERCOSUR	380	425	675	7.4%	77.6%
Exports to rest of world	579	389	428	-3.7%	-26.1%
MERCOSUR share of total	39.6%	52.2%	61.2%	----	----
		Uruguay			
Total exports	1,708	1,914	2,770	6.2%	62.2%
Exports to MERCOSUR	594	898	1,533	12.6%	158.1%
Exports to rest of world	1,114	1,016	1,237	1.3%	11.0%
MERCOSUR share of total	34.8%	46.9%	55.3%	----	----
		MERCOSUR			
Total exports	46,432	62,125	81,427	7.3%	75.4%
Exports to MERCOSUR	4,127	12,049	20,496	22.2%	396.6%
Exports to rest of world	42,305	50,076	60,931	4.7%	44.0%
MERCOSUR share of total	8.9%	19.4%	25.2%	----	----

Source: CEI, Ministerio de Relaciones Exteriores, Comércio Internacional y Culto, Secretaría de Relaciones Económicas Internacionales, República de Argentina, "Panorama del MERCOSUR No. 4" (Sección Sexta, Anexo Estadístico, Buenos Aires, Argentina, November 1999).

In the case of Paraguay, Argentina and Brazil are its main trading partners, accounting for 29.0 percent and 30.8 percent, respectively, of Paraguayan exports in 1998. The most dynamic market within the trade bloc for Paraguay was Argentina, with a 24.3 percent average growth rate during 1990-98. For Uruguay, Brazil has been its primary export destination, taking 29.6 percent of its exports in 1990 and around one third (33.8%) in 1998. During the same decade, the EU bought between 20 to 25 percent of Uruguay's exports; but the EU lost its second-place ranking to Argentina, which accounted for 18.6 percent of Uruguay's exports in 1998. Uruguay's exports to Argentina grew at a rate of 25.8 percent over the 1990-98 period.

Table 3.3
Trends in Intra- and Extraregional MERCOSUR Imports
(millions of dollars and percentages)

	1990	1994	1998	Annual Growth 1990-98	Total Growth 1990-98
		Argentina			
Total imports	4,078	21,589	31,405	29.1%	670.1%
Imports from MERCOSUR	834	4,783	7,927	32.5%	850.5%
Imports from rest of world	3,244	16,806	23,478	28.1%	623.7%
		Brazil			
Total imports	20,536	33,078	57,549	13.7%	180.2%
Imports from MERCOSUR	2,306	4,581	9,425	19.2%	308.7%
Imports from rest of world	18,230	28,497	48,124	12.9%	164.0%
		Paraguay			
Total imports	1,350	2,424	2,790	106.7%	9.5%
Imports from MERCOSUR	404	980	1,900	370.3%	21.4%
Imports from rest of world	946	1,444	890	-5.9%	-0.8%
		Uruguay			
Total imports	1,404	2,706	3,807	171.2%	13.3%
Imports from MERCOSUR	560	1,364	1,648	194.3%	14.4%
Imports from rest of world	844	1,342	2,159	155.8%	12.5%
		MERCOSUR			
Total imports	27,367	59,801	95,551	16.9%	249.1%
Imports from MERCOSUR	4,103	11,708	20,900	22.6%	409.4%
Imports from rest of world	23,264	48,093	74,651	15.7%	220.9%
MERCOSUR share of total	15.0%	19.6%	21.9%	----	----

Source: CEI, Ministerio de Relaciones Exteriores, Comércio Internacional y Culto, Secretaría de Relaciones Económicas Internacionales, República de Argentina, "Panorama del MERCOSUR No. 4" (Sección Sexta, Anexo Estadístico, Buenos Aires, Argentina, November 1999).

The trade bloc's total imports grew at an annual rate of 16.9 percent, while intra-MERCOSUR imports grew at a 22.6 percent rate. Therefore, the relative importance of trade among members changed, and the importance of the region's imports increased from 15 to 21.9 percent between 1990 and 1998. Table 3.3 presents the region's imports by origin and their average growth rates during the 1990s.

Argentina acquires around one-fourth (22.5%) of its imported goods from Brazil, while Brazil imports 14.2 percent of its goods from Argentina. Although they are not each other's main source of imports (both Argentina and Brazil import the largest share of their goods from the EU, 27.5 percent and 29.2 percent, respectively) bilateral import growth rates have risen faster than those for the rest of the world. More than two-thirds of Paraguay's total imports come from Argentina (22.6%) and Brazil (46.2%). For Uruguay, Argentina (22.0%) and Brazil (20.8%) are the main providers, followed very closely by imports from the EU (18.9%). All MERCOSUR countries show higher-than-average growth rates in intraregional imports versus imports from the rest of the world. Table 3.4 presents each country's dependence in both exports and imports on the other partners for a selected number of years.

Table 3.4
Intraregional Exports and Imports as percentage of Total Trade by Country, 1990-98

EXPORTS

	Argentina			Brazil			Paraguay			Uruguay		
Country	1990	1995	1998	1990	1995	1998	1995	1998	1998	1990	1995	1998
Argentina	---	---	---	11.5	26.2	30.1	1.2	3.0	2.4	2.1	3.1	3.2
Brazil	2.1	8.7	13.2	---	---	---	1.2	2.8	2.4	0.9	1.7	1.7
Paraguay	5.8	8.7	29.0	32.5	44.7	30.8	---	---	---	1.3	3.7	1.4
Uruguay	4.8	12.7	18.6	29.6	33.3	33.8	0.4	1.2	3.0	---	---	---

IMPORTS

	Argentina			Brazil			Paraguay			Uruguay		
Country	1990	1995	1998	1990	1995	1998	1995	1998	1998	1990	1995	1998
Argentina	---	---	---	17.5	20.7	22.5	1.0	0.7	1.1	1.9	1.4	1.7
Brazil	6.8	11.2	13.9	---	---	---	1.6	1.0	0.6	2.8	1.5	1.8
Paraguay	12.7	16.6	22.6	16.4	21.7	42.5	---	---	---	0.7	1.2	3.0
Uruguay	15.6	21.2	22.0	23.5	24.4	20.8	0.8	0.5	0.4	---	---	---

Source: CEI, Ministerio de Relaciones Exteriores, Comercio Internacional y Culto, Secretaría de Relaciones Económicas Internacionales, República de Argentina, "Panorama del MERCOSUR No. 4" (Sección Sexta, Anexo Estadístico, Buenos Aires, Argentina, November 1999.)

It is clear that, in the case of Argentina and Brazil, Paraguay and Uruguay do not represent the most important export destinations and are also not the main import providers. Dependence rates have grown faster for the two smaller countries than for the larger members of MERCOSUR.

In any case, it is important to acknowledge the increasing export dependence of Argentina, Paraguay, and Uruguay on Brazil. Almost one-third of each country's exports are destined to Brazil (Argentina 30.1%, Paraguay 30.8% and Uruguay 33.8%) but there is no reciprocity from Brazil, since only 17.3 percent of its exports are shipped to the other three MERCOSUR partners combined.

Argentina and Brazil: Commodities Traded Between the Main Partners

In 1998, Argentina and Brazil together accounted for 89.2 percent and 83.0 percent of intra-MERCOSUR exports and imports, respectively. Therefore, it was deemed convenient that only commodities traded between these two countries be analyzed.

Vehicles and their components are the most traded commodities between the countries: approximately one-third of trade between Brazil and Argentina consists of vehicles, 30.2 percent of Brazil's exports to Argentina and 32.8 percent of Brazilian imports from Argentina. As mentioned in the introduction, vehicles have not converged with the rest of the free trade zone, and they are treated separately under the "Régimen Automotriz Común del MERCOSUR." Under this regime, vehicles proceeding from non-MERCOSUR countries are bound to a 35 percent common external tariff, and vehicles proceeding from each MERCOSUR country are tax exempt, under some origin and quota restrictions. [2]

The second most-traded commodities between the countries are cereals, in this case wheat. Brazil imports wheat worth $1.13 billion from Argentina, around 14.1 percent of its total imports from that country. Other top-traded commodities are machinery, mainly different types of motors, which accounted for 13.7 percent of Brazilian exports to Argentina ($927 million). Petroleum and its derivatives and mineral fuels are another important commodity traded between the countries, with $704.7 million imported by Brazil; it accounts for 8.8 percent of Brazil's imports from Argentina. All combined, the ten main exports from Brazil to Argentina and the ten main Brazilian imports from Argentina comprise 71.4 percent and 75.9 percent of total exports and imports, respectively. Table 3.5 presents these commodities in order of importance and as a percentage of total exports and imports.

Commerce on the Border

Border crossings within MERCOSUR have emerged primarily as a result of heavily used transportation routes. It is important to understand, however, that historical trade barriers between the MERCOSUR countries have precluded the development of binational economic trade regions between nations. Integrated economies have tended to develop within individual countries but not between MERCOSUR countries. In addition, efforts at integration have been hindered by the lack of coordinated policies with respect to macroeconomic stability, stable exchange rates, trade rules, and legal frameworks for development. The lack of coordination with respect to these issues has had an inevitable impact on trade and the development of border regions. Nevertheless, six border crossings and regions are significant for MERCOSUR. These crossings are identified in Table 3.6.

Table 3.5
Top Ten Argentina-Brazil Exports and Imports by Commodity Groups, FOB, 1998 (thousands of dollars and percentages)

Brazil Exports to Argentina

NCM* Code	Commodity-Group Description	Rank	Value of Trade	Percentage of Total Exports
87	Transportation equipment	1	2,036,752	30.19
84	Mechanical machinery	2	926,950	13.74
85	Electrical machinery	3	343,017	5.08
72	Iron and iron by-products	4	287,591	4.26
39	Plastics	5	278,644	4.13
48	Paper and paperboard	6	278,168	4.12
29	Organic chemicals	7	221,005	3.28
26	Mineral products	8	159,396	2.36
38	Chemical products	9	144,766	2.15
40	Latex and its by-products	10	140,617	2.08
		TOTAL	4,816,906	71.39

Brazil Imports from Argentina

NCM* Code	Commodity-Group Description	Rank	Value of Trade	Percentage of Total Imports
87	Transportation equipment	1	2,631,172	32.75
10	Cereals	2	1,132,918	14.10
27	Mineral fuels	3	704,651	8.77
84	Mechanical machinery	4	394,021	4.90
07	Vegetables	5	308,591	3.84
04	Animal products	6	236,341	2.94
39	Plastics	7	187,556	2.33
15	Animal and vegetable oils	8	184,989	2.30
52	Cotton	9	170,300	2.12
85	Electrical machinery	10	145,642	1.81
		TOTAL	6,096,181	75.86

*NCM: Nomenclatura Común del MERCOSUR.

Source: Ministerio do Desenvolvimento, Indústria e Comércio Exterior (MDIC), Secretaría de Comércio Exterior (SECEX), Departamento de Opesações de Comércio Exterior (DECEX), and Gerência de Estadísticas e Sistemas de Comércio Exterior (GEREST), 1999.

While the above border crossings are significant in terms of MERCOSUR activity, they are by no means the only crossings used for MERCOSUR trade. Improvements in highways, railroads, and bridges will often divert traffic from inefficient crossings to new and efficient crossings. An example of this is the case of Santo Tomé/São Borja bridge. This bridge, created by a binational agreement between Argentina and Brazil, is a model for an efficient border crossing within the MERCOSUR region. However, most border crossings currently experience delays in customs clearance procedures. These delays, coupled with needed infrastructure investments, present challenges for the integration of MERCOSUR. An in-depth analysis of customs clearance and infrastructure needs will be provided later in this chapter.

Table 3.6
MERCOSUR Border Crossings

Border Cities	Border
Xuí/Chuy del Uruguay	Brazil-Uruguay
Santana do Livramento/Rivera	Brazil-Uruguay
Paso de los Libres/Uruguíana	Argentina-Brazil
Santo Tomé/São Borja	Argentina-Brazil
Puerto Iguazú/Foz de Iguaçu/Ciudad del Este	Argentina-Brazil-Paraguay
Encarnación/Posadas	Argentina-Paraguay

Source: Inter-American Development Bank (IADB) "MERCOSUR: Achievements and Challenges," Working Paper Series 222, 1997, p. 26.

The "MERCOSUR Effect"

In 1990, inflation rates in Argentina and Brazil were extremely high (1343.9% and 2937.7%, respectively) and real GDP for both countries was declining.[3] With the signing of the Act of Buenos Aires in 1990 (Argentina and Brazil), the Asunción Treaty in 1991, and the advent of the date (January 1, 1995) upon which the MERCOSUR agreement became effective, structural adjustment processes were initiated in the four countries. Analogous to this macroeconomic shift, average external tariffs were decreasing significantly throughout the four countries.[4] Therefore, the impressive growth in trade between partners could well be explained by these factors.

Nevertheless, there is empirical evidence that a significant portion of the growth in trade between these partners derives from the "MERCOSUR effect"[5]; that is, the impact that the creation of the trade bloc has had in the commercial flows within it. Close to 95 percent of trade between the MERCOSUR countries is tax exempt, and only some "sensitive" products, such as sugar, cars, capital goods, and telecommunications and information technology, do not enjoy tax-exempt status.[6]

An analysis by A. Bevilaqua, E. Talvi and F. Blanco, points to the existence of the "MERCOSUR effect." Examining quarterly data from 1985 to 1997, the researchers introduced a MERCOSUR "dummy" variable into their regression analysis, which also included real exchange rates and real gross domestic product (GDP). The MERCOSUR variable took a value of "0" between 1985 and 1990 and a value of "1" between 1991 and 1997. The analysis confirmed that "after 1991 the countries in the region traded more with one another as a result of MERCOSUR."[7]

The Real Crises' Impact on Trade

Fluctuations in the macroeconomic conditions within the countries are transmitted through the trade of goods, services, and assets and the flow of factors of production. The intensity or extent of the influence of these conditions depends on the degree of their integration and the characteristics of the economic policies adopted, particularly in exchange rate policy.[8] In the case of the MERCOSUR integration process, macroeconomic interdependence has emerged through the trade flows of goods, since both asset and factors of production movements are still limited.[9]

The devaluation of Brazil's currency, the real (plural reais, with 100 reais denoted as R$100), had a severe impact on the countries' economies in the first months of 1999. This devaluation, as would be expected, affected MERCOSUR's trade volume, which fell drastically in the first half of 1999, and especially trade among the four countries. Intra-MERCOSUR exports fell an impressive 28.3 percent in the first half of 1999, while intraregional imports fell 28.0 percent, compared to the first half of 1998. Meanwhile, exports to the rest of the world fell only 9 percent, although imports fell more dramatically by 17.5 percent for this same period.

Modes of Transportation

There are five distinct modes of transportation that are used to carry goods between MERCOSUR member nations. While railway, inland waterway, maritime, highway, and air transportation routes are options for intraregional trade, maritime and highways carry the majority of trade between MERCOSUR member countries. In fact, these two modes together account for 90 percent of intraregional trade.[10] This section examines each of the modes of transportation, specifically looking at the benefits and challenges that each faces.

Table 3.7 illustrates the share of each mode for 1998. Rail accounts for 0.4 percent of the total volume (tonnage) and 0.7 percent of the value transported. While inland waterways account for just 5.9 percent of the value of products transported, they carry 0.1 percent of the total goods traded in the region. Maritime transportation carries 64.8 percent of the total value of goods traded in the region. Truck transport over highways has the opposite effect; 56.4 percent of the total volume of goods are transported by road, but these goods account for 27.6 percent of the total value of goods traded. Finally, air transportation only accounts for 5 percent of the total goods traded in the region and only 0.2 percent of the value.

Table 3.7
MERCOSUR 1998 Modal Split

	Highways	Railways	Maritime	Waterways	Air
Value	27.6%	0.7%	64.8%	5.9%	0.2%
Volume	56.4%	0.4%	35.5%	1.0%	5.0%

Source: IADB, as quoted in Centro de Economía Internacional in "New Trade and Investment Opportunities," Buenos Aires, Argentina, 1999, p. 13.

It is important to consider the cost and travel time associated with each mode of transportation. In general, air transportation is the most expensive mode of transportation. Truck transport is the second most expensive mode, followed by rail. Maritime is less expensive than rail, and inland waterway is the least-expensive mode of transportation in the region. The time required for each of these modes is inversely related to its cost. Air is the quickest means of transportation, followed by highway, railway, maritime, and, last, inland waterway.

Table 3.8 provides a concrete example of the distinct costs and travel times for each mode of transportation. Specifically, the table delineates these characteristics for the cargo traveling between Buenos Aires in Argentina and São Paulo in Brazil, the two largest population centers in the MERCOSUR bloc.

Table 3.8
Mode of Transportation, Costs, and Time for Travel between São Paulo and Buenos Aires

Mode of Transport	Cost (Dollars/Ton)	Time
Maritime	77.4	10 days
Truck (highways)	104-110	5 days
Rail	110-80	10-12 days
Air	525	0.5 day

Source: "MERCOSUR y Transporte: Los Precios Costos y Ventajas de Cada Medio," *La Nación,* (Buenos Aires, Argentina, June 1998), p. 31.

Highways

Intraregional exports increased by 396.6 percent from 1990 to 1998.[11] While the volume of goods carried by each mode of transportation has increased, some modes have absorbed this dramatic increase in trade more than others. In the case of Argentine exports, truck transport over highways has increasingly become the mode of choice.[12] In the case of Paraguay, almost 70 percent of its total exports and imports to and from other MERCOSUR countries are carried by truck. Highway use in Uruguay accounts for a lower share, but it is still the second highest in the trade bloc. And both Argentina and Brazil rely on highways to a greater extent than most other countries. As one study points out, "Within Brazil more than half of the cargo moves by road, twice as much as in the United States."[13]

There are several problems connected with highway uses within MERCOSUR countries. First, roads are becoming increasingly congested. Second, infrastructure maintenance and construction are direly needed along some of the main MERCOSUR corridors. There are also safety issues. Truck transport is susceptible to cargo theft, robberies, and assaults.[14] In some circumstances, it is the only way to transport goods. One report points out "poor roads and lack of rail or other modes of transport in Brazil add to the price of freight transportation by more than a third."[15] At this point, truck transport is still the most "flexible" in terms of transporting goods from "door to door" and can most easily adapt to changes in demand.[16]

Railways

As seen in Table 3.8, relatively little intra-MERCOSUR trade is transported by rail. This is also evidenced in Argentine-Brazil trade. The percentage share of rail transportation over the past decade has decreased for Argentina and stayed roughly the same for Brazil, which shows that rail is not absorbing the increased intraregional trade.[17]

Rail transport is potentially a much less-expensive alternative to truck. As the president of the state train company of Uruguay (AFE) estimated, one train could transport up to 1,500 tons, whereas to transport the same amount by highway would require at least 50 trucks.[18] Local governments as well as international companies have expressed interest in using railway as an alternative means of transportation to highway uses.

There are several reasons why rail has not been a viable alternative to truck transport. In addition to the issues of different track gauge sizes within and between MERCOSUR member countries, there are inadequate rail line infrastructure, rolling stock (equipment) and storage facilities.

Inland Waterways

In terms of costs, inland waterway transport is the least expensive of all modes of transportation in the region. A study completed by Wagner de Almeida Reinig (CESP) estimates that transportation by rail is one and a half times more expensive than transportation by inland waterway; transportation by truck is approximately four times as expensive. This study estimates that transportation by truck from Buenos Aires to São Paulo would cost approximately $110 per ton, and a multimodal transportation network utilizing the inland waterway system would reduce the cost by $70 to approximately $40 per ton.[19]

Cargo transported from the state of Mato Grosso in Brazil could potentially benefit from waterway transportation. Currently, in the northern part of the Paraguay-Paraná waterway, 90 percent of the grain cargo is transported by truck.[20] Most of the roads in this region are not paved, and maintaining and repairing these roads are expensive.

Although costs are much lower and the volume of cargo per vessel is greater for waterway verses land transportation, transit times are much slower. One barge can take up to 30 days to navigate through the Paraguay-Paraná waterway down to Palmira, while a truck covering the same distance only takes approximately two and a half days. Customs procedures, tolls, and taxes have yet to be standardized between the countries sharing the waterway and barges, which as a result make transportation by waterway even slower. Overland routes cross through fewer border crossings, thus encountering less red tape. There are also other water-related requirements that need to be addressed, such as dredging, river markings, and investments in port infrastructure to handle the cargo before waterway travel can become an effective means of transportation.

Maritime/Ports

An attractive alternative to land transportation is maritime transportation because it can handle a larger volume of cargo at a lower cost. There are, however, a number of challenges facing maritime transportation for intra-MERCOSUR trade. Ports are still expensive, especially in Brazil, and many have basic infrastructure needs in order to become more efficient.[21] Some of the infrastructure needs include better inland rail and highway connections to ports.

Another reason for the inefficiency of intra-MERCOSUR maritime trade is that it continues to be protected by a cargo reservation scheme for MERCOSUR flag-carrying fleets. A working group (see chapter 1) has been looking into a multilateral agreement for maritime trade in which the number of products that are protected by this scheme would be reduced over a ten-year period.[22] Private businesses within the MERCOSUR bloc are opposed to this protection of national fleets because of the inefficiencies and extra costs that result from such protection.[23]

Airways/Airports

Air transport has the advantage of transporting cargo rapidly, and companies are beginning to use air transport more regularly for certain goods. For example, in Argentina, air transport is used to transport auto parts and perishables. A 1996 agreement between Argentina, Brazil, Uruguay, Paraguay, and Bolivia is also opening doors for air transport. The Sub Regional Agreement of Air Transportation facilitates air transportation between cities and regions that have not traditionally been linked by air transport. The agreement allows airlines to explore possibilities for new routes before official authorization for those routes are granted. One example of this treaty is the new route between the cities of Córdoba and Salta and the beginning of international routes to and from these cities.[24]

Transportation by air has taken a secondary role in intra-MERCOSUR trade. One of the main reasons for this is the relatively high cost of air transport and the general lack of airport infrastructure. Although efficiency has been greatly enhanced by the incorporation of pallets in air transport, airports often do not have sufficient equipment or facilities needed to move cargo. Despite these needs, there has been an increase in the use of air as a means of transportation. Aerolíneas Argentinas Cargo, an Argentine air-cargo company, estimated a 15 percent increase in the quantity of goods it transported by air in 1997 from 1996.[25]

Multimodal Considerations

The region has identified developing multimodal transportation systems as an important step to making transportation of goods within the region more efficient and less costly. Attempts to create a legal structure for multimodal transportation and harmonizing regulations between MERCOSUR member nations has proved difficult. In 1993, Working Group No. 5, which focuses on transportation issues, approved a Multimodal

Transportation Agreement. The agreement was later ruled unconstitutional by the government of Uruguay and annulled in 1998.[26]

Although the legal framework is not in place on a MERCOSUR administrative level for multimodal networks between countries within the region, there have been agreements between companies to establish multimodal transportation networks. One of the most important agreements, which was sponsored by rail companies in Brazil and Argentina, essentially connects the state of São Paulo in Brazil to the region of Buenos Aires through a multimodal network that utilizes containers. The company BAP that regulates this network is looking to expand and facilitate cargo traveling on the bioceanic corridor between the ports of Valparaíso/San Antonio in Chile and Buenos Aires in Argentina.[27]

Manufacturing/Production Centers

Brazil

The states of southern Brazil possess the largest and most important manufacturing centers. The states in this region are Rio de Janeiro, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul. Within these states, the major cities of Rio de Janeiro, São Paulo, Curitiba, and Rio Grande do Sul form a cluster of industries within a distance of 1,553 kilometers (964 miles). The following section provides an overview of each region's economic profile.

Rio de Janeiro

The city of Rio de Janeiro maintains its economic vitality as a business and port center in Brazil. Numerous national, multinational, and state-owned corporations maintain their headquarters in Rio de Janeiro. Rio's port serves to export automobiles that are produced in nearby interior states such as Belo Horizonte. Companies such as Petrobrás, Shell, Esso, and Rio Doce Valley Company maintain headquarters in Rio de Janeiro, which instill an economic vitality to the city.[28] In addition, large government-sponsored research institutions such as the National Economic and Social Development Bank (Banco Nacional de Desenvolvimento Economico e Social, or BNDES) provide employment to a significant middle-class population. Major industries in Rio have historically included metallurgy, engineering, textiles, nonmetallic mineral products, chemicals, and pharmaceuticals.[29]

São Paulo

The state of São Paulo is Brazil's industrial hub. It accounts for more than half of the country's manufactured goods. Primary industries in São Paulo include textiles, mechanical and electrical appliances, furniture, foodstuffs, chemicals, and pharmaceuticals.[30] In addition to these industries, São Paulo is a major producer of coffee, poultry, beans, fertilizers, and paper. São Paulo's economic strength stems from both its large industrial profile and the Port of Santos.

Paraná and Santa Catarina

The Brazilian states of Paraná and Santa Catarina play a pivotal role within the scope of MERCOSUR economic activity. As major producers of soy, corn, wheat, cattle, and poultry, these states compete with Argentina and Uruguay within these industries. Paraná and Santa Catarina are situated in a position that affords them access to both MERCOSUR countries and the agriculturally rich interior states of Goiás and Mato Grosso do Sul. Efforts to improve the states' railroads, such as the Sistema Ferroviário Centro Oeste, and development of the Araguaia-Tocantins Hidrovia will allow greater integration with the interior of Brazil. The Araguaia-Tocantins Hidrovia would provide an interior link to the ports of Maranhão and Pará. In addition to railroads and waterways, both states' highways must be modernized to ensure efficient interstate and intrastate transport.

Rio Grande do Sul

The state of Rio Grande do Sul in southern Brazil is situated in a position where it serves as the southernmost Brazilian state within the context of MERCOSUR activity. Rio Grande do Sul supplies most of its grain to internal markets in Brazil and is a major producer of soybeans, rice, wheat, and fertilizers. However, Argentina's and Uruguay's proximity to Brazilian markets present an opportunity for foreign producers to supply agricultural goods to the large consumer centers of São Paulo and Rio de Janeiro. In addition, the development and use of waterways and ports, linking Argentina and Paraguay to large Brazilian markets, provide a low-cost transportation alternative to the use of high-cost highways. The use of these low-cost transportation modes could shorten travel distances and costs, which could facilitate the movement of Argentine and Paraguayan products into Brazilian consumption centers.

Argentina

Buenos Aires

Buenos Aires, the city with the largest port in South America, serves as the hub for Argentina's agricultural commodities. Grains and agricultural by-products are processed and shipped as primary exports from Buenos Aires, while machine goods and consumer durables are received as imports.[31] Agricultural and agri-industrial products account for 60 percent of Argentina's exports, with wheat, corn, and soybeans being major crops.[32] In addition to these crops, livestock and meat production are key activities in the economy. In 1996, food products were 16.1 percent of exports, while live animals made up 9.1 percent of exports.[33]

Córdoba

The province of Córdoba, with approximately 3 million residents, has numerous industries that form the basis of its large economy. Wheat, corn, soybeans, and cattle raising make up approximately 11 percent of the region's agricultural economy. Textiles, food production, and cement make up about 25 percent of the region's manufacturing sector. Approximately 40 percent of the region's exports are produced for Brazil. Córdoba's location at the crossroads of major corridors that lead to Chile, coupled with its large economy, make it an important regional manufacturing center.

Rosario/Santa Fe

Rosario, located in the region of Santa Fe, is strategically located in a geographic area of MERCOSUR activity. Rosario is a hub for the production and processing of grains that are exported from nearby shipping facilities that lie along a 50-mile span of the Paraná River. Rosario is Argentina's largest exporter of grains and grain by-products, accounting for approximately 70 percent of total grain exports. The region of Santa Fe produces the largest share of Argentina's soy production, with 5 million tons of soy produced each year, and processes more than half of Argentina's oil-producing grains.[34] Rosario is also significant to MERCOSUR's economy because it serves as a hub for imports and exports that are transported along the Paraguay-Paraná Waterway. This waterway connects Rosario to other large soy production areas, such as the Brazilian states of Mato Grosso and Mato Grosso do Sul. As various regions of MERCOSUR become integrated, Rosario will continue to play an important role in serving as a focal point for trade and commerce.

Mendoza

Mendoza serves as a gateway for goods traveling over the Andes Mountains from Argentina to the Chilean Port of Valparaíso. Two railroads and one major highway pass through Mendoza to connect Argentina and Chile. In addition to serving as a transportation gateway, Mendoza produces wine, fruit preserves, and petrochemicals.[35] Alfalfa (which is exported to Chile for livestock feeding), cereals, and soybeans have become important areas of production. Mendoza also has important mineral resources that include uranium, natural gas, manganese, and copper. With improvements in highways and railroads that cross the Andes, Mendoza will continue to serve as an important crossroad for goods traveling between the Atlantic and Pacific coasts.

MERCOSUR Corridors: North-South Routes

Currently, transportation networks within the MERCOSUR countries are in need of infrastructure investment and maintenance. These investments are particularly necessary for highways because they are used to transport two-thirds of MERCOSUR's intraregional cargo.[36] Dependence on highway transportation stems from historical governmental policies that have favored highway development. In the case of Brazil, investment in highway development accounted for 70 to 80 percent of all transportation investments between 1945 and 1964.[37] In addition, the Brazilian Ministry of Mining and Energy currently provides subsidies for the production of diesel fuel.[38] This subsidy, in turn, provides incentives for truck transportation and further perpetuates dependence on highways. The following sections provide a status summary of the major highway, railroad, and waterway networks in Brazil and Argentina.

Brazil

Highways

The most important north-south corridor is the MERCOSUR Highway. This highway, which links the cities of southern Brazil and Buenos Aires, is the most important transportation system that integrates the major industrial centers within Brazil and Argentina. The MERCOSUR Highway is not one uniform highway but is composed of numerous links that altogether make up a highway network between Brazil and Argentina. Segments of this highway are determined by how close they are to major industrial centers and border crossings. The primary border crossings between Brazil and Argentina in the state of Paraná are Foz do Iguaçu and Uruguaiana. In the state of Rio Grande do Sul, the border crossings are Chuí, Jaguarão, and Santana do Livramento.

The major highway connecting Rio de Janeiro with São Paulo, Curitiba, and Porto Alegre is BR 116. Between Rio de Janeiro and São Paulo, BR 116 is a privately operated highway known as the Via Dutra. The Via Dutra was privatized in 1996 with a 25-year conservation and restoration contract. Upon reaching São Paulo, BR 116 continues south to Curitiba, from which point there is the option to choose a second highway, BR 376. BR 376 travels south along the coast of the state of Paraná to the border with the state of Santa Catarina, at which point it becomes BR 101. BR 101 continues traveling south along the coast, passing Florianópolis, the capitol of Santa Catarina, and finally reaching Osório in the state of Rio Grande do Sul. At Osório, BR 101 becomes BR 290 and heads east to Porto Alegre. BR 290 continues east, crossing the entire state of Rio Grande do Sul until it reaches the border crossing with Argentina at Uruguaiana.

At the city of Rosário do Sul, BR 290 intersects with BR 158. BR 158 travels in a southeast direction and reaches a border crossing with Uruguay at Santana do Livramento.

At Curitiba, there is also the option to continue traveling south on BR 116 to Porto Alegre. This segment of BR 116 travels through the interior of Paraná, Santa Catarina, and Rio Grande do Sul. From Porto Alegre, BR 116 continues traveling south to a border crossing with Uruguay at Jaguarão. The segment of BR 116 within Rio Grande do Sul has been targeted for restoration and duplication of the road with the creation of another parallel road.[39]

At the city of Pelotas in Rio Grande do Sul, there is the option to travel south on BR 471. BR 471 is an alternate route to BR 116 that travels through Rio Grande do Sul, a significant port, and continues south to a border crossing with Uruguay at Chuí.

Finally, a highway that does not enter Rio Grande do Sul on its way to a border crossing is BR 277. BR 277 travels east from Curitiba across the entire state of Paraná. BR 277 reaches Foz do Iguaçu, a border crossing with Argentina and Paraguay.

Railways

Four primary railroad systems form the Brazilian portion of the MERCOSUR railroad corridor. These systems are the Rede Ferroviária Federal S.A. (RFFSA), railroads in the states of Vitória and Minas Gerais (EFVM), the Paraná Oeste S.A. (Ferroeste), and the Ferrovias Paulistas S.A. (Fepasa).[40] Together, these railroads make up 21,353 kilometers that travel from the agriculturally rich interior states of Brazil to industrial and consumption centers, to ports, and finally to links with Argentine railroads.

Railroads owned by the federal government, namely RFFSA, were privatized between 1996 and 1997. The objective of privatization was to improve service and expand railroad potential. Federal railroads were privatized by the state with 30-year concessions. The states of Paraná, Santa Catarina, and Rio Grande do Sul together make up 6,586 kilometers of railroad tracks, while the southernmost state of Rio Grande do Sul makes up 3,100 kilometers of tracks.

The main railroad route between Brazil and Argentina travels from São Paulo to Ponta Grossa, to Porto Alegre, and ends in Uruguaiana. It is estimated that this route moves between 50,000 and 200,000 tons of cargo per year, which include cereals, wheat, sugar, and fertilizers.[41]

A final important note about railroads is the fact that track gauges vary both between and within Argentina and Brazil. Railroads in both countries operate over broad, standard, narrow, and even dual-gauge lines (see Table 3.9 and Table 3.10). These differences present a challenge to integration of railroads across international boundaries.

Inland Waterways

Major waterways affecting MERCOSUR are composed of three rivers in the southern states of Brazil. These rivers, which link the interior states of Brazil and São Paulo with Argentina, are the Tiete, Paraná, and Paraguay.

The Tiete-Paraná river system currently spans 1,040 kilometers. On the Tiete River, the route spans from Conchas, a city northeast of São Paulo, to the canal of Pereira Barreto, where it connects to the Paraná River. From this point, the route runs north to São Simão, a city on the border region of Goiás, Minas Gerais, and the state of São Paulo. The river system also runs south on the Paraná River to Itaipu Dam. Traffic on the river currently cannot travel beyond Itaipu.

The Paraguay-Paraná river system is a critical transportation system that links the countries of Argentina, Bolivia, Brazil, Paraguay, and Uruguay. This north-south waterway spans 3,442 kilometers from the Port of Nueva Palmira (Uruguay) at the southernmost point, to the Port of Cáceres (Brazil) at the northernmost point. Various stretches of the river system have different depths. For example, between the northern point of Corumbá in Brazil and the Apa River, the river's depth is 1.5 meters. Between the Apa River and Port of Nueva Palmira, the waterway is fully navigable, with medium-size ships being able to travel between Buenos Aires and Asunción.

In 1989, the Intergovernmental Committee of the Hidrovía Paraguay-Paraná (CIH) was created, with representatives from all nations sharing the waterway, to improve the navigating conditions of the waterway. The CIH aims to create port and river conditions necessary for the use of the waterway 24 hours a day, 365 days a year, in order to facilitate the movement of large volumes of cargo across large distances at the lowest possible cost.[42] The CIH is currently studying the technical, economic, and environmental improvements needed for the waterway through a three-phase strategy that will evaluate short- and long-term investment needs.

Argentina

Highways

The most important highways in Argentina that are involved in MERCOSUR activity are those that link Buenos Aires to the border crossing with Brazil at Paso de los Libres (Uruguaiana in Brazil). Of less significance are highways that connect Buenos Aires to Puerto Iguazú (Foz do Iguaçu in Brazil).

The highways that travel from Buenos Aires to Uruguaiana are AR 193, AR 12, AR 14, and AR 117. Buenos Aires is linked by AR 12 to the city of Ceibas in the state of Entre Rios. At this point, AR 12 connects with AR 14. From this point, AR 14 travels north along the Argentina-Uruguay border to Uruguaiana.

At Uruguaiana, AR 12 connects with two Brazilian highways, BR 290 and BR 472. On BR 290, traffic travels east to BR 101, north along the coast of Santa Catarina, and eventually connects with BR 116 in Curitiba. Another option is to travel east on BR 290 and then north on BR 116 at the juncture in Porto Alegre. Both these highway options eventually lead north to São Paulo.

Another less-common option is that of BR 472. BR 472 travels north along the Brazil-Argentina border to São Borja to connect with BR 285. BR 285 travels east through Rio Grande do Sul to the Passo Fundo, where it connects to BR 153. BR 153 travels north to BR 373 at Imbituva. At that point, BR 373 travels east to Curitiba via Ponta Grossa. In Curitiba, there is the option to continue traveling north on BR 116.

The route to Foz do Iguaçu follows the same path until Uruguaiana. From Uruguaiana, the route continues north along AR 14 in the state of Corrientes to AR 105 in the state of Misiones. In the city of Posadas, the route continues north on AR 12, along the Argentina-Paraguay border, to Foz do Iguaçu. From this point, the route continues east on BR 277 to Curitiba and then north to São Paulo on BR 116.

Railways

As previously mentioned, the primary railroad in MERCOSUR runs from Buenos Aires to São Paulo via Paso de los Libres, Uruguaiana, Santa María, Porto Alegre, Lages, and Ponta Grossa. On the Argentine side, service has historically been provided by General Urquiza Company, which uses the 1.43-meter railroad gauge. On the Brazilian side, service has been provided by RFFSA. In recent years, railroads have been privatized and multinational mergers between railroad companies in both countries have aimed to better integrate railroads used for MERCOSUR commerce.

Inland Waterways

The main waterway system in Argentina is the Paraguay-Paraná river system. As described earlier in this chapter, this river system spans from the Port of Cáceres in Brazil to the Port of Nuevo Palmira in Uruguay. This river system has an enormous impact on the economy of Argentina because 55 of the 97 ports on the route are in Argentina.[43] In addition, the waterway's importance to Argentina stems from the fact that maritime cargo is transported along the southern portion of the waterway. This portion lies on Argentine territory, from the city of Santa Fe to Buenos Aires.

MERCOSUR Corridors: East-West Routes

Efforts to integrate South America via east-west corridors stem from the need to connect Atlantic coast markets with the markets of Asia and the western coast of the United States. These corridors, also known as bioceanic corridors, aim to connect the Pacific and Atlantic coasts. Numerous obstacles, such as border crossings, rivers, wetlands, and mountain ranges, pose challenges for these corridors. In addition, these corridors are currently in need of much infrastructure development and international and interstate coordination. The most important east-west corridors are described in this section.

Buenos Aires/Mendoza-Valparaíso

Highways

The transportation network between Buenos Aires and Valparaíso is the most critical east-west corridor. This corridor transports more than half of the trade between Argentina and Chile.[44] Traffic on this corridor travels primarily by highway on Argentina's AR 7 from Buenos Aires to Mendoza. The highway continues east through the tunnel of Cristo Redentor at the Andes Mountains and west to Santiago and Valparaíso.

In addition to Buenos Aires, numerous Argentine cities form points of origin for traffic that travels to Cristo Redentor. These cities are Córdoba, San Juan, and Santa Fe.

Railways

This corridor has two railroad routes. Each route has different railroad gauge sizes that pose a challenge to integration.

The first route uses a 1.00-meter railroad gauge and covers a distance of 1,762 kilometers. It travels from Buenos Aires to Rosario, Córdoba, and Mendoza. From Mendoza, the route continues to Las Cuevas and arrives at its final stop at San Felipe, 79 kilometers east of Valparaíso. From San Felipe, the railroad continues on a 1.676-meter railroad gauge.

The second route uses a 1.676-meter railroad gauge and covers a distance of 1,060 kilometers. It travels from Buenos Aires to Mendoza. From Mendoza to San Felipe, the route does not have a railroad that uses a 1.676-meter gauge. From San Felipe to Valparaíso, the route continues on a 1.676-meter gauge.

Rio Grande-Valparaíso

The only bioceanic connection between Rio Grande and Valparaíso is made up of 2,780 kilometers of highways through the state of Rio Grande do Sul and several provinces in Argentina. This corridor travels through Rio Grande do Sul, crossing into Argentina at Uruguaiana/Paso de los Libres. Once in Argentina, the corridor continues via numerous Argentine highways that lead to Cristo Redentor. From this point, the corridor follows the same route as the Buenos Aires-Valparaíso corridor.

Santos-Arica

A railroad route provides service between the Port of Santos and the Port of Arica. The route travels through the interior of Brazil to Bolivia. However, the 600 kilometers between Santa Cruz de la Sierra and Cochabamba is currently traversed by highway, which means that cargo must be transferred from rail to truck. From Cochabamba to Arica, the route is available through railroad.

Proposed Atlantic Corridor: Policy Implications

Efforts to integrate MERCOSUR (MERCOSUL in Portuguese) emerge from within individual countries. The Consórcio do Corredor Atlântico do MERCOSUL is a nonprofit Brazilian organization that aims to promote the use of marine transportation, vis-à-vis port privatization agreements, in order to facilitate MERCOSUR integration. The Consórcio seeks to transfer cargo that is currently transported by highways along the Brazilian coastline to ports closest to the points of origin. Under the Consórcio's plan, ports initiate the following tasks:

- Coordinate and monitor regional integrated and multimodal land linkages from the interior of the Brazil to port connections.
- Develop an association of port operators along the Atlantic coast to promote door-to-door delivery of goods via the Altantic corridor.
- Act as a regional centers to promote commerce and investment.[45]

Impetus for the Consórcio's establishment stems from the need to reduce high transportation costs in Brazil as a result of heavy reliance on highway transportation. Moreover, the Consórcio also seeks to integrate northeastern Brazil with the Río de la Plata region, with the primary goal of achieving integration in the most cost-effective way. The Consórcio reports that Brazil has some of the world's highest transportation costs. The Consórcio also estimates that Brazilian highways will transport approximately 140 million tons of cargo per year by the year 2000. The Atlantic corridor is seen as an effective way to minimize transportation costs across Brazil's vast territory in order to promote integration with MERCOSUR.

In addition to the Consórcio, the state of Rio Grande do Sul is also on the forefront of advocating for integration and investment within Brazil. Polo RS, a nonprofit organization, promotes the development of Brazil and Rio Grande do Sul through a network of investors, academics, politicians, and industry leaders. Based in Rio Grande do Sul, Polo RS serves as a link between public- and private-interest groups involved in trade and commerce to attract investment and increase the state's participation in the global market. Moreover, Polo RS outlines its mission of development within the context of environmental and urban sprawl protections.

Integration of transportation systems is key to the development of effective transportation corridors throughout nations that participate in trade. The forces of globalization dictate that transportation systems deliver goods and services in the quickest and most cost-efficient manner. Such transportation systems must capitalize on regional resources and natural highways of transportation. Moreover, national borders must foster, rather than impede, the free flow of goods from points of origin to points of destination and consumption. Within this framework, nations must coordinate transportation, monetary, and political policies that foster the efficient flow of commodities.

With the advent of MERCOSUR, transportation corridors are increasingly serving as international channels of transportation. Understanding how goods are transported from origin to destination entails a definition and description of transportation corridors that facilitate commerce and trade. MERCOSUR provides an important case study to examine how transportation corridors can foster integration.

Infrastructure Needs, Finance, and Privatization/Deregulation

Maintaining and constructing transportation infrastructure are two of the most important aspects of physical integration of MERCOSUR countries. In general, there are major deficiencies in the actual transportation infrastructure of all MERCOSUR countries. The Inter-American Development Bank has rendered an assessment that "the infrastructure is inadequate for the current level of intra-block trade and will lead to probable saturation of the existing systems in the near future."[46] This section examines the infrastructure needs for each mode of transportation, the projects that are modernizing and integrating transportation infrastructure in the region, and the finance mechanisms that are being used to pay for these projects.

The transportation infrastructure system within MERCOSUR countries began with the establishment of seaports and gradually penetrated into the interior. Settlement patterns during the colonial period were main factors that determined the initial design of transportation infrastructure in the Southern Cone. This infrastructure was later modified to suit agriculture and mining industry needs. These two activities boosted the development of railway networks in the Southern Cone at the end of the 19th century. The development of the road system occurred later than that of the railway. The road system was developed after World War II when Latin America began to industrialize and diversify their production output.[47] In sum, transportation infrastructure in MERCOSUR countries was constructed and developed first with colonial, and then with individual, national economies in mind, not regional integration.

The following sections examine current infrastructure and investment needs for MERCOSUR's two largest members, Argentina and Brazil.

Transportation Infrastructure in Argentina

A summary of Argentina's transportation infrastructure is found in Table 3.9.

Financing of Infrastructure in Argentina

The extent to which various sectors are involved in the financing of transportation infrastructure projects can be seen in the Ministry of the Economy and Public Works' 1995-99 five-year budget. Funding was projected to remain relatively constant from 1995-99 at roughly $2 billion a year, for a total of $11.5 billion. Public investment from government funds amounted to $7.4 billion of the total over the five years, with private investment accounting for $4.1 billion.[48] However, transportation spending declined from 3.04 percent of the total budget in 1990 to 2.27 percent in 1998.[49]

Even more significant was transportation spending as a percentage of GDP. Here, there was a decrease from 0.92 percent of GDP in 1990 to 0.57 percent in 1999.[50] This decrease was due, in part, to a rapidly growing economy, which reduced the percentage of national spending dedicated to transportation. The reduction also reflected the government's increased spending on education, health care, and social security.

Taking a closer look at the types of projects that fell under the 1995-99 five-year budget helps illustrate Argentina's transportation infrastructure necessities. Many of the projects centered on resurfacing roads to meet all-weather standards and widening highways to include passing lanes.[51] While a modern highway system may seem a basic task for any country's infrastructure, a brief discussion of a project underway in the northern half of Argentina provides an idea of the hurdles facing transportation policymakers.

To some degree, the federal government is counting on private investment to develop and maintain transportation infrastructure. The vast majority of the government's $7.4 billion in transportation spending through 1999 was targeted for road construction and corridor expansion ($6.3 billion of the total). The government spent $65 million on rail projects. The entire amount was budgeted for the Belgrano line.[52] Conversely, while private-sector funding for highway access routes and concession maintenance was $2.3 billion (about one-third the government's level), private-sector investment in rail projects sector amounted to $1.7 billion, or more than 20 times the government's budget.[53] With the sale of many state-owned enterprises already complete, private businesses will now have to fund capital improvements and maintenance costs, formerly the responsibility of the federal, state, and municipal governments.

Table 3.9
Transportation Infrastructure in Argentina

Mode	Components	Statistics
Railways	Total	37,910 km
	Broad gauge	24,124 km, 1.676 m gauge (142 km electrified)
	Standard gauge	2,765 km, 1.435 m gauge
	Narrow gauge	11,021 km, 1.000 m gauge (26 km electrified)
Highways	Total	215,578 km
	Paved	61,440 km
	Unpaved	154,138 km
Waterways	Total	11,000 km navigable rivers and
Pipelines	Total	coastal canals
	Crude oil	16,900 km total
	Petroleum products	4,090 km
	Natural gas	2,900 km
		9,918 km
Major ports	Total	11
Merchant Marine	Total ships	37 (1,000 GRT or over)
	Total capacity	303,448 GRT/458,864 DWT
	Bulk ships	1
	Chemical tanker	1
	Container ship	3
	Oil tanker	14
	Railcar carrier	1
	Refrigerated cargo	5
	Roll-on/roll-off cargo	1
	Cargo ships	11
Airports	Total	1,253
	Paved runways	Over 2,438 m in length: 29
		914 to 2,437 m in length: 100
	Unpaved runways	Under 914 m in length: 511
		Over 2,438 m in length: 3
		1,524 to 2,437 m in length: 60
		914 to 1,523 m in length: 549

Source: Central Intelligence Agency (CIA), "Argentina," World Factbook 1995, World Fact Book Home Page (Central Intelligence Agency, 1996[cited January 25, 1998]). Online. Available: http://www.odci.gov/cia/publications/nsolo/factbook/gm.htm. Accessed: March 23, 2000.

Privatization and Deregulation in Argentina

History

Argentina has been at the forefront of privatization in Latin America and has realized substantial economic benefits from its efforts. Argentina's privatization program began in late 1989. By December 1993, the program had contributed $11.1 billion to reduction of the commercial bank debt and $8 billion to the Argentine Treasury.[54] Although the sale of a telecommunications component and the state oil company accounted for about 65 percent of the total, numerous state-owned transportation enterprises were sold as well, most notably railways and the national airline, Aerolíneas Argentinas.

Key Legislation

Not only has Argentina aggressively pursued privatization as a way to improve the transportation infrastructure, but also the administration of President Carlos Menem showed its willingness to give official support to multimodalism through passage of two key pieces of legislation. In June 1992, Law 24.093 (the Law of the Ports) went into effect, which governed the operations of port facilities throughout Argentina.[55] A key provision of the law is the requirement that administrators and operators of ports work to improve intermodal capacity through a combination of maintenance and new construction. The primary concern was that, if some aspects of the ports were going to be privatized (concessions for port operations began in August 1992), then concessionaires would be responsible for developing infrastructure that would facilitate intermodal transfers.[56] The law also clarifies the legal status of private ports and port terminals that were operating with incomplete authorization.

The decentralization of the national port system, where control of the jurisdiction of port operations was transferred to the provincial governments, confirmed that the national government was serious about improving the investment climate. This transfer of control has led to a dynamic change in areas where operators have begun to invest in infrastructure.[57] In addition, the legislation helped spur improved maintenance at government-run facilities. For example, the channel from Santa Fe to the sea is now kept at a depth of 28 feet and a width of 100 meters at all times, allowing ships to use the lanes for ocean access 24 hours a day. Another example of improvements is the installation of a radar system in 1995 to help monitor shipping traffic on the Río de la Plata.[58] Argentina was the first country in Latin America to install navigation radar along its waterways. These and other changes helped move the Port of Buenos Aires from obsolescence into the role of a major port in Latin America.

More recently, the federal government enacted Law 24.921, which provides for comprehensive multimodal transportation planning with regard to business operations. The law was enacted on January 7, 1998, and, at a minimum, companies are required to use two modes of transportation in delivering goods.[59] In addition, the law requires either consolidation or decentralization (depending on the situation) of operations to maximize transportation efficiency. Moreover, the law is prescriptive with regard to manifesting shipments and requiring operator registration and responsibilities and contractual obligations of owners to make sure other regulations are followed.[60]

Concessions and Licenses

The types of government-led initiatives for privatization take several forms. There are concessions or licenses that are granted to private companies or consortia to operate and provide all services associated with a facility or transportation mode. In this case, the government retains ownership and is entitled to all improvements once the concession or license expires. In the second situation, the government continues to operate the enterprise, and the maintenance is privatized. In the third example, the government sells the enterprise but retains administrative oversight for either a limited or indefinite period. In the final case, the government sells all aspects of the enterprise (administration, ownership, operation, maintenance, etc.) to a private firm. Approximately 100 productive state enterprises have been sold in sectors ranging from agriculture to defense.

It has been a struggle for the federal government to integrate the concessionaires. For example, the northern highway corridor has automatic toll booths, but between corridors (operated under different concessions), there are different systems, so users need a different type of magnetic card between corridors.[61] Similarly, there have been complaints that the newly privatized airline is even more inefficient than before it was sold.[62] Obviously, these are areas that can be addressed in the process of writing the contracts for concessions, for example, ensuring that systems between different operators are compatible and fit within a national system of integrated fares. It is estimated that the cost of transportation can be reduced by 7 percent through such a system, but the substantial investment to create an integrated system has deterred any single company from attempting its development.[63]

Nevertheless, a variety of transportation privatizations and concessions is moving Argentina toward an infrastructure with greater intermodal capability. Beginning with the sale of 85 percent of Aerolíneas Argentinas in November 1990 for $260 million in cash and $1.61 billion in debt instruments, the federal government has sold all or part of nine transportation enterprises and granted licenses for six rail lines and seven commuter rail routes (including the Buenos Aires subway system).[64] Additional licenses have been given to private companies operating roads and access highways to major cities, elevators and docks at ports, and radio and television broadcast rights.

Since 1990, there have been a number of different concessions granted for highway routes as road corridors, including blocks of several national routes in a determined area. The condition of the routes ranged from satisfactory to poor, with 70 percent of the system classified as poor. The bid process was carried out somewhat quickly, because the government road enterprise did not have the financial resources to improve the routes and the country needed to reduce the deficit.[65]

In 1992, the contracts were renegotiated and the fare structure for toll roads was set at an average of $1.20 for each 100 kilometers of road in the franchise. The rate for individual road corridors were raised in 1994, ranging from a low of $1.00 per 100 kilometers to a high of $4.10. The toll policy is considered to be economically viable, with a traffic-flow rate of 2,500 to 3,000 vehicles daily.[66] The contracts are aimed at maintaining and improving the existing routes and not building new roads. The condition of the roads is determined by the state index and ranges from 1 to 10. At the beginning of the franchise, the average state index of the routes was 4.5 As a condition of the contract, the operators have agreed to return the roads with an average state index of 7.5 at the end of the 15-year concession.[67]

In all, 9,300 kilometers of roads were included in the toll-road concessions (toll roads constitute about one-third of all the national roads), and traffic has increased along the routes. Since 1993, cargo traffic has grown 25-30 percent. The road system absorbed the bulk of this increase, because after years of infrastructure neglect and despite a high level of public funding, the rail system cannot currently transport freight economically. Approximately 30 million additional tons of commercial cargo are now carried on highways yearly, with 62 percent of all freight and 85 percent of Argentine travelers being transported by road, down from 85 and 92 percent, respectively, in 1990.[68]

In one of the most ambitious privatization projects in Latin America, a single operator was granted a 30-year license to operate 38 aviation facilities in Argentina. This license is not a sale of the facilities. At the end of the contractual period, all improvements and the facilities themselves revert back to the federal government. The concession is valued at $5.6 billion in payments (surpassing the government-imposed minimum of $1.9 billion), plus investments in infrastructure improvement.[69] Drafting the contract involved more than a year of planning by federal, state, and local governmental officials, private consultants, and public-interest groups.

A primary concern of the government is the potential for a serious accident or security incident. There have been 16 near misses recently reported at Argentine airports, and the October 1997 crash of a regional carrier's DC-9 increased attention on the air-traffic control system. Acknowledging the problems that other concessions have produced, the airport contract calls for a substantial investment by the operator for the duration of the license. Improvements required under the contract include new or enhanced passenger- and cargo-handling facilities, airport amenities, runway expansion, improved safety standards and equipment, and advanced technology for air-traffic control.[70]

Transportation Infrastructure in Brazil

A summary of Brazil's transportation infrastructure is found in Table 3.10.

Financing of Infrastructure in Brazil

The National Economic and Social Development Bank (BNDES) is attempting to establish models for funding and project finance, through which various levels of government may seek advice for infrastructure projects. The BNDES sets a policy agenda to highlight the importance of infrastructure quality within each state and to stress development of diverse services. The BNDES promotes this synergy as crucial to the development of the region.[71] Private investors are more attracted to large-scale federal projects; therefore, the government should encourage investment in small-scale, rural services.[72] In 1996, the BNDES appropriated $9.5 billion to implement programs: 48 percent of the appropriated funds served to develop industrial needs, 7 percent went to agricultural development, and 35 percent was dedicated to infrastructure projects.[73] The budget and planning priorities of 1996-97 focused on increasing competition for export products in the open market.[74] In coordination with the federal Bank of Brazil (Banco do Brasil), the BNDES emphasized equal treatment of foreign and domestic capital in Brazilian investments by increasing the transparency of the government's financial status and clearly establishing privatization goals. One of the projects incorporating the new treatment of foreign investment is the coordination of a project with the Eximbank of Japan, to increase the exchange between financial institutions of the two countries.

Privatization and Deregulation in Brazil

National Privatization Program (PND)

Brazil began privatization efforts in the late 1980s, in an attempt to salvage companies suffering from financial difficulties. The Brazilian government did not intend for privatization to extend beyond the sales of minority shares until 1990, when the administration of President Fernando Collor (1990-92) initiated the National Privatization Program (Plano Nacional de Desestatização, or PND).[75] The program's goals included eliminating redundant legislation, defining rules and regulations, stimulating the economy, and protecting consumer rights.[76] From its initial stages in 1990 to 1992, deregulation centered on strengthening antitrust laws and lifting barriers from the steel and fuel distribution sectors. The PND encouraged competition among ports by deregulating hiring practices for dock workers and permitting companies to use the docks for transporting third-party cargo. The PND began to include larger government-owned enterprises but still continued to limit participation by foreign investors until 1995.

In 1995, the government created the National Privatization Council (Conselho Nacional de Desestatização, or CND) to coordinate the PND and accelerate the privatization efforts. President Fernando Cardoso reformed the PND by restructuring the CND to serve on a cabinet level, chaired by the minister of planning, enabling a direct channel to the president. The BNDES was appointed to manage the funds for the PND. The BNDES also advises the CND in the selection and contractual process, supervision, and adjustments for company privatization.[77]

Concessions and Licenses

The definitions of privatization and concessions in the transfer of governmental services to private holdings vary. Privatization is the transfer of assets previously owned by the government or the management of services and operations of an existing entity.[78] Concessions involve the government's contracting with private investors to construct or provide new services. The privatization goals of Brazil's programs incorporate both concessions and privatization, depending on the sector and the final contractual terms.[79] In the case of ports, the current trend in federal governmental policy is to decentralize management of the port to municipalities or to private terminal operators with concessions for up to 20 years. The Port of Santos exemplifies this relationship between the government and the private sector. The Ministry of Planning decentralized the administrative duties for the port to the state of São Paulo (Companhia das Docas do Estado do São Paulo) and granted terminal concessions to private interests for $130 million.[80]

Table 3.10
Transportation Infrastructure in Brazil

Mode	Components	Statistics
Railways	Total	27,418 km (1,750 electrified)
	Broad gauge	5,730 km 1.600 m gauge
	Standard gauge	194 km, 1.440 m gauge
	Narrow gauge	20,958 km, 1.000 m gauge; 13 km 0.760 m gauge
	Dual gauge	523 km, 1.000 m and 1.600 m gauge
Highways	Total	4,661,850 km
	Paved	142,919 km
	Unpaved	1,518,931 km
Waterways	Total	50,000 km navigable
Pipelines	Total	6,899 km
	Crude Oil	2,000 km
	Petroleum products	3,804 km
	Natural gas	1,095 km
Major points	Total	13
Merchant Marine	Total ships	207 (1,000 GRT or over)
	Total capacity	5,108,543 GRT/8,477,760 DWT
	Bulk ships	48
	Chemical tanker	11
	Container ship	14
	Combination oil/ore	12
	Passenger cargo	5
	Refrigerated cargo	1
	Roll-on/roll-off cargo	11
	Liquefied gas tanker	11
	Cargo ships	29
Airports	Total	2,950
	Paved runways	Over 2,438 m in length: 24 (5 over 3,3037 m) 1,524 to 2,437 m in length: 122
	Unpaved runways	914 to 1,523 in length: 295 Under 914 m in length: 60 1,524 to 2,437 m in length: 60 914 to 1,523 m in length: 549

Source: Data from CIA, "Brazil," World Factbook 1995, January 27, 1998. Online. Available: http://www.ocdi.gov/cia/publications/nsolo/factbook/br.htm. Accessed, March 23, 2000.

Legally, the concessions process requires bidding from interested investors. The bidding process serves to increase competition and raise the standards of the infrastructure project, reducing inefficiency. The goal of the concessions process includes realistic user charges, better quality in projects, and an increased transparency of services.[81] Historically, concessionaires received a fixed return on their total investment from the government as the public-service user charge. The new law sets price to be the determining factor for selecting a particular concessionaire. Concession contracts may take up to two years for completion; the contracts generally stipulate front-loaded infrastructure investments, scheduled over 20- to 50-year concession periods.[82]

In the case of Brazil, the Law of Concessions (No. 8987, February 13, 1995) authorizes third parties to perform public services by investing at their own risk on behalf of the state and by receiving benefits from the collected charges from the public. This new method of financing public infrastructure projects is different from traditional means, such as financing through public user charges, capital grants from the national treasury, or debt to the public sector.[83] A 1996 constitutional amendment (Article 192, item II) bolstered the concession law by breaking the government's monopoly on reinsurance. The measure permits private companies to provide coverage to varying classes of liabilities potentially incurred in the development and investment of infrastructure projects. The law sets up a framework for the regulation of concessions and public utilities, with the bulk of the responsibility for concession regulation falling on state and local governments.

The Law of Concessions does not prohibit a state from bidding for the project and allows a legal entity or a consortium of companies to demonstrate an ability to carry out the project. The criteria defining the quality and adequate service requirements are set individually for each concession, but the criteria must be quantified so that the granting authority can monitor the concessionaire's performance. The law defines adequate service as satisfying the conditions of regularity, continuity, efficiency, security, innovation (response to demand and current techniques and equipment), availability, courtesy, and moderate user charges.

Overall, the promotion of private-sector investment in public companies resulted in yields of $400 million from the sale of government shares and $8.2 billion from auctions.[84] These figures do not account for the indirect benefits of privatization: tax receipts, new employment opportunities, improved productivity, and the private assumption of $3.2 billion in outstanding debt.[85] Other studies estimate that the sales from privatization resulted in a total of $9.7 billion since 1991.[86] Privatization of transportation is estimated to reduce transportation costs by 25 to 30 percent, bringing Brazil to the efficiency level comparable to that of Argentina or the United Kingdom.[87] Of the $85 billion marked for infrastructure projects from 1996 to 1999, $30.1 billion came from private investments.[88]

To establish a consistent intermodal transportation system, the government now must create financial models and regulatory bodies. The entities must be in place to monitor private initiatives, to prioritize and standardize technological advances, and to protect consumer rights and the obligations of private industry.[89]

Highways

In 1993, the National Highway Department (DNER) aggressively pursued infrastructure development by creating the Program for Federal Road Concessions. Under Law 9.277, any state, federal district, municipality, or consortium of these entities may gain equal access to federal highway concessions for a period not to exceed 25 years. The first stage of privatization initiated by this program included the Rio-Niterói bridge connecting Rio de Janeiro and Niterói and the Dutra Highway running between Rio de Janeiro and São Paulo among the more lucrative sections.[90] This stage allowed the transfer of 854 kilometers of highway to private initiative for the purposes of exploration, recuperation of costs, and development. Highway concessions under this program are granted for 25 years, allowing the investor to collect the initial proceeds from tolls to recuperate costs. The first stage of concessions involved investments of $871 million, with the BNDES funding $354 million of the financing costs.

The second stage of the privatization effort began in 1998 with the privatization of 7,084 kilometers, 5,244 of which were built with investments granted through concessions for the maintenance, operation, and expansion of those particular roads.[91] The federal government transferred 2,920 kilometers of highway in January 1998 to the states of Santa Catarina, Minas Gerais, Bahia, Goiás, and Pará, allowing the individual states to negotiate their own concessions.[92] The constituents of these governmental entities then decide whether to transfer the highway concession to a private investor or not.[93] The stretches of highway, less attractive to investors because of low rates of return and use, may return to the DNER for a federal bidding process for maintenance and operations concessions. The federal program set a goal to grant concessions for 17,247 kilometers to private investors by the year 2000 (see Table 3.11).[94]

Table 3.11
Highway Concessions

Program	Extension (km)
Federal Roads Selected for Full Concession	7,708
Federal Roads Selected for Conservation Concessions	4,755
Federal Roads Transferred to States for Concessions	5,406
Total	17,869

Source: Use of data from National Highway Department (DNER), "Informativo DNER," cited October 12, 1997. Online. Available: http://www.transporte.gov.br/dner/SCS/dner.htm. Accessed: March 24, 2000.

Concessions already receive public praise for improving efficiency in moving freight transport. For example, concession is attributed as raising the productivity of the Dutra Highway, the primary highway between São Paulo and Rio de Janeiro, by 20 percent.[95] The contract with Nova Dutra, the concessionaire, required the construction of five new overpasses in 1997 with an additional ten expected in 1998, providing pedestrian crossing at critical junctures.[96]

The Atlantic coast corridor, which connects the southeast region of Brazil with other MERCOSUR countries, can facilitate freight movement between the ports of Rio de Janeiro, Espírito Santo, and São Paulo and the industrial manufacturing regions of Minas Gerais. The federal government initiated a program in 1994 to construct an alternative to an existing highway that connects Minas Gerais and São Paulo. The first stage of the program involves the construction of 270.7 kilometers from Belo Horizonte to Nepomuceno.[97] The second stage involves an additional 292.2 kilometers from Nepomuceno to Atibaia. The finance structure is shown in Table 3.12.

Table 3.12
Funding Structure for Minas Gerais-São Paulo Highway

Investment Source	Stage I	Stage II
Inter-American Development Bank	50%	50%
Federal Government	22%	25%
Minas Gerais	14%	20%
São Paulo	11%	5%

Source: Data from DNER, "Informativo DNER," cited October 12, 1997. Online. Available: http://www.transporte.gov.br/dner/SCS/dner.htm. Accessed: March 24, 2000.

Railways

Until recently, the federal government controlled the railroad system throughout Brazil. The Federal Railroad Department (RFFSA) operated under the authority of the Ministry of Transportation. The recently privatized Vale do Rio Doce Mining Company (CVRD) and National Steel Company (CSN) operated under the Ministry of Mining and Energy (Ministério de Minas e Energia). The CVRD and CSN each control segments of rail infrastructure essential to the supply and export of their products with the most notable stretch of track being CVRD's line running from the mines of Carajás in the state of Pará to the Maranhão Port of Itaqui. These lines have the best maintenance and infrastructure of any railroads in Brazil. After being privatized themselves, both the CSN and the CVRD have enhanced their transportation holdings by entering into consortia that have purchased segments of the RFFSA (see Table 3.13).

The states control a minor portion of rail activities. The most influential state holding is São Paulo Railway (Ferrovia Paulista S.A.). The São Paulo Railway operates under the jurisdiction of the state of São Paulo and coordinates with the RFFSA.[98] Another network worth noting is the Paraná Railway (Ferrovia Paraná S.A.).

Because of current deteriorating conditions of federal rail infrastructure, rail freight transport adds 46 percent to the average cost of ground transport. Poor productivity and idle locomotives resulted in heavy financial losses for the railroad. The RFFSA has operated at a loss with an annual deficit of $380 million over the past 15 years.[99] The railroad's dependence on subsidies and debts accumulated by borrowing against social security and employment retirement funds led the federal government to assume these debts in order to permit privatization.[100] As a result, the government now pays the RFFSA's $1.5 billion debt to social security.

In 1996, the National Privatization Council (CND) divided the RFFSA into six regions for privatization.[101] The concessionaires accept a 30-year term of operations, with specific provisions and goals established in the contract. For example, the South's rail concession contract stipulated that the concessionaire invest $1.3 billion in the next 30 years, $276 million of which must be invested in the first 5 years, to increase productivity by 60 percent and decrease accidents by 40 percent.[102]

New operators hire consultants to improve efficiency and salespersons to procure new customers, along with purchasing insurance to protect their assets. These kinds of investments increase demand for the improved services. The first privatized railroad, Bauru-Corumbá, earned a profit within the first ten months with minimal investment.[103] The privatization of the six rail systems has already resulted in the reduction of accidents by 50 percent and a growth in train movements to ports by 4.5 percent.[104] Table 3.13 lists rail concessions by region.

Ports

By constitutional mandate, the federal government is responsible for managing all port services. However, the government may grant a concession of its obligations to states or private entities through a public bidding process. Enacted in May 1996, Law 9.277 allows the government to delegate port authority to municipalities and states.[105] The majority of the southern ports operate under concessions to the states.[106] Paranaguá in Paraná, Rio Grande and Porto Alegre in Rio Grande do Sul, and São Francisco do Sul in Santa Catarina exemplify large harbors operating under this system. The largest ports in the country are Santos in São Paulo, Rio de Janeiro and Sepetiba in Rio de Janeiro state, and Vitória in Espírito Santo. These four all operate as public ports, managed by harbor companies. Other ports may be large-scale, bulk-cargo ports proprietary to major industries like the steel and mining companies CSN and CVRD.

The National Privatization Program includes the objective to privatize a total of 31 ports. Seven of these ports already have been privatized. The first stage of the privatization program includes Cabelo in Paraíba, Itajai and Laguna in the state of Santa Catarina, and Porto Velho in Rondônia. The second stage of the program will privatize the ports in Recife, Maceió, and Manaus. The program first delegates the overall authority of the ports, then privatizes the actual terminals.[107] To accommodate shipping and container movement, most ports require the modernization of equipment to store and transfer containers, improve the capacity of piers, and dredge channels and maintain sea bottom conditions.[108]

Table 3.13
Rail Concessions

Railroad	Minimum Bid (R$ millions)	Actual Bid (R$ millions)	Date of Auction	Concessionaire
South	158.00	216.60	12/13/96	Ferrovia Sul-Atlântica comprising Varbra, Railtex, Ralph Partners, Judore, and Interférrea
Southeast	888.90	888.90	10/20/96	MRS Logística, Consigua, CSN, Ferteco, Inferférrea, MBR, Ultrafértil, and Usiminas
Tubarão	16.60	18.50	11//22/96	Ferrovia Teresa Cristina composed of consortium led by Banco Interfinance
Northeast	11.46	15.80	7/18/97	Companhia Ferrovia do Nordeste comprising CSN, CVRD, Bradesco, and Vicunha Group
West	60.20	62.36	3/5/96	Ferrovia Novoeste comprising Noel Group (U.S.)
Mideast	316.90	316.90	6/14/96	Ferrovia Centro-Atlântica comprising CVRD, Banco Garantia, MPE, Judori, CSN, Interférrea, Railtex, and Ralph Partners

Source: Data from Federal Railway Network (Rede Ferroviária Federal S.A., or RFFSA), cited June 12, 1998. Online. Available: http://www.rffsa.gov.br/. Accessed: March 22, 2000 (RFFSA Web site).

Port of Santos

In December 1999, the Brazilian government inaugurated Tecon 2, an extensive container terminal with a pier of 310 meters in width to complement Tecon 1.[109] This particular development fell within the overall program to restructure the Port of Santos by 2001. In the year 2000, the port is expected to move 500,000 containers of general cargo per year. Tecon 1 is currently leased to a private investor. Tecon 1 and 2 terminals will increase the efficiency of the port. Currently, Santos transports 36 million tons of cargo per year; the improved terminals will enable 60 million tons to pass through annually.[110] The government expects to provide concessions for the terminals and allow private companies to manage the movement of cargo until the internal costs of operation decrease.[111]

Port of Suape

Situated 45 kilometers south of Recife, in the northeast region of Brazil, Suape is able to receive full container ships, with a holding capacity of 4,000 containers.[112] Current projects focus on completing the dredging of an internal port, to move cargo within the northeast, at a cost of R$172 million.

Suape provides an example of a public/private partnership, in which the infrastructure of the port is public, while private entities manage the port.[113] President Cardoso predicted that the project will be completed by December 1998; however, in January 1998, the project was already behind schedule and expected to delay beyond the targeted completion date.[114] Delays are commonplace to Suape, a project originally conceived by the state of Pernambuco to be constructed between from 1974 to 1979.

Port of Pecém

The Port of Pecém will be developed into an alternative to the Port of Mucuripe, in the city of Fortaleza, Ceará. The federal government and the state of Ceará joined in the planning and investment of an industrial complex in Pecém, anchored by the construction of a port complex. Since Mucuripe is located within the confines of a large urban city, the port has reached it limits for expansion. Pecém's connections to highway and rail lines may increase efficiency for cargo movement, without the delays and problems associated with a large metropolitan area. The government's role at Pecém involves building targeted infrastructure for private companies that seek to locate at the Pecém Industrial Park or use the port.

Integration Projects

Efforts to integrate the numerous corridors in the MERCOSUR region bring to light various infrastructure needs. This section examines major projects in the north-south and east-west corridors. These projects are not a comprehensive list of all infrastructure needs in South America but, rather, are a selection of the most critical areas that need infrastructure development. Table 3.14 illustrates the main road and railway integration projects in the Southern Cone. Each of the projects listed in the table will be described in greater detail below.

North-South Corridors

Numerous north-south corridors, including the Rio de Janeiro/São Paulo and Buenos Aires corridor, require infrastructure development. The following list provides a summary of the major infrastructure projects on these corridors:

Highways/Bridges

- São Paulo-Buenos Aires highway. Improvements totaling $2.5 billion needed on the overall highway.[115]

- São Paulo-Curitiba and Curitiba-Florianópolis. Specific improvements are needed on these segments of the highway, which are being handled by a 25-year concession contract. Approximately $1.2 billion in investments will be required from the winning concession bidder.[116]

- Colonia-Buenos Aires bridge. The bridge will cut in half the present-day 600-kilometer route used to travel from Buenos Aires to Montevideo. Investment of approximately $1 billion is needed for construction.[117]

Table 3.14
Road and Railway Integration Projects
(millions of dollars)

Project	Estimated Amount	Status
Highway, São Paulo-Bs. As.	2,500	No data
Bridge, Colonia-Buenos Aires	1,000	International Treaty to be approved
Railway, Santos-Arica/Antofogasta	1,000	Listing of projects
Railway, Antofogasta-Paranágua	550	Listing of projects
Bridge, Rosario-Victoria	350	In construction
Connecting roads, Argentina-Chile	321	Feasibility studies
Railway, Gen. Luz-Pelotas	270	Prefeasibility studies
Southern Trasandean Railway	168	Prefeasibility studies

Source: Centro de Economía Internacional (CEI), based in IDB Transports and Undersecretariat, taken from "MERCOSUR New Trade and Investment Opportunities," June 1999, p. 41.

Railways

- From General Luz to Pelotas. This proposed high-speed railroad will span 265 kilometers from General Luz to Pelotas. The railroad will link Rio Grande do Sul to the Port of Rio Grande. Costs for the project are $270 million.

- A 120-kilometer connection from Campinas to Jacarei in Brazil's São Paulo state. This link will allow goods traveling on the Tiete-Paraná waterway and the Ferronorte railway to reach Curitiba and the Port of Paranaguá.[118]

- São Paulo-Buenos Aires. Improvement of 2,157 kilometers of rail lines spanning from São Paulo to Uruguaiana and of 683 kilometers of lines spanning from Uruguaiana to Buenos Aires. A total of approximately $22.5 million is needed to improve the Brazilian side of this railroad system. Improvement needs are categorized into three segments: São Paulo-Pinhalzinho ($5.4 million), Pinhalzinho-state of Santa Catarina ($7 million), and Santa Catarina-Uruguaiana ($10.1 million).

It is important to note that privatization of Brazilian railroads created momentum for the integration of Brazil. Historically, railroads in Brazil were built in short distances without concern for interstate routes. With privatization, railroad industry groups began to promote the use of railroads as a lower-cost alternative to truck transportation. A 1998 industry report lauds railroads as a key to integrate Brazil and restore foreign investor confidence. This foreign investment is seen as a critical factor in ensuring that railroads function as a viable mode of transportation in light of reduced public financing. Binational business strategies such as Brazilian Ferrovia Sul Altântico's (FSA) merger with Argentine railways illustrate the momentum that privatization has created for integration efforts.[119]

East-West Corridors

Infrastructure needs for east-west corridors center on various bioceanic corridors. These corridors primarily connect Argentina with Chile, as well as Atlantic ports with Pacific ports. Physically there are many problems in traversing these corridors, mainly because of the size of the Andes Mountains. Infrastructure needs revolve around improving and building highways, railroads, bridges, and mountain passes. The use of various modes of transportation to traverse the east and west sides of South America is an important infrastructure need. Major projects on these corridors include the following:

- Roads connecting Argentina and Chile. Numerous industries in the cities of San Juan, Córdoba, Santa Fe, and Rosario feed into the Buenos Aires-Valparaíso corridor, and serve as stopping points for traffic traveling from Brazil to the Pacific. Investment estimates for these highways are at $321 million.

- Sistema Cristo Redentor. This Andean Mountain pass between Mendoza and Santiago contains a tunnel at an elevation 3,200 meters above sea level. During winter months, the tunnel is snowed in and must be closed anywhere from 45-50 days per year. To resolve this problem, an alternate tunnel, at a lower elevation of 2,500 meters, is being proposed. This tunnel would not be affected by intense snowstorms because of its lower altitude. The proposed tunnel will be 25-28 kilometers long and will include a railway component. Costs for construction range from $1.6 to $2.4 million.

- Railway Santos-Arica/Antofagasta. This railway corridor currently has a 503-kilometer gap in service between the cities of Santa Cruz and Cochabamba in Bolivia. A total of almost 5,000 kilometers between Santos and Arica/Antofagasta will require about $1 billion in investment to build the missing railway segment, existing bridges, and general rail upkeep.

- Railway Antofagasta-Paranaguá. Two segments of this corridor require construction. The first is in Brazil between Cascavel and Guaíra, spanning 180 kilometers. The second segment spans 250 kilometers across Paraguay, through Asunción and ending in Formosa, Argentina. Total infrastructure investment needed ranges from $550 to $600 million.

- Southern Transandean Railway. This corridor would connect the Atlantic Port of Bahía Blanca with the Pacific Port of Concepción with the construction of a 210-kilometer railway between Zapala and Lonquimay. The entire corridor spans 1,640 kilometers. Infrastructure investments would cost $168 million.

- Rosario-Victoria Bridge. This bridge will connect the northeastern Argentine provinces of Entre Ríos, Corrientes, and Misiones with the rest of the nation. The bridge, which crosses the Paraná River, also aims to make Rosario a hub for MERCOSUR economic activities and transportation. The bridge is currently in construction with an estimated budget of $350 million.

Waterways and Ports

The use of waterways as a mode of transporting goods has not been a top priority of the respective governments of MERCOSUR. However, new legislation has been passed to take advantage of sea routes as a means of transporting goods. A working group was created in MERCOSUR's beginning years (1991-95) in order to make "water-based transport options more attractive by lowering costs and increasing frequency of service."[120] One adopted measure was the elimination of the tax charged on intra-MERCOSUR shipments between Argentina and Brazil. With the help of the previously mentioned Maritime Transport working group, trade was opened up between the four member countries effective on January 1, 1995. Carriers are now permitted to ship goods between any two member states.

Privatization of ports, along with labor reforms, has contributed to substantially lower transportation costs. Argentine ports have witnessed a 25 percent decrease in water-based costs because of the privatization process. In Brazil, however, the two largest ports of Santos and Rio de Janeiro have remained government managed and, therefore, experience costs of 32 to 40 percent higher than the ports of Vitória and São Sebastiaõ.[121] Part of the problem of port privatization in Brazil is the power of the port labor unions. They employ an estimated four times as many workers as are actually needed because of fears of unemployment, thereby greatly increasing the costs of port services.[122] An estimation of the volumes of shipped goods indicates that "more than two thirds of the region's imports and exports are handled by privately run and owned or leased specialized ports and terminals. Each of the ten major ports comprises various terminals, most of which are specialized bulk terminals."[123] Table 3.15 describes the main waterway and port integration projects in the Southern Cone. Each of the projects listed in the table will be described in greater detail in the following section, which provides a brief status report of waterway and port infrastructure needs.

Inland Waterways

The waterway system in MERCOSUR is approximately 7,000 kilometers long. It borders or runs through five countries in the Southern Cone including Argentina, Brazil, Paraguay, Uruguay, and Bolivia. The waterway system has been referred to as "South America's spinal cord."[124] The five countries that have access to the waters see it as the backbone of integration in the Southern Cone. The system is made up of the Paraná

River, the Paraguay River, and the Tiete River. These three rivers create two main waterways, the Paraguay-Paraná and the Tiete-Paraná. The Paraguay-Paraná waterway begins from the Port of Cáceres in the Brazilian providence of Mato Grosso and reaches the Port of Nueva Palmira in Uruguay. The Tiete-Paraná waterway extends from Piracicaba and Conchas, which is located near the city of São Paulo on the Tiete, to São Simãs. Both share the stretch of river that extends from Confluencia to the Atlantic Ocean.[125]

Table 3.15
Waterway and Port Projects
(millions of dollars)

Project	Estimated Amount	Status
Paulo-River Plate Waterway	2,300	Brazilian part in execution
Cáceres-Nueva. Palmira Waterway	1,000	Listing of project
Chilean harbors rehabilitation	460	Investments Plan
Rio Grande Port (Br.) improvement	200	Pre-feasibility studies
Port of Santos modernization	200	Project
Martín García channel	100	In execution
Rosario harbor transformation	100	In execution

Source: CEI based in IDB Transports and Undersecretariat, taken from "MERCOSUR New Trade and Investment Opportunities," June 1999, p. 42.

- São Paulo-River Plate Waterway (Tiete-Paraná). This river system currently connects the Paraná River regions north of Itaipu Dam to São Paulo, Goiás and Minas Gerais. Traffic cannot travel south of Itaipu Dam because locks to traverse the dam's 115-meter height do not exist. In addition, the waterway must be widened and dredged to promote greater and more efficient navigation. Approximately $2.3 billion are needed for infrastructure investment.

- Paraguay-Paraná waterway. The main infrastructure needs have been identified in the Hidrovia Paraná-Paraguay waterway project. The project calls for the transformation of the Paraguay-Paraná-Uruguay-La Plata river system into a 3,400 kilometer long shipping canal.[126] The project, which could cost as much as $1 billion, would open an outlet to the sea for Paraguay and Bolivia. The general goals of the project include improving the navigability of the river for use 24 hours per day, 365 days a year, and improving the ports' infrastructure. Large barges currently cannot navigate between the ports of Ladário in Brazil and Concepcíon in Paraguay during periods of drought. Infrastructure that will permit year-round navigation is needed. Investment needs total $1 billion, with $80 million already invested in this project by ACBL Hidrovias S.A.[127]

Atlantic Ports

- Port of Santos. With 13,000 meters of docks and a depth of 13.5 meters, this port handles approximately 40 million tons of cargo per year. Infrastructure needs are required to modernize the port in order to reduce operating and shipping costs. About $200 million in investment are required.[128]

- Port of Rio Grande. This port requires improvements that will facilitate the handling of grains and containers. The port has less than 1,000 meters of docks but has a depth of 14.5 meters. The port is important for Rio Grande do Sul's economy. About $200 million are required for modernization.

Table 3.16
Inland Waterway Projects

Paraguay-Paraná Inland Waterway		Tiete-Paraná Inland Waterway	
Countries Involved		**Countries Involved**	
Argentina		Argentina	
Bolivia		Paraguay	
Brazil			
Paraguay			
Uruguay			
Navigable Sections of the Waterway		**Navigable Sections of the Waterway**	
Buenos Aires-Sta. Fe	590 km	Rio Tiete:	620 km
Sta. Fe-Confluencia	660 km	Intersection Tiete Paraná to the north	399 km
Confluencia-Asunción	380 km	Intersection Tiete/Paraná to Iguazu	1,480 km
Rio Apa-Corumbá	603 km		
Sub Total	2,770 km	Sub Total	2,400 km
Corumbá-Cáceres	672 km		
Total	3,442 km	Total	2,400 km

Source: CEI, "Aspectos Sobre Infraestructura Basica de Transporte y Medio Ambiente," January 1998, p. 23.

Inland Ports/Channels

- Port of Rosario. This port is at the crossroads of the Paraguay-Paraná waterway and critical export-import highway and railroad routes. Rosario is the hub of regional economic development that involves agriculture, cattle, and industrial sectors. Investment needs require increasing the port's docks from 2,300 to 4,000 meters, increasing the port's depth to 13 meters, and creating specialized container and cargo transfer terminals. Transformation of the port requires about $100 million.

- Martín García Channel. Dredging of this channel is needed to create links within Montevideo, the Uruguay River, and Río de la Plata. The channel will be 32 meters deep and 100 meter wide. This project is currently in progress with an estimated budget of $100 million.

Pacific Ports

- Port of Arica. This port currently requires investments to increase the amount of grain tonnage that it handles. Infrastructure needs require constructing silos, a facility to handle containers, and a specialized facility to handle grains. Investment in the port is proposed in two phases, with the first phase requiring $107 million and the second phase requiring between $13.5 and $17.6 million. Investment funds for both phases would be acquired through a concession contract.

- Chilean Harbors Rehabilitation. In addition to the Port of Arica, other Chilean ports are being evaluated for rehabilitation. Funds for these are projected at $460 million.

Investment needs in the Southern Cone vary in scope and function. Some investment needs address minor infrastructure problems, while other projects are of great magnitude. As explained at the beginning of this section, these projects are only a selection of needed infrastructure investment that are the most critical for the integration of MERCOSUR corridors and economic activities.

Customs

MERCOSUR faces one of its greatest challenges in its customs clearance processes. The region's companies frequently complain about the long delays they suffer when arriving at a member country's port or border and how it rises freight costs significantly.[129] On the other hand, transportation authorities in the four countries mention customs clearances as the greatest obstacle that precludes the free flow of goods within the intraregional trade corridors.[130]

In the search for solutions to the obstacles involved in customs clearance, Working Group No. 2, "Customs Clearing Issues" (Asuntos Aduaneros), was created within the structure of the MERCOSUR Secretariat, under the "Common Market Group" (Grupo Mercado Común). Although customs departments in the four countries have made great efforts to expedite the processes[131] and have implemented some of the recommendations of this working group, there are still multiple obstacles that severely curtail trade flows within the bloc. These obstacles can be roughly divided into two main categories: macrointegration constraints and microadministrative obstacles.

This section attempts to address the most salient issues, and, although it is by no means an exhaustive list, it gathers the opinions of some of the main stakeholders within the bloc's transportation industry.

Macrointegration Constraints

Legal Voids and Deficiencies in the Current Legal Structure

In the Reunión de Ouro Preto, December 1994, the MERCOSUR partners approved the Customs Code of MERCOSUR (Código Aduanero del MERCOSUR).[132] As was mentioned in the introduction, MERCOSUR as an institution does not have supranational authority over each of the member countries. The code did not take effect immediately, and it awaits the ratification from each of the countries' parliaments. Only Paraguay has ratified and adopted the code.

Therefore, in practice, there is no MERCOSUR customs code. The bloc has four different codes, and each one is the legal basis for trade between the partners. Furthermore, the custom codes of Argentina, Brazil, and Uruguay are all outdated: for example, Argentina's code was enacted in 1981 and Uruguay's in 1984, both under military regimes. Furthermore, in the case of Uruguay, the bylaws to the code dates from 1975, and the Ley de lo Contencioso Aduanero (which lists the violations of the customs code) dates from 1964.[133] Osmar De Virgilio, director of the Customs Department of Argentina, explains, "The Code [the Customs Code of Argentina], that does not know about information systems or containers, has fines for infractions of $12.50 pesos. Its modification is a vital tool for the improvement of the customs department."[134] The four countries also have outdated norms and legislation pertaining to trade, which in some cases dates back as far as 1930.[135]

Although each of the partners made suggestions to modify the MERCOSUR code, each of them is involved in the process of reforming their own codes,[136] which could mean that there is a prevalent interest in improving the currently fragmented customs structure, rather than adopting a MERCOSUR code for the four countries. One must take this into consideration, notwithstanding the fact that if and when a general code is enacted, it would have to undergo the long and painful internalization process in the institutions of each country.[137]

Although MERCOSUR has advanced its customs union process, major hurdles are still present. One major impediment to integration is the fact that once goods are internalized in one of the member countries and the customs dues have been paid, those same goods cannot move freely within the bloc without being taxed again. For example, a company or individual that imports televisions from the United States to Uruguay, paying the corresponding tariff in the country, would have to pay the same tariff again if it took those same televisions to Brazil.[138]

This process creates problems specifically related to logistics. A company cannot import a specific consignment of products to a single national market unless it is certain that the national market is capable of absorbing the entire consignment. There is no flexibility in respect to decisions relative to the movement of goods. Having two separate shipments from the originating country, one destined to Brazil with the specific amount needed there, and one to Uruguay creates extra costs in the importing process.[139]

It is clear that with the existing double-taxation measures in the law, there is no practical integration resembling a customs union. Therefore, unless there is a dramatic shift in the current policy, the enactment and implementation of a unique MERCOSUR code seem distant. And beyond the legal and political difficulties that the creation and consolidation of the customs union embodies, another long set of challenges impedes the free flow of goods in the region's corridors.

Other Macro Issues

With very distinct characteristics, MERCOSUR countries present a relatively similar organizational structure for their customs. Customs usually depends on a higher authority, be it the Administración Federal de Ingresos Públicos (AFIP) in Argentina, the Ministerio da Fazenda in Brazil, or the Ministerio de Hacienda of Uruguay. Customs offices are part of a larger national institution responsible for federal- or national-level tax collection. As the share of revenues from tariff collection has decreased over the years in the four countries, their relative political importance and power has also been diminished. Furthermore, the top priority for fiscal policymakers in the fiscal agencies is to collect tax revenue, not necessarily to expedite the flow of goods between countries. On the other hand, the fiscal agencies allocate fewer and fewer resources to customs, since the total contribution to the national treasury is decreasing.[140]

Microadministrative Obstacles: Customs Clearing and Related Issues

All the countries are using a single document for international cargoes, with minor changes introduced by each of the countries. The use of the "Manifiesto Internacional de Carga–Declaración de Tránsito Aduanero" (MIC/DTA), meaning International Cargo Manifestation–Traffic Statement at Customs, merged to separate manifestations: the declaration of the cargo on board and the declaration of the tariff regime under which the merchandise is circulating. This sole declaration is valid in all the customs units of the partner countries.[141]

A private customs agent called "despachante de aduana"[142] and the international shipping company prepares the document. Later, it is registered in the customs department of the forwarding country. One copy is kept at the customs office of the country of origin. A second is kept at the point of exit of the merchandise, and a third at the customs point of entry. Also, a fourth is held at the customs final point of destination, and finally a fifth is kept by the bearer.[143]

Ever since the MIC/DTA was established, the time required for customs procedures has been significantly reduced.[144] Nevertheless, the customs clearance process for agricultural goods going into Argentina, as an example, with document delivery, customs clearance, registration at the Ministry of Agriculture, and approval from the sanitation authority could take up to four days in 1995.[145] A good portion of this delay can be traced to the following administrative issues encountered in the customs clearing processes.

Poor infrastructure, lack of equipment, limited and untrained personnel, and corruption are some of the most salient difficulties that the border crossings face within the trade corridors of MERCOSUR.[146] Although some significant advances have been made, such as at Santo Tomé (Argentina) and São Borja (Brazil), which are mentioned in this chapter, most of the border crossings are "unsalvageable" bottlenecks in the flow of goods within the region.

Information Systems

Just as each country has its own customs code, each one has established its own customs systematization process and information systems. In Brazil, the Foreign Trade Information System (Siscomex) is used, while Argentina uses the Sistema Informático María and Uruguay the Sistema Informático Lucía. Although the systems have been practically extended to every border crossing and customs post within each country, the systems are not fully operational yet. The three countries are still using manual records while implementing the electronic records systems.[147]

Double Clearance Procedures

Argentina has made a concerted effort to reduce corruption in customs procedures. In November 1997, the country enacted an import preshipping inspection system. Under the system, imports of consumer goods and cars must have a certificate issued by a private firm to be passed through customs. The system covers approximately 2,000 items that represent about 20 percent of total imports, and it has been set up to remain in place for two years. The system represents efforts not only to reduce customs fraud but also to increase federal revenue and help build a database on trade volume and pricing. The cost of this system was estimated at $48 million, paid by the Argentine government. Nevertheless, the system has had some negative effects. Double clearing with the verification authorities has occurred, since customs also checks the cargo before departure.[148]

Although some advances have been made in integrating the border crossings within the MERCOSUR countries, the process has been slow and cumbersome. Shipments are double-checked, since they are checked at both the exiting and arriving borders of each country. Separate paperwork has to be filled out for each country, and procedures are still not standardized. Nevertheless, some borders, like that of Santo Tomé-São Borja have implemented joint clearance procedures.[149]

Mandatory Clearance in Multiple Governmental Agencies

There are at least five different governmental organizations represented at border crossings on each side: customs, immigration, agricultural regulations, transportation ministries or secretariats, and human health departments. All of them report to different institutions within government and work during different schedules. Multiple paperwork has to be filled out to go through each of the agencies.[150]

Personnel

Personnel are a grave concern, especially in the case of customs border points. According to one government official, some of the people who are sent to the most undesirable borders, because of climatic or undesirable regional or zonal conditions, are sent to be "punished" or as a nonofficial demotion. Furthermore, with low-paying wages and poor living conditions, the incentives for unmotivated, inefficient, and, in many cases, corrupt personnel are set forth. In other cases, personnel were assigned to specific posts because it was a "highly profitable" post, because of all the "extra revenue" customs agents could perceive through bribes.[151]

Understaffing is also a concern. Wayne Cook, former logistics chief for Kodak Brasileira, stated, "We've had discussions with Federal Revenue and at every turn the answer we've gotten . . . is they don't have all the manpower, they don't have all the systems they would like." As an example, Cook mentioned how, in Kodak's facility in São José dos Campos in São Paulo state, out of 27 trucks awaiting clearance, 1 was sent somewhere else for further inspection, and 7 were cleared on the spot. The other 19 had to wait for another week. Understaffing is a situation due in part to Brazil's fiscal crisis.[152]

No Superposition of Schedules

Both of these administrative issues create problems. With some exceptions,[153] supervision of working hours at border crossings is nonexistent. Customs agencies have different hours depending on the country: Paraguay does not receive trucks for approximately three hours during midday, while Brazilian and Argentine borders are open.

Another example is evident on the border of Chuí, between Uruguay and Brazil, where Brazilian customs agents do not let trucks pass until five o'clock in the afternoon, instead of inspecting them as they arrive. The agents accumulate the paperwork during the day and let the trucks circulate until then. Trucks then move to the Uruguayan border, which has to deal with all the incoming trucks at the same time.

Ports face similar problems regarding customs. Corruption to "speed up" the bureaucratic entangled process of nationalizing goods is still present. And although ports are "open" 24 hours a day, customs departments have regular 8-hour shifts, which clearly impairs the flow of the nationalization process.

Breakthroughs

In spite of the obstacles discussed above, some major advances have been reached recently. During the last trimester of 1999, an in-house customs system was established in the Ford automotive plant in General Pacheco.[154] This system allows a delegation of customs agents, consisting of five officers, who are assigned inside Ford's production complex to do all the necessary paperwork regarding the firm's import/export operations within the firm. This new arrangement, established through Resolution 596/99 of the AFIP, was created for corporations with high international transaction levels. It not only benefits the company but also decongests port activity, as in the case of the port of Buenos Aires.[155]

Savings from the implementation of the system have been considerable: the dispatch processing time fell from three days to one and a half days. It is easily seen that other automotive firms, such as Toyota and Volkswagen, are considering this system for their own plants. The AFIP also made it easier for firms to check information related to reimbursements of their exports, enabling users to access information through the Internet.[156] A similar program was established in Brazil, known as Linha Azul,[157] which provides clearance to large and internationally established companies that import and export large volumes and values of cargo.

Another case of in-house customs clearance processing is that of Dell Computers, the Texas-based company that recently started operations in Eldorado, Brazil. From this location, Dell plans to serve the main metropolitan regions of the MERCOSUR regions, Buenos Aires, Rio de Janeiro, São Paulo, and Santiago. Since the computer company's sales rely on online and phone ordering (it does not have show rooms and does not sell through retail stores) the company must manage "a complex logistics system and deal with the vagaries of unreliable road and air transport"[158] and have efficient customs procedures.

The Brazilian government agreed to a unique high-speed customs clearance process for Dell's import/export traffic. The "virtual warehouse" enables tax and customs inspectors to monitor the company's inventories online. This procedure creates the possibility for the company to take its imports directly from the airport to its plant without going through the customs clearance process at the site. Fernando Loureiro, director of Corporate Affairs for the company, points out that "industrialists in Brazil have to hustle to clear customs, pay their taxes, manufacture their products, export and pay their taxes. It is chaos. But Dell will not have to deal with this. The virtual warehouse is an extension of the customs [department]. This gives us control of parts and components, which is vital for us to control our logistics."[159]

Companies such as Compaq Computer and Hewlett Packard (HP) are using the virtual warehouse system called Entreposto Virtual, which translates loosely into "virtual bonded warehouse."[160] The difference between this mechanism and in-house customs system is that in the former there are no customs representatives physically present at the plant. This system, as Nelson Procopio, director of Foreign Trade and Government Affairs for HP in Brazil, stated "permits HP to reduce the transit time, gives flexibility for inventory and reduces some costs. For example, the warehousing costs at customs (facilities) and broker costs."[161] IBM, Motorola, and Ericcson are also using the virtual warehouse system. An interesting element in this trend is that, as companies such as Compaq acquire permission for this kind of service, they try to get their suppliers similar services so that they can make their delivery mechanisms more efficient.[162]

Although this type of "in-house customs" is available only to large firms, leaving out small- and medium-size firms, it does benefit smaller companies by removing high-volume traffic from the regular customs offices in ports and at border crossings.[163]

Brazil's government is currently studying how to provide such expedited import clearance systems as the Linha Azul and Entreposto Virtual for smaller manufacturers.[164]

Furthermore, there have also been advances in customs clearance because of decentralization.[165] Decentralization has allowed individual border-crossing offices to make decisions regarding clearance procedures. Before decentralization, all clearance procedure decisions had to be made in Montevideo or Buenos Aires, a process that delayed the customs clearance process.

Implications

The absence of a unified customs code among the countries creates a series of difficulties and obstacles in the free flow of goods between the partners. The process of internalization of goods, specifically when goods are traded by two or more partners, becomes complex. The lack of a unified customs code increases the transaction costs for exporting/importing businesses and the transportation companies involved in the freight transport. The lack of unified customs codes also gives rise to arbitrary decisions by customs departments and agricultural regulations within each country, and in turn leaves room for misinterpreting policies and accepting bribes to expedite, impede, or slow down the clearance process.

According to Zully Perez[166] of Ardoino Transporte Internacional, based in Uruguay, road transportation costs could go down as much as 40 percent if border crossings worked efficiently. For example, a trip from Montevideo to São Paulo currently requires a total of 120 hours.[167] With efficient customs clearance procedures, the company estimates that the same trip would require only 48 hours,[168] thus lowering labor costs, which are among the highest costs in truck transport, second only to fuel costs. Furthermore, using the same number of fixed assets, namely trucks, the company could more than double its current production capacity. This increase in the number of efficient trips would make capital investments more productive. A more effective use of capital investments would make road transportation more efficient, lowering costs both for producers and consumers.

In the case of maritime transportation, Martin Sgút[169] illustrated the costs of both port and customs clearance inefficiencies with a hypothetical example. He estimated the cost of importing a 20-foot container with a $12,000 value (Free on Board, FOB), through the Port of Buenos Aires. Sgút concluded that unnecessary customs clearance costs account for as much as 4 percent of the total FOB price, once preinspection, verification, cost of delays, qualifications, and bureaucracy are taken into account. These costs would add up to more than $179 million[170] for 370,000 container units cleared through the Port of Buenos Aires.

Logistics

The globalization process and integration within the MERCOSUR region have exerted a great degree of pressure on the production processes of the region's companies, many of which are newly exposed to foreign and internal competition within the region. Furthermore, with the economic downturn of 1999 in the four countries, the need for cost reduction in every aspect of the production chain has become a crucial element to keep many businesses afloat. "Domestic and multinational companies are investing heavily in logistics because they see it as a question of survival,"[171] explained Jose Adenildo da Silva, president of the Brazilian Association of Logistics (ASLOG).

Advanced Logistics in MERCOSUR

Innovative and advanced logistics services and technologies have usually emerged in developed countries. As business communities in these countries have felt the need to be more and more competitive, logistics innovations have been generated from within to reduce costs and increase overall efficiency. Corporations with large operations, extended markets, and steady revenues have been able to invest in these innovations, which again made them even more competitive. Furthermore, these advancements in logistics emerged in developed countries because of the basic infrastructure facilities, such as efficient ports or good arterial road systems, already existed.

Therefore, it is not surprising that the logistics market and, specifically, local third-party logistic providers are far less developed, in the case of MERCOSUR, compared to markets in developed countries. "Third-party logistics is still in its infancy in Latin America," and even though "there are some third-party logistics activities in Brazil and Argentina," the use of these technologies "is not anywhere nearly as widespread as in the United States." [172]

The concept of logistics is relatively new. In fact, it was practically foreign five or six years ago, when the region's economies started to open up to intraregional and international competition.[173] Nevertheless, the logistics market is quickly developing and extending through the region. As the leading partner in MERCOSUR, Brazil's logistics market is the largest in the region, and it is presently strong despite the recession.[174] There were around 100 integrated logistics service providers by the first trimester of 1999, tripling the number three years ago.[175]

Market Trends, Structure, Services, and Strategies

Local logistics providers were not able to accommodate the increased demand for services and the high degree of sophistication that international companies required. Furthermore, a significant portion of local demand (the national companies whose production boomed after economic reforms and trade liberalization in the region) were not being properly served by the weak local providers. The regional providers were "not a major competitive force."[176]

Aware of this market potential, European and U.S.-based third-party logistics companies expanded their operations in the region, bringing their management and information systems with them.[177] "Traditionally, logistics providers followed their customers [multinational firms] to South America where they provided import and export services. We did that as well, but we also see a huge domestic market."[178] MERCOSUR's logistics market expanded and advanced logistics supply was spurred as multinational corporations settled in the region, bringing with them their own providers or installing their own logistics units within their production structure. Local providers, who have not allied with multinational firms, are suffering the most as "multinational giants are gaining market share from them."[179] Furthermore, the devaluation of Brazil's real opened new possibilities for American firms to acquire Brazilian companies.[180]

There are at least three identifiable strategies that international logistics companies have taken in their approach to gain market access within MERCOSUR: (1) establishing a regional office owned by the company and subcontracting or outsourcing with local providers while retaining overall control of the operation;[181] (2) setting up an alliance or joint venture or buying a local logistics firm; and (3) extending licenses to local firms to use the international firm's systems.

Regional Offices

The case of Rohde & Liesenfeld, a Hamburg-based logistics firm that specializes in trade between America and Germany, exemplifies the system of establishing a regional office. The company won a contract in Curitiba, a southern city in Brazil. Rohde & Liesenfeld do Brasil delivers spare parts for SAS Automotive, a supplier to both Volkswagen and Renault, in a joint venture of Siemens Automotive (Germany) and Sommer Allibert (France). Components are delivered door-to-door from suppliers in Europe to the two manufacturing plants in Greater Curitiba. The company also has regular land operations in Córdoba, Argentina, where Volkswagen and Renault also have plants. Manufacturers transport parts from one side of the border to another with greater efficiency. The company handles around 2,000 containers a month in this business.[182]

Alliances/Joint Ventures and Acquisitions

A perceived trend in logistics operators in the MERCOSUR market is the creation of alliances between local companies and multinational logistics corporations. Such is the case of the alliance between QUALCOMM and AUTOTRAC Comércio e Telecomunicações S.A., of Brazil (Commerce and Telecommunications), which embarked in a joint venture to introduce mobile information management systems to Argentina. The system, called OmniTRACS, provides two-way satellite-based communications, with real-time Global Positioning System (GPS) monitoring, and a satellite communication mechanism allows information transferal to and from a vehicle en route.[183] The system enables continued coverage during border-crossing trips between the MERCOSUR countries and central Chile,[184] allowing drivers and dispatching units to maintain constant communications during the journey. The system will also provide detailed street-level mapping.

This advanced logistics service has been available in Brazil since 1994 and is distributed by the same company, AUTOTRAC of Brazil, under the name OmniSAT. By the third quarter of 1999, the company had sold more than 10,000 units.[185] Mid- and large-size Brazilian transportation firms, such as Rapidão Cometa, Transporte e Comércio Fassina Ltda, Bunder Express, Marbo, Estrada, Spal, Itapemirim, Transporte Luft, and Transvale Transporte de Cargas e Encomendas and other firms such as Arisco, a leading food and drink producer in Brazil, use the OmniTRAC system.[186] By mid-1999, five of the newly privatized railroad companies in Brazil, which represent 85 percent of the market, were using the AUTOTRAC system.[187]

Penske Logistics, another U.S. logistics firm, formed a joint venture with Coati Trading, S.A., a $3.8 billion Brazilian company based in São Paulo.[188] The same logistics services offered in the United States will be offered to the MERCOSUR market through the joint venture named Cotia-Penske Logistics Ltd. The "joint venture brings to the market Cotia's expertise and tradition added to Penske's leading-edge technology in logistics processes."[189]

As an expansion strategy, multinational logistics firms have also bought local companies. Such is the case with C.H. Robinson Worldwide Inc., which in late 1998 bought Comexter Group and its subsidiaries, an Argentine conglomerate in the transportation sector. Comexter already provided freight forwarding, transportation, trading, and customs brokerage services intraregionally and with the United States.[190]

Another case is that of Ryder System Inc., a U.S. company based in Miami, Florida, which bought stock of Expreso Fuiuino, a warehousing, distribution, and transportation company in Argentina, and purchased outright Companhia Transportadora e Comercial Translor, S.A., a Brazilian trucking and logistics company based in São Paulo.[191] Ryder Translor is a $125 million company that provides services to Ford, General Motors, Toyota, Mercedes-Benz, and Volkswagen in Argentina, Brazil, Paraguay, and Uruguay. It handles intrafirm and intraindustry trade in the automotive sector between Argentina and Brazil.[192] Through this venture, Ryder consolidated its local independent office with Ryder Translor.

A joint venture between Enfield Logistics, a U.S. logistics company based in Boca Raton, Florida, and its Argentine and Brazilian partners, Celsur Logística, has clients such as Wal-Mart, Nabisco, General Motors, Pepsico, and Michelin and recently bought land with 1.6 million square feet of warehouse and distribution space in General Rodriguez, a town outside Buenos Aires.[193] A third-party logistics provider with another 600,000 square feet of warehouse space in Brazil, Celsur was hired by General Motors to distribute its vehicles and parts to auto dealers across Argentina and MERCOSUR. The company also handles parts for Isuzu (Japan) and Opel (Germany).[194]

Axis Sinimbu Logística Automotiva (ASL), an affiliate company of Axis Group, Inc., which is a subsidiary of Allied Holdings, Inc., a U.S. firm based in Decatur, Georgia,[195] won a contract to provide supply-chain logistics services to the Mercedes Benz do Brasil plant that produces the A-class model car in Juiz de Fora, Minas Gerais. The company collects production material for the consolidation center, which they also run in São Bernardo do Campo, from local suppliers through a dedicated pickup route system, and it also directly delivers truck loads from these suppliers to the Juiz de Fora plant without taking them to the consolidation center.[196]

Another example of mergers is that of Schneider and Exel Logistics Americas, a U.S. company based in Columbus, Ohio, which allied with Brasilero Comércio Exterior Corporation (BCE), based in São Paulo, Brazil. BCE, with offices in all MERCOSUR countries, is a multimodal and logistics company.

Alliances and joint ventures have not been limited to multinational-local deals. There have been some alliances between Argentine and Brazilian firms. In the air-cargo sector, the Brazilian airline Tam allied with Organización Coordinadora Argentina (OCA), the express and mail service of the Exxel Group, which purchased OCA in 1997. The new endeavor, OCA Express MERCOSUR, distributes mail and packages in both Argentina and Brazil, with facilities in Uruguayana and Aeroparque airports. The Exxel Group also controls the Uruguayan courier Tiempost[197] and has a strategic alliance with Aerolíneas Argentinas for package and document delivery operations within Argentina called OCA JET PAQ.[198]

Licensing

Initializing logistics operations in foreign countries confronts a series of significant barriers, such as culture, language, and regulatory frameworks for the operation of the business, which can hamper the effectiveness of the international company. Thus some companies such as USCO Logistics have followed a distinct path: "Rather than transporting management form the U.S. into foreign countries, USCO has aligned itself with local partners who know the territory."[199]

USCO Logistics, a U.S. firm based in Naugatuck, Connecticut, developed an innovative and unique approach regarding partnerships in Latin America. Through license agreements with in-country operating partners in Argentina, Brazil, and Chile, USCO has expanded its operations by creating what they call the "USCO Global Logistics Network –an alliance of licensed logistics service providers."[200] The company has partners in North and South America, Asia, and Europe.

Companies that want to become part of the USCO Global Logistics Network must comply with certain prerequisites established by the company: (1) be an expert in local logistics with demonstrated quality standards; (2) possess a solid portfolio of high-profile customers, with a customer-focused approach toward management; and (3) have financial solvency and disposable resources invested in new systems toward operational excellence.[201]

Local logistics service providers and USCO partners in MERCOSUR are S.A. DeGiacomo (Argentina), Columbia Sistemas Integrados de Logística (Brazil), and AVB/USCO (Chile). Their investments allow them to use USCO's name and information systems.[202] The companies have to follow USCO's operational procedures and policies. Training for the partner companies' employees is done in Almacenadora InverMexico USCO (Mexico), another company joint venture.[203]

Founded in 1928, S.A. DeGiacomo/USCO Logistics is the leader in providing foreign trade service in Argentina, according to the Argentine National Customs Office.[204] The company provides warehousing, customs brokerage and freight forwarding, free-trade-zone services, foreign purchasing, customs duties classification, communications and information systems, reengineering, and other logistics support activities.[205]

With 160 employees in its four locations within the Buenos Aires perimeter, S.A. DeGiacomo administers 500,000 square feet of shared and dedicated space. The company is also a registered representative of Airborne Express. DeGiacomo serves automotive, chemical, consumer products, and computer/electronics companies, such as Bridgestone/Firestone, Exxon, General Electric, General Motors, Monsanto, and Nike.[206]

Based in São Paulo, Brazil, Columbia has operated logistics services in Brazil and Paraguay since 1942. The company offers multiple logistics services, such as public, dedicated, and bonded warehousing; temperature-controlled storage; certifications to handle chemical and pharmaceutical products; bar-coding and radio frequency systems, labeling and repacking; port operations; and intermodal transportation management. Columbia services the automotive, pharmaceutical, computers/electronics, cosmetics, consumer products, and chemical industries, among others. [207]

Columbia operates 8.2 million square feet of warehousing space, bonded areas for public use, in 14 locations throughout Brazil and Paraguay. Depending on the location, the warehouses are equipped with pallet stackers and trucks, closed circuit television system monitoring, highway and precision scales, plugs for Reefer containers, container systems monitoring and tracking from port departure, and other cargo-handling equipment.[208] Most of the warehouses are certified to ISO 9002 quality standards. The company also has port locations in Santos and in the Cubatão River and offers services such as vessel loading and unloading planning, container and general cargo transport, and in-dock or back-up area handling and container filling and emptying.[209]

Other Logistics Investments

Some big local firms and multinational corporations have invested in their own logistics operations and processes. BASF invested heavily, around R$6 million (approximately $3 million), in their logistics system in Guaratingueta, Brazil. The company is attempting to shift its export/import traffic to and from its plant and the Port of Santos from truck to rail.[210] The plant, which produces agricultural chemicals, colorings and pigments, constructed one mile (0.94 miles to be precise) of railroad track between its plant and the railway that connects to the Port of Santos in São Paulo. The company also built a terminal with a storage capacity of 10,000 containers per year.

Nevertheless, the trend to contract third-party logistics providers prevails. Companies like Compaq are looking for logistics providers that will help it create door-to-door services. "We don't want to contract truckers, customs brokers. We want a logistics provider that is housed in the plant here and oversees it all. He has to do it all for us."[211] AEI Corporation is currently providing the service to the company.

Practically all logistics services available in the U.S. market and Europe are available in MERCOSUR, and to provide these services, multinational companies try to emulate as closely as possible the operations they run in developed nations, adapting them to the local conditions. Operations of U.S. and European firms in the region are mainly focused on warehouse-based services: consolidation and deconsolidation, inventory control, pick-and-pack, repackaging and labeling, and storage. There is considerable demand for import/export and transportation management, domestic distribution, and information systems.[212]

The Automotive Industry and the Development of Advanced Logistics in MERCOSUR

The expansion of logistics in MERCOSUR has been caused to a large extent by the growth of the automotive industry. As mentioned earlier in the chapter, trade in automobiles and automotive-related goods account for roughly one-third of trade between Argentina and Brazil. In this sense, the automotive industry has acted as a catalyst in attracting international logistics corporations.[213] Daimler-Chrysler, Ford, Fiat, General Motors, Volkswagen, Volvo, Toyota, and Renault, among others, have interests in the region. Furthermore, the industry, after the current crisis, is expected to expand at a 5 percent rate in the following years.[214] This expansion will, without much doubt, create an increasing demand for logistics operators, not only by the automotive companies themselves but also by the providers that are linked to their production chains.[215]

So far, automotive companies have adopted different strategies to satisfy their logistics needs. Some companies, like Ford, General Motors, and Fiat, outsource their logistics activities to a single provider or multiple ones, while Renault "imported" Catlog, its logistics subsidiary, when it arrived in Brazil and uses other firms for specific parts of its productions system. Volkswagen had a different approach and created an independent company, Volkswagen Transport, to take care of this portion of its production process and could eventually provide services to other companies.[216]

Challenges

The region still confronts a serious of shortcomings that can limit the expansion of the logistics market. Some of them are related to weaknesses in the bloc's integration process. Others are related to internal issues within each of the countries, such as deficiencies in infrastructure or inadequate regulation of the transportation sector. Furthermore, the novelty of the sector makes some of the services practically unknown: the biggest challenge for logistics in Latin America is marketing and informing businesses of the advantages of logistics.[217]

Firms like Schenker USA established distribution centers in Argentina and Brazil, but they are intended to cover local markets only. There are regulatory impediments, such as a prohibition in Brazilian law for international firms to operate bonded warehouses.[218] Another example of a regulatory deficiency is in the automotive regime. Standardization is not yet a reality in the trucking industry, and there are several limitations in trade of trucks and trailers within the region. "It is not uncommon at the Port of Buenos Aires to see 30-year-old trucks chopped up and modified to haul containers. The average truck fleet age in the United States is about two or three years, in Mexico 12 years, but in Argentina it is a shocking 18 years."[219] Celsur Logística confronted the issue innovatively by modifying the design of a wall of one of its docks, varying its heights, and sloping upward so that it can fit an ample variety of trucks and their multiple loading heights. And although the firm has its own fleet that is standardized, it still subcontracts around 65 percent of its dedicated logistics fleet.[220]

Part of Argentina's privatization and concession process of ports, roads, and rails is intended to avoid active participation by the government in those sectors. Furthermore, the process is not "keen on large-scale expenditures,"[221] and, with the economic downturn of 1999, private investment has also slowed. If underinvestment in infrastructure occurs, continued economic development of the region will become more challenging.[222] Also, the current infrastructure was not ready for the boom in intraregional trade, nor does it allow to run more efficient intermodal chains. Quality distribution centers are not enough, and companies have been compelled to invest in building their own warehouses.[223]

Security concerns in the use of highways in Argentina, Brazil, and Paraguay have also emerged. Since high-valued goods usually move by truck, this mode of transportation is a constant target of criminal activity[224] imposing high costs on the logistics chain because of extra investments in insurance, guards on trailers, and the use of reinforced or sealed containers.[225] Finally, customs has also been a major concern.

Role of the Public Sector in Logistics

Developing countries such as the member states of MERCOSUR do not have the institutional framework to provide the basic but essential infrastructure for an effective transportation system. Ports were not operating efficiently, roads were in poor condition, and railway systems were often in shambles. And where international trade was involved, the Himalayan obstacles of tariffs, their administrators (customs departments), and the whole lot of bureaucratic hassle had to be dealt with. Therefore, logistics operations were, and still are, bogged down in solving just the most basic and pressing needs posed when transporting goods from point "A" to point "B."[226]

Nevertheless, advances have been made; MERCOSUR governments have instituted changes in their systems, reducing clearance from weeks to days, enabling more efficient logistics procedures. Delays in port and customs clearance took up to three weeks or more from the moment the merchandise arrived at the port to the moment it left the facilities.[227]

Privatization, infrastructure and process concessions, decentralization, and deregulations have played a large part in this process. Furthermore, within each country efforts are being made to standardize transportation procedures. Through Working Group No. 5, the MERCOSUR partners attempt greater integration for the region, although at a slow pace. Relating this to what private investment is doing in the logistics sector, it seems that the right path for government is to continue facilitating the process, deregulating the market even more, and standardizing transportation procedures. There seems to be little room and little willingness for new governmental intervention in big investment in the sector.

Logistics: Buffer in the Crisis

Brazil's currency devaluation affected all the sectors tied to trade, specially the one carried out intraregionally. And logistics turned into a buffer that partially alleviated the crisis shock. "The best time for logistic providers is when the economy is good, or when it is bad. When an economy is strong, good logistics management provides marketing separation from competitors. When times are bad, logistics help cut costs and boost efficiency and inventory management." [228]

As the crisis affected producers and retailers, logistics companies were called in to help boost efficiency to lower costs. "We're finding some clients or potential clients looking at outsourcing, where they didn't before." Nevertheless, some activities within the logistics process have suffered. Bonded warehouse demand fell, as trade volume fell more than 25 percent. Furthermore, since customs warehouses are more expensive than regular customs facilities, there has been a shift toward the latter to save.[229]

Final Notes

Within MERCOSUR countries and their production apparatuses, there are clear and profound differences between corporations and businesses regarding their economic capacities, and each group has different logistics needs. As companies differ in size and income, so do their requirements and effective demand for different grades of advanced, complex, and expensive logistics services. Advanced logistics services are available, but only a few local mid- and large-size companies and multinationals created in the region can take full advantage of them. Most mid- and small-size companies cannot yet harness the benefits of all the technology advancements. However, they do benefit indirectly, as large companies take less space in common warehouses and take less of the time of the customs agents because of their preferential status. It needs to be noted that logistics services are concentrated in Brazil and Argentina, with few major logistics providers in Uruguay and almost none in Paraguay.[230]

Although logistics is in its infancy,[231] growth and interest in the region's market are quite evident. On April 27-28, 1999, the 5th Annual MERCOSUR Logistics Conference took place in Coral Gables, Florida. Organized by the Center for Business Intelligence, an international conference company, the forum has attracted a good number of participants to its five conferences.[232] It seems that although the industry is an infant, it is a precocious one indeed.

Environmental Considerations

The countries that constitute the MERCOSUR trade bloc encompass a wide range of ecosystems. For example, Argentina contains rich plains of the Pampas in the northern half and flat to rolling plateau of Patagonia in the south with the Andes, which it shares with Chile on its western border. Brazil has flat to rolling lowlands in the north, some plains, hills, mountains, and a narrow coastal belt. Paraguay is mostly made up of grassy plains and wooded hills east of the Rio Paraguay, and west of the river there is mostly low marshy plains near the river and dry forest further from the river. Uruguay has mostly rolling plains and low hills and fertile coastal lowland.[233] While some of these ecosystems are present or concentrated in one country, much of the ecological and natural resource diversity extends beyond national borders.

Environmental Problems in MERCOSUR

Some of the environmental challenges facing MERCOSUR member countries include the following. Argentina has problems with erosion as a result of inadequate flood controls, irrigated soil degradation, desertification, and air pollution in Buenos Aires and other major cities. Water supplies in urban areas and rivers are becoming polluted because of increased pesticide and fertilizer use. Brazil faces deforestation in the Amazon Basin; air and water pollution in Rio de Janeiro, São Paulo, and several other large cities; land degradation and water pollution caused by improper mining activities. Paraguay is experiencing deforestation, water pollution, and inadequate means for waste disposal that, as a result, present health risks for many urban residents. Uruguay is currently faced with transboundary pollution that is largely caused by Brazilian power plants near the border, water pollution from the meat packing/tannery industry, and inadequate solid/hazardous waste disposal.[234]

The impacts of international trade on the environment are almost exclusively related to the transportation of goods.[235] The region has become increasingly aware of the impacts of transportation on the environment. Some of the environmental problems caused by transportation that have been identified by MERCOSUR member countries include gas emissions, noise pollution, green house effect, energy use, and accidents.[236]

In the case of transportation by truck, pollution is fundamentally caused by the emission of gases such as carbon dioxide, hydrocarbons, and carbon monoxide. While rail also emits these gases, it is estimated that highway transportation accounts for 80 percent of these gas emissions.[237] Another major concern for MERCOSUR countries is the transportation of dangerous products. The concern is that not enough is being done to control the contamination of water from accidental spills and to ensure safe transportation of chemical and waste products. Also, increased movement of ships along the waterway system has environmentalists concerned for changes in water quality of the Paraguay and Paraná Rivers.

One of the major challenges facing increased trade between MERCOSUR member countries is congestion along MERCOSUR routes. Much of the current transportation infrastructure is unable to support the amount of traffic. The congestion not only affects the operational efficiency of the systems of transportation but also results in higher consumption of energy and operational contamination. Congestion is mostly seen in road transportation, especially near urban areas.

MERCOSUR Environmental Policy

Initially, the Common Market Group did not handle environmental issues with a central working group. Environmental concerns did not receive "special treatment." They were seen as transcending different areas and, as a result, were handled by several working groups.[238] The Common Market Group made its first step toward a centralized environmental group in 1992 when an Environmental Specialized Meeting (REMA) was organized.

The first five meetings of REMA have established the structure of MERCOSUR's environmental policy. In the second meeting, the Basic Directives of Environmental Policy was proposed (see Table 3.17). The Common Market Group later accepted this document in Resolution 10/94. These basic directives constitute the backbone of MERCOSUR's environmental policy. In general, the directives focus on promoting cooperation in environmental legislation, institutional procedures for environmental licensing, and monitoring and compensation activities that cause negative environmental impacts on shared ecosystems. The directives also stipulate ensuring equal conditions for competition between member states by including environmental cost in the analysis of the total cost of all production processes.[239]

REMA has also sponsored workshops that look at environmental concerns of MERCOSUR members. It has also proposed several modifications to the Customs Code of MERCOSUR and has promoted the development and implementation of studies that evaluate natural resource management on a national level. In 1995, REMA was instrumental in establishing Working Group No. 6.

Working Group No. 6 can be seen as an outgrowth of REMA. It has continued working with and promoting some of the issues that were originally discussed in the REMA reunions and has brought these issues before the Common Market Group. It has outlined a number of objectives that focus on issues related to trade and the environment. Specifically, it examines issues related to competitiveness and the environment. It also promotes the implementation of the proposals dealing with the environment that were presented by other working groups. Some of the projects it has initiated include a project to develop a legal reference document for member countries to consult in regards to questions of environmental management issues and a project to evaluate the information systems on the environment that exist in different countries, with the objective of creating the "MERCOSUR Environmental Information System." Most recently, in the 29th meeting of the Common Market Group, it was established that Working Group No. 6 would include the topic of "environmental emergencies" in its program. Working Group No. 6 will now be responsible for defining priorities and proposing to the Common Market Group the coordination mechanisms and general directives for the implementation of the cooperation between the MERCOSUR member states on the issue.[240]

MERCOSUR Environmental Impact Assessments

Environmental impact assessments (EIAs) are not part of the Common Market Group's system for evaluating infrastructure projects. Although REMA has suggested instituting studies that would evaluate potential problems in managing natural resources, to this point an environmental impact procedure (such as that developed for environmental impact statements, EISs, in the United States) has not been written into Common Market Group agreements. Instead, each country has its own regulations for the completion of environmental impact assessments. These procedures reflect the governmental structure and planning mechanisms of each country; as a result, the regulatory regimes in the four countries differ in the conception of the environmental impact assessments as a regime.

Table 3.17
REMA Basic Directives of Environmental Policy

To ensure harmonization of environmental legislation between Member States of the Treaty of Asuncion, understanding that harmonization does not imply the establishment of a singular legislation.

To ensure equal conditions of competition between the Member States by including the environmental cost in the structure analysis of the total cost for all production processes.

To guarantee the adoption of safe environmental practices in processes that utilize natural resources

To ensure the adoption of sustainable management of renewable natural resources in order to guarantee their future use.

To ensure obligatory adoption of the practice of environmental licensing for all activities potentially harmful to the environment of the Member States, utilizing environmental impact assessment as a mechanism.

To ensure the minimization and/or elimination of waste disposal through the development of appropriate clean technology, recycling, as well as through adequate treatment of solid liquid and gaseous waste.

To ensure the least possible environmental degradation through production processes and intermediary products, taking into account regional integration in the scope of MERCOSUR.

To ensure the coordination of actions prioritizing the harmonization of legal and/or institutional procedures for environmental licensing, and monitoring activities that may cause environmental impacts in shared ecosystems.

To stimulate the coordination of common environmental criteria for the negotiation and implementation of international accords with priority incidence in the integration process.

To promote the strengthening of institutions for sustainable environmental management through the increase of substantive information for decision-making; and excellence of education, training and research institutions.

To guarantee that the activities related to the development of tourism between Member States take into account principles and norms that ensure environmental equilibrium.

Source: Carlos Saul Menem, *Qué es el MERCOSUR?* Fundación Centro de Estudios Políticos y Administrativos (Ediciones Ciudad Argentina, 1996).

Brazil's environmental institutions at the federal level have been consolidated for a longer period, in comparison to the other three countries. Brazil has been successful in developing institutions at the federal level, which now have more than ten years experience in implementing environmental impact assessment (EIA) procedures. Paraguay and Uruguay established EIA procedures in the mid-1990s. Consequently, they have little experience at administrating EIAs and do not have institutions or the personnel to effectively manage the procedures. Argentina, in contrast with its MERCOSUR partners, does not have a comprehensive EIA regime at the federal level. EIA procedures are instead implemented at the subnational level or are applied on a sector-specific basis. "This difference between Argentina and the other three countries does present a clear disparity with obvious consequences for coordinating or harmonizing EIA regimes where major infrastructure projects are concerned, particularly considering the implications for regional integration."[241]

The major infrastructure projects that are undertaken in the region do not proceed without an initial EIA. Because an increasing number of projects are being concessioned to the private sector, the companies that are granted the concession thus become responsible for completing the EIA. For example, in the Rosario-Victoria bridge project in Argentina, the sponsors, an Italian engineering firm named Impregilo; Hochief, a German engineering and construction firm; and Benito Roggio e Hijos, an Argentine construction company, contracted a consulting firm to complete an initial EIA. The EIA outlined the basis for the environmental management plan of the project; identified the direct and indirect impacts during the construction and operation of the project and mitigating measures; and defined the responsibility of the concessionaire and government of Argentina. An updated EIA will be completed before the construction is initiated.[242]

Sustainable Development Initiatives

The first initiative that focused on the effects of transportation and the environment came in 1991 when the Common Market Group dictated Resolution 9/91 that established safety, noise, and vehicular emission requirements in order to prevent the harmful effects produced by vehicular emissions of gases and noise. Another resolution that also focuses on transportation's effects on the environment is Resolution 2/94. This resolution approves the "Agreement on Hazardous Waste Transport," which establishes norms guaranteeing the safety of persons, goods, and the environment.[243]

One of the most important sustainable development initiatives in which all four MERCOSUR member countries have participated is a project for sustainable forestry. Representatives of the lumber industry from the four MERCOSUR member countries have met several times to discuss initiatives for developing the forestry sector of all four countries. The group, formally known as the Consejo de Desarrollo Sustentable Forestal del MERCOSUR (Cedefor), has made a list of objectives. Some of their short-term goals include completing a study examining the characteristics and particularities of forest industries, complete a study comparing legal aspects of forestry in each of the four countries, exchanging experiences between the four countries that each is using to develop their agro-forestry sector, and creating a glossary of "forestry terms."[244]

One recent sustainable development initiative aims to promote more-efficient environmental management in Argentina by strengthening the legal and institutional framework of the national, provincial, and municipal systems. The program costs a total of $38.6 million; $30 million will be funded by the Inter-American Development Bank and $8.6 million by the Argentine government. The specific program objectives are to lay the bases for a national environmental system; support the framing of a national environmental policy; promote the policy and strategies formulated through proposals for additional legislation, reforms in existing legislation, as well as supplementary rules and regulations; and strengthen the technical and operating capacity of the executing agency, the Ministry of Natural Resources and Human Environment (Secretaría de Recursos Naturales y Ambiente Humano), and of the agencies responsible for the environment at the national and provincial levels.[245]

Brazil has created similar projects to promote sustainable development. Currently, the Brazilian Ministry of the Environment is seeking to implement an environmental protection agenda in the port sector. The ministry's efforts aim to assist ports in modernizing and building capacity by pointing out the economic benefits of implementing environmental protections. The ministry has included all stakeholders involved in the port sector, including union leaders and other ministries of the federal government.[246]

Privatization of highways and ports in Brazil and Argentina has allowed these federal governments to more effectively monitor environmental issues. In the case of Brazil, before privatization, when highways and ports were publicly owned and operated, the federal government faced a challenge in regulating and implementing environmental protections. However, with privatization, the federal government is able to outline specific environmental protections that must be addressed by private contractors. Licensing and contract requirements ensure that private companies are held accountable for environmental protections. Federal and state laws mandate these licensing requirements. Furthermore, private companies are able to efficiently and professionally provide environmental protection services. Some "best practices" models with respect to highway environmental protections have already emerged in the states of Minas Gerais and São Paulo.

Case Study: The Paraguay-Paraná Waterway

The upper Paraguay River Basin region is at a crossroads. Governments with land in the area are contemplating two interrelated environmental issues. The first issue is sustainable development in the region. National governments and international agencies have recognized that the industrial and agricultural development of the area is contributing to negative environmental impacts. As a result, together and with the participation of local and international nonprofit groups, they are beginning to address these concerns. At the same time, economically, the region could potentially benefit from increased trade; however, this increased trade will result in further development of the region. Dependent on this increased trade is the development of a viable means of transportation, the second environmental issue. Potentially, the cheapest means of transportation for the products of this region is on the Paraguay-Paraná waterway. The development of the Paraguay-Paraná waterway is a major transportation project that has gained international attention in part because of the project's potential environmental impact on the region. This case study explores these two issues and briefly summarizes how MERCOSUR member countries, as well as international agencies, are handling these issues. In sum, the Paraguay River Basin provides a glimpse of the kinds of challenges one region in the Southern Cone is facing in terms of balancing the environment, sustainable development, trade, and transportation.

The Pantanal, the world's largest wetlands, lies in the Paraguay River Basin. The wetlands are valued for their remarkable biodiversity; it is reported that more than 600 species make their home in the wetlands. The development of this area has resulted in a number of negative impacts on the environment, in particular the Pantanal wetlands. Some of these impacts include depleted fish stocks from overfishing, contamination of the river resulting from gold mining upstream, and soil erosion from increased commercial production of soybeans. Water quality is also a growing problem. It is estimated that 64 percent of the households in the region use rudimentary septic pit systems, and other households use the back of their properties or the waterways themselves to deposit their waste products.[247] There has been growing concern regarding the sustainable development of this region.

There have been several initiatives for sustainable development in this region. One initiative, by the Brazilian government with the help of the UN Development Program (UNDP) and the Organization of American States (OAS), consisted of a series of public workshops that established a proposal for "integrated management" of the upper Paraguay River Basin.[248] Another initiative, which is in the planning stage, seeks to develop "an integrated water information system" for the area.[249] This project will be led by an agency called the Global Environment Facility and will receive assistance from the UN Environment Program (UNEP) and the OAS. The governments of Bolivia, Brazil, and Paraguay will be primarily responsible for funding the project.[250]

As the countries that have land in the upper Paraguay River Basin seek ways to promote economic development in the region, the Paraguay-Paraná waterway project has been identified as one way to stimulate economic growth by lowering transportation costs of goods traveling in and out of that region. The Paraguay-Paraná waterway is the least-expensive form to transport goods to and from the region. The lower transportation costs will result in more-competitive products and lower prices for consumers.

The Paraguay-Paraná project is a large-scale infrastructure project that will convert part of the Paraguay River into a canal to allow barges to transport goods between the upper Paraguay River Basin and the port of Buenos Aires. The waterway project will "straighten" the river, eliminating the S curves of the portion of the river that runs through the Pantanal. Potential effects of this project include drying out of the Pantanal, loss of fish, decreased cattle-ranching productivity, sediment loading, loss of vegetation, decreased assimilative capacity of the wetlands, increased downstream flooding, increased loss of soil carbon, destruction of thousands of archaeological sites, and the proliferation of land conflicts in the region resulting in the expulsion and marginalization of riverine and indigenous populations.[251]

The Inter-American Development Bank (IADB), potentially a major investor in the project, stated that it would not invest in the project unless an environmental impact assessment was completed and the effects of the infrastructure project were found to be "moderate." In 1995, the IADB and the UNDP began new engineering and impact assessments on the project. Depending on the results of these studies, which cost between $7.5 and $10 million, the IADB will decide whether or not to commit to financing the project. The EIA was completed in 1997; however, there is still much debate regarding how to proceed with the project. Additional EIAs have been conducted that highlight deficiencies in the IADB's study, thus provoking controversy in how the waterway project should continue.

Environmental groups argue that there are alternatives to dredging the upper Paraguay River. One alternative involves modifications to the lower portion of the river, rehabilitating and improving the existing shipping channel, and exploring multimodal forms of transportation to complement the river system mode of transportation.

As the governments to which the upper Paraguay River Basin belong discuss the continuation of the waterway project, the waterway is increasingly being used to transport cargo. Dredging is occurring in small increments north of Santa Fe. Local governments, eager to increase their revenue from the increased trade in the region, are calling for more dredging projects.

In general, there has been a lack of coordination among the countries involved in the waterway project. Issues of an environmental nature are dealt with as they come up, in part because there isn't any established protocol in the region for evaluating environmental impacts. One example of how MERCOSUR member countries have been successful in responding to environmental concerns surrounding the waterway project. The four countries have devised a procedure of reimbursement for costs to control contamination produced by ships using the waterway. For those countries which feel their natural resources have been in some way damaged they can begin legal proceedings with the administrative center of MERCOSUR to be reimbursed for any damage that might have occurred.[252]

Unfortunately, in many cases, responses such as these have come too little too late. One recent study outlined the uncertainties that exist in the upper Paraguay River Basin, in particular concerning the waterway project. These uncertainties are listed in Table 3.18 along with a series of recommendations and needs.

Relationship to Fostering Regional Economic Development

Brazil currently maintains a region that is considered a type of "continental island." This area, composed of states such as Mato Grosso and Tocatins, has fertile land, rivers, and adequate rainfall that could provide lucrative harvests if connected to Brazil's major transportation networks. Integration of this region is seen as a tool for economic development that could have a direct impact on social needs like housing, health care, and education by stimulating regional development. Moreover, integration is seen as a tool to redistribute wealth from traditional industrial sectors in southern Brazil to nontraditional sectors in the northeast and interior parts of Brazil.

Railroads and waterways are seen as the most feasible transportation modes for integrating these regions. These modes can facilitate integration in ways that minimize transportation costs and maximize natural resources. The use of waterways is seen as a low-cost option that could integrate remote parts of Brazil with MERCOSUR trade regions. Given Brazil's historical dependence on the use of high-cost highways, waterways are seen as a low-cost transportation alternative. However, waterways are currently in need of much dredging and infrastructure development. Nonetheless, proponents of waterways assert that their increased use could foster regional development in remote areas of Brazil by facilitating the movement of goods from isolated production sources to consumption points. Areas that could benefit within Brazil include the remote Amazon Basin and northeast Brazil, as well as the continental interior.

Table 3.18
Uncertainties and Recommendations for Upper Paraguay River Basin/Pantanal

Uncertainties	Recommendations
• Previous EISs have primarily considered the Brazilian portion of the Pantanal, not Paraguay and Bolivia	• Need integrated multinational (Paraguay, Brazil, Bolivia) environmental database
• Pace and extent of development are unclear	• Need scenario analysis needs to be conducted to understand the range of impacts for each step in the project
• The environmental impacts of the Hidrovia project are poorly documented	• Need more comprehensive and accurate environmental impact statement for the waterway
• The relative sizes of potential impacts to stakeholder groups remain poorly understood	• Conduct social and economic studies to identify the dominant sector vulnerabilities
• Public and stakeholder perceptions of environmental issues are poorly understood	• Conduct studies to elicit societal preferences on environmental issues for each sector
• Who/what level of government should allocate and manage resources	• Train policymakers, managers, and agents in environmental issues
• Threshold levels where environmental issues will begin to cause conflict	• Need more extensive and intensive water quality and hydrological monitoring network, data on concentrations of toxins in wildlife, wildlife contaminant residue concentrations, manage watershed, not political boundaries, by strengthening international transboundary river basin management systems

Source: "Environmental Stresses and Regional Security in Latin American and The Caribbean: The Cases of the Upper Paraguay River/Pantanal and the Wider Caribbean" (report prepared by the Dante B. Fascell North South Center at the University of Miami, Miami, FL., October 1999), Pg 16.

In addition to waterways, railroads are seen as a viable tool for integration. A current effort to integrate the interior region of Brazil comes under the auspices of the Corredor Centroleste, an 1,800-kilometer railroad that cuts through the interior of Brazil, crossing nine states. The Corredor Centroleste connects two highways in the interior, the Leste-Oeste and the Norte-Sul, with five ports in the area of Vitória, a coastal city in the state of Espírito Santo. Development of the Corredor Centroleste is steered by a nonprofit consortium organization. A council of governors from the nine states provides political support to the consortium to facilitate coordination between railroads and port authorities.[253] In addition to the Corredor Centroleste, the new railway Ferronorte is under construction in the state of Mato Grosso. Ferronorte will link this interior state with the Port of Santos. As a sign of the emergence of railroads as a promising mode of transportation, Ferronorte was able to secure a $50 million tax credit to speed up construction of its line.[254]

In November 1999, Dell Computer Corporation opened its first Latin American manufacturing facility and customer center in Rio Grande do Sul. Rio Grande do Sul's location on the border with Argentina and Uruguay serves as a hub for MERCOSUR trade that makes it an attractive region for foreign investment. Dell plans to invest $64 million and increase its current employment from 185 to 900 employees over the next five years.[255] Approximately half of Dell's sales will be aimed at markets in Argentina and Brazil. Michael Dell, chairman and chief executive officer, states "Brazil and the MERCOSUR region represent a phenomenal opportunity for Dell, and Rio Grande do Sul is an excellent base of operations because of its sophisticated labor force, its economic incentives to attract technology-manufacturing companies to the region, and its strategic location as an export hub to other South American countries."[256]

Dell's investment in Rio Grande do Sul demonstrates the benefits that MERCOSUR corridors have had on regional economic development. Rio Grande do Sul's geographic location and investment profile provides the foundation for regional growth. In the case of Dell, this growth can be measured in terms of direct and indirect jobs that will be created to support Dell's operations. Economic impact assessments of Latin America prepared by Price Waterhouse demonstrate that for every direct job that is created through information technology industries, up to 5.5 indirect jobs are created in supporting industries.[257] Rio Grande do Sul's success in attracting Dell is a result of collaborations between the state government, the business community, and public-private organizations such as Polo-RS that worked together to attract Dell's business. Effective collaborations of government and business sectors are critical for attracting foreign investment to promote regional economic development in all areas of MERCOSUR activity.

Notes

[1] All estimates in this section are our own, and they are based on import and export data from the Centro de Economía InterNaciónal (CEI), Ministerio de Relaciones Exteriores, Comércio InterNaciónal y Culto, Secretaría de Relaciones Económicas InterNaciónales, República de Argentina. "Panorama del MERCOSUR No. 4" (Sección Sexta, Anexo Estadístico, Buenos Aires, Argentina, November 1999).

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[99] Mello and Gall, "Crossroads of Transportation," p. 6.

[100] Ibid.

[101] Piccinini, "A Infra-Estructura nas Diferentes Esferas do Sector Publico e a Participação de Iniciativa Privada," p. 86.

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[129] Interview by Joel Aldape and Andy Fouché with Luiz Alberto Mincarone, Director Presidente, Transportadora DM S.A., Rio Grande do Sul, Brazil, January 20, 2000; and interview by Horacio Alvarez and Emily Fortney with Zuly Bonahon, Ardoino Transporte InterNaciónal, Montevideo, Uruguay, January 21, 2000.

[130] Interview by Horacio Alvarez and Emily Fortney with Conrado Sorrentino, Undersecretary of Transportation, Ministry of Transportation and Public Works, Montevideo, Uruguay, January 13, 2000; interview by Horacio Alvarez and Emily Fortney with Silvia Sudol, Coordinator of International Affairs, Secretariat of Transportation, Ministry of Infrastructure and Housing, Buenos Aires, Argentina, January 17, 2000; and interview by Horacio Alvarez and Emily Fortney with Zuly Bonahon, Ardoino Transporte InterNaciónal, Montevideo, Uruguay, January 21, 2000.

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[132] Rubén César Pavé, "Aspectos Destacables de los Ilícitos Aduaneros y Recursos en el Proyecto de Código Aduanero del MERCOSUR: Comparación con el Código Aduanero Argentino," in *Del MERCOSUR: Aduana, Jurisdicción, Informática, Relaciones Intercomunitarias,* coord. Miguel Angel Ciuro Caldani (Buenos Aires, Argentina: Ediciones Ciudad Argentina, 1998), pp. 105-118.

[133] Alvarez interview.

[134] Leandro Uría, "Entrevista con Osmar de Virgilio, Director de la Aduana: 'Vamos a hacer un control inteligente,'" *Diario La Nación,* Suplemento Comércio Exterior (May 19, 1998). Online. Available: www.laNación.com. Accessed: February 15, 2000.

[135] MERCOSUR countries have legislation affecting trade that goes back to the 1930s. For example: Argentina: Reglamento General de la Ley 4084, Decreto N° 83732 de 3/VI/36 (deals with products made out of plants and vegetables); Productos vitivinícolas, Ley N° 14878 de 6/XI/59 (deals with products from grapes and their derivatives); Autorización previa de importación emitida por la Comisión Naciónal de Energía Atómica, Ley N° 22477 de 18/XII/56 Decreto N° 5423 de 23/V/57 and Reglamento de la Ley N° 22.477/56 (deals with imports of atomic energy products). Brazil: Reglamento del Servicio de Defensa Sanitaria Animal, Decreto N° 24548 de 3/VII/34 (deals with live livestock imports); Reglamento de

Inspección Industrial y Sanitaria de Productos de Origen Animal, Decreto Nº 30691 de 29/III/52 (deals with products made out of animals); Decreto Nº 4071 de 12/V/39 and Decreto Nº 28670 de 25/IX/50 (deal with imports of petroleum and its derivatives), among others. Paraguay: Decreto Nº 10189 de 22/XII/41, Reglamento de la Defensa Agrícola; Decreto Ley Nº 8051 de 31/VII/41; Decreto Ley Nº 8051 de 31/VII/41, productos de origen vegetal. Uruguay: Decreto de 8/VI/34. animales y productos de origen animal; Decreto de 8/VI/34, animales y productos de origen animal; Ley Nº 8764 de 14/X/31, petróleo y derivados, gas natural, carburantes y productos de la industria petroquímica; Decreto Nº 2605 de 7/X/43; Reglamentario del Decreto Ley Nº 10415/43; Adicionado por Decreto Nº 550 de 4/XI/69), armas y explosives; Decreto Ley Nº 10415 de 13/II/43, armas y explosives; Decreto Nº 2605 de 7/X/43; Reglamentario del Decreto Ley Nº 10415/43; Adicionado por Decreto Nº 550 de 4/XI/69), armas y explosivos. Online. Available: http://www.aladi.org/inicio.htm. Accessed: March 3, 2000 (ALADI Web site).

[136] Enrique C. Barreira, "El Transbordo en la Reforma del Código Aduanero," *Diario La Nación,* Suplemento Comércio Exterior (July 20, 1999), p. 24.

[137] Alvarez interview.

[138] Gabriela Wurcel, "La Union Aduanera Todavía es un Objetivo Pendiente," *Diario La Nación,* Suplemento Comércio Exterior (May 19, 1998), p. 16.

[139] Ibid.

[140] Mincarone interview.

[141] Pablo González Bianchi, "Algunos Aspectos Aduaneros Relacionados con el Transporte InterNaciónal Terrestres," in *Revista de Estudios Aduaneros* (Buenos Aires, Argentina: Instituto Argentino de Estudios Aduaneros), Sección Doctrina, Año VIII, Primero y Segundo Semestres de 1998, no. 12, pp. 143-54.

[142] The "despachantes de aduana" have to be certified by the customs department to be able to provide this service. The legislation defines them as private agents of public interest, who in theory contribute to make the customs clearance procedures easier and are responsible for the infractions that could be committed during the customs process.

[143] Bianchi, "Algunos Aspectos," pp. 143-54.

[144] Alvarez interview.

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[146] Sudol interview.

[147] Mincarone, Sudol, and Alvarez interviews.

[148] "El Control Preembarque: Criticas de los Importadores: Preocupacion por los Sobrecostos," *Diario La Nación*, (March 17, 1998), p. 9.

[149] Mercovia, S.A., "Primer Centro Unificado de Frontera del MERCOSUR,", Buenos Aires, Argentina, 2000 (company information brochure).

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[151] Interview with official from the Ministry of Infrastructure, Argentina. Because of the delicate nature of the subject, the official requested not to publish his/her position and name.

[152] Kevin G. Hall, "Kodak Details Gridlock at Brazil Warehouses," *Journal of Commerce*, Transportation section (May 6, 1999), p. 10A.

[153] Some cases, like the border crossing of Paso de Los Libres (Argentina)–Uruguaiana (Brazil) and Santo Tomé-São Borge, have 24-hour service

[154] Leandro Uría, "Ford ya Trabaja con Aduana Domiciliaria," *Diario La Nación,* Suplemento Comércio Exterior (July 12, 1999), p. 3.

[155] Ibid.

[156] "Servicios de la Aduana en Internet," *Diario La Nación*, Suplemento Comércio Exterior. Online. Available: http://www.laNación.com.ar/suples/indice/98/indexasp.htm. Accessed: March 7, 2000.

[157] Interview by Joel Aldape and Andy Fouché with Cassia Schittini, Grupo Update, Editora Update do Brazil, Ltd., January 21, 2000.

[158] John Barham, "Online in Latin America: Information Technology Logistics: Dell's 'Virtual Warehouse' in Brazil Is an Important Part of Its Plans to Expand in the Region," *Financial Times of London,* Management and Technology section (October 7, 1999), p. 10.

[159] Ibid.

[160] Kevin G. Hall, "Compaq Bids Farewell to Customs Agents," *Journal of Commerce* (April 23, 1999), p. 1A.

[161] Ibid.

[162] Ibid.

[163] Schittini interview.

[164] Hall, "Compaq Bids," p. 1A.

[165] Alvarez interview.

[166] Interview by Horacio Alvarez and Emily Fortney with Zully Bonahon, Ardoino Transportation Company, Montevideo, Uruguay, January 21, 2000.

[167] Since there are long waiting lines at the border, trucks are loaded one day before they depart to their final destination. Loading the truck and waiting to leave until next day account for 24 of the 120 hours of the trip. Departing in the morning from Montevideo, reaching the border, and doing all the paperwork takes some 24 to 36 hours under current conditions (in some cases, trucks have take from 2 to 3 days to cross the border). Since only one driver is assigned per truck, the trip within Brazil's borders to São Paulo takes approximately 48 hours. Delivering the merchandise and doing other minor activities account for the rest of the 12 to 24 hours.

[168] Working overnight and with two drivers assigned to the task, taking the goods from Montevideo to the border could take 12 hours. From the border to São Paulo, with alternate driving shifts, another 36 hours would be required to complete the trip.

[169] Martin Sgút, preliminary version of draft for ECLAC, Santiago, Chile, no title, 1999 (mimeograph).

[170] The $179 million was estimated with Sgút's data: 370,000 container units and a customs over-expenditure of $483.88 per container.

[171] Charles W. Thurston, "Latin American Firms Looking for Help with Logistics Services," *Journal of Commerc*, Special Report (April 22, 1999), p. 7A.

[172] Ian Putzger, "Forwarders Wait Their Turn to Take Off," *Journal of Commerce*, Special Report (April 27, 1999), p. 5A.

[173] Hall, "Compaq Bids," p. 1A.

[174] Thurston, "Latin American Firms," p. 7A.

[175] Ibid.

[176] Putzger, "Forwarders Wait," p. 5A.

[177] Toby B. Gooley, "U.S. 3rd Parties Hit the Road to Rio; Third-Party Logistics Companies Are Flocking to Latin America These Days. Their Goal: To Bring U.S.-Style Logistics to This Undeveloped but Fast-Growing Market," *Logistics Management & Distribution Report*, Outsourcing Report Section (August 31, 1998), p. 87.

[178] "Logistics Giants Head to Brazil," Logistics Management & Distribution Report, *International News* (June 30, 1998), quoting Mark Skoda, Executive Vice President of Penske Logistics, p. 81.

[179] Putzger, "Forwarders Wait, p. 5A.

[180] Thurston, "Latin American Firms," p. 7A.

[181] Putzger, "Forwarders Wait," p. 5A.

[182] Thierry Ogier, "Automakers' Decentralization Affects Supply Chains," *Journal of Commerce*, Transportation section (September 13, 1999), p. 9.

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[184] Autotrac Comércio e Telecomunicações, S.A., "El Sistema." Online. Available: http://www.autotrac.com.br/espanhol/ index_esp.htm. Accessed: April 1, 2000 (company information Web site).

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[187] Christiane Bueno Malta, "Satélite No Controle de Ferrovias Brasileiras," *Gazeta Mercantil* (June 4, 1999), p. A1.

[188] "Penske Logistics Expands Services to South America," *Canada News Wire*, Financial News (May 19, 1998), p. 2D.

[189] Ibid., quoting Joffre Selies, President and CEO of Cotia Trading, p. 4D

[190] "Robinson Buys Comexter as Wedge into MERCOSUR," *Journal of Commerce* (December 7, 1998), p. 13A.

[191] Thurston, "Latin American Firms," p. 78.

[192] "Logistics Giants Head to Brazil," p. 81.

[193] Kevin G. Hall, "Real's Slide Gives Logistics Sector a Chance to Shine," *Journal of Commerce* (February 8, 1999), p. 1A.

[194] Kevin G. Hall, "US-Based Logistics Provider Banks on Growth of MERCOSUR," *Journal of Commerce* (July 31, 1998), p. 1A.

[195] Gregory S. Johnson, "Allied: Into Logistics for the Long Haul," *Journal of Commerce*, Transportation section (June 30, 1998), p. 20A.

[196] "Allied Holdings, Inc. Subsidiary Announces New Business Awarded to Its Brazilian Affiliate," *PR Newswire*, Financial News section (June 24, 1998), , p. 4D.

[197] "OCA Joins with Brazilian Airline Tam to Form OCA Express MERCOSUR to Offer Mail and Package Delivery in Argentina and Brazil," *El Cronista* (July 30, 1999), p. 21.

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[203] Gooley, "U.S. 3rd Parties," p. 87.

[204] USCO Logistics, "About USCO: International Logistics." Online. Available: http://www.usco.com/samerica.htm. Accessed: April 2, 2000 (company information Web site).

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[211] Hall, "Compaq Bids," p. 1A.

[212] Gooley, "U.S. 3rd Parties," p. 87.

[213] Thierry Ogier, "German Companies Focus on Supply Chain," *Journal of Commerce*, Transportation section (September 9, 1999), p. 3.

[214] Ibid.

[215] Ibid.

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[230] Interview by Horacio Alvarez and Emily Fortney with Fernando Frugoni, President, URULOG (Logistics Association of Uruguay), Montevideo, Uruguay, January 21, 2000.

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[235] ALADI, "Plan Maestro para el Desarrollo Sostenible del Transporte y su Infraestructura en America del Sur," Montevideo, Uruguay, December 1998, pp. 48-50.

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[238] Jennifer Allis, "Nafta and MERCOSUR: A Comparative Approach to Environmental Policy Development" The University of Texas at Austin (1998), pp. 54-56.

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[246] Interviews by Joel Aldape and Andy Fouché with Leila Ollaik, Assorssora para MERCOSUR, Ministerio do Meio Ambiente/Secretaria de Qualidade Ambiental; Robson Jose Calixto, Integrated Coastal and Marine Management, Ministry of the Environment/Secretariat for Environment Quality in Human Settlements/Territorial Environmental Management Programme; and Mauricio Andres Ribeiro, Director, Ministerio do Meio Ambeinte/Secretaria de Qualidade Ambiental nos Assentamentos Humanos, Brasília, Brazil, January 13, 2000.

[247] Center for Marine and Environmental Analyses (CMEA), "Environmental Stresses and Regional Security in Latin America and the Caribbean" (University of Miami, Miami, Florida, October 1999), p. 6.

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[253] "O Consórcio do Corredor Atlântico do Mercosul" Online.

[254] "Brazil's Railways: Trucks to Trains," *The Economist* (October 23, 1999), p. 76.

[255] "American Embassy, Brazil: Brazil's Commercial Overview." Online. Available: http://www.embaixada-americana.org.br/comov21.htm. Accessed: March 10, 2000.

[256] "Dell Dedicates First Latin American Manufacturing Plant and Customer Center in Rio Grande do Sul, Brazil." Online. Available: http:// www.dell.com/us/en/gen/corporate/press/pressoffice_us_1999-11-03-pa-000.htm. Accessed: March 10, 2000.

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Chapter 4. NAFTA Transportation

Trends in Trade

NAFTA: Trade with the World

The United States, Mexico, and Canada have experienced significant increases in trade with the rest of the world. As illustrated in Table 4.1, between 1994 and 1999, the United States experienced a rate of growth of 36 percent in exports and 54 percent in imports. Correspondingly, Mexico's exports grew 125 percent and its imports 79 percent. Canada's exports grew 58 percent and its imports 57 percent.

Table 4.1
NAFTA Total Exports and Imports, and Growth in 1994 and 1999
(millions of dollars and percentages)

	Total Exports to the World			Total Imports to the World		
Country	1994	1999	Growth	1994	1999	Growth
United States	502,400	683,000	36%	668,600	1,030,000	54%
Canada	228,167	360,599	58%	207,872	326,662	57%
Mexico	60,817	136,703	125%	79,345	142,063	79%
Total	791,384	1,180,302	49%	955,817	1,498,725	57%

Sources: Statistics Canada, "Imports and Exports of Goods on a Balance of Payment Basis," Online. Available: http://www.statcan.ca/english/Pgdb/Economy/International/gblec02a.htm. Accessed: March 11, 2000. Mexican Secretariat of Commerce and Industrial Development (SECOFI). NAFTAWORKS, "Mexico Is U.S.' Second Largest Trading Partner," September 21, 1999. Online. Available: http://www.naftaworks.org. Accessed: March 21, 2000. U.S. Department of Commerce, *Monthly Trade Update*, U.S. Foreign Trade Developments, February 18, 2000. Online. Available: http://www.ita.doc.gov/td/industry/otea/usftu/MTU1299.PDF. Accessed: March 6, 2000.

This growth in NAFTA trade with the rest of the world has attracted foreign capital to all three nations. Overall, foreign direct investment in NAFTA member countries reached over $864 billion in 1997. In addition, this robust economic climate has created demand for increased jobs. Since the implementation of NAFTA, employment has increased by 7 percent (12.8 million jobs) in the U.S., 10 percent (1.3 million jobs) in Canada, and 22 percent (2.2 million jobs) in Mexico.[1] While NAFTA countries have certainly increased trade with other nations, a large part of this trade is clearly attributed to intraregional trade within the NAFTA bloc.

NAFTA: Intraregional Trade

The amount of intraregional trade between the United States, Mexico, and Canada has increased exponentially since NAFTA took effect January 1, 1994. In 1993, trilateral trade was $289 billion; in 1999, the combined amount surpassed $500 billion. Trade between the three nations has increased by over 76 percent since 1994. Investment in all three nations has increased; since 1997, an estimated $189 billion has been invested trilaterally.

A close examination of imports and exports is central to the understanding of the size and importance of the NAFTA trade relationship. The increase in exports and imports between the U.S., Canada, and Mexico has increased since 1994, as reflected in Table 4.2 and Table 4.3.

Table 4.2
U.S. Total Exports and Imports to and from Canada
(millions of dollars)

	1994	1995	1996	1997	1998	1999
Exports	114,439	127,226	134,210	151,767	156,603	166,200
Imports	128,406	144,370	155,893	167,234	173,256	198,300

Sources: U.S. Department of Commerce, *Monthly Trade Update,* U.S. Foreign Trade Developments (December 1999). Online. Available: http://www.ita.doc.gov/otea. Accessed: December 10, 1999. U.S. Department of Commerce, *Monthly Trade Update,* U.S. Foreign Trade Developments, February 18, 2000. Online. Available: http://www.ita.doc.gov/td/industry/otea/usftu/MTU1299.PDF. Accessed: March 6, 2000.

The United States has a long-standing trading relationship with Canada. The two nations enacted the U.S.-Canada Free Trade Agreement in 1989. U. S. exports to Canada in 1999 increased 3.1 percent over 1998. In 1999, U.S. exports to Canada amounted to $166.2 billion, while imports from Canada totaled $198.3 billion. Imports from Canada have increased about 31 percent since 1994, while U.S. exports to Canada have increased 35 percent since 1994.

U.S.-Mexico Bilateral Trade

The U.S. monetary value of exports and imports with Canada is larger than with Mexico. However, since NAFTA took effect, there has been a larger increase in the percentage of trade between the United States and Mexico than with the United States and Canada. Overall, U.S.-Mexico trade increased by a total of 120 percent in NAFTA's first five years.[2] In 1993, total trade between the two nations was $85.2 billion. Just in the first six months of 1999, U.S.-Mexico trade surpassed the $107 billion threshold.

The increase in NAFTA commerce has immensely benefited Mexico, because of the strong relationship it has with the United States. According to the Mexican Secretariat of Commerce and Industrial Development (Secretaría de Comércio y Fomento Industrial, or SECOFI), total world trade for Mexico amounted to $140.6 billion in 1994; in 1999, it increased to $278.7 billion largely because of the increase in foreign trade with the United States.

The increase can clearly be shown in Table 4.3. During 1999, Mexico continued to be the United States' second-largest trading partner. According to the U.S. Department of Commerce, in 1999 U.S.-Mexico trade reached $196.6 billion; a 13.4 percent growth in comparison to 1998.[3]

Table 4.3
U.S. Total Exports and Imports to and from Mexico
(millions of dollars)

	1994	1995	1996	1997	1998	1999
Exports	50,844	46,292	56,792	71,388	78,773	86,870
Imports	49,494	62,101	74,297	85,938	94,629	109,700

Sources: U.S. Department of Commerce, *Monthly Trade Update,* U.S. Foreign Trade Developments (December 1999). Online. Available: http://www.ita.doc.gov/otea Accessed: December 10, 1999. U.S. Department of Commerce, *Monthly Trade Update*, U.S. Foreign Trade Developments, February 18, 2000. Online. Available: http://www.ita.doc.gov/td/industry/otea/usftu/MTU1299.PDF. Accessed: March 6, 2000.

Mexico was a major consumer of U.S. products in 1999. It purchased almost 12.5 percent of total U.S. exports. U.S. exports to Mexico grew 10.3 percent, reaching $86.87 billion, while U.S. worldwide exports of goods in 1999 amounted to more than $695 billion, a 1.9 percent increase over 1998. On the other hand, Mexico was also a major provider of products and services to the United States in 1999; and accounted for 11 percent of total U.S. imports.[4] Mexican imports to the United States increased almost 16 percent to reach $109.7 billion.

Mexico is in a dead heat with Japan to be the second-largest trading partner with the United States. In July of 1999, U.S.-Mexico trade increased 20 percent from the same period in 1998 to an estimated $16.2 billion, which surpassed the bilateral trade relationship of United States and Japan at $15.8 billion.[5] During this time, Mexico's purchases of U.S. goods amounted to $46.26 billion, which were $13 billion more than the amount of U.S. exports bought by Japan.

Table 4.4 lists the top-ten commodity groups exported and imported between the United States and Mexico from 1994-98, by the three-digit Standard Industrial Classification (SIC) code.

Table 4.4
Top Ten U.S. Exports to Mexico and Mexican Exports to the U.S. by Commodity Group, 1994-98
(millions of dollars)

U.S. Exports to Mexico

SIC	Commodity Group	1994	1995	1996	1997	1998
784	Parts and accessories for motor vehicles, etc.	4,641	3,948	4,097	5,510	5,301
776	Thermionic, cold cathode, photocathode valves	1,916	2,590	3,284	4,381	4,908
772	Electrical apparatus for switching or protecting electrical circuits	1,610	2,059	2,663	3,296	3,497
994	Est. low val shp; can low value & N.I.K. (exports)	1,756	1,625	1,952	2,465	2,738
764	Telecommunications equipment, N.E.S. & pts	1,732	1,424	1,649	2,168	2,598
778	Electrical machinery and apparatus, N.E.S.	1,363	1,481	1,840	2,477	2,501
773	Equipment for distributing electricity, N.E.S.	1,401	1,431	1,772	1,934	2,091
893	Articles, N.E.S of plastics	1,163	1,140	1,402	1,650	1,942
699	Manufactures of base metal, N.E.S.	1,132	1,226	1,487	1,541	1,799
	TOTAL	16,714	16,924	20,146	25,422	27,375

Mexico's Exports to the U.S.

SIC	Commodity Group	1994	1995	1996	1997	1998
781	Motor cars & other motor vehicles	3,944	5,821	7,903	8,215	9,147
333	Crude oil from petroleum or bituminous minerals	4,653	5,417	6,356	8,133	5,007
773	Equipment for distributing electricity, N.E.S.	2,973	3,334	3,776	4,503	4,780
761	Television receivers	2,265	2,493	2,750	3,062	4,698
764	Telecommunications equipment & pts, N.E.S.	2,016	2,579	3,128	3,298	4,221
752	Automatic data processing machines & units thereof	932	1,118	2,021	3,141	3,622
82	Motor vehicles for transportation of goods & special purchase vehicles	643	1,772	3,052	3,605	3,513
784	Parts and accessories for motor vehicles	2,385	2,405	2,777	3,189	3,500
931	Special transactions & commodity not classified by kind	1,599	2,072	2,241	2,626	3,028
772	Electrical apparatus for switching or protecting electrical circuits	1,729	1,816	1,907	2,245	2,482
	TOTAL	23,139	28,827	35,911	42,017	43,998

Source: U.S. Department of Commerce, International Trade Administration. U.S. Aggregate Foreign Trade Data, U.S. Commodity Trade by Country (top 20 SITC-3 and all SITC-1 products), "U.S. Trade by Commodity with Mexico." Online. Available: http://www.ita.doc.gov/industry/otea/usfth/top80cty/mexico.cp. Accessed: December 7, 1999.

Commerce on the Border

Overwhelmingly, NAFTA exports and imports travel by land through ports of entry along the U.S.-Mexico border. There are 32 U.S.-Mexico ports of entry on the border, 18 of which are along the Texas border. Major crossings along the U.S.-Mexico border are listed in Table 4.5.

Table 4.5
Major U.S.-Mexico Border Crossings

U.S. City and State/Mexico City and State
Laredo, Texas/Nuevo Laredo, Nuevo León
El Paso, Texas/Ciudad Juárez, Chihuahua
Brownsville, Texas/Matamoros, Tamaulipas
Hidalgo, Texas/Ciudad Reynosa, Tamaulipas
Eagle Pass, Texas/Piedras Negras, Coahuila
Del Rio, Texas/Ciudad Acuña, Coahuila
Columbus, New Mexico/Palomas, Chihuahua
Santa Teresa, New Mexico/San Jerónimo, Chihuahua
Nogales, Arizona/Nogales, Sonora
Douglas, Arizona/Agua Prieta, Sonora
Naco, Arizona/Naco, Sonora
San Luis, Arizona/San Luis, Sonora
Otay Mesa, California/Otay Mesa, Baja California
Calexico, California/Mexicali, Baja California
San Diego, California/Tijuana, Baja California
San Ysidro, California/Puerta Mexico, Baja California
Tecate, California/Tecate, Baja California

Sources: Border Trade Data, "Comparisons between Calendar Year 1998 and 1994 for Border Ports." Online. Available: http://www.tamiu.edu/coba/bti/analysis/combined/yearend2.htm. Accessed: December 12, 1999. Binational Border Transportation Planning and Programming Study, "Task 3: Point of Entry Inventory". report prepared by Barton-Aschmon, La Empresa, March 13, 1998, pp. 19-20 (CD-ROM).

Trade flows that run through the Mexican border cities are significant. In 1998, $84,689,932,347 worth of U.S. imports from Mexico passed through U.S./Mexico ports of entry. In the same year, an estimated $69,869,940,661 of U.S. exports to Mexico passed through these same crossing points. Texas/Mexico ports of entry received an estimated 73 percent of border trade in 1998, largely because Texas shares a border with four Mexican border states: Tamaulipas, Coahuila, Chihuahua, and Sonora. California ports received 16 percent of border trade; Arizona, 10 percent; New Mexico, less than 1 percent.

Maquiladora Trade

To fully understand trade flows between the United States and Mexico, it is necessary to differentiate between traditional and maquiladora trade. The year 1965 marked the advent of the maquiladora industry in Mexico, when foreign companies first gained the legal right to open assembly plants. The informal agreement that relaxed Mexico's strict foreign investment, customs, and immigration provisions was formalized into law as the Border Industrialization Program in 1971. The program was intended to serve as a partial remedy for high unemployment in border states, as well as to attract foreign investment and manufacturing facilities. In the 1970s, high wage scales and a demand for lower prices in the United States caused a boom in the industry. By 1992, there were more than 2,000 maquiladoras in Mexico. Some 3,565 maquiladora plants were documented in Mexico as of April 1997.[6]

Maquiladora activity, also known as in-bond manufacturing, consists primarily of the assembly of products from American or other foreign components. These products are then typically imported back to the United States for consumption. Typical maquiladora products include textiles, automobiles, and electronic components. Maquiladora trade tends to be concentrated between Mexican border states and either U.S. border states or the United States' industrial northeast. By contrast, traditional trade tends to be far more diverse in terms of both origin and destination. In addition, traditional trade tends to consist of products destined for consumption or as inputs for locally consumed products in either the United States or Mexico.

Makeup of the Maquiladora Industry

In 1995, maquiladora-related products represented 50 percent of total southbound U.S.-Mexico trade, a gradual increase from prior years. Machines, electronics, and electrical equipment dominated this flow, with plastics representing a significant 10 percent of the total. Machines, electronics, and electrical equipment also represented 57 percent of the northbound maquiladora trade, with nuclear and steam reactors representing an additional 8 percent of this trade. Nonrailway vehicles and parts also represented a significant portion of the northbound trade flow.

Preferential Treatment for the Maquiladora Industry

Under the U.S. Generalized System of Preferences (GSP), the portion of an item's value manufactured in a maquiladora that is U.S. made is excluded from U.S. customs valuation. A duty is levied only on the value added through Mexican processing and third-country components. Input components imported into Mexico for manufacture in maquiladora plants are also allowed in duty free as long as the goods are used to manufacture products for export. In addition, provisions for the maquiladora industry allow 100 percent foreign ownership of maquiladora plants, the easing of customs procedures, and an allowance for maquiladora location in the interior of the country.

The implementation of NAFTA on January 1, 1994, extended special provisions for the maquiladora industry, including provisions for exemptions of duties on third-party components on products manufactured in Mexico and exported back to the United States. Maquiladoras in the textile and apparel, scientific instruments, and rubber and plastics industries tend to qualify for this preferential treatment because these products contain a majority of components with NAFTA origin. Items such as television sets and radio equipment, many of which are Japanese owned and thus utilize too large a percentage of third-country components, generally do not qualify for preferential treatment.[7] NAFTA will also allow the maquiladora industry to have full access to the Mexican market by 2001.

However, in the year 2001, NAFTA Article 303 will go into effect mandating the end of duty deferrals on imported goods and materials used to manufacture products in one NAFTA country that are subsequently exported to another. Currently, American manufacturers can utilize foreign goods, such as Japanese-origin chemicals, in the manufacture of maquiladora products without paying a duty to export the good to Mexico. When Article 303 takes effect, such a product will be subject to a 20 percent tariff. As such, U.S. firms may be forced to find domestic suppliers to avoid the tariff, even if such suppliers are less efficient and reliable. The other alternative may be to move operations out of Mexico and into the United States or other countries, such as beneficiaries of the Caribbean Basin initiative.

Modes of Transportation

Trade between the United States and Mexico flows by means of different modes of transportation. The characteristics and final destination of the traded commodities will determine the mode of transportation used. Transportation corridors identified with NAFTA include land corridors, air corridors, and sea corridors; the land corridors are further subdivided into highways (motor carriers) and railroads. Currently, most of the goods are transported by motor carriers, followed in distant second place by rail. Transportation by sea or air is less common and is usually used only when the characteristics of the commodities make it unprofitable or impossible to do it by any other means. As shown in Table 4.6, the surface modes of transportation (motor carrier and rail) accounted for 90 percent southbound trade and 85 percent for northbound trade in 1997. The shares of trade transported by sea and air were considerably lower.

Table 4.6
Modal Split in 1997 Trade

Mode of Transportation	Percentage of Southbound Trade	Percentage of Northbound Trade
Sea	5.54	12.06
Air	4.16	2.56
Surface	90.30	85.38

Source: Miguel Figliozzi and Robert Harrison *Truck Trade Corridors between U.S. and Mexico* (Research Report SWUTC 99/472840, Center for Transportation Research. The University of Texas at Austin, February 2000).

Highways

As already mentioned, most U.S.-Mexico trade flows over NAFTA highways. The popularity of this mode derives from the relatively high quality of highway infrastructure in the United States (and more recently in Mexico) used for international trade, and truck transport's flexibility in adjusting to different routes and quicker transit times compared to rail. According to data provided by the Mexican Secretariat of Commerce and Industrial Development (Secretaria de Comércio y Fomento Industrial, SECOFI), motor carriers moved 64.4 percent of trade by value between the United States and Mexico in 1996, whereas rail accounted for 16.4 percent.[8]

Table 4.7
Mexico-U.S. Land Transportation, 1996

Mode of Transportation	Tonnage (thousands of metric tons)	Value (millions of dollars)
Truck	38,728	92,442
Rail	15,120	17,417
Total	53,848	109,859

Source: Alberto Mendoza, Claudia Z. Gil, and Juan M. Trejo, "Multiproduct Network Analysis of Freight Land Transportation between Mexico and the United States," *Journal of the Transportation Research Boar,* (Transportation Research Record 1653, Paper No. 99-1391), p. 71.

Railways

The Mexican railway system has undergone a transformation through privatization (discussed later) with the aim of improving the quality of services offered and gaining market share from motor carriers. Overcoming a history of poor services, slow transit times, low labor productivity, and inadequate infrastructure in Mexico, the newly privatized rail carriers (through substantial investments) are seeking to attract new businesses by offering competitive prices, specialized equipment, reliable transit times, and safer means of delivering products. Rail also offers greater efficiency in energy consumption per ton-kilometer than do motor carriers and generally is considered friendlier to the environment (see chapter 5).[9].

Maritime/Ports

The participation of ports and airports in trade between the United States and Mexico has been increasing over time. This situation became more evident with the privatization of Mexican ports and airports through a system of concessions, making the improvement of their services possible. Among the products transported by sea are agricultural and mineral products, bulk commodities, and oil and its derivatives. The improvement in port facilities has allowed growth in container services.[10] The increase in efficiency of Mexican ports has elevated them to international levels, where they are starting to compete with other ports and railroads, especially in the border region.

Airways/Airports

Air transport is more commonly used in southbound trade. However, improvements to the airports' facilities may allow an increase in northbound trade. Transportation by air is considerably more expensive and is usually used to transport delicate or small equipment, such as computer parts, communications, and some automobile parts.

As inventory and delivery systems evolve, by providing just-in-time services for example, the demand of faster means of delivery will increase. This evolution will increase air-cargo's share of U.S.-Mexico trade.

Manufacturing/Production Centers

Mexico's industrial heartland and major population centers consist of the cities of Mexico City, Monterrey, and Guadalajara. Known as Mexico's "golden triangle," the three cities are major contributors to the country's economy and are served extensively by Mexican motor carriers as well as recently privatized rail lines. Inland cities located outside the golden triangle tend to receive relatively poor service, with shipments generally being transferred from line-haul motor carriers in Mexico City to smaller carriers, dramatically increasing freight shipping times.

Mexico City

Mexico City is one of the fastest-growing urban areas in the world. The population of the city proper had reached 8,235,744 people according to a 1990 census, with an urban agglomeration of 15,047,685.[11] It is home to more than one-fifth of Mexico's population. Mexico City is also the hub of the nation's transportation system. Five main highways link the capital with all regions of the country, as well as with the United States and Guatemala. Rail lines run south, east, and north from the city, connecting to the major industrial centers and border crossings. The Benito Juárez International Airport handles national and international flights.

The city's internal transportation system is considered to be chaotic and overextended. Well over 4,000,000 motor vehicles circulate daily in the city, and the number is growing rapidly. Their average speed is a mere 12 miles per hour, with all-day rush hours in some areas bringing traffic to a virtual standstill at times.[12] Massive investments have been made to expand the esteemed but crowded Metro system.

Mexico City's metropolitan area accounts for more than 30 percent of the nation's industrial production. An ongoing trend has been occurring since the 1950s to move heavy industry out of the city, but a number of major plants remain. Major industries include construction and the production of chemicals, plastics, cement, yarn, and textiles. Light industry is also becoming more predominant in the city's economy. In addition, more than 40 percent of the nation's domestic sales occur in Mexico City, with services and tourism both representing important aspects of the local economy. Financial services, including banking institutions and the country's only stock exchange, are also concentrated in the capital city.[13]

Guadalajara

Guadalajara is the capital of the state of Jalisco in west central Mexico. With an urban population of 2,870,417 in 1990, the city has become Mexico's second largest city.[14] In addition to being a major agricultural region, Guadalajara has grown into a major industrial producer in the last half of the 20th century. Major industrial products include textiles, shoes, chemicals, building materials, tobacco products, and soft drinks. The city abounds in modern industrial parks and commercial buildings. It is also home to the University of Guadalajara, founded in 1792, and the Autonomous University of Guadalajara, founded in 1935.

The city is connected by railroad and highway with Nogales, Arizona, to the northwest and with Mexico City to the southeast. Roads also lead to communities on the central and Pan-American highways. National and international airports also serve the city.

Monterrey

Monterrey is the capital of the state of Nuevo León in northern Mexico. In 1990, the city had an urban population totaling 2,562,531 people.[15] Rail connections between Monterrey and Laredo, Texas, opened in 1882. Along with state legislation favorable to capital investment, the rail line aided in large-scale smelting and heavy-industrial enterprises developing in the region. The building of the Inter-American Highway, beginning in 1930, further stimulated growth. Today Monterrey is Mexico's third largest city and one of the most modern and enterprising industrial complexes in the hemisphere.

Major industries include fabricating plants, ore-processing units, and other heavy industries. Hundreds of light industries also dominate the region, including production of beer, cigarettes, pottery, glass, and textiles. There is also considerable irrigated agriculture in the region. Local rivers and dams, including the great Falcon Dam on the Lower Rio Grande, provide hydroelectric power. Numerous institutes of higher education are also found in the city, including the Monterrey Institute of Technology and Higher Education (ITESM), Nuevo León University, Labastida University, and the University of Monterrey. The city is located on main highways, railroads, and air routes between Laredo, Texas, and Mexico City.

San Luis Potosí

While the golden triangle, along with heavy co-production activities in the northern border states, dominate Mexican manufacturing, manufacturing is increasing in other cities within Mexico's interior as companies look for more strategic locations to locate manufacturing operations. However, to serve as viable alternatives to the cities of Mexico's golden triangle or the northern border states, these locations must provide significant benefits in terms of cost efficiencies and availability of essential services, including labor and transportation.

San Luis Potosí, the capital of the state with the same name in northeastern Mexico, is one example of a city succeeding in this endeavor. Traditionally a hub of rich silver mining, agriculture, and metal smelting and refining activities, this city of approximately 700,000 people has begun to attract new investment to the area from corporations and major multinationals such as 3M. The 3M distribution center is a hub for both manufacturing and distribution services and uses advanced logistics technologies, such as cross docking, bar coding, and radio frequency, for instant inventory management. While 3M also operates in the border cites of Tijuana and Ciudad Juárez, the strategic location of San Luis Potosí, which is centrally located between Monterrey, Mexico City, and Guadalajara, puts the city within 300 miles of close to 90 percent of the country's population. The city is also located at the crossroads of the Mexican highway linking the Atlantic and Pacific Oceans as well as the Mexico-Laredo highway, which carries more than 30 percent of national traffic.

San Luis Potosí also has an advanced telecommunication infrastructure and relatively inexpensive water, construction, and land costs. 3M has experienced fiscal advantages in terms of low state taxes and low governmental paperwork expenses.[16] Perhaps most important, San Luis Potosí has a significant technical and specialized workforce, good relations between unions and the private sector, as well as scholarships and training opportunities to benefit workers and industry.

The example of San Luis Potosí provides some important illustrations of the prerequisites manufacturers look for when deciding where to locate major manufacturing or distribution facilities. Among these are quick and reliable access to major markets, provision of essential infrastructure and services, benefits in terms of low-cost land and services, and the availability of labor.

NAFTA Corridors: United States

Trade between the United States and Mexico moves through different routes according to infrastructure availability, technology improvements, and characteristics of the goods traded. The main modes of transportation used include highways, railways and seaports (maritime transportation).

Highways

Highways in the United States have been characterized for their efficiency and high quality. Given their geographic locations, the main highway corridors related to NAFTA have been identified as the Western Corridor, Midwestern Corridor, Northeastern Corridor, and the Southeastern Corridor.

The Western Corridor follows Interstate 5 (I-5) from Seattle going through Washington state, Los Angeles, and southward to San Diego in California. The corridor connects with Mexico through the Mexico City-Nogales corridor and with Interstate 8 (I-8), which provides access to Mexicali, Mexico, and Nogales. Traffic along I-8 can either exit via Nogales into Mexico or continue along Interstate 10 (I-10) for travel through New Mexico, El Paso, West Texas, and San Antonio. A spur of this corridor begins in Denver, Colorado, and moves directly south along I-25 through New Mexico, where it intersects

I-10 in El Paso. At El Paso, the Western Corridor connects with Mexico through the Querétaro-Ciudad Juárez Corridor.

The Midwestern Corridor links the north central region of the United States with Mexico. The corridor links Chicago, Illinois, to St. Louis, Missouri, through I-55. In St. Louis, the corridor connects to I-44 and continues southwest until it reaches Oklahoma City. From Oklahoma City, it connects, through to Dallas, Austin, San Antonio, and Nuevo Laredo in Texas and into Mexico through the Mexico City-Nuevo Laredo Corridor.

The Northeastern Corridor has three spurs, two from Canada (Toronto and Montreal), and one from New York City. All three spurs converge in Nashville, Tennessee. The Toronto spur moves south through Detroit, Michigan, where it connects with I-75 until it reaches Cincinnati, Ohio. From that point, traffic moves along I-71 to Louisville, Kentucky, and then along I-65 into Nashville. The Montreal spur moves along I-90, I-71, and I-65 into Nashville. Finally, the New York City spur begins on I-80 and then extends southwest along I-81 into Nashville. From Nashville, all three spurs follow I-40 through Memphis, Tennessee, to Little Rock, Arkansas. From Little Rock, traffic moves along I-30 into Texas, where it can take several alternative routes to reach the Texas-Mexico border.

The Southeastern Corridor starts in Charlotte, North Carolina, where it moves through I-85 to Atlanta, Georgia, and Montgomery, Alabama. From Montgomery, the corridor connects to I-65 to New Orleans and Louisiana, where it is linked with I-10 to Houston, San Antonio, and El Paso in Texas.[17]

Railways

The Texas Mexican Railway (Tex Mex) operates over a 500-mile route in Texas that includes its 157-mile line between Laredo (on the border) and Corpus Christi, and an additional 400 miles of trackage rights between Corpus Christi, Houston, and Beaumont.

The Union Pacific Railroad (UP) serves 23 states, linking every major West Coast and Gulf Coast port. It also serves four major gateways to the east: Chicago, St. Louis, Memphis, and New Orleans. The UP is the primary rail connection between the United States and Mexico, with connections at border crossings in Laredo, Brownsville, Eagle Pass, and El Paso, all in Texas, Nogales, Arizona, and Calexico, California.[18]

The Burlington Northern Santa Fe Railway (BNSF) serves 28 states and two Canadian provinces. Its network covers two-thirds of the United States, stretching from the West Coast to the Midwest, Southeast, and Southwest; and from Canada to the Gulf of Mexico. The BNSF interchanges Mexico-destined traffic with the Tex Mex at Robstown, Texas, which is then moved to the border at Laredo. The BNSF also has a direct rail connection with Mexico at El Paso, Texas.[19]

The Canadian Pacific Railway (CP) has partnered with UP, BNSF, and two Mexican railroads to offer intermodal service linking Canada and the United States to 16 Mexican cities.

A similar partnership involves the Norfolk Southern Corporation's (NS) affiliate Triple Crown Services, which operates Roadrailer technology between Canada, the United States and Mexico. Roadrailers move over the NS to Kansas City or St. Louis, where they connect with the BNSF. The BNSF, in turn, takes trailers to Robstown, Texas, for interchanges with the Tex Mex and final movement to the border at Laredo.[20]

Finally, the Canadian Nation Railway (CN), which already has purchased the Illinois Central Railroad and has a marketing agreement with the Kansas City Southern Railroad, is seeking to extend its transcontinental rail network into the United States by combining with the BNSF. The deal is on hold pending a 15-month moratorium on rail mergers imposed by the Surface Transportation Board. If eventually approved, the CN intends to use the merged CN-BNSF to offer single-line rail services from Canada, throughout much of the United States, to Mexico.[21]

Maritime/Ports

U.S. ports located along the Gulf Coast dominate port-to-port trade with Mexico. In 1998, in terms of total volume (tonnage) of two-way trade with Mexico, the top-ten ports were all located along the Gulf Coast. In rank order, they were Houston, Beaumont, Lake Charles, New Orleans, Corpus Christi, Port Arthur, Southern Louisiana, Galveston, Pascagoula, and Texas City. In terms of total value of two-way trade with Mexico, the top-ten ports were Houston, Beaumont, Jacksonville, New Orleans, Southern Louisiana, Port Arthur, Lake Charles, Gulfport, Port Hueneme, and Corpus Christi. Only Jacksonville, Florida and Port Hueneme, California are not located along the Gulf Coast.[22]

Airways/Airports

U.S. airports involved in binational trade with Mexico are located mostly in border states. In the state of California, there are six public airports in operation. The airports of Los Angeles International and San Diego International-Lindbergh stand out as the most important. The state of Arizona has seven public airports. The Phoenix Sky Harbor International Airport is the most important in the state because of the amount of binational trade that it carries.[23]

New Mexico has three airports: Albuquerque International, Las Cruces International, and Doña Ana County Airport. Albuquerque International Airport moves the largest volume of binational trade. The state of Texas has the largest number of airports engaged in binational trade with Mexico. Among them are Brownsville, Dallas-Fort Worth International, El Paso, and Rio Grande Valley International (Harlingen). Laredo and McAllen-Miller also have the infrastructure to perform customs, immigration, and agriculture inspections. Dallas-Fort Worth International and Houston International account for the largest share of trade with Mexico in the state.[24]

NAFTA Corridors: Mexico

Highways

According to the Secretariat of Communication and Transportation (Secretaría de Comunicaciones y Transportes, or SCT), Mexico has a total of 3,223,857 kilometers of roads, of which approximately 108,803 kilometers are paved.[25] To improve its infrastructure, the Mexican government developed a program of private toll concessions under the administration of President Carlos Salinas de Gotari. The federal government, because of the Mexican peso crisis of 1994, later bailed out this program. After the crisis, the federal and state governments resumed and maintained a sound infrastructure.

Most of the Mexican highway corridors, identified with NAFTA, link Mexico City with the United States and pass through most of the important cities in the country. The Mexico City-Nogales corridor extends from Mexico City through Guadalajara, the ports of Manzanillo, Culiacán, and Guaymas and to the border cities of Nogales and Mexicali. It also has a spur that links up with the ports of Acapulco and Lázaro Cárdenas.[26] This corridor is known as the Pacific Corridor and has connections with railroad lines.

The Mexico City-Nuevo Laredo corridor represents one of the most important transportation corridors but also the most overloaded with traffic. It goes through the cities of Querétaro, San Luis Potosí, Saltillo, and Monterrey with a spur to Piedras Negras. This corridor carries almost 80 percent of the nonmaquiladora trade. There are several intermodal facilities located along the corridor on the Mexican side, connecting with I-35 on the U.S. side.

The Querétaro-Ciudad Juárez corridor runs from Ciudad Juárez to Querétaro, where it merges with the Mexico City-Nuevo Laredo corridor, and goes through Chihuahua, Torreón, Zacatecas, Aguascalientes, and Guanajuato. This corridor is characterized as vital to maquiladora trade.

The Acapulco-Tuxpan corridor, connects the ports of Acapulco and Tuxpan and passes through Mexico City. The Mazatlán-Matamoros corridor, goes from Mazatlán through Torreón, Saltillo, and Monterrey until it reaches the border city of Matamoros.

The Manzanillo-Tampico corridor runs from Manzanillo to Guadalajara, San Luis Potosí, and Tampico. The importance of this corridor lies in its links to the important ports of Manzanillo and Tampico and with two of the most important cities in the country: Guadalajara and the strategically located city of San Luis Potosí.

The Central corridor, which extends from Veracruz to Acapulco, links the port of Veracruz to Puebla, Cuernavaca, Chilpancingo, and Acapulco. Finally, the Veracruz-Monterrey corridor (Gulf Corridor) runs from Monterrey to Tampico, Tuxpan, and Veracruz with spurs to Matamoros and Mexico City. Although this corridor is the least important in terms of trade, it is increasing its participation given the increasing importance and modernization of the ports of Veracruz and Tampico with which it connects.

Railways

Mexico's railroad system has been known for its lack of investments and slow growth over the last 60 years. From 1987 to 1997, the total kilometers of rail lines increased by only 335 kilometers, totaling 26,622 kilometers at the end of 1997. Currently, Mexico's railway system is divided into three major rail corridors and a rail line traversing the Isthmus of Tetuantepec in southern Mexico.

The Northeast line connects Nuevo Laredo to Monterrey, Saltillo, San Luis Potosí, Querétaro, Mexico City, and Veracruz. It also has spurs to Matamoros, Tampico, Aguascalientes, and Lázaro Cárdenas. The line has intermodal facilities in Nuevo Laredo, Monterrey, San Luis Potosí, Querétaro, and Pantaco in Mexico City.

The North Pacific line goes from Mexicali to Guanajuato, passing through Nogales, Guaymas, Culiacán, Mazatlán, Guadalajara, and Manzanillo. This line has a spur to Querétaro and Mexico City. This corridor also includes the line that goes from Piedras Negras to Tampico, having a connection to a third line that connects Ciudad Juárez with Chihuahua, Torreón, Aguascalientes, Irapuato, and Mexico City.

The Southeast line connects Mexico City with Puebla, Veracruz, and Coatzacoalcos, with spurs to Pachuca. The Istmo de Tehuantepec corridor will link the Pacific Ocean with the Gulf of Mexico through the ports of Salina Cruz and Coatzacoalcos. It is hoped that this corridor eventually will compete with the Panama Canal for east-west maritime commerce.[27]

Maritime/Ports

The main ports in Mexico are located at Veracruz, Tampico-Altamira, Manzanillo, and Lázaro Cárdenas. Given that the vast majority of the production centers are located in the center of the country, rail and highways connect the ports to these commercial centers. The Port of Veracruz is connected to the north by the Northeast rail line and to the south by the Southeast rail line. The port is also connected to Federal Highway 150, which extends to Mexico City. The port's influence zone extends to almost the whole country.

Federal Highway 180 and the Northeast rail line connect with the Port of Tampico-Altamira. This port is categorized as industrial, serving the central and northern region of the country The Pacific rail and highway corridor connects the Port of Manzanillo to Guadalajara. The Port of Lázaro Cárdenas is the most important port on the Pacific Coast and is connected to Mexico City and the Port of Tampico-Altamira through the Northeast rail line and Federal Highway 37. In Mexico, approximately 85 percent of the total volume of imports and exports is transported by sea.[28]

Airways/Airports

Mexico's national airport system consists of 58 airports, which are managed by a federal agency, Airports and Support Services (Aereopuertos y Servicios Auxiliares). Of these airports, 37 are international. Mexico's airports are often divided into four classifications: tourist, border, metropolitan, and regional. The tourist airports are Acapulco, Cancún, Cozumel, Guaymas, Huatulco, La Paz, Loreto, Manzanillo, Mazatlán, Mérida, Puerto Escondido, Puerto Vallarta, San José del Cabo, Veracruz, and Zihuatanejo. Border airports include Ciudad Juárez, Chetumal, Matamoros, Mexicali, Nogales, Nuevo Laredo, Reynosa, Tapachula and Tijuana. Guadalajara, Mexico City, Monterrey and Toluca are considered metropolitan airports. The nation's airport infrastructure also includes 2,172 airfields.[29] Primary cargo airports are Guadalajara, Mexico City, and Monterrey.

Infrastructure Needs, Finance and Privatization/Deregulation

The growth in trade due to NAFTA has significantly increased the investment demands in both the United States and Mexico. Although infrastructure comprises a large share of such demands, an efficient Electronic Data Interchange (EDI) network between both countries has become increasingly important. The different economic cultures of these countries have determined the approach taken to fulfill these needs. Mexico's approach to fulfill its investment needs has involved higher and more-radical modifications given the paternalist system that it used to practice.

United States

Most federal transportation revenues are collected from users in the form of fuel and vehicle taxes, registration and licensing fees, and air passenger ticket taxes. These moneys are managed as trust funds. The four primary funds are the Highway Trust Fund, the Airport and Airway Trust Fund, the Inland Waterways Trust Fund, and the Harbor Maintenance Trust Fund. These funds are user financed, provide for investment in transportation infrastructure, and do not contribute to the federal deficit.[30] However, because the Harbor Maintenance Fee has been declared an unconstitutional tax on exports, the U.S. Congress is considering new revenue sources for the Harbor Maintenance Trust Fund.

State and local transportation revenue comes from the operations of various modal facilities, such as bus stations, airports, and seaports, as well as from taxes and fees levied on the users of these facilities.

Most state transportation income is from highway user fees in the form of gasoline and vehicle taxes. Transit revenues include public mass transit system (subway, bus, and rail) fare fees, advertising, and other general fund revenues, which are obtained from property taxes and other special assessments.[31]

The role the federal government plays today in the ownership, operation and maintenance of various types of transportation facilities differs greatly from one mode to another and is largely a function of the economic forces that brought these facilities into being. For example, seaports and airports have historically been financed by the local authorities that benefit from their commercial activity, and today most ports are owned and operated by local jurisdictions as opposed to federal or state governments.

Early rail infrastructure development was financed by the private sector. However, the federal government did become involved in the efforts to build a transcontinental railroad network in the mid-1800s. Later, the gradual decline of the rail industry prompted governmental subsidies for both passenger and freight rail. Federal, as well as some state and local, subsidies for passenger rail remain in place today. The rail freight industry no longer receives federal subsidies.

In addition to the public sector, it is important to recognize the expenditures made by the private sector, particularly in the movement of freight, although it is also involved in the movement of people.

In accordance with typical business practices, the performance of the transportation system is usually measured by the private sector in terms of the total costs of transporting goods, with reduced costs indicating improved performance. For this reason, it is difficult to discern the amount spent on infrastructure by this sector. However, one can still gain appreciation of its contribution by examining the dollar figures associated with the total logistics cost of the industry.

Total logistics costs, which include inventory carrying costs and transportation costs, were $898 billion, or 10.6 percent of gross domestic product (GDP), in 1998. Total transportation costs accounted for $524 billion, 81 percent of which involved the trucking industry. The remaining $374 billion was used to cover inventory carrying costs, which involve costs of storage while at rest or in motion.[32]

Mexico

Mexico has looked for alternative and innovative ways to finance basic infrastructure improvements. It focused its efforts to meet its investment needs through a complex privatization process, which, among other things, aimed to expand the transportation network with the aid of the private sector. The privatization scheme consolidates highways, railways, airports, and ports, which have been increasingly awarded to the private sector through concessions.

Highways

Starting in 1989, concessions were granted through the Secretariat of Communications and Transportation (SCT) in a two-stage competitive bidding process. In the first stage, a bidders' technical and financial capabilities to implement the project were assessed. In the second stage, the concession was awarded to the bidder who offered the shortest concessionary time span.

The description of concessionaire responsibilities for toll-road concession is explained as follows: "The concessionaire is responsible for constructing, financing, maintaining, and operating the facility to agreed standards; and, in return, retains the tolls collected during the life of the concession. The Government owns the road and operating equipment, and upon termination of the concession, the right to collect revenues reverts to the Government. Once a concession is granted, an independent trust is established to oversee construction and maintenance. Members of the trust include in some cases the Ministry of Finance (Ministerio de Hacienda)."[33]

The SCT has placed the development of toll roads high on its list of priorities. Its Highway Investment Program has identified the ten largest sections of highway as priority listings for modernization of the national highway system. The most important tract of highways for commerce runs from Nuevo Laredo to Mexico City. The basic objectives of the National Federal Highway Program are to lower the costs of transport on the highways, to augment the level of security and quality of service, and to give more longevity to the federal transport system.[34]

The investment program for the toll roads came to fruition in two stages. In the first stage, from 1989 to 1994, approximately 15 percent of the total funds necessary to develop the toll roads came from federal and state governments, 15 to 20 percent derived from capital markets, and 70 percent came from credit.[35] Because of the peso devaluation in 1994 and concomitant overestimates of the profit potential of many toll roads, the federal government increased its financial support with the onset of the second stage of toll-road development. Governmental investment increased to between 30 to 40 percent of the total depending on the project. The increase in investment was accomplished through financing from the National Bank for Public Works and Services (BANOBRAS) and the Infrastructure Fund (FINFRA). Capital investment in the (current) second stage is a mere 15 percent, and 55 percent of the projects are financed from credit.[36]

FINFRA will pay off the debt accrued by the first roads that were privatized, as well as administer 23 private toll roads. The SCT decreased prices on the toll roads by 15 percent for cars and 30 percent for trucks to help ameliorate the lack of traffic on toll roads. Insufficient traffic was the main cause of toll-road problems.[37]

To ensure that the ten major highways will be completely modernized, the SCT purchased 852 kilometers of these roadways. By the end of 1997, these routes composed 56 percent of the total amount of highways to be modernized. In constant prices, these actions had a price tag of 3.28 billion pesos.

For the 1998-2000 period, the SCT's Highway Modernization Program concentrated on augmenting the capacity of major highways. By the year 2000, SCT's goal is to purchase an additional 3,135 kilometers of roadways (3.2 times more than was realized in 1995-97), which will constitute 73 percent of the total length of roads to be modernized.[38] The funding needed in each year of the 1995-97 period for toll-road modernization is 3.73 billion pesos, for a total of 11.2 billion pesos over the three years. This figure represents an increase of 43 percent, with respect to the 1997 budget.[39]

Efforts to privatize transportation infrastructure had a rough start. The privatization of Mexican roads was particularity cumbersome. Starting in 1989, the Mexican government's objective was to privatize more than 6,000 kilometers of roadways. The toll-road program was perhaps the most ambitious of all the government's privatization efforts. The efforts involved a mechanism by which private investors participated in the concessions process by bidding for concessions to construct, finance, operate, and maintain the roads in return for toll revenues. This process went on for some time, without many burdens to the Mexican government's coffers.

Unfortunately, many of the toll-road projects did not generate sufficient revenues, because of lack of traffic and high tolls. As a result, many projects went bankrupt. The mechanics of the toll-road program and financing structures have been refined as the government has gained experience and taken steps to correct past shortcomings.[40] The government is no longer attempting to privatize roads that do not have sufficient traffic to provide an adequate return to investors. And the roads will no longer have exorbitant tolls to discourage their use.

Maritime/Ports

The privatization of port operations in Mexico began with the creation of autonomous port authorities called Integral Port Administrations (Adminstraciones Portuarias Integrales, or APIs) in 1993. The policy for the privatization of port operations includes a 51 percent share to be sold to Mexican national companies and the remainder to Mexican and foreign investors. Port operation concessions vary in duration, depending on the concession. For example, the SCT offered only 20-year concession rights to terminals at the Port of Ensenada, while rights at Puerto Vallarta were for 50 years. Mexican law prohibits the same company from controlling two similar port operations on the same coast.[41] In 1997, the secretary of the SCT declared that the land on which ports are located will be transferred from federal to state governments.[42]

The first port operation concession was awarded to Transportación Maritíma Mexicana (TMM) in 1996, for the Port of Acapulco. In addition, a joint venture comprising Stevedoring Services of America and TMM purchased the concession for the Port of Manzanillo.[43] The Mexican government also auctioned concessions for container and multiuse facilities for the ports at Veracruz and Altamira on the Gulf, and Lázaro Cárdenas on the Pacific.[44] Through privatization and deregulation efforts, Mexico is trying to provide more-efficient transportation services at lower costs.[45]

Before the concession process took place, the revenues from the ports were concentrated and redistributed according to the needs of each of the ports. Under this system, the bigger ports were subsidizing the smaller ones. The new reform solved this problem by allowing the ports to charge different tariffs according to the port's facilities and services rendered.

Among the principal APIs in the country are Topolobampo, Mazatlán, Manzanillo, Lázaro Cárdenas, Puerto Madero, Tampico, Altamira, Tuxpan, Veracruz, Coatzacoalcos, Progreso, and Cozumel. The only API that has been privatized is the Port of Acapulco, which was awarded to TMM. It is believed that no port will be privatized until the next administration.[46] Those APIs that are not big enough or that are not very attractive to business will remain under the control of the government.

Airways/Airports

Plans to begin the privatization of Mexico's airport system are finally becoming a reality. After a delay of several years, the SCT announced in early 1998 its plans to privatize 35 of the 58 airports in the national system.[47] The privatization of air transport was initiated in 1988, when most of AeroMexico was sold. The ambitious airport privatization program will cap foreign investment at 49 percent. Similar to the privatization of railroads, airport privatization follows a regional approach. The airport program involves concessions for operations and infrastructure.

Thirty-five airports will be privatized from the following groups:

- the North Central group, consisting of the cities of Monterrey, Acapulco, Mazatlan, Zihuatanejo, Culiacán, Ciudad Juárez, Chihuahua, San Luis Potosí, Durango, Torreón, Tampica, and Reynosa;
- the Pacific group, consisting of Guadalajara, Puerto Vallarta, Tijuana, San José del Cabo, Bajío, Morelia, Hermosillo, La Paz, Aquascalientes, Los Mochis, Mexicali, and Manzanillo;
- the Southeast group , consisting of Cancún, Mérida, Villahermosa, Cozumel, Oaxaca, Huatulco, Minatitlán, Tapachula, and Veracruz; and
- the Mexico City group, consisting of Benito Juárez International Airport.[48]

The privatization process will conclude in a partnership between an enterprise, which will be a state holding company, and a strategic associate. The strategic partner will be allowed to have up to 15 percent of the shares. The state holding company will then go public in the national and international stock markets. It will be allowed a maximum of 49 percent participation of foreign capital. The first concessions took place last year with the Southeast Group, which was awarded to Grupo Tribasa,[49]while the Pacific Group was awarded to Aeropuertos Mexicanos del Pacífico, S.A. de C.V., on August 1999.

Railways

The railroad privatization process was officially initiated in 1995, generating discontent among the investors of the intermodal facilities. Their main concern was that under this scheme, the new owners of the lines would be able to decide if they wanted to use the mentioned facilities or build new ones. The government gave no response to this claim and the owners of the intermodal facilities had to negotiate with the rail lines' owners to keep the business. As mentioned, the main lines were grouped into three groups, the Northeast, the North Pacific and the Southeast lines. Two additional short lines were privatized, the Ojinaga-Topolobampo and the Coahuila-Durango lines. Today, 95 percent of rail services are rendered by private entities.[50]

The Northeast line's concession was awarded to Transportación Ferroviaria Mexicana (TFM) in December 1996. TFM paid $1 .6 billion dollars for this line. The North Pacific line, as well as a short line that travels from Ojinaga to Topolobampo passing through Chihuahua, was awarded to Grupo Ferroviario Mexicano S.A. de C.V. (Ferromex) in June 1997. Ferromex also operates a rail line that goes from Piedras Negras to Tampico having a connection to a third line that connects Ciudad Juárez to Guanajuato.

The last group of privatized lines, the Southeast, was awarded to Ferrocarril del Sureste S.A. de C.V. (Ferrosur) in December 1998. Because of its strategic importance, the federal government retained the rail corridor called Istmo de Tehuantepec. A governmental enterprise will be created under the name of Ferroca. This corridor will link the Pacific Ocean with the Gulf of Mexico through the ports of Salina Cruz and Coatzacoalcos. It is believed that this corridor will facilitate commodity flows just like the Panama Canal.[51]

The short line of Coahuila-Durango was awarded to Grupo Acerero del Norte S.A. de C.V. and Industrias Peñoles S.A. de C.V. The Tijuana-Tecate and Oaxaca rail lines are still in the process of being awarded.

Among the major changes brought with privatization is the liquidation of the Mexican national Railways (Ferrocarriles Nacionales de Mexico), which used to be the agency of the government in charge of the Mexican railway system. Also, most of the passengers' services were suspended, except for those that were the only means of transportation existent in the region.

It is believed that the current rail infrastructure is sufficient to meet the needs of the country. However, adjustments to some of the lines have to be made to speed up the service and reduce the risk of accidents.

Case Study: Transportación Ferroviaria Mexicana (TFM)

TFM is a joint venture partnership between KCSR and Transportación Marítima Mexicana. Through concession, TFM owns the Laredo-Mexico City-Veracruz rail line, which is the most direct line in the country between Laredo and Mexico City. The Mexican government still owns a 20 percent share in the rail line, but TFM plans to buy out the remaining share of the government's ownership in the near future. This rail line was also the heaviest density line under the formerly state-owned Ferrocarriles Nacionales de Mexico rail system. The 2,600-mile Northeastern Corridor was purchased by TFM for a price of $1.6 billion and was the first rail line to be privatized in Mexico.

Since 1997, TFM has made substantial improvements in rail service. Rail accounted for approximately 12 percent of goods shipped within the country prior to privatization. Through increased investments and improvements in service, TFM seeks to increase this share to 20 percent.[52] A sizable portion of this new business is likely to come from intermodal business. However, despite significant investment in Mexican railways in recent years, a shortage of intermodal terminals has been a limiting factor on growth opportunities for the intermodal business. Thus, a key component of TFM strategy is to make substantial investments in intermodal terminals to improve services and increase market share by shifting Mexico's growing highway traffic to rail.

Currently, the most significant intermodal facilities are located at the Pantaco terminal in Mexico City. However, by the middle of 2000, the company expects to have completed six projects that will greatly expand Mexico's intermodal options.[53] The Toluca terminal, located on the outskirts of the industrial city of Toluca, was completed around of the middle of 1999. It consists of two tracks and two cranes. The principal client of the Toluca terminal is Daimler Chrysler, which will ship final goods on the TFM line from its nearby Freightliner truck plant, Chrysler light-truck engine and car assembly plant, and another parts plant in Toluca. However, within five years, TFM expects that half of the business of this new facility will come from other clients. Daimler Chrysler is also the principal client of TFM on a national level and has a long-term contract with the company, stipulating additional intermodal investments in Monterrey and Mexico City to accommodate Daimler Chrysler's other production center in the country.[54]

TFM is also building a terminal in the growing industrial city of Querétaro, north of Mexico City. The site should be ready for operation in the first quarter of 2000. Another terminal in the city of San Luis Potosí should also be ready for operation in early 2000 and will expand the services of the current temporary terminal in the city, which only provides trailer movement. The new site will also have a customs area for trailers as well as containers. The intermodal site planned for Monterrey should reach completion in the year 2000. A new facility appealing to cross-border clients will be located just outside Laredo. This terminal, the Jose Serrano Yard, will allow for run-through customs clearance before entering Laredo, aiding in the easement of unruly congestion at the Laredo border crossing.[55]

TFM has also been making significant investments in new equipment. In 1999, the company purchased 200 new 89-foot cars, as well as 60 double-stack container cars. But beyond purchases, which could aid TFM in having the youngest fleet in North America, the company is also making significant strides in safety and security. By reducing theft, as well as through its status as the first Mexican railroad to be an active member of the Association of American Railroads, TFM has begun to convince U.S. railroads that it is now safe to bring equipment into Mexico, thus increasing equipment availability and strengthening relationships with North American railroads. The company has increased guards from 70 to 1,000 in recent years and reduced theft by 60 percent. In addition, through increased efficiency, TFM has reduced the turnaround time for a car from Laredo to Mexico City and back from 30 to 40 days to approximately 8 days[56] Important investments have also been made in the areas of track signaling and car tracing, Hot Box detectors and Automatic Equipment Identification (AEI) readers.

TFM is also planning to join a special railcar pool for the North American auto trade. The pool would dedicate equipment, both bilevel and multilevel railcars, to ensure that the automobile industries can get vehicles to market in a timely fashion. By joining the pool, TFM equipment with TFM logos will be used by all participating U.S. railways, thus spreading the TFM name. Joining the pool will be an important step toward North American rail integration and will put TFM on a more equal footing with U.S. competitors.

Finally, TFM has recently completed installation of the Centralized Traffic Control (CTC) on the Laredo-Monterrey track. This automatic track-signaling system will enable monitoring of train traffic from Nuevo Laredo to Mexico City and will complete consolidation of the system to and from the main destinations in the United States and Canada. TFM hopes the system will maximize capacity and, along with other significant investments and improvements in service, help confirm the line as one of the most important railroad corridors for Mexican, American, and Canadian importers.[57] Overall, the privatization of the TFM line has resulted in remarkable strides in rail line quality and service.

Intermodal Facilities

Several other intermodal facilities are being built around the country, such as those in San Luis Potosí and Monterrey, which will be discussed in further detail. The facility in San Luis Potosí, named Interpuerto, is located within a logistics park. This facility aims to incorporate the advantages offered by combining rail and truck access with an interior customs facility, an industrial park, a storage park, and a commercial and service zone. The Interpuerto incorporates an innovative design that will considerably reduce the time spent on customs clearance procedures. Such a design has been adopted by other customs facilities in the country.

The Monterrey facility will consist of 44 million square feet of space and plans to have terminals for handling containers, automobiles, agricultural products, steel, and chemicals, among other commodities. It is located next to the northern Monterrey airport. Large shipments will be allowed to clear customs until they reach this facility, considerably reducing the time spent at the border. However, the facility will not have access to the railway system. The facility is expected to be finished in the year 2001.

Special Investment Needs for Maquiladoras

Although well over 90 percent of maquiladora trade is still concentrated in border states, an ongoing trend is the establishment of maquiladoras farther into Mexico's interior. A breakdown of new maquiladoras by state in 1996 shows 353 new plants located in border states and a significant 195 located in nonborder states (see Table 4.8).[58] In addition, border states were the location of 68.9 percent of maquiladora plants in 1995. This percentage had dropped to 61.9 by 1998. [59]

Movement of new maquiladoras into the interior of the country is an important development in terms of the benefits to Mexico's economy. However, for this trend to continue, significant investments will have to be made in new multimodal logistics infrastructure to ensure seamless integration of the maquiladora product life cycles, from acquisition of component inputs to delivery of final product. As time-based competition intensifies, product half-lives decrease, and the need for speed to markets becomes increasingly crucial. Manufacturers will face serious disincentives to locating maquiladora plants in Mexico's interior if fast transport linkages between U.S. markets and Mexican manufacturing locations cannot be ensured, especially for the many maquiladora plants that serve as just-in-time affiliates of U.S. factories and distribution centers.

Table 4.8
Breakdown of New Maquiladoras by State, 1996

State	Number of New Maquiladoras
Aquascalientes Baja	16
Baja California*	134
Baja California Sur	1
Coahuila*	45
Chihuahua*	64
Distrito Federal	4
Durango	14
Guanajuato	14
Jalisco	23
Mexico	20
Michoacan	1
Morelos	4
Nayarit	2
Nuevo León*	21
Oaxaca	1
Pueblo	31
Querétaro	20
Quintana Roo	3
Sinaloa	4
Sonora*	29
Tamaulipas*	60
Tlaxacala	145
Veracruz	1
Yucatan	20
Zacatecas	2
Total	**548**

* Border states.
Source: Texas Center for Border and Economic Development, *Mexican Maquila Industry.* Online. Available: http://www.tamiu.edu/coba/bti/trade/maquila/maq_new.htm. Accessed: December 14, 1999. (University Research Institution Web site).

Public- and private-sector entities must continue to be motivated to ensure technology assimilation, as has been ongoing in large part because of strategic alliances between Mexican and U.S. transporters. Currently, intracorporate just-in-time manufacturing represents a significant portion of cross-border trade. As such, joint U.S. and maquiladora operations are likely to play a large role in the absorption of information technologies, enhanced intermodal freight capabilities, and advanced logistics in the Mexican marketplace. In addition, as Transportación Ferroviaria Mexicana continues to improve rail service and gain market share along the Northeastern Corridor, intermodal rail should become a more significant competitor to the truck industry for long-distance, nonborder state maquiladora trade.

Customs

Administration and Paperwork

Customs procedures at the U.S.-Mexico border are characterized as being time consuming and inefficient. The complications arise from an inadequate infrastructure and complicated paperwork owing to the numerous parties involved and the lack of coordination between U.S. and Mexican customs agents.

The border-crossing scene can be an exceptionally complicated process of paperwork and administration. This fact is well illustrated in a pamphlet distributed by a U.S. transportation broker outlining a typical journey of a truckload of goods from Los Angeles to Mexico City. When the truck reaches the Laredo border crossing from Los Angeles, it is be delivered to a U.S. freight forwarder. At this point, commencement of the freight forwarding process will not begin until the shipper's original commercial invoice, packing list, and export documentation are in the hands of the freight forwarder. Once the accuracy of the paperwork has been confirmed and the merchandise inspected, the export documentation will be forwarded to the consignee's designated Mexican customhouse broker in Nuevo Laredo. The Mexican broker than calculates duties, customs users fees, and broker fees. All fees must be paid before the goods can enter Mexico.

At this point, the broker prepares the import documentation to be delivered to Mexican customs officials, and a U.S. transfer carrier takes the trailer through U.S. customs, presenting all necessary documentation along the way. A Mexican customhouse broker will then meet the vehicle at Mexican customs, providing necessary documentation to show all duties have been paid and necessary papers are all in order. Assuming everything is indeed in order, the trailer will either be cleared for delivery to the Mexican line-haul carrier, or randomly inspected, with financial penalties assessed for any discrepancies between the paperwork and the actual merchandise aboard.

Once the trailer is delivered to the Mexican line-haul carrier, a bond, or "Fianza," on the U.S. trailer must be obtained before the trailer can be dispatched to its final destination. Once the trailer is dispatched from the line-haul carriers yard, there is one more 26-kilometer interior checkpoint to ensure all documentation and seals are still in order.[60]

Needless to say, numerous checkpoints and onerous paperwork can lead to significant delays in crossing the border. Add to this administrative burden the need to search for illicit drugs, illegal contraband, and hazardous materials and one can see how waits at the border become longer and longer. A truck crossing the border may face inspection by the U.S. Department of Transportation, the U.S. Department of Agriculture, the U.S. Fish and Wildlife Service, or the Food and Drug Administration, depending on the goods being shipped, and that is just on the U.S. side of the border. Insufficient staffing at some border crossings intensifies the delays caused by necessary inspections from numerous different agencies.

Cross-Border Trucking

Refusal on the part of the United States to implement the cross-border trucking provisions of NAFTA has intensified congestion problems at the border. Phase I of the agreement, which was supposed to be implemented in December 1995, would have opened up U.S. and Mexican border states to foreign trucking competition. Phase II, which was scheduled for January 1, 2000, would have opened up the entire United States to Mexican truckers and also allowed U.S. truckers into Mexico's interior (see chapter 1).

President Bill Clinton has claimed his refusal to implement the cross-border trucking provisions of NAFTA stems from safety concerns with the Mexican trucking industry, as well as a lack of consistency between regulations governing the industry in the two countries. However, the decision to keep the border closed to cross-border trucking has been widely viewed as a concession to the Teamsters and organized labor designed to shore up political support, both in the 1996 congressional elections and for Vice President Al Gore's presidential campaign.[61] Although Mexico has taken the matter to arbitration under NAFTA, no agreement has been reached at the time of this writing. It is unlikely that either of the cross-border trucking provisions will be implemented in 2000.

The lack of implementation of the cross-border trucking provisions increases the number of trucks involved in moving goods across the border. U.S. line-haul carriers bring trailers to the border, then transfer carriers take the trailers across the border, and finally Mexican line-haul carriers bring the goods to their final destination. The same applies in the opposite direction. At a *Journal of Commerce* trade conference in January 2000, carriers, shippers, and freight brokers agreed that implementation of the cross-border trucking provisions could reduce border congestion.[62]

However, even with implementation of the provisions, many argue that partnerships between U.S. and Mexican motor carriers would continue to be the preferred method of conducting cross-border trucking. Many shippers and carriers view logistics issues involved with customs clearance, documentation, and duties to be the most significant impediment to speeding the movement of goods across the border and reducing congestion, not prohibitions on cross-border trucking. This concern may be due to the economic and cultural factors that may restrict the amount of trucking moving beyond the immediate commercial zone even in the presence of cross-border trucking. U.S. carriers may be hesitant to send expensive rolling stock into Mexico's interior and face the associated expense of likely detainment should an accident occur. In addition, language barriers and poorer road conditions may also make U.S. truckers hesitant to operate in Mexico. Instead, alliances between U.S. and Mexican firms may continue to be the predominant means of overcoming documentation and billing problems. An exception to this rule is in the immediate border area, where thousands of trucks make trips everyday. U.S. motor carriers may benefit from serving these markets directly.[63] In addition, Mexican motor carriers may be less hesitant to travel into the U.S. interior given the higher quality of highways and truck stops.

National and Binational Working Groups

Recognizing the need for coordination between the many entities involved in border crossings, the United States and Mexico have created a number of binational mechanisms to facilitate cooperation and integrated actions. At the national level, the U.S.-Mexico Binational Group on Bridges and Border Crossings coordinates agreements for existing potential bridges and border crossings. The U.S. State Department and its Mexican counterpart oversee it. The Joint Working Committee works at both the local and national levels to address transportation planning. It consists of representatives from U.S. and Mexican states as well as from the federal government. In addition, there are a number of informal binational port-of-entry committees. These groups work to assess the capacity of border-crossing points as well as the adequacy of border-related road and highway infrastructure and to improve interdiction efforts, efficiency, and management at ports of entry. Additionally, these groups attempt to bring together all agencies responsible for facilities and operation.[64]

The Mexican Customs Modernization Program is working to improve customs operations at ports of entry. In the United States, the Border Trade Alliance, a coalition of both public- and private-sector entities, has compiled a comprehensive report identifying potential port-of-entry capital improvements. The Western Governors Association has also released a study with recommendations to reduce congestion at border crossings. These recommendations include better monitoring and staffing of inspection lanes, establishing official goals regarding queue times, and establishing a unified ports-of-entry management system to increase efficiency and uniformity.[65]

However, despite the progress that is being made, the bureaucracies involved with customs clearance, documentation, inspections, and other border-crossing logistics still pose significant problems in terms of expediting border crossings. Despite working groups such as those listed above, there is currently no single group with the authority to integrate or streamline all the multiple agencies and jurisdictions at the border. Entrenched political and economic interests serve as additional obstacles to reform. Despite this, if seamless border-crossings are to become a reality, governmental agencies, private-sector participants, and other concerned entities on both the Mexican and U.S. side of the border must continue to work toward efficiency and integration.

Technologies Advancing Cross-Border Efficiency

The goal of seamless border crossings is easily thwarted by vehicular congestion resulting from safety inspections, drug intervention, and customs clearance. Advanced telecommunications and computer systems hold great promise for improving cross-border traffic flow or even eliminating conventional border inspections. The

Transportation Equity Act for the 21st Century (TEA-21), and the TEA-21 Restoration Act (both enacted into law in 1998) will provide $1.282 billion for the funding of "Intelligent transportation systems" over a six-year period. One of these systems is the North American Trade Automation Prototype (NATAP). NATAP will allow shippers to transmit information concerning a truck, contents, origin, crossing location, destination, driver, and all other relevant details via computer to a U.S. Customs agent. The trucks can then be sealed electronically before leaving the point of origin and tracked though use of an on-board radio transponder. The technology will allow U.S. Customs to clear the vehicle as soon as it reaches the border. All the electronic hardware and system components are currently in place for this system at the El Paso and Laredo border crossings.[66]

The customs division of Mexico's finance ministry will invest $50 million in 2000 to implement a program designed to reduce border-crossing times from an average of 90 minutes to 10 minutes or less. Widespread installation and utilization of X-ray equipment to spot contraband should facilitate faster customs clearance. U.S. Customs has implemented similar technologies, such as the use of a gamma-ray inspection device on the international rail bridge in Laredo to facilitate faster movement of railcars over the border for rail carriers such as Union Pacific Railroad and TFM. Mexico's new investments are part of its Customs Modernization Program. They will place top priority at land crossings in Nuevo León, Laredo, and Ciudad Juárez. The ports of Manzanillo and Veracruz have also been targeted for the program. In addition, increased use of the U.S. Customs database, known as the Integrated Automated Customs System, will facilitate reduced inspections for companies with a strong history of complying with customs regulations but will also flag shippers who have violated regulations in the past.

It is important to note that, while these technologies hold significant promise for creating more-seamless border crossings, their implementation will not be fully effective without addressing the problems of institutional bureaucracies within both state and federal agencies that have jurisdiction at the border. These bureaucracies could pose barriers to implementation of new border-crossing technologies and limit their effectiveness once they begin being used.

Role of Rail in Cross-Border Movement of Goods

Privatization of the Mexican rail system, along with partnerships between U.S. and Mexican rail lines, is facilitating a greater role for rail in cross-border transit. The resulting improvements in technology, infrastructure and logistics have increased efficiency, reduced costs, and aided rail lines in their goal of achieving more-seamless border crossings for their clients. They are also aiding rail lines in overcoming obstacles to growth such as the dominance of the trucking industry and the lack of government-to-government dialogue regarding railroad customs clearance procedures and border-crossing processes.

Investments in new or improved rail yards near border crossings are having a positive impact on cross-border efficiency. As of February 1999, the Union Pacific Railroad was in the process of completing a $1.5 million central examination station at its Port of

Laredo rail yard. The new facility will have in-house U.S. Customs as well as other federal agencies such as the U.S. Department of Agriculture. The facility will also include an X-ray machine to expedite railcar inspection. TFM's U.S. sister rail carrier, Texas Mexican Railway, is opening a massive new rail yard in the Laredo area. The U.S. facility will allow the rail line to easily ground and detach railcars targeted for inspection by U.S. Customs without delaying an entire train. On the Mexican side of the border, TFM plans a new international facility in Nuevo Laredo, which will facilitate quicker and more-efficient customs clearance. In the process, TFM hopes to cut out the middlemen altogether. As Dan Beers, vice president of intermodal transport for TFM, asserts, the goal of TFM is "to kill brokers, kill the warehouses . . . I don't make any pretenses about it . . . our goal it to close Laredo down. Put everything across the border to the destination before it's ever touched."[67] TFM's new facilities are aimed to bypass current inspections and warehousing that delay goods being shipped via intermodal transit on each side of the border.

The prospect of rail reducing congestion at the Port of Laredo was highlighted in a 1999 report jointly prepared by the Texas Department of Economic Development and the Economic Information Clearinghouse. The report recommends the installation of a multimodal system that would consist of transferring truck trailers to rail for transport to the opposite city via a dedicated line. Inspections for contraband would occur with existing X-ray technology. Beyond reducing congestion, the system could significantly reduce customs clearance delays and facilitate a more seamless border crossing. Similar operations specializing in truck-to-rail transfers are already in operation in Navarre, Ohio, and Auburn, Maine.

Logistics

NAFTA has resulted in rapid and noticeable changes in the manner in which goods are shipped between the United States and Mexico. The advent of free trade has allowed Mexico to enter global manufacturing chains without a significant domestic market for the final products it produces or a significant presence of Mexican-owned logistics providers. However, the increased need to deliver goods in the quickest and most efficient manner possible has spurred significant investment, both foreign and domestic, in developing and utilizing advanced logistics in Mexico. This trend will continue as NAFTA partners continue efforts toward deregulation, privatization, and reduced barriers to trade.

Developments in the Logistics Industry

To meet the needs of consumer demand in a highly competitive global environment, manufacturers and firms in the transportation industry must find ways to cut costs and increase efficiency. According to Thomas Anderson, deputy director of science, technology, and industry at the Organization for Economic Cooperation and Development (OECD), new technologies will play the key role in increasing efficiency and providing for sustainable economic growth. These transport solutions must be inherently innovative and adaptive and provide significant benefits in terms of efficiency while incorporating consumer and governmental demands for safety and environmental sustainability.[68] Transportation and logistics providers are meeting this need by enhancing service offerings and by providing innovative delivery technologies, which allow delivery windows to be calculated in terms of minutes or hours as opposed to days or weeks.

These services include in-vehicle navigation systems to allow drivers to avoid congestion and road hazards that could significantly delay shipments, two-way navigation systems to improve communication between dispatchers and drivers, and Electronic Data Interchange (EDI) and AEI to ease the burden of regulatory compliance and provide smoother, more-seamless border crossings, to name just a few. In addition, the Internet is likely to cause rapid expansion of the entire EDI industry in coming years. Internet-based EDI promises to eventually make EDI so simple and cost affordable that many small businesses in Mexico could begin utilizing the technology.[69]

Role of the Public/Private Sectors in Logistics and Intermodal Transport

The complexities and nuances of the logistics process necessitate that the private sector determine appropriate structures for logistics investment and development. As economic growth becomes intertwined with the free flow of raw goods and manufactured products, the importance of deregulation of the transportation sector increases. Over the last decade, deregulation in Mexico and the United States has resulted in an increase in the flow of goods within and between the two nations and an acceleration in the development of technological improvements in the transportation industry. Deregulation may also speed the push toward uniformity and harmonization of transport processes in instances where harmonization is beneficial. However, the state may need to continue to play a role in the maintenance of public infrastructure, including modal transfer infrastructure where appropriate. The public sector also needs to charge appropriate fees for the use of such infrastructure, which include the cost of externalities and maintenance. The public sector can also work toward eliminating constraints prohibiting the private sector from responding to and adapting technological advances in the industry. In addition, the state may be able to play a role in standardizing transport practices when the private sector proves less able.[70] Finally, government can take steps to ensure that competition occurs both efficiently and legally.

The Mexican government has taken a number of steps to fulfill these functions. In addition to continuing deregulation and privatization in the transportation industry, the government is working with NAFTA partners to harmonize land transport standards and ease border crossings. The Secretariat of Communications and Transportation (SCT) is considering the creation of a transport regulatory commission to strengthen the planning capabilities of the transport sector and to aid in research and technological development. The government is also continuing to work to develop infrastructure investment programs with a multimodal focus and to support export projects and physical distribution systems through Mexico's official bank for supporting external trade, Bancomext.

Advanced Logistics in Mexico

Though the current availability of Mexican-owned logistics firms is limited, the industry is growing. In addition, the Mexican government has made major technology infrastructure investments over the past few years to improve logistics technology, including activation of the Morelos II satellite system allowing for increased satellite positioning and global communication. In addition, fiber optic networks connecting more than 50 large urban areas have facilitated high-volume data transfers across the county.[71]

However, despite advancements, Mexico faces a relative shortage of advanced logistics capabilities. According to the publication *Binational Border Transportation Planning and Programming Study*, modern logistics practices are being used by only the top 5 percent of shippers operating in the U.S.-Mexico market.[72] Third-party logistics providers tend to focus their services on this limited market, although their long-term goals include expanding services to small and mid-size shippers over the next five to ten years. The concepts of third-party logistics and supply-chain management are just starting to catch on in Mexico's interior, and U.S. companies in Mexico are in great need of firms to provide total logistics packages. However, despite the shortage, the development of logistics services in Mexico is far more advanced than in the rest of Latin America, primarily because of NAFTA and associated multinational manufacturers operating export-assembly or maquiladora plants in Mexico under the agreement.[73]

The need for logistics services in Mexico has sparked a huge influx of U.S. logistics providers in the interior of the country, with nearly three-quarters of the major players arriving in the last five years.[74] However, these companies have focused their services primarily on U.S. multinational corporations. The use of outside firms by Mexican-based companies goes against Mexico's more traditional method of relationship-based methods of satisfying transportation needs.

However, U.S. logistics firms do collaborate with Mexican transportation companies to satisfy the logistics and transportation needs of multinationals doing business in Mexico. These partnerships are necessitated in part by the very limited opportunities for cross-border trucking between the United States and Mexico. In addition, most logistics companies in Mexico and the rest of Latin America that are domestically owned began as trucking or other transportation companies. For these less-advanced logistics providers, joint ventures and strategic alliances provide a viable growth strategy or opportunity for profit for companies that choose to sell their operations completely to international logistics firms.

A lack of logistics infrastructure also poses major problems for companies looking to ship goods to and from Mexico. However, advances are being made. Nearly the entire transport sector is now in the hands of the private sector, increasing competition as well as infrastructure investments. For example, Mexico's two primary north-south rail line routes, previously part of the nationalized Mexican National Railways (Ferrocarriles Nacionales de México, or FNM), are now in the private hands of Transportación Ferroviaria Mexicana (TFM) and Grupo Ferroviario Mexicano. The competition has allowed General Motors de Mexico (GM), which annually moves more than 1.3 billion pounds of raw materials and finished automobiles and car engines to and from its Mexican assembly plants, to push for better pricing and services. TFM is currently making plans for new terminals and intermodal yards. GM's ultimate goal, however, is to be provided with an integrated logistics plan coordinating all rail, trucking, and intermodal services needed from the assembly plant to the point of destination.[75]

Other companies are focusing on the need for "integrated logistics centers" that provide cross-docking operations, where suppliers back into a loading dock at one end of the warehouse and goods are immediately divided for delivery into trucks to various plants or stores at the other end. This is one of the foci of Daimler Chrysler de Mexico. The time pressures and large volumes involved in automobile assembly create the need for exceptionally well-coordinated logistics practices in the automobile industry. The need for just-in-time delivery to keep storage costs low, while also attempting to reduce transport times and costs, adds to this critical need. While just-in-time delivery of assembly parts reduces the associated costs of maintaining large inventories, the downside is that a delay in shipment of a critical good can result in shutting down an assembly line. To ensure delivery, Chrysler maintains close and frequent contact with its suppliers. Chrysler's integrated logistics centers, which are operated in Cuautitlán and Monterrey, also serve to increase efficiency, decrease costs, and ensure timely delivery of goods. The centers have reduced the number of plant deliveries by 75 percent.[76] Although cross docking still remains in relative infancy in Mexico, the push by Chrysler, as well as large warehouse companies such as Price Club de Mexico and Wal-Mart, to have suppliers utilize more-advanced logistics concepts such as cross docking is facilitating more rapid development of these technologies in Mexico.

Other U.S. companies such as 3M have opted to build their own distribution centers within Mexico to facilitate movement of goods and improve logistics. 3M operates a distribution center in San Luis Potosí, a city approximately equidistant from Monterrey, Guadalajara, and Mexico City, Mexico's three main population centers. The distribution center opened in 1993. In 1998, 3M moved its manufacturing operations there as well. The distribution center provides some cross docking as well as bar coding and radio frequency for data exchange.[77]

Strategic Alliances and Third-Party Logistics Providers

Alliances among U.S. logistics providers and Mexican transportation firms serve an essential function in bringing advanced logistics capabilities to the Mexican market. In addition, third-party logistics providers perform essential services for firms seeking timely, competitive services in the movement of goods across the border. While in the past, logistics costs were generally not an essential target for cost savings, in today's market logistics costs are in fact a critical element of a shipper's and transport provider's ability to increase profits and growth. One way to accomplish these savings is by outsourcing logistics functions to third-party providers. These functions include inventory management, warehousing, and information processing. Sometimes a third-party logistics provider may be hired to perform a single task. At other times, a third-party provider may take over a company's entire logistics needs via full-scale strategic alliances. Prominent third-party logistics providers in the Mexican market include Ryder Logistics, Exel, USCO, CTI, GATX Logistics, Hub Group, Mark VII, and APL. These providers focus on specialized services for the larger and more sophisticated shippers in the Mexican marketplace.[78]

Transportation alliances in Mexico are occurring in several areas. Besides the numerous alliances between shippers and third-party logistics providers, alliances are also being formed within and between service providers in order to expand services and market penetration. For example, trucking alliances have been able to provide shippers with better assurances of equipment for backhauls and to provide more effective coordination of door-to-door shipments. These alliances allow for better coordination of fleet movements and a guarantee that a carrier can provide a manufacturing firm with the necessary equipment to move goods, which provides an important competitive advantage in the Mexican marketplace where equipment shortages often pose major problems. Examples of alliances in the Mexican marketplace include M.S. Carriers' merger with Tranportes Easo, allowing for major equipment investments in Mexico; Yellow Freight LTL's exclusive arrangement with Transportes Sierra for international and domestic service; and the alliance between Kansas City Southern Railroad (KCSR) and Transportación Marítima Mexicana (TMM), who won the concession for Mexico's most strategic rail line, the Northeast line.

Case Study: Transportación Marítima Mexicana

TMM provides an excellent example of both the growing role of third-party logistics providers in the Mexican marketplace and the role of strategic alliances, both domestic and international, in providing comprehensive, integrated transportation and logistics solutions.

TMM's aim is to offer an integrated intermodal service and logistics management through the use of dedicated transport fleets, strategic infrastructure, and expertise in computer systems and logistics consulting. Considered a pioneer in Mexico's container transportation shipping business, this segment of TMM's operations continue to be the largest source of revenue generation.[79] However, the company is increasingly seeking to market itself as an integrated, third-party logistics provider capable of handling both simple door-to-door services and complex supply-chain tasks that involve the complete flow of materials from point of origin to final destination. In fact, TMM is currently the largest provider of dedicated supply-chain management in the Mexican marketplace. Through numerous joint ventures and strategic partnerships, TMM is able to provide its clients with dedicated truck fleets equipped with satellite tracking technology; maritime routes for containers, automobiles, and liquids to ports throughout the world; a network of railroad lines connecting major cities and ports in the United States, Mexico, and Canada; integrated rail-trucking services; and a network of operation centers, port facilities, and border and inland terminals.

In its goal to implement the most cost-efficient means available in offering door-to-door service throughout Mexico, TMM selected firms in the United States with proven expertise in offering quality services. For example, in mid-1992, TMM formed a joint venture with J.B. Hunt Transport, Inc., to create TMM/Hunt de Mexico. By combining TMM's strength in the rail and maritime industries with J.B. Hunt's expertise in the trucking industry, the new company was capable of providing complete door-to-door service to clients across all modes throughout Mexico. The joint venture aided TMM in its marketing of overland transportation services in Mexico as well as in developing road freight transportation services between Mexico and the United States, while allowing J.B. Hunt to penetrate its market beyond the maquiladora zone into the interior of Mexico. The venture also aided in bringing significant information technologies to Mexico, such as computerized dispatch, satellite tracking, and specialized routing software.

Another significant alliance occurred recently between TMM and KCSR. The partnership between the two companies, followed by a successful bid for FNM's most strategic Northeast line, has allowed both companies to compete successfully with recent railroad mergers in the United States, such as between the Union Pacific and Southern Pacific railroads, and to increase binational market share in the industry.

Finally, in its comprehensive approach to supply-chain management, which includes integrated logistics solutions, TMM partners with logistics and inland service providers within the Mexican market. TMM contracts business out to numerous specialized firms to handle specific aspects of the services TMM's clients demand. The companies include Servicios de Logística de México, Servicio Dedicado de Transportación, and Centro Logístico Mexicano. TMM partners with other companies in a similar manner in its rail, port, and specialized maritime services.

Advances in Transport and Multimodal Technologies

The combining of modes of transport may be preferable to single-mode transport because of the different relative advantages of each mode in transport and local distribution. However, the use of multimodal transport for land freight movements is still rather limited, mainly because of the high monetary and physical costs of modal transfer. Thus, a high importance is placed on the development of improved modal transfer mechanisms and multimodal facilities.[80] Other freight transport technologies outside the information technologies sector are also key for increased use of multimodal transport. Some of the technologies being developed and improved upon, and which are contributing to lower costs and improve transport, include intermodal containers, railcar technologies, alternating current, high-horsepower and low-emissions rail locomotives, trucking technologies, and cargo-handling systems.[81]

Of the numerous types of intermodal containers used in multimodal transport, the automobile container is one used frequently in U.S.-Mexico trade. Traditional movement of cars by truck or double-level railcars exposes vehicles to cosmetic damages during loading as well as environmental damages from dust, salt, and industrial contaminants. However, "Autostack," an automobile container developed by Greenbrier Companies, which has been in use since 1992, solves many of these problems. The Autostack consists of a simple, collapsible tubular steel frame that is loaded with cars and then rolled into a standard container. Ford Motor Company uses the containers extensively to ship parts from Detroit to Hermosillo, Mexico, and to send finished cars back north along the Ferromex, Union Pacific, and Canadian National rail lines.[82]

Other new railcar technologies are allowing rail lines to compete with truckers for delivery of time-sensitive materials, including double-stack container cars, bimodal trailers, and high-horsepower and alternating current locomotives. Utilization of slackless couplers for double-stack cargoes, as well as improvements in joints and roadbeds, has increased the viability of double-stack container cars by reducing vertical and lateral forces. However, lack of equipment standardization poses problems for widespread implementation of slackless couplers and related technologies.

Bimodal truck trailers include concepts such as the RoadRailer, Railrunner, and Iron Highway. These bimodal trailers convert rapidly from truck to rail through the use of four wheel bogies, and can be operated without the need for conventional locomotives or expensive intermodal freight terminals. The RoadRailer, for example, can be attached to an ordinary freight or passenger train at any railroad crossing, and the process is not labor intensive. Given the RoadRailer's versatility, it could present significant transportation benefits in Mexico as well as in other nations with poor roads but significant rail coverage. The Railrunner improves on the RoadRailer through engineering advancements, which eliminate the need for a truck trailer to carry a compressed-air supply to raise the trailer onto the bogie, among other things. TMM currently has plans to utilize the Railrunner to facilitate increased intermodal transportation between its trucking fleets and rail lines.

Alternating current (AC) traction motors and high-horsepower locomotives provide promise in making rail fleets more efficient in terms of locomotive use as well as more adaptive to harsh environment and heavy loads. The biggest downside of these technologies is that they are largely untried in North American rail systems and the high capital costs of conversion are risky for a rail industry operating on slim profit margins. In addition, alternative-fuel locomotives provide promise for reduced emissions. Such technologies have evolved to address pollution problems and meet environmental restrictions in cities with intermodal container ports, such as Oakland and Los Angeles, which are also located in congested urban areas experiencing some of the world's worst photochemical smog. Industry leaders such as BNSF are developing natural gas-powered, medium-horsepower locomotives and experimental refrigerated liquefied methane locomotives to reduce locomotive emissions. Mexico may begin to utilize these and related technologies as rail lines continue to modernize.[83]

Significant advances are also being made in the trucking industry to facilitate multimodal transport. Companies such as J.B. Hunt and Schneider Trucking have developed joint ventures with Mexican rail lines to develop seamless intermodal transport. As a result, containers and chassis units are replacing thousands of conventional truck trailers. These ventures are also considering utilization of RoadRailer and Iron Highway technologies. The advances allow rail lines to handle long hauls while trucking companies can specialize in just-in-time and door-to-door deliveries. Truck engine builders such as Cummins and Caterpillar have also devoted billions of dollars to developing low-emission diesel engines as well as alternative- and multi-fuel engines capable of running on diesel, methanol, and natural gas. Other technologies include fleet management innovations, such as mobile communications and onboard data loggers, intelligent routing, and software scheduling. Since deregulation of the trucking industry in the United States, nearly a decade ago, it is clear the industry has experienced massive technical advances. Mexican trucking firms have experienced advances such as higher-torque engines, fuel-control electronics for adaptive engine control, safety features such as antilock brakes and hydrostatic transmissions, and onboard electronics including dashboard instruments, location-tracking devices, and CB radios. These advances have allowed the trucking industry to maintain a competitive advantage over rail lines.[84]

Environmental Considerations

There is an obvious need to assess the environmental impact on this region due to the phenomenal growth in trade. North America encompasses a wide diversity of ecosystems, including forests, plains, mountains, deserts, lakes, rivers, tundras, and wetlands. In total, North America covers an estimated 8,407,000 square miles of geographical area.[85] Each ecosystem also contains natural wealth in forms of fertile land, freshwater, wood, minerals, and thousands of species of plants and animals. The significance of these ecosystems is that problems transcend national boundaries.

Environmental Problems in NAFTA

Trade patterns influence the stresses on highway infrastructure since most North American trade involves trucking. Trucking is the primary method of transportation for inter-American trade; it has grown considerably and is forecast to continue to increase.[86] NAFTA commercial traffic volumes have increased by more than 50 percent since 1991. The North American region has some of the highest rates of consumption and production in the world; the result has been the creation of many forms of pollution. North America has only 7 percent of the world's population though it emits an estimated 30 percent of the world's total carbon dioxide (CO_2). In Mexico, $C0_2$ emissions are at an estimated 3.70 tons per person, which is lower than the world average of 4.02 tons per person, and considerably lower than the U.S. average of 20.50 tons per person.[87] This is a grave issue not only because of adverse effects on humans and animal species but also because of the effect these gas emissions have on the global climate.

A serious environmental issue for Mexicans is the exposure of its citizens to health-threatening levels of air pollutants, carbon monoxide, sulfur dioxide, particular matter, and nitrogen dioxide. Air quality issues are further compounded by increasing emissions, unpaved roads, and increased industrialization. Severe social and economic costs are incurred from urban environmental degradation. Air pollution in Mexico City causes 12,500 deaths and 11.2 million lost workdays per year, mostly attributed to respiratory illness. In addition, economic damages due to the impact of health from air pollution in Mexico City are estimated at $1.5 billion per year.[88] Other studies report that excessive exposure to lead has caused 140,000 children to suffer a reduction in IQ and agility, which will later affect their working productivity.[89]

Sustainable Development Studies in NAFTA

The Commission for Environmental Cooperation (CEC) brings together trilateral teams to discuss and attempt to build consensus on difficult environmental issues, which affect all three nations. The CEC is the only regional environmental organization that has roots in expanded economic integration brought about by a trade liberalization agreement.[90] It is composed of a council of cabinet-level environmental officials from the three nations; the Joint Public Advisory Committee, a group of five citizens from each country; and a secretariat, staffed with environmental experts. One of their primary objectives is to prevent or mitigate the development of regional environmental problems by fostering joint action among experts from each nation and to promote sustainability in economic activity. CEC conducts programs and evaluations, which facilitate the understanding of critical environmental needs in Mexico, Canada, and the United States (see chapter 1).

The importance of sustainable development studies of the NAFTA transportation corridor cannot be overstated. CEC programs seek to identify emerging trends in environmental quality as well as the underlying causes of environmental trends, such as biodiversity and urban air quality. These types of projects are conducted in an effort to provide an early warning to policymakers of environmental degradation in hopes of developing timely and effective responses. Information collected by environmental assessments and diagnostic analysis can then be used later to establish environmental goals for national, state, and municipal levels of government.

Commission for Environmental Cooperation (CEC) Programs

The CEC project titled *Environmental Cooperation in the NAFTA Transportation Corridors* began in 1999. Its main objective is to "explore the feasibility of demonstrating the potential for increasing efficiency in the movement of goods and services and improving environmental quality" in the NAFTA corridors. The program will encourage federal, state, provincial, and local governmental agencies to incorporate environmental considerations in NAFTA transportation corridors in order to determine the need and feasibility of "greening" the NAFTA corridors. In its initial phase, the project will identify trends in transportation and the environment, as well as seek resources of funding and potential sites and develop a framework to explore "green trade" corridors. This study will eventually involve a design of a pilot project for trade corridors to present a model of economic prosperity through trade and environmental sustainability in the context of NAFTA.[91]

Another project underway by the CEC, titled *Trinational Air Quality Improvement Initiative: North American Trade and Transportation Corridors,* addresses significant air quality issues affecting the three countries along North American trade corridors. This program plans to accomplish four goals in 2000: identify and launch a pilot project designed to facilitate cooperation on a near-term reduction of transport-related diesel emissions, compile and evaluate data related to a specific transportation corridor in order to quantify current and future emissions from transport vehicles, organize a workshop of technical experts to review analyses, and coordinate a trinational meeting of governmental and nongovernmental officials to identify opportunities for environmental cooperation.[92]

Sustainable Development Initiatives in Mexico

Secretariat of Social Development (SEDESOL)-100 Cities Program

The Secretariat of Social Development (Secretaría de Desarrollo Social, or SEDESOL) is a Mexican federal agency whose primary responsibility is to set standards in urban infrastructure planning and designing, as well as to finance or pursue financing and supervise development of social service projects. The General Directorate of Infrastructure and Equipment (Dirección General de Infraestructura y Equipamiento, or DGIE), is in charge of implementing the 100 Cities Program.[93] The program's primary objective is to ensure sustainable urban development in 116 medium- and small-size cities. The promotion of environment preservation through the implementation of environmental-friendly planning mechanisms and management of urban development, including the organization of transportation projects, is essential in the 100 Cities Program. According to SEDESOL, the program was developed so that "the orderly and sustainable urban development requires a special emphasis on the regulation of urban development which must be governed by a close link between planning and investment, making investment flows available so that it will be possible to meet the demands of economic development and the population's well being, as well as being environmentally friendly."[94]

Overall strategic goals of the 100 Cities Program are as follows:

- encouraging an orderly and sustainable urban development in the strategic cities, as well as promoting alternatives in the metropolitan zones that can receive investment and population, and initiate regional development;
- modernizing infrastructure and basic urban services;
- raising urban living standards; and
- encouraging social participation in defining actions of urban development, supervision and implementation of the urban development plans.[95]

A sample of cities that take part in the 100 Cities Program along NAFTA transportation corridors are as follows:

- **Mexican rail/highway corridor cities**–San Luis Potosí, Querétaro, Chihuahua, Guanajuato, Ciudad Victoria, Linares, Cuauhtémoc, Saltillo, Fresnillo, Zacatecas, Lagos De Moreno, Tepic, Toluca, Aguascalientes, Oaxaca, Hermosillo, Torreón, Durango, Pachuca, Tehuacán, Ciudad Valles, Mérida, Colima, Cuernavaca, Morelia, Villahermosa, Tuxtla Gutiérrez, Chilpancingo, Monclova, Gómez Palacio, Culiacán, Irapuerto, and Tapachula;

- **Seaport cities**–Progreso, Ensenada, Lázaro Cárdenas, Guaymas, Topolobampo, Mazatlán, Manzanillo, Salina Cruz, Altamira, Tuxpan, Veracruz, Coatzacoalcos, La Paz, Campeche, San José de Cabo, Acapulco, and Chetumal; and,

- **Mexico border cities (ports of entry)**–Tijuana, Tecate, Mexicali, Nogales, Agua Prieta, Ciudad Juárez, Piedras Negras, Nuevo Laredo, Reynosa, and Matamoros

Cities are not mandated to join this program; however, financial incentives are provided to implement projects. Funding for these urban development projects are from a combination of federal, state, and local resources, as well as from credit and private investment from the National Bank for Public Works and Services (BANOBRAS) and the World Bank (see Table 4.9).

Table 4.9
Investment in 100 Cities Program–Resource Total, 1993-98
(millions of pesos)

Area of Investment	Total for 1993-98	1993	1994	1995	1996	1997	1998
Highway administration and transportation	2,659	180	320	108	616	875	560
Environmental issues	756	129	276	124	53	71	103
Economic revitalization	649	81	108	34	87	195	144
Urban land	706	275	207	56	66	65	37
Regulations of use of land and urban administration	227	53	98	39	22	11	4

Source: Secretariat of Social Development, Under Secretary of Urban Development and Housing, SEDESOL, *100 Cities Program.* Online. Available: http://www.SEDESOL.gob.mx. Accessed: March 2, 2000 (Mexican government agency Web site).

Highway administration and transportation are critical components for the success of the 100 Cities Program. The program is in charge of developing an integral study of the municipality that involves urban road systems and transportation. The seven areas examined in this study are institutional development; road and infrastructure; road maintenance; urban transportation system; environmental impact; paving of road in suburbs; and facilities modernization. The second stage includes the Immediate Action Plan, and the third stage is the three-year Action Plan.[96]

Funds that were used for the improvement of the Mexican transportation sector in the 100 Cities Program have supported 93 cities in executing 855 projects, 11 studies, 19 executive projects, 18 vehicular bridges, 532 roads, and road paving in 236 suburbs. In addition, through the Program of Urban Road Systems and Transportation for mid-size cities, whose regulating agent is SEDESOL, 42 studies of urban road system and transportation have been supported, 240 executive projects in 60 cities have been assessed and carried out, 700 technicians of 140 cities have been trained, and 15 technical manuals of urban road systems and transportation have been published.[97] In 1998, SEDESOL reported that the 100 Cities Program supported 55 cities in carrying out different works such as road paving and rehabilitation. The importance of sustainable development in transportation planning cannot be underestimated. According to Table 4.10, an estimated 66 percent of the 100 Cites Program was allocated to highway administration and transportation projects.

Table 4.10
Actions for 100 Cities Program, 1993-98

Program	Actions	Investment (millions of pesos)	Percentage
Highway Administration and Transportation	1,148	2,159	66
Environmental Issues (municipal solid waste)	107	351	10.7
Economic Revitalization	342	460	14.1
Land corporation in urban development	44	224	6.9
Regulations of use of land and urban administration	42	72	2.3

Source: Secretariat of Social Development, Undersecretary of Urban Development and Housing (SEDESOL), *100 Cities Program.* Online. Available: http://www.SEDESOL.gob.mx. Accessed: March 2, 2000 (Mexican government agency Web site).

According to SEDESOL, future goals in transportation are to conduct 16 integral studies and executive projects; train 120 technicians, operators, and managers; reinforce institutionally the organisms operating urban transportation in 10 strategic cities; offer technical assistance in terms of urban road systems and transportation at state and municipal levels to benefit 30 strategic cities; teach three regional courses of urban road systems and transportation for 120 participating pupils, through the SEDESOL-UNAM (Universidad Nacional Autonoma de Mexico, or National Autonomous University of Mexico) Agreement; monitor works and actions of the program in 30 cities; update the regulations and urban equipping manuals; and support the integral programs in the cities of Lázaro Cárdenas (seaport) and Manzanillo (seaport).[98]

The outcome of the 100 Cities Program is mixed. Criticisms from the municipalities are that the objectives of the program are too broad, which creates a problem of feasibility, since many municipal administrations are not in office long enough to carry out the objectives of the previous administration. Other problems are that the cities feel that development plans that are mandated by SEDESOL provide a federal/centralized framework, which does not take into account local problems. However, through a combination of the city's resources, SEDESOL's budget, BANOBRAS, and the World Bank, funding is allocated for the municipality's urban development planning and environment impact studies to carry out this program. This funding set-up is extremely significant since many Mexican public-sector programs are grossly underfunded. Certainly the 100 Cities Program is not without its flaws; however, it must be noted that it is a genuine move toward sustainable development throughout the Mexican corridor because it provides a framework that allows cities to integrate environmental, transportation, and economic development planning.

Sustainable Development in the U.S.-Mexico Border Region

> The emergence and evolution of the post-NAFTA environmental institutions in the U.S.-Mexico border region is a large transnational experiment, one that recognizes that sustainable development links economic prosperity with quality-of-life issues . . . While different situational contexts clearly require different solutions . . . there is reason to believe that the model's roots – openness, transparency, capacity-building, and bottom-up design, all in the context of sustainable development-could take hold in other transboundary areas.[99]

The U.S.-Mexico border stretches 1,952 miles and encompasses 10 border states, 39 Mexican municipalities, and 25 U.S. counties. The states of the border region are Texas, New Mexico, Arizona, and California in the United States and Tamaulipas, Nuevo León, Chihuahua, Coahuila, Sonora, and Baja California in Mexico. This region is characterized by a shared ecosystem, rapid industrialization, rising urbanization, and historically inter-reliant economies. The environmental problems in the U.S.-Mexico region are issues that clearly transcend boundaries and thus call for binational cooperation.

Environmental issues are increasingly playing a part in urban planning and transportation in the border region. This incorporation of environmental issues is partly being driven by the rapid growth of border area, which requires collaboration between U.S.-Mexico border officials, especially in counties with significant trade flows. The importance of the government's interaction is essential to establishing both formal and informal relationships that create an environment on which to build transportation, commerce, and the environmental goals. These relationships range from the integration of information and the formulation of proposals that in some cases lead to actions, to a simple diplomatic relationship that is characteristic of neighbors with common problems.[100]

Interagency Group on Ports of Entry and Border Services

The Mexican Secretariat of Foreign Relations (Secretaría de Relaciones Exteriores, or SRE) is a federal agency in charge of diplomatic relations between Mexico and foreign countries. It encourages participation from a variety of agencies in the planning, construction, and operation process of international bridges and border crossings. Its participation is through the coordination of the Interagency Group on Ports of Entry and Border Services (Grupo Intersecretarial de Puertos y Servicios Fronterizos). This group, created in 1983, takes on the function of project management, gathers participants, evaluates new projects, conducts diplomatic protocol, and follows up on the infrastructure construction process and the operation of all border-crossing points.[101] In addition, the group works with local governments in Mexico to consider the urban development guidelines of the border state governments.

The Interagency Group on Ports of Entry and Border Services usually meets every three months. A few of the agencies that make up this group are Secretariat of Communications and Transportation; Secretariat of Environment, Natural Resources, and Fisheries; Secretariat of Social Development; Secretariat of Commerce and Industrial Development; and other federal, state, or local agencies whenever necessary.

Santa Theresa/San Jeromino Meeting

An interesting issue in Mexico is the emergence of border states and municipalities working with their U.S. counterparts to address the issues of sustainability and transportation in rapidly growing areas. One recent example of environmental cooperation was a meeting in the community of Santa Teresa, New Mexico, held in May 2000. The meeting is an unprecedented gathering of various governmental officials from Mexican and the U.S. environmental, transportation, and economic development departments to discuss methods for sustainable development in the Santa Teresa/San Jeronimo border area.

The Mexican highway corridor that reaches this area connects Querétaro to Ciudad Juárez, which is considered one of the most important highways in the Mexican highway system.[102] The Santa Theresa/San Jeronimo border-crossing helped alleviate bridge-crossing congestion at the El Paso/ Juárez bridges. Negotiations for the creation of the border crossing were finalized in 1991 by a bilateral agreement between Mexico and the United States. Total trade activity of exports and imports in the Santa Teresa/San Jerónimo port of entry totaled $605,844,072 in 1999.[103]

According to a meeting coordinator, Gedi Cibas from the New Mexico Secretary of State, the overall objective was to provide a collaborative forum for experts and stakeholders to exchange information on the project's status and the area's anticipated growth relative to the area's transportation, economic development, environmental and health issues.[104] This idea was originally spawned by the New Mexico Environment Department.

Mexican Environmental Impact Assessments

Mexican environmental impact assessments (EIAs) do not typically fit the model of what are commonly known as environmental impact statements (EISs) in the United States. Many EIAs do not have precise data on the impact of the project. Much of the information consists of a brief synopsis of possible environmental problems that are likely to occur and how to mitigate these issues. In general, these environmental impact assessments contain the following: location of the project, legal statutes which project must comply with, brief overview of the social and economic impact, governmental agencies involved with the planning and implementation of the project, dimensions of the project, impact during the construction, operation, maintenance of the project, effects on fauna and flora, air, water, and mitigation of environmental harms, and brief recommendation.

Environmental Impact Assessment #1: Los Tomates International Bridge

Characteristics of Location: Bridge over the Rio Bravo, located in Matamoras, Tamaulipas. Connects the port of entries between Matamoras and Brownsville, Texas.

Transportation Corridor Area: Mexican Federal Highway corridor 180, which connects Veracruz (seaport), Tuxpan, Tampico (seaport), and Ciudad Victoria to Matamoras

Economic Characteristics: Local and international demand for the bridge, maquiladora plants. Operation of the bridge will more or less employ 130 men, which will provide a positive impact to the local economy. In addition, indirect jobs will be created in the service industry to meet the needs of commerce and an augmentation of travelers in the area.

Environmental Impacts: Air quality will be affected by the machinery, which will emit gases into the air. Air pollution will be emitted from vehicles using the bridge and driving around the area. It is estimated that a daily .05 tons of gases (carbon monoxide, nitrogen oxide, and hydrocarbons) will be generated daily from traffic on the bridge. However, it is recognized that the new bridge will cause less of a backlog of trucks waiting to cross the border, thus causing less air pollution than with the current bridge. In this case, this bridge will provide a positive environmental outcome. Water contamination in the Rio Bravo could occur if materials and chemicals in the process of the construction are not disposed of properly. Soil erosion can also cause contamination in the Rio Bravo. The impact of tree clearing for the construction of the bridge can generate contamination of the subsoil. Local flora will be affected by gases and dust from machinery during construction of the bridge, which are expected to accumulate in the foliage of the plants. However, this adverse impact will continue because of the gases emitted from traffic. Animals are not expected to be affected since this area is already urbanized.[105]

Environmental Impact Assessment #2: International Bridge of Piedras Negras

Characteristics of Location: New bridge over the Rio Bravo to replace the 30-year-old bridge located in Piedras Negras, Coahuila. Connects the port of entries between Piedras Negras and Eagle Pass, Texas.

Transportation Corridor Area: Mexican Federal Highway 57, which connects the cities of Nava and Saltillo, San Luis Potosí, Querétaro, and Mexico City to Piedras Negras.

Economic Characteristics: Local and international demand for the bridge since bottlenecks often occur. The bridge will be enlarged by several lanes to meet increased usage for transportation of goods and services. In addition, indirect jobs will be created in the service industry to meet the needs of commerce and an increase of travelers in the area.

Environmental Impact: The environmental impacts from the new Piedras Negras bridge will be minimal simply because it is taking the place of the old bridge. Thus, adverse effects of this bridge will generally be environmental issues that are long standing. However, increasing lanes on the bridge will reduce the congestion in the region. It was recommended that construction should take place during the time when the river is at its lowest level to prevent contamination of the Rio Bravo. One particular recommendation was to implement a replanting program. The assessment discusses various species of plants that should be planted around the bridge area.

Environmental Impact Assessment #3: Morelia-Lázaro Cárdenas Highway

Characteristics of Location: Highway corridor.

Transportation Corridor: This highway will be part of a new highway system connecting Lázaro Cárdenas (seaport) to Morelia.

Economic Characteristics: This highway system will connect industrial zones, a coastal area, and the center of Mexico, thus reducing the costs of transportation for logistics services.

Environmental Impact: A reforestation program should be implemented upon completion of the highway system to replenish the area's trees and vegetation, especially since the area is covered by 92.3 percent agriculture and 7.7 percent forested area.[106] The smoke emitted by machinery and equipment during construction will affect the quality of the air, because of emission of carbon monoxide, nitrogen oxides, benzene, and other hydrocarbons generated. In general, further analysis the local vegetation, soil, and the general ecosystem should be conducted, once the highway is constructed, to trace any sort of contamination.

It remains to be seen how significant a role environmental impact assessments will play. Traditionally, environmental impact compliance in Mexico is complex and considered by many industry proponents as cumbersome for project start-up.[107] According to the new Mexican Environmental Impact Regulation, any project whose impact surpasses an established standard for permissible limits of environmental contaminants requires governmental authorization. However, *Business Mexico* reported that projects exempt from submitting an environmental impact assessment under the new Mexican Environmental Impact Regulation were highways and infrastructure projects. The general director of the Ecological Zoning and Environmental Impact for the INE, Pedro Alvarez-Icaza, said this new trend will provide certainty for investors and project managers, reduce the workload of federal evaluators, and increase response times for reviews. Many believe that Mexico is streamlining a process that in many cases is unfeasible from a project-cost perspective. INE estimates that, despite the legal timeframes for reviews (60 to 90 days), the INE has taken as long as 16 to 18 months to review complex documents.[108] On the other hand, environmentalists fear that efficiency is taking priority over the health of the environment.

Mexican Environmental Data

In general, people are aware that environmental and social costs, such as overcrowded urban areas, air pollution caused by motor vehicles, vehicular accidents, and noise pollution damage, which are characteristic in Mexican cities. According to the *Binational Border Transportation Planning and Programming Study*, equivalent quantitative and statistical bases that measure social costs are nonexistent in Mexico.[109] While the environment is considered when a transportation corridor is planned, an extensive environmental analysis does not take place.

The Mexican public sector is strapped for resources. Hence, scarce funds are allocated to critical areas like economic development, education, and health. For example, the state Secretariat of Human Settlements and Public Works (Secretaría de Asentamientos Humanos y Obras Públicas del Estado, SAHOPE) in Baja California is in charge of transportation planning.[110] Although SAHOPE is aware of the importance of transportation planning, the state agency has not been able to maintain updated information on changes in the urban and transportation planning process. The EMME-2 forecasting model has produced urban traffic and transportation projections using a 1992 database.[111] Unfortunately, a lack of funding has prevented SAHOPE from updating the database, including information needed for the environmental modules

One way of sharing the financial and administrative burden of collecting and evaluating environmental data in Mexico is through the use of trilateral organizations, such as the CEC. This organization has plans to collect environmental data, including an assessment of air quality along NAFTA transportation corridors. Mexico, the United States, and Canada, should continue their financial and administrative support of the CEC. In addition, joint initiatives between Mexican and U.S. border states will be necessary to create a safe and healthy environment. Binational meetings are beneficial to all involved parties, since they provide opportunities for collaboration and action. Binational environmental impact assessment of border cities should be further pursued, and be conducted with the help of government, nongovernmental institutions, and academic institutions.

Although there is a lack of environmental data, there is also growing concern and interest in Mexico to improve the situation. The INE, as stated in the National Environmental Program 1995-2000, will continue implementing environmental policy through the following instruments: evaluation of environmental impact, environmental regulation for sustainable urban development, environmental information, environmental auditing, compliance of Mexican laws, and economic instruments.[112] Also planned for implementation is the National System of Environmental Information, which will enable the establishment of a framework and objective criteria to evaluate environmental performance and estimate the costs of harming ecology.

It is a difficult task for Mexican citizens and governmental officials to address ecological issues if they are not equipped with scientific data that can demonstrate the need for changing policy. Before NAFTA, the idea of preserving and protecting the environment was not a commonly shared belief among Mexicans. However, the number of environmental advocacy groups and institutes dedicated to the protection of the environment in Mexico has increased. Environmental studies and projects related to NAFTA have been conducted by academic institutions, such as El Colegio de la Frontera Norte, Instituto Tecnológico y de Estudios Superiores de Monterrey, and the Universidad de Guadalajara. A few of Mexico's environmental advocacy groups are Greenpeace (Mexico), Coalition to Defend Laguna San Ignacio, Grupo de los Cien, and Unión de Grupos Ambientalistas.

In the next decade, there is potential for Mexican environmental advocacy groups to craft policy that will positively affect the environment. The importance of these groups is crucial to creating policy. Currently, some nongovernmental organizations have begun efforts to understand positive and negative effects of transportation in the United States and Canada. An estimated ten organizations have been launched to deal with these issues: International Mobility and Trade Corridor Project, the CANAMEX (CANada, AMerica, MEXico) corridor, the Central North American Trade Corridor, the Mid-Continent International Trade Corridor Task Force, the North American International Trade Corridor Partnership, North American Superhighway Coalition, and the East-West Highway.[113] Several organizations are investigating proposals to harmonize regulatory environment and distributed infrastructure planning. There is no reason to believe that Mexican citizens will not increasingly take part in evaluating the effects of the NAFTA transportation corridor in their country.

A recent example of the importance of environmental data, sustainable development, and nongovernmental organizations within the Mexican government was the Laguna San Ignacio issue. Although this example does not involve transportation corridors, it speaks to the increasing importance of environmental issues in Mexico. On March 2, 2000, President Ernesto Zedillo, Julia Carabias, from SEMARNAP, and James Brumm, from Japan's Mitsubishi Corporation announced the termination of a six-year project to build the largest salt factory on the Laguna San Ignacio. This project was terminated because of the strong opposition by Mexican and international environmentalists who protested the project's placement in Latin America's largest wildlife sanctuary, Vizcaino Biosphere Reserve.

Interestingly enough, a $1 million, 3,000-page environmental impact assessment showed the salt flats would not harm whales or other wildlife. However, the government was persuaded by the concerns that the proposed 116 square miles of evaporating ponds would "damage the integrity" of the desert landscape within the reserve, an area visited by thousands of whale watchers every year. This evidence was presented by the UN Educational, Scientific, and Cultural Organization (UNESCO), which released a report on the potential adverse environmental impact of the salt works. President Zedillo said the government had carefully weighed the pros and cons of the project. The deciding factor was the "national and world importance and the uniqueness of the Vizcaino Biosphere Reserve," Zedillo said.[114] This decision had been met with praise from the environmental groups. The World Wildlife Fund, which has called for establishing fisheries to create jobs around the lagoon, said Zedillo's announcement "demonstrated anew the Mexican government's respect for environmental integrity and sustainable development."[115]

Relationship to Fostering Regional Economic Development

Mexico has experienced significant economic growth over the last decade. However, the resulting prosperity has not spread equally to all areas of the country. The effects of NAFTA mostly have been felt in regions that are currently linked by efficient transportation corridors and support facilities (including advanced logistics services). These areas are the major metropolitan areas of Mexico City, Guadalajara, and Monterrey, the six northern border states of Mexico, and three industrial corridors: Ciudad Juárez-Chihuahua-Delicias-Torreón; Nogales-Hermosillo-Guaymas-Culiacán-Mazatlán; and Nuevo Laredo-Monterrey-Saltillo-San Luis Potosí-Mexico City.[116]

The *Binational Border Transportation Planning and Programming Study* in 1998 reported that, "In Mexico, there is no ongoing, routine effort to quantify the economic impacts of trade with the United States or to other countries for Mexico as a whole."[117] However, it is known that the biggest benefit to Mexico from NAFTA is the jobs produced both directly and indirectly.

In 1995, an estimated 665,000 direct jobs in the traditional industry were created (not including maquiladoras), a dramatic 25 percent of the industrial workforce. The effect of bilateral trade is even larger in the Mexican industrial sector than in the maquiladora sector. Indirect jobs created by bilateral trade was 216,000 in the traditional industry (not including maquiladoras). Binational trade with the United States generated 1,565,000 direct and indirect jobs, that is 6.8 percent of national employment and about 45 percent of total industry-related employment (traditional industry and maquiladora) in 1995.[118]

The challenge for the transportation sector is to create an integrated network of highways, waterways, and railways that can literally provide the economic opportunities to all areas of the country.

The National Institute of Statistics, Geography and Information (Instituto Nacional de Estadística, Geografía e Informática, INEGI) estimated that as of December 1999, 1,196,678 people were employed in a maquiladora industry as laborers, administrators, or technicians.[119] Although these workers are employed throughout Mexico, the bulk of these jobs were created in the border region. An estimated 86 percent of jobs created by maquiladoras are in the border region.[120] What is not currently known is the precise number of indirect jobs that has been created in Mexico due to maquiladoras. However, overall, the growth of the maquiladora sector has been outpacing growth in the general economy in recent years.

Integrating the Maquiladora Industry into the Mexican Economy

Critics of the maquiladora program argue that to date the industry has not created strong backward linkages into the Mexican economy or, arguably, resulted in significant economic benefits beyond employing Mexican labor. Luckily, present trends do provide some hope that the maquiladora industry's contributions to the Mexican economy can be increased.

The maquiladora industry has experienced rapid growth throughout the past two decades. This growth has increased with the implementation of NAFTA. Growth of the industry has been somewhat slower outside the border states. However, as transportation costs continue to decrease and advanced logistics decrease travel times, more maquiladoras will locate in Mexico's interior. This trend is also facilitated by the rapidly increasing costs of establishing a maquiladora factory in the northern border states. In 1996, the maquiladora industry amounted to almost 4 percent of national employment and more than 30 percent of total industry-generated employment.[121] As a result of the maquiladora industry, unemployment rates in the northern border states are the lowest in the country. In addition, at current rates of growth, maquiladora employment could account for more than 5 percent of national employment in the year 2000. Finally, the maquiladora industry is highly productive. In 1995, less than 4 percent of the labor force was able to generate 45 percent of Mexico's national exports.[122] Such growth will continue to have a dramatic effect on transportation flows on both sides of the border.

However, despite the significant benefits in terms of employment that the maquiladora industry provides, in many ways the industry has not been well integrated into the Mexican economy. Only a small percentage of materials used in maquiladora manufacturing are of Mexican origin. In 1995, national suppliers contributed only 8 percent of total inputs. Many of the jobs provided are relatively low skill, in industries such as textiles, which provide few benefits in terms of knowledge and technology transfers. In addition, the maquiladora industry provides limited benefits in terms of multiplier effects or the creation of jobs outside the industry. One obvious reason for this is the lack of national suppliers providing inputs into the industry.

For the maquiladora industry to become better integrated into the Mexican economy, greater partnership must take place between foreign manufacturers and domestic suppliers. The increasing trend of locating maquiladoras in Mexico's interior, closer to domestic centers of production and economic activity, may facilitate such partnering. However, for this to occur, Mexico will have to continue to make the necessary investments in infrastructure and logistics technologies to facilitate transport of finished products to U.S. markets.

In addition, a slow shift in the industry toward high-tech sectors should increase technology transfers as well as help provide Mexico with a more knowledgeable and skilled workforce. Over time, an ideal scenario is that these transfers of knowledge and technology will increase entrepreneurial activity within the Mexican market and aid in the creation of regional agglomerations consisting of significant interaction between U.S. manufacturers and Mexican producers in high-tech industries.

Success and Challenges for Guadalajara

Guadalajara is an interesting case since it is taking part in the technological revolution occurring around the world. There are various industrial zones in Guadalajara, for example, the Parque Industrial, El Salto corridor, Lomas al Sur, Old Industrial Zone, and Belenes/San Juan Ocotán, which house Mexican and international corporations. Many of these areas have a strategic location for commerce by being located near the International Guadalajara Miguel Hidalgo Airport or network of railroads or highways. In 1996, an estimated 15.563 billion pesos came from the transportation, storage, and communication sector in the state of Jalisco. In addition, it contributed 147 billion pesos to the total Mexican GDP, about 6.40 percent of the GDP.

In the 1970s and 1980s, major corporations such as IBM, Motorola, Eastman Kodak Company, and Hewlett-Packard Company, began establishing plants in Guadalajara. In the 1990s, seven of the largest electronics contract manufactures set up locations there. These companies have set up innovative factories, some of which encompass dozens of factory buildings. For example, Flextronics International Ltd., an electronics manufacturer, in its first eight months in Guadalajara, earned $12 million in sales. Revenue is continuing to grow $140 million a quarter. Flextronics plans to triple the size of the plant and has acquired 75 acres of land to expand the plant.

Behind the base of the factories are the suppliers of stamped metal, modeled plastic, and logistics services. The competitive advantage that Guadalajara has over Asian competitors is the speed with which it can transport its products to its corporate clients in the United States Alejandro Gómez, general manager of Solectron, an electronics manufacturer, commented, "Chinese labor is cheaper, but the real issue is speed."[123] Solectron is currently constructing a hangar-sized truck-docking facility for its Guadalajara plant. When construction is completed, trucks will be loaded with goods that already have been processed by Mexican Customs to be delivered directly to the Guadalajara airport only a few miles always. Gómez comments on the benefits of the process, "The faster you get something through the production chain, the longer it will be on the market."[124]

Major challenges that Guadalajara faces in sustaining economic growth are continuing to meet the demand for skilled workers. The *Wall Street Journal* stated, "The cargo and customs infrastructure is already buckling under the strain of exploding demand. And in spite of all the schools here, there is a growing shortage of managers and, particularly, of logistics personnel such as master schedulers." To build a more skilled workforce, the factories are using innovative strategies, in coordination with Mexico's Education Ministry, to operate junior high and high schools at the factories. This program is a direct effort to fill slots for the factories, since the need for skilled workers is projected to triple in size over the next three years.

A high-tech hub like Guadalajara will provide opportunities to Mexicans that will advance their standard of living in both educational and economic terms. This reciprocal economic relationship will benefit corporations with a speedy market to technical products, as well as providing high-tech and logistical jobs and training to Guadalajara residents.

It must be noted that efficient transportation corridors alone cannot make a city, state, or region economically viable; there are certainly other contributors to success. For example, other advantages for Guadalajara are the seven universities and dozens of technical schools, which allow firms to hire from an educated-applicant pool. Companies are attracted to the region by subsidies, such as tax breaks, but must, in exchange, offer local workers technical training. Guadalajara's success stems from its public sector providing incentives to firms that establish their businesses in Guadalajara and providing infrastructure that will facilitate a smooth flow of trade. Thus logistics firms that cab support these businesses will be attracted to the area and will also continue to reinvest in the community through employment and training

National plans need to include regional economic development projects specifically targeted to hard-pressed areas. Transportation will continue to play a vital role in the economic growth of the underdeveloped southern Mexico, because the importance of the efficiency of transporting goods and services in a timely fashion to various parts of the nation and the world is a dominant trait in a successful and robust economy. For a state to be economically viable, it is essential that transportation and infrastructure are accessible. Economic development plans that integrate environmental, social, and transportation policies will reap benefits that can provide sustainable growth.

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Chapter 5. Transmodal Environmental Impacts

Introduction

This chapter discusses how transportation and trade affect the environment and the potential effects of environmental change on transportation infrastructure. Transportation and its infrastructure are basic components of any trade corridor. To understand their possible environmental impacts, it is useful to identify for each mode of transportation its economic characteristics (including the cost of goods shipped and cost of transport); service characteristics (speed versus efficiency and type of goods shipped); and sources of residuals (differentiating between construction and maintenance impacts versus operation impacts).

Based on the economic, service, and residual characteristics of each transportation mode, this chapter explores the emission factors of each transport mode on the environment. In any transportation endeavor, there is the potential for unforeseen environmental risks that come in the form of man-made error or unpredictable natural events. This chapter also discusses the opportunity for human error and the severity of its consequences, along with the possibility and frequency of natural disasters.

The previous chapters on MERCOSUR and NAFTA discussed specific environmental provisions and issues facing these trade groups; this chapter discusses all transport activity and its effects on the environment. One focus is a prevention of serious consequences versus intervention or degradation. Just as car owners conduct preventive maintenance to avoid possible mechanical failure, transportation planners can use prevention and mitigation techniques to avoid environmental disasters. The last section of this chapter discusses some, but not all, mitigation techniques and feasible alternatives for Latin American planners to consider in future transportation and trade corridor development.

Modal Comparison

Each mode of transportation has its own unique set of characteristics that influence how transportation is performed, how the various modes organize, how prices are established, and what the nature of government involvement is. Although each mode is unique, the relevant outcomes of transport can be classified as economic, service, and pollution characteristics.[1]

Economic Characteristics

Users choose a transportation mode based on each mode's cost to shippers, flexibility of service, capacity of shipment size, speed, and energy efficiency. Table 5.1 shows the five surface modes ranked according to comparative advantages among key economic characteristics.[2]

Table 5.1
Comparative Economic Advantages

Characteristic	Air	Rail	Mode Truck	Water	Pipeline
Cost (cents/km)	10.0 to 22.0	1.0 to 8.0	4.0 to 15.0	0.3 to 3.0	0.3 to 1.0
Market coverage	Port-to-port	Port-to-port	Door-to-door	Port-to-port	Source-market
Competitors	Moderate	Moderate	Many	Few	Few
Predominant Traffic	High value, low-moderate density	Low/moderate Value, moderate-high density	All	Low value, high density	Low value, high density
Average length of haul (miles)	885	617	515	376 - 1,367	u/a
Equipment capacity (tons)	5 to 125	50 to 12,000	10 to 25	1,000 to 60,000	30,000

Source: D. Lamber and J. Stock, *Strategic Logistics Management*, 3rd ed. (Illinois: Irwin, 1993), p. 175.

Differences in the cost of shipping goods are related to the cost of creating the ability to transport them, building infrastructure, and generating the energy needed to move those goods. Transportation infrastructure is made up of two basic components, the right-of-way (ROW) and the vehicles that pass along the ROW. Railroad and pipeline-operating companies traditionally have owned their own ROW. Truck, bus, marine, and air transportation companies that operate on public ROW usually provided by governmental agencies.[3]

Service Characteristics

Because of their unique characteristics, each mode lends itself to shipment of different types of goods. Cost is a major consideration of shippers, but it is by no means the only basis of choice. The characteristics of the commodities themselves play an important role in the selection of a mode of transport; the characteristics can include value of the commodities, perishability, fragility, susceptibility to bulk-handling techniques, shipment size, volume over time, density, weight, physical state, reactiveness, degree of hazard, volatility, and frequency of movements.[4] For example, petroleum products are often transported by ocean vessel because they are nonfragile, usually large in volume, in a controllable physical state, and are not time sensitive. Donated human organs due for transplant need to be shipped via airplane because they are highly perishable, fragile, and extremely time sensitive. Table 5.2 compares the different transportation modes in relation to the key characteristics mentioned above. Each mode has inherent strengths and weaknesses that influence the choices of shippers who balance considerations of flexibility, cost, speed, and volume.[5]

Table 5.2
Comparative Service Advantages

Characteristic	Air	Rail	Mode Truck	Water	Pipeline
Average speed (mph)	100 to 250	20 to 45	40 to 60	3 to 19	3 to 6
Availability	Moderate	Moderate	High	Low	Low
Consistency (delivery time)	High	Moderate	High	Low-moderate	Moderate
Loss & damage	Low	Moderate-high	Low	Low-moderate	Low
Flexibility (to shipper needs)	Low-moderate	Moderate	High	Low	Low

Source: D. Lamber and J. Stock, *Strategic Logistics Management*, 3rd ed. (Illinois: Irwin, 1993), p. 175

Sources of Pollutants

The environmental effects of transportation can be divided into two categories: land-use effects and residuals dispersed in the land, water, or air.[6] Every mode of transportation utilizes land for ROW and operations. Figure 5.1 illustrates how infrastructure affects land, water, and air. As infrastructure is constructed and maintained, land is used. As vehicles are manufactured, operated, maintained, and disposed of, various pollutants are introduced into the environment. The following sections identify specific outputs each mode of transportation creates, discuss the social and ecological effects of land use, and how pollutants affect health, the environment, and human welfare.

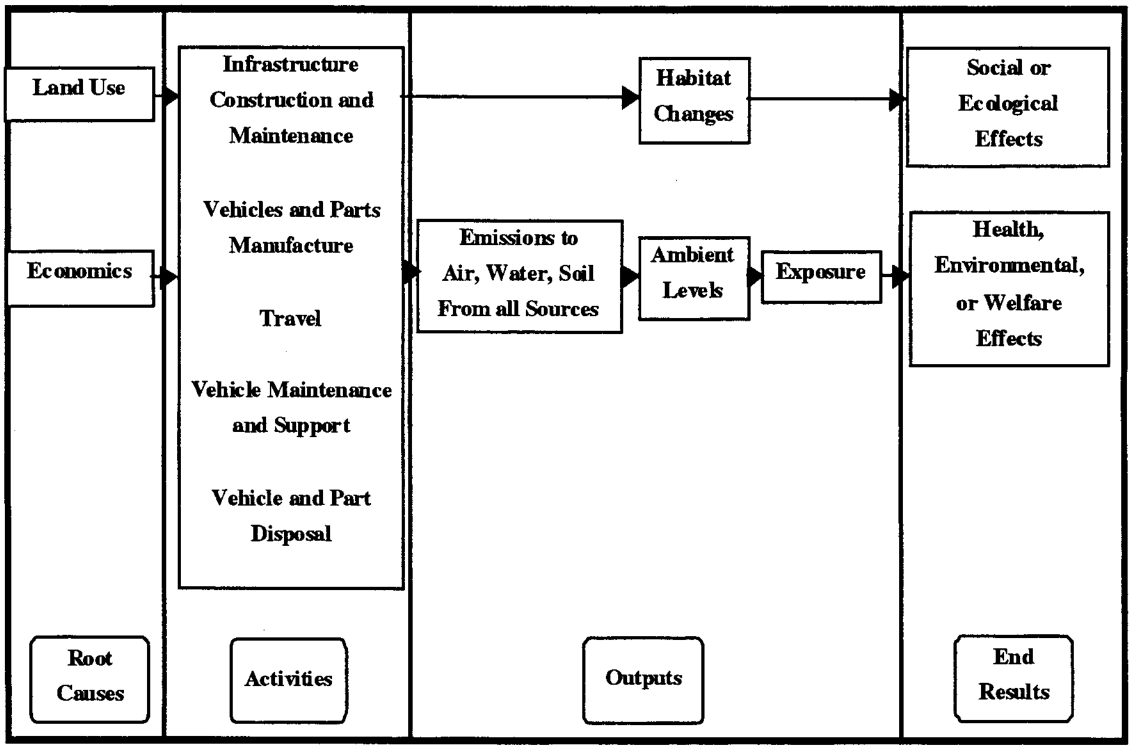
Modal Emission Factors

Each transport mode produces residuals, and some of these factors are measurable (see Table 5.3), while other factors are characteristics of individual transportation corridors. Factors more difficult to measure are discussed below under each transportation mode in two phases, construction and maintenance versus operations, reflecting the fact that different processes occur within each phase.

Air Emission Factors

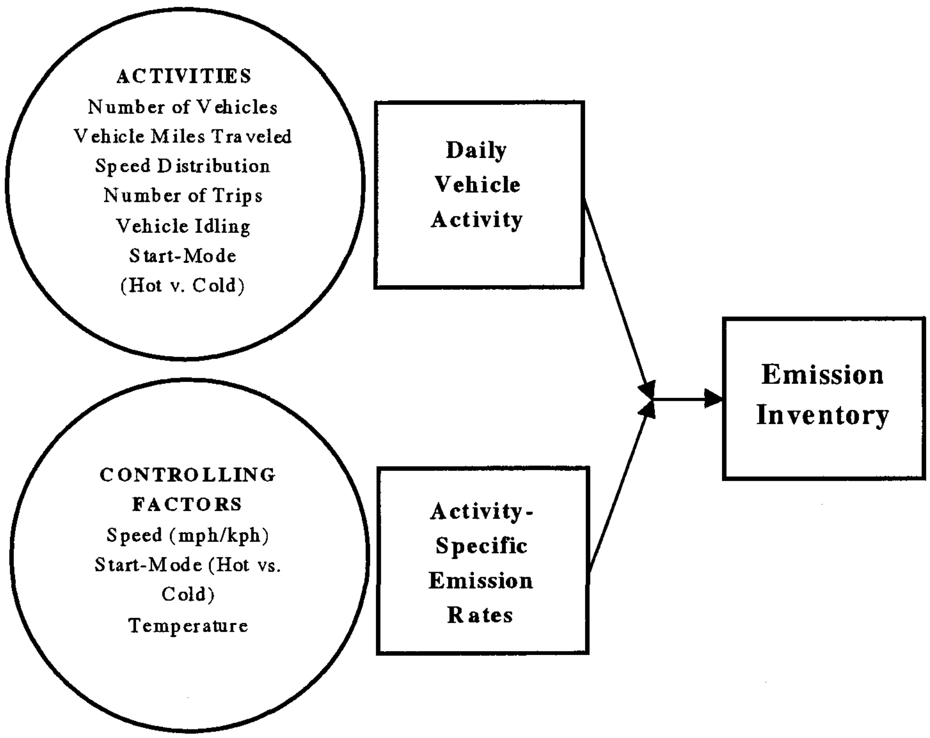
Engine combustion is responsible for most air emissions, and each vehicle in operation has a corresponding power unit that produces a quantifiable amount of air emissions. Figure 5.2 lists the permanent emission factors from each power unit. For any transportation mode, the aggregate air emission levels that occur over time and space reflect the mix of vehicles and the number of trips. Technology and fuel advances have made it possible to manufacture cleaner burning, more fuel-efficient engines. Figure 5.3 lists some factors that contribute to ambient air emission levels and their potential effects.

Figure 5.1
Causes and Effects of Transportation



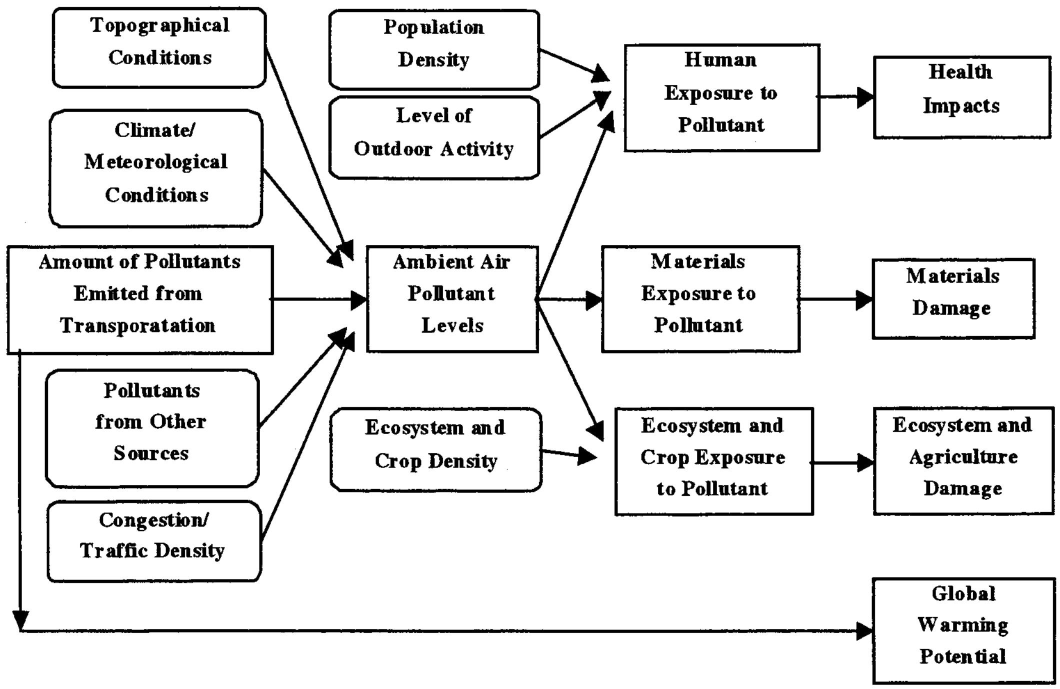
Source: U.S. Environmental Protection Agency (U.S. EPA), Policy, Planning and Evaluation Office Indicators of the Environmental Impacts of Transportation: Highway, Rail, Aviation and Maritime Transport (Washington, D.C. October 1996), p. viii.

Figure 5.2
Generic Mobile Source Emissions



Source: Institute of Transportation, University of California at Davis, *Uncertainty in the Emission Inventory for Heavy Duty Diesel-Powered Trucks*, Research Report UCD-ITS-RR-91-02 (Davis, CA June 1991), p. 11.

Figure 5.3
Ambient Air Emission Factors



Source: EPA, Policy, Planning and Evaluation Office Indicators of the Environmental Impacts of Transportation: Highway, Rail, Aviation and Maritime Transport (Washington, D.C. October 1996), p. 72.

Table 5.3
Environmental Factors Measured

Infrastructure construction and maintenance	Number of lane miles constructed Number of rail miles constructed Number of pipeline miles constructed Percent of roads that are paved/unpaved Number of road/rail bridges constructed Number of transit stations
Vehicle and parts manufacture	Number of vehicles manufactures Number of railcars purchased Number of new aircraft delivered Number of new ships introduced Number of registered vehicles
Travel	Vehicle miles traveled (VMT) Passenger miles traveled (PMT) Number of trips Average vehicle occupancy (AVO) Modal split (percentage use of each mode) Speeds (peak and off-peak) Acceleration, stops, etc. Congestion levels (number of delay hours) Gallons of fuel used
Vehicle maintenance and support	Number of cleaning or refueling stations/terminals Number of painting or refurbishing stations/terminals Number of active petroleum underground storage tanks Number of solid waste disposal sites

Source: EPA, Policy, Planning and Evaluation Office Indicators of the Environmental Impacts of Transportation: Highway, Rail, Aviation and Maritime Transport (Washington, D.C. October 1996), p. 18.

Noise Emission Factors

Noise pollution, while not usually a direct threat to human health, is a major issue in dealing with general welfare and the standard of living. High ambient noise levels can disrupt day-to-day activities and can cause minor to severe hearing loss over time. How people perceive loudness or noisiness of any given sound depends on several measurable physical characteristics of the sound, including intensity, frequency, changes in sound pressure levels, and rate of increase of sound pressure levels.[7]

Individual human response to noise varies. Researchers have identified emotional and physical factors that influence the way in which people react to noise. Noise will affect different groups of people depending on the time of day or the length of time exposed to the noise. The operation of each mode of transportation creates a certain amount level of noise pollution. Figure 5.4 illustrates the certain noise thresholds that can damage the human ear.

Figure 5.4
Typical Noise Levels

	dBA	
Riveting on Large Steel Plate at 6 ft.	115	
	110	Temporary Damage to Eardrum
Chain Saw	105	Jet Flyover at 1000 ft.
	100	
	95	
Food Blender at 3 ft.	90	
Garbage Disposal at 3 ft.	85	Diesel Truck at 50 ft.
	80	Noisy Urban Daytime
Shouting at 3 ft.	75	
Vacuum Cleaner at 10 ft.	70	Gas Lawnmower at 100 ft.
Normal Speech at 3 ft.	65	
	60	Commercial Area Heavy Traffic at 300 ft.
Large Business Office	55	
	50	Quiet Urban Daytime
	45	
Small Theatre (Background)	40	Quiet Urban Nighttime
Library	35	Quiet Suburban Nighttime
Bedroom at Night	30	
Concert Hall (Background)	25	Quiet Rural Nighttime
	20	
	15	
	10	
Threshold of Hearing	5	
	0	

Source: U.S. Department of Transportation (U.S. DOT), Federal Highway Administration (FHWA), *Final Environmental Impact Statement, California Route 168, Route 180 to Temperance Ave.*, FHWA-CA-930287 (Washington, D.C. June 1993), p. 3-64.

Studies have shown that a ten-decibel increase in noise intensity may be considered a doubling of the perceived loudness or noisiness of a sound. In addition, sounds with concentrations of energy between 2,000 Hertz (Hz) and 8,000 Hz are perceived to be more noise than sounds of equal sound pressure level outside this range. Sounds that are increasing in level are perceived to be somewhat louder than those decreasing in level, a perception called the Doppler effect. Impulsive sound, or noise reaching a high peak very abruptly, such as pile drivers or jackhammers, are usually perceived to be extraordinarily noisy. Since construction, infrastructure, or vehicle operation becomes more pervasive as trade increases, ambient noise levels will become a growing concern.

Water Emission Factors

Ambient water quality measures the level of substances found harmful to humans and aquatic life. Air quality, storm-water runoff, vessel travel, and sediment contaminants can affect water quality.

Dissolved oxygen (DO) is a major concern in surface waters near ports and other areas of high maritime traffic. Hypoxia, a condition in which DO concentrations are below air saturation (normal levels), can have a negative effect on marine life. DO insufficiency results in reduction in cellular energy and a subsequent loss of ion balance in cellular and circulatory fluids.[8] Hypoxia results in reduced motor activity that can make less-adaptable species more vulnerable to predators who can adapt, thus creating an imbalance in the ecosystem.

Contamination of sediments can contribute to decreased water quality. Sediments can contain nutrients, organics, halogenated hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), metals, and many other contaminants. Table 5.4 lists some of these pollutants. Metals, PAHs, and organics can be toxic to various plants and animals, and some may tend to biomagnify as they travel up the food chain (i.e., their concentrations become more harmful in bodies of species that eat large number of contaminated prey).[9] These contaminants emanate from illegal waste dumping, vessel traffic, and storm water runoff from ports and other industrial facilities. Dredging and vessel traffic stir up sediments, causing aquatic wildlife to come in contact with and digest these substances.

Solid Waste Emission Factors

The construction, maintenance, and operation of each transport mode generates solid waste. While equipment has varying life expectancies, invariably every piece of equipment is disposed of as waste eventually, if it is not recycled. This process represents a continual conversion of natural resources into eventual expended waste. For example, once a truck or an ocean vessel is manufactured, there is an expected life of that vehicle. Once a vehicle expires, it can be reused, scrapped and recycled, or disposed of as solid waste, while individual parts may be resold or reused.

Infrastructure construction also yields a high level of waste material in the form of unused steel, asphalt, plastics, and other building materials. These materials may or may not be disposed of properly after construction is completed. There is also the potential for materials to leech toxic residuals into local soils or water systems or to harm wildlife through direct contact.

As construction projects produce scap materials that are not reused or recycled, that waste represents an overuse of natural resources and an overexpenditure of energy and transport capacity. Some solid wastes connected with transportation can be toxic or have the potential of being toxic in certain habitats. Disposal of these materials can require specialized disposal methods and, in some instances, additional rehabilitation of affected habitat.

Table 5.4
Major Contaminants of Sediments

Nutrients	Phosphorous and nitrogen compounds *(promote unwanted growth of algae)*
Bulk organics	Hydrocarbons *(includes oils and grease)*
Halogenated hydrocarbons	DDT and PCBs *(chemicals resistant to decay)*
Polycyclic aromatic hydrocarbons	Petroleum products and byproducts *(harmful organic chemicals)*
Metals	Iron, manganese, lead, zinc, mercury *(toxic to various plants and animals)*

Source: Adapted from EPA, Office of Water, *Contaminated Sediments OST: Major Contaminants of Sediment.* Online. Available: http://www.epa.gov/OST/cs/aboutcs/sources.html. Accessed: January 20, 2000 (government information Web site).

Unproductive land use associated with landfill disposal has one of the largest impacts of solid waste. Lands used to provide a receptacle for solid wastes can pose a potential source for future adverse environmental impacts, such as degradation of groundwater sources and alteration of surrounding soil yield potential.

Rail

Construction and Maintenance

Construction and maintenance within the rail industry can consist of new construction projects; rehabilitation of existing or abandoned ROW or right-of-ways; construction of bridges, walls, railroad signals, and communications; and the modification of existing utilities. Each can affect land use, the economy, water, air, and noise.[10]

The acquisition and conversion of rights-of-way affect land use by converting land (agricultural, irrigated or nonirrigated, grazing, and unused) into transport corridors. As these lands go through the construction process, their previous use is usually lost, affecting adjacent land value and uses. Construction projects such as barriers, bridges, and culverts can harm, hurt, or even eliminate vegetation and wildlife habitat. Such construction can hinder access to, or divide, important ecosystems and have adverse effects on local wildlife and effect local economies.

Construction and maintenance can cause local social and economic effects through development and multiplication of investments. The population of rail workers needed for such projects will likely have direct and indirect impacts on local employment. Likewise, projects can increase local expenditures from workers and from the rail industry for supplies. It can also bring the potential for future employment as the rail line begins to operate and require local services.

Land-use changes associated with transport may clear vegetation or modify landscape. Without proper mitigation, soils can be exposed to erosion and/or toxic substances used during the construction of the ROW. An increase in erosion of topsoil can result in increased turbidity in local rivers and lakes. Water systems can also be affected by the transport pollution or modification of wetlands.

Heavy construction equipment for ROW will release air pollutants. Unlike the periodic passage of a train, air emissions from diesel fuel combustion will be constant in a concentrated local area as construction and maintenance occurs. Exposed land can also decrease air quality as heavy equipment throws large quantities of dust into the air. Air-borne dust particles can be reduced through mitigation measures.

Noise and vibration, while not a direct health risk, can be disturbing to local populations. As discussed earlier, increasing ambient noise levels can become an annoyance and contribute to a decrease in welfare and quality of life. Table 5.5 lists possible construction equipment that can be used during rail construction and maintenance, along with levels of noise generated.

Operations

Rail operations constitute train travel, railcar servicing, and railcar disposal.[11] Some analysts view rail operations as a relatively environmentally friendly transport alternative in Latin America.

Rail travel constitutes moving of railcars and engines along the ROW, switching of railcars, and track switching, which generates modest amounts of exhaust emissions, noise pollution, and toxic materials. As discussed in the quantitative section above, rail exhaust can contain quantities of CO, NO_x, VOC, SO_2, PM, CO_2, CH_4, N_2O, and trace ammonia. In high enough concentrations, these gases have been linked to human health problems.

Noise and vibration are the most noticeable impacts of rail travel. The dominant source of noise for freight cars and engines is due to the wheels. The noise is a function of speed and severity of the wheel "flats," areas of uneven wear due to weight and stationary duration.[12] Vibration levels for freight cars vary because of speed, car weight, traction, and wheel condition.[13]

Rail travel also generates an amount of toxic solids, mainly in the form of grease and oil used as lubricants for railcar wheel axles. These toxic solids, while primarily concentrated on or near track beds, can contaminate freshwater supplies through rain runoff.

Railcar servicing is the largest source of pollutants in the rail industry, emanating from terminal operations, car cleaning, maintenance, repair, and refueling. Terminal operations include tank car unloading and cleaning, equipment degreasing, exterior washing, and painting. Many of these processes may use materials that are hazardous or may generate hazardous waste or wastewater. Table 5.6 lists typical terminal operations, the materials used, and the types of waste that are generally produced.

Table 5.5
Rail Construction Equipment Noise

Type of Equipment	Estimated Range (dBA at 50 ft.)
Crawlers, tractors, dozers	77-90
Tractor shovels, front-end loaders	77-90
Hydraulic backhoe excavators	81-90
Self-propelled scrapers	83-91
Graders	79-89
Off-highway haulers	83-94
Steel rollers	75-82
Rubber-tired rollers	79-83
Derrick cranes	79-86
Mobile cranes	80-85
Concrete pumps	74-84
Portable air compressors	76-89
Portable generators	71-87
Trucks	81-87
Concrete vibrators	68-81
Pile drivers	94-107
Jackhammers	75-85

Source: Empire State Electric Energy Research Corporation, *Power Plant Construction Noise Guide* (May 1977), p. 27.

The cleaning of rail tank interiors is a major source of pollution during terminal operations. The typical rail tank car has a volume of 76,000-114,000 liters (20,000-30,000 gallons) and generates about 11,000-19,000 liters (3,000-5,000 gallons) of wastewater during cleaning, resulting in the creation of spent cleaning fluids, fugitive VOC emissions, and residuals from inside the tanks. In addition, refueling operations affect the environment through spills and drips of fuel and through fuel tank vapors that are displaced when the tank is filled.[14]

Disposal of railcars, as with all modes of transportation, generates large volumes of solid waste. Fortunately, this impact can be reduced through recycling the scrap metals, as discussed later in this chapter.

Table 5.6
Railroad Terminal Operations

Process/Operation	Materials Used	Waste Generated
Unloading or cleaning of tank cars	Solvents, alkaline cleaners	Acid/alkaline wastes, toxic wastes, solvent wastes, residual tank contents
Rust removal	Naval jelly, strong acids, strong alkalines	Acid/alkaline wastes
Painting	Enamels, lacquers, epoxies, alkyds, acrylics, primers, solvents	Ignitable wastes, toxic wastes, paint wastes, solvent wastes
Paint removal	Solvents, paint thinners, enamel, white spirits	Paint wastes, toxic wastes, solvent wastes
Exterior washing	Solvents, cleaning solutions	Solvent wastes, oil, and grease
Equipment degreasing	Degreasers, engine cleaners, acids, alkalis, cleaning fluids	Ignitable waste, combustible solids, acid/alkaline wastes
Refueling	Diesel fuel	Evaporative losses, fuel drops and spills

Source: EPA/RCRA, *Fact Sheet: Motor Freight/Railroad Terminal Operations* (Washington, D.C., 1993), p. xi.

Aviation

Construction and Maintenance

Construction and maintenance within the aviation industry consist of creation, expansion, and rehabilitation of airports and surrounding infrastructure. Since aviation ROW is primarily airspace, environmental impacts emanating from any particular flight path are negligible. Airports do influence land use, social and economic impacts, soil and water quality, air quality, local ecology, and noise.[15]

Airports require a great deal of land for runways, storage facilities, maintenance facilities, fuel storage, ground support storage, airplane access terminals, utilities, and various relays to road and rail outlets. Consequently, a large area of contiguous habitat is usually lost during construction or expansion. For airports to be effective, they need to be located in close proximity to large population centers to compensate for transportation costs.

During airport construction or expansion, soil and water quality can be affected negatively. Cleared vegetation and grading will expose topsoil to erosive conditions, creating runoff into local streams or water systems. This runoff can possibly include toxic substances, such as diesel fuel, oil, grease, asphalt and concrete materials, and various solvents used in the construction process.[16]

Construction and expansion of an airport generate air emissions directly and indirectly through landscape excavation. Most large airport construction equipment creates concentrated levels of diesel fuel combustion and stirs up a large volume of airborne dust particles as they traverse exposed soil.

Airport construction or expansion can affect local ecosystems and local biotic communities if it occurs on or near wetlands, floodplains, or wildlife habitats. If the airport project is creating development where previously it didn't exist, the population relocation problem will most likely be avoided. However, modification to natural lands may constitute just as detrimental an effect. Serious disruption to local ecosystems can occur as airport facilities develop large areas of land.

Noise will also be a factor as an airport is being constructed or expanded. As discussed previously, construction equipment can generate a great deal of noise (see Table 5.5). Airport and airline experts have invested a great deal of effort into noise mitigation methods, which can be effective on cutting down the noise impacts of construction equipment.

In these urban areas, land is either difficult to come by or people are required to relocate their homes or businesses. Airport construction and expansion bring about positive contributions to a local economy through employment opportunities and purchase of materials. Relocation of residents or businesses can be positive (if people are compensated and relocated by preference) or negative.

Operations

The cost of operating aircraft and the weight and volume limits on the amount of goods that can be transported per plane make aviation expensive relative to other modes measured in terms of dollars per kilogram/kilometer of transit. Aviation travel, airport operations, and disposal of aircraft can each produce an environmental impact.[17] Aviation travel generates high-altitude emissions, low-altitude/ground-level emissions, and noise. At high altitudes, a plane's engines burn fuel at high temperatures, giving off quantities of CO_2, CH_4 and N_2O, along with large volumes of water vapor.[18]

Airplane engines burn cooler at low-altitudes and ground level and subsequently emit different by-products: CO, NO_x, VOC, SO_2, PM, butadiene, and others; generally these gases remain localized around airports. Unlike high-altitude emissions, which disperse in the upper atmosphere, the adverse affects of low-altitude and ground-level emissions on local ambient air quality correspond directly to the frequency of flights.

Noise pollution is arguably the most measurable environmental impact of flights. The louder each aircraft is and the longer it's heard, the more disturbing it is. The greater the number of aircraft operations, the more disturbing is the noise they produce. Air travel noise during night hours typically is more disturbing than daytime noise.[19] Table 5.7 lists factors that can be used in measuring aircraft noise exposure.

Environmental impacts from airport operations occur from air emissions from both ground support equipment and discharge from rail and highway traffic leading up to and away from the airport. Ground support vehicles are used primarily in disembarking aircraft, loading and unloading cargo, and transporting materials from one area of the airport to another. These vehicles emit quantities of CO, NO_x, VOC, and PM as air emissions resulting from engine combustion of petroleum and diesel fuels.[20] As the aviation industry is used to a greater extent for transportation of goods and people, the quantity and frequency of usage of these ground support vehicles will grow proportionately.

Airport operations generate a great deal of solid and liquid waste, primarily from the servicing of aircraft. Aviation fuel, waste fuel, oils, synthetic lubricants, hydraulic fluids, and solvents must be stored and transported on site. Table 5.8 illustrates the facilities, materials, and characteristics of these generated solid and liquid wastes. Some of these products are toxic and can be a threat to human health if not properly handled and stored.

Table 5.7
Aircraft Noise Exposure Factors

Arrival and departure profiles
Engine thrust and power settings
Runway layout
Airport flow
Runway use and flight corridors
Operational activity within corridor
Yearly fleet mix
Number of operations
Daytime operations
Nighttime operations

Source: US DOT, Federal Aviation Administration (FAA), *Final Environmental Impact Statement: Proposed Runway at Miami International Airport, Final Report Summary*, vol. 1, FAA-FL-980275-Frs (Washington, D.C., September 1998), p.4-3.

Truck

Construction and Maintenance

The trucking industry relies on roads and bridges as its ROW, making it unique among all other transportation modes in that it depends on an infrastructure built not exclusively for it. The general public relies on highways for personal transportation, which enable trucks to accomplish what no other mode can–deliver door-to-door. For the purposes of this chapter, the trucking industry ROW will be referred to with a variety of synonyms including road, roadway, highway, or street. The interchange of these words will not constitute a differentiation between ROW sizes or capacity. However, the flexibility of road transport comes at a price, for it requires miles of ROW construction and maintenance. Its environmental impacts can be broken down into land use, social and economic impacts, air quality, noise pollution, soil and water quality, and local ecology.[21]

Table 5.8
Airport Operation Wastes

Source	Materials/Wastes	Characteristics
Airline maintenance and aviation industrial facilities	Waste fuel, used oil, synthetic lubricants, hydraulic fluids	Generated during aircraft system servicing and repair
	Detergents and cleaning solvents	Contained in aircraft wash
	Acids, alkalines, metals	Used in metal plating, hardening, and anodizing
	Paints, resins, solvents, acrylics, and primers	By products of aircraft painting operations
DCAD airport facilities	Fuel, oil, and paint removers	Stored for disposal
Fuel storage and transfer	Jet-A, aviation fuel, and other petroleum-based fuels	Transferred through pipe or tank trucks
Aircraft ground support equipment	Used oil, hydraulic fluids, solvents, paint, and batteries	Generated during servicing and repair

Source: USDOT, FAA, Final Environmental Impact Statement: Proposed Runway at Miami International Airport, Final Report Summary, vol. 1, FAA-FL-980275-Frs (Washington, D.C. September 1998), p. 3-83.

The construction and maintenance of highways consume a great deal of land and often alter land-use patterns, eliminating possible agricultural land and vegetation, wetlands, or wildlife habitats. Land conversion to roadways can also influence local population growth and neighborhood development; there can be positive and negative social or economic impacts. Use of land to construct roads can also have an effect on local aesthetics, creating views of human-made structures, such as bridges and bypasses, over natural landscapes.[22]

Social and economic impacts from road construction and maintenance come in the form of capital inflows into local economies, along with changes in population characteristics. Through road-related employment and purchase of materials, local economies can grow sharply, and the opportunity for increased traffic entices businesses and neighborhoods to build up around new roadways.

Diesel-fueled road-construction equipment will generate emissions as roads are being constructed or maintained. Large volumes of airborne dust will also be present as construction equipment stirs up exposed soil. Air quality degradation is a major impact of the trucking industry, as discussed below under "Operations."

Noise pollution will also be a factor during road construction and maintenance. As in the construction methods of the rail industry, a great deal of heavy machinery is used. In addition to the equipment listed in Table 5.5, road construction and maintenance may use machinery listed in Table 5.9. Again, noise pollution does not usually pose a health risk but does contribute to adverse public reaction and a decrease in the quality of life.

Table 5.9
Road Construction Equipment Noise

Type of Equipment	Estimated Level (dBA at 50 ft.)
Air compressor	81
Asphalt spreader (paver)	89
Asphalt trucks	88
Backhoe	85
Bulldozer	87
Compactor	80
Concrete spreader	89
Concrete mixer	85
Roller	80

Source: USDOT, FAA, *Draft Environmental Impact Statement Airport Access Program La Guardia-JFK International Airports*, vol. 1, FHWA-940236 (Washington, D.C. June 1994), p. 5-88.

Leveling, grading, and paving over large amounts of landscape affects soil and water quality through soil erosion. Without proper mitigation, large amounts of exposed soil can be washed away in local streams causing increases in turbidity. In addition, certain hazardous materials, including phenolic compounds and sulfates, used in the paving and finishing of road surfaces, can affect surface water quality through runoff.[23] Road construction and maintenance also can disrupt, diminish, or alter local ecosystems and wildlife habitats, affecting distribution of animal-mating cycles, access to important food sources, and opportunities for shelter.

Operations

Throughout the world, trucks have gained in importance primarily because they possess speed and flexibility, desirable qualities to shippers of higher valued and packaged goods, of which more are shipped every year.[24] As trade increases, no matter what mode of transportation is used primarily, the trucking industry will grow in order to deliver goods directly to distribution or retail sites. Environmental impacts from trucking operations can be broken down into truck travel, motor vehicle maintenance and support, and vehicle disposal.[25]

Truck engine emissions can contain quantities of CO, NO_x, VOC, SO_2, PM, CO_2, CH_4, N_2O, benzene, butadiene, and formaldehyde. These air pollutants, in high enough concentrations, have been associated with cases of chronic respiratory illness, cancer, headaches, and premature deaths.[26] In addition, particulate matter such as dust can also contribute to increase asthma attacks, as well as many of the human health consequences listed above.[27]

Congestion is an additional factor, one which many other transportation modes are able to avoid, which exacerbates air quality effects. Road congestion and delays force truck engines to idle; as engines run at hotter temperatures, they produce emissions at a higher rate in a more concentrated area. When trucks are used in international trade, border crossing can contribute greatly to delays and idling truck engines. Mitigation of these conditions will be discussed later in this chapter.

A number of different pollutants can be deposited on road surfaces, and runoff from road surfaces can affect water quality. As motor vehicle parts (e.g., tires and brakes) wear, trace elements are left on road surfaces. During rainfall, these materials can be washed off the roads and carried into local water systems. Table 5.10 lists some common materials that can be found in street surface runoff. Many of these substances can pose a potential threat to wildlife or human health.

Table 5.10
Common Street Surface Pollutants

Source	Pollutant
Local soil erosion	Sediments (inert)
Plant/soil carried by wind/traffic	Nitrogen/phosphorus compound
Vehicular leaks/spills (not engine oil)	Grease, petroleum, n-paraffin, lead
Vehicular leaks/spills (engine oil only)	Phosphates, zinc, hydrocarbons
Tire wear	Rubber
Clutch/brake wear	Asbestos, lead, chromium, copper, nickel
Deicing compounds and roadway wear	Chlorides, sulfates, cyanide
Animal excrement	Bacteria (coliform), nitrates

Source: Connecticut DOT, *Interstate Route 95 – New Haven Harbor Crossing: New Haven/East Haven/ Branford/ Madison/ Clinton, Connecticut, Water Resources Supplement*, FHWA CT 990214-F, USDOT-FHWA, May, 1999, p. II-14.

Noise emanating from truck travel is also a serious environmental impact. Roadway noise is dependent on many factors: vehicle type, speed, number of vehicles, roadway surface and gradient, distance from the roadway to the receptor (ear), ground surface (whether hard or soft), and shielding between a receptor and the road. Generally, if a vehicle speed and/or traffic volume increases, so does the noise level. However, heavy trucks typically operate at a more constant noise output than automobiles do regardless of speed, as they retain a nearly constant engine revolutions-per-minute level.[28]

Motor vehicle maintenance and support produces a great deal of solid and liquid wastes, much like the rail industry. Table 5.11 illustrates the many possible contaminants produced through terminal operations, which can include general maintenance, repair, refueling, repainting, and tank truck cleaning. These pollutants, while generated in different quantities, are comparable to those produced by rail terminal operations. Truck terminal operations can also produce levels of diesel fuel combustion emissions as a result of loading and unloading truck trailers.

Table 5.11
Motor Freight Terminal Operations

Process/Operation	Materials Used	Waste Generated
Unloading or cleaning of tank cars	Solvents, alkaline cleaners	Acid/alkaline wastes Toxic wastes Solvent wastes Residual tank contents
Rust Removal	Naval jelly, strong acids, strong alkalines	Acid/alkaline wastes
Painting	Enamels, lacquers, epoxies, Alkyds, acrylics, primers, solvents	Ignitable wastes Toxic wastes Paint wastes Solvent wastes
Paint removal	Solvents, paint thinners, enamel, white spirits	Paint wastes Toxic wastes Solvent wastes
Exterior washing	Solvents, cleaning solutions	Solvent wastes Oil and grease
Equipment degreasing	Degreasers, engine cleaners, acids, alkalis, cleaning fluids	Ignitable waste Combustible solids Acid/alkaline wastes
Refueling	Diesel fuel	Evaporative losses Fuel drops and spills
Changing of batteries	Lead-acid batteries	Acid/alkaline wastes Batteries (lead acid)

Source: US EPA/RCRA, *Fact Sheet: Motor Freight/Railroad Terminal Operations* (Washington, D.C., 1993), p. xxi.

Trucks do not last nearly as long as railcars, aircraft, or ocean vessels. Accordingly, large quantities of trucks and truck parts, along with used tires, used motor oil, and lead-acid batteries, need to be disposed of or reused on a regular basis. Many of these materials are not easily recyclable, and must be handled with caution because of their potential harm. Truck hardware takes up space in landfills. Toxic materials associated with trucking operations can, if uncontrolled, seep into groundwater supplies.

Maritime

Construction and Maintenance

Waterway construction projects can range from deepwater ports to canals, river terminals to breakwaters. No matter what type of construction or maintenance is being conducted, there are going to be significant potential environmental impacts to consider.[29] Port and terminal construction or expansion can directly affect wetlands and permanently alter acres of land for warehouses, storage yards, and maintenance facilities. Such construction or expansion requires, in most cases, the use of impervious asphalt and concrete to blanket these areas, creating substantial volumes of storm-water runoff.

Maritime facilities can also affect coastal watersheds, from quarrying rock and creating breakwaters, to building dykes to divert water sources. These wetlands provide food, shelter, and nursery areas for birds, marine invertebrates, fish, and other wildlife. As construction occurs, vital areas can be lost or altered to the point that they cannot sustain these sensitive ecosystems.

Construction and expansion of ports will have a positive impact on local economies because of increased employment as local businesses benefit from sales of materials for construction. Port facilities also encourage increases in travel and tourism, which can also have a positive impact on local economies.

Operation of construction equipment creates air emissions and increased noise levels. Construction equipment air emissions can come from diesel and petroleum fuel combustion, as well as particulate dust stirred up by traveling over uncovered soil. Noise levels will rise as well, emanating from high truck traffic, bulldozers, and other equipment (see Table 5.12) used during harbor terminal construction and maintenance.

Dredging is one of the most significant sources of environmental impacts from the maritime industry. Dredging is necessary in many harbors and channels because many ports are not naturally deep enough to accommodate modern vessels.[30] As most ports are naturally near river sources, sedimentation from river flow may make repeated dredging necessary. The difficulty lies in the disposal of dredged materials. Some dredged materials can contain high levels of toxicity from settled materials resulting from earlier spills, vessel operations, or disposed-of wastes from operations in the port areas. Dredging near ports on freshwater channels can also increase salinity.

Operations

Trade enhancement can encourage the use of larger vessels, increase congestion, and add to maritime traffic along important waterways. Thus, the environmental impacts of maritime operations will continue to become more prevalent. The maritime industry produces a variety of environmental impacts through vehicle operations, terminal operations and vehicle servicing, and vehicle disposal.

Table 5.12
Harbor Construction Equipment

Type of Equipment	Estimated Range (dBA at 50 ft.)
Earth moving:	
Compacters	72-88
Front Loaders	72-95
Backhoes	72-92
Bulldozers	75-85
Scrapers, graders	78-94
Pavers	83-92
Trucks	70-98
Materials handling:	
Concrete mixers	72-91
Concrete pumps	78-84
Cranes (movable)	78-96
Cranes (derrick)	85-88
Stationary:	
Pumps	69-80
Generators	69-82
Compressors	69-86
Impact equipment:	
Pneumatic wrenches	82-88
Jackhammers and Rock drills	77-98
Pile drivers	89-105
Other:	
Vibrator	69-81
Saws	67-93

Source: U.S. Army Corps of Engineers, Draft Environmental Impact Statement/Environmental Impact Report: Phase I 2020 Plan and Feasibility Study, COE-CA-900342 (Washington, D.C., September 1990), pp. 3.11-16.

Vessel engines give off air emissions in the form of CO, NO_x, VOC, SO_2, CO_2, CH_4, and N_2O. There are currently no international restrictions on maritime vessel emissions, and it has been well documented within the industry that regulation is needed in this area.[31]

Ships can discharge oils and lubricants, untreated sewage, and various bilge materials into waters. Vessel movement and use of anchors can also stir up sediments that can increase turbidity, releasing settled toxins and affecting photosynthesis processes, which in turn can affect marine life and habitats. Vessel discharges can harm or kill fish and other biota. Disrupted photosynthesis can negatively affect plant life. Another important issue is the introduction of invasive species. The introduction of exotic or nonindigenous species into an area from visits by foreign ships can affect the ecological, economic, and social aspects of the environment. Ocean vessels can carry seawater containing these species to ports all over the world, and some ecosystems have experienced local species extinction as a result.

Maritime vessel travel, especially through developed river systems, can also cause serious soil erosion. Traveling vessels leave a wake from the propeller movement, which causes waves to bombard the banks of the river. The size and frequency of these waves depend on the width of the river, the speed of the vessel, and the number and size of the vessels traveling on the river. Soil erosion can cause damage to fragile habitats along riverbeds, along with increased turbidity and sedimentation along the course of the river.[32]

Terminal operations for maritime vessels include a number of services, such as structural repairs, painting, engine or power plant maintenance, electroplating, air conditioning and refrigeration service, and electrical repair. In addition, operations include vessel unloading and cleaning, vessel storage, and refueling.[33] All of these operations may produce wastes that can have a negative impact on air, water, and soil quality. Table 5.13 lists possible terminal activities and the type of pollutant produced through that activity.

Fortunately, water vessels, due to low levels of friction and relatively few moving parts, last a long time. As a consequence, vehicle disposal is not common but can be significant when it does occur.

Pipeline

Construction and Maintenance

Pipelines do present a viable transportation alternative for bulk liquid and gaseous commodities. In most cases, the construction of a pipeline produces the largest environmental impact of the life cycle of the pipeline. Construction will create impacts in the form of land use, air quality, water and soil quality, and noise pollution. Pipelines can either be buried underground, run above ground, or be a combination of both. The siting of a pipeline may be dependent on the topography, type of soil, elevation, and surrounding habitat. The ROW of the pipeline is much like that of the rail industry, in that a wide, usually straight-line run area of land must be cleared and excavated. This process can have an effect on local land use, affecting agricultural lands and wildlife habitats.

Construction can also include facilities such as compressor stations, meter stations, and mainline valves.[34] These collateral facilities also will use land and will incur similar potential impacts as does construction of the actual pipeline ROW.

Heavy use of construction equipment during pipeline construction will also affect ambient air quality as pollutants are emitted from the combustion of diesel and petroleum-based fuels. As in construction of the other modal ROW, construction equipment can also throw dust particles into the air when traversing exposed soil.

Table 5.13
Maritime Terminal Operations

Process/Operation	Waste Generated
Air emissions from storage tanks and open processing equipment	VOC emissions
Grit blasting and chemical Stripping	Wastewater containing blasting media, organic paint sludges, heavy metals, stripping chemicals, VOCs
Spray painting, resin application	Waste paints, thinners, degreasers, solvents, resins and gel coat, VOCs
Engine repair	Waste turbine oil, lubricants, degreasers, acids, batteries, carburetor cleaners, VOCs
Electroplating/metal finishing	Cyanide solutions, heavy metal sludges, corrosive acid, alkali solutions
Machine shops	Spent cutting and lube oils, scrap metal, degreasers, VOCs
Equipment cleaning	Wastewater containing paints, solvents, oils, and degreasers
Degreasing, equipment cleaning, chemical paint stripping, plastics	Resin- and paint-contaminated solvents, VOCs

Source: US EPA/RCRA, *Fact Sheet: Maritime Terminal Operations* (Washington, D.C., October 1991), p. ii.

Exposed soil may be eroded from storm water and wind. These soils and toxic remnants of the construction process can be washed into local surface and groundwater systems. As soil constitution in the area is altered, local vegetation may be removed and changes in local ecosystems may affect wildlife habitat areas.

Pipelines, in operation, make relatively little sound. Consequently, almost all the sound impacts incurred from the pipeline mode are during the construction phase. However, especially if the pipeline is buried, the pipe-laying process can be exceedingly slow. As a result, noise impacts to local residents may be experienced for extended periods.

Operations

With pipelines, the majority of the environmental effects are produced in the construction phase. Pipeline facilities, such as compressor stations, produce some air and noise emissions in creating the vacuum force that creates movement of commodity within the pipeline. One potential source of significant environmental impact in the operation of a pipeline is a leak or breach of the pipeline. It is possible for large amounts of a piped commodity to be released into the environment if such an event were to occur. The potential harm could be disastrous, particularly if the commodity being transported is either a toxic petroleum product or a combustible gaseous compound. Fortunately, such discharges or explosions are rare, and there are design mitigation techniques that reduce this potential effect.

Multimodal Transportation Hubs

Globalization, agile manufacturing, and speed-to-market delivery demands are encouraging innovation in the creation of multimodal transportation infrastructure. Intermodal transportation services are an integral part of supply-chain management as producers require coordinated, continuous, flexible, and reliable transportation, which creates a demand for ports, airports, and rail and trucking terminals that integrate transportation and logistics services.[35] While previous subsections discussed the environmental effects of each individual transport mode, multimodal hubs compound these effects as modes interact through the same space at the same time.

Even though multimodal transportation hubs provide important efficiency opportunities, they do create environmental impacts.[36] Figure 5.5 shows the interconnection between vehicle operations, equipment maintenance, and facility operations.

Vehicle Operations

As discussed earlier in this chapter, vehicle operations can pose serious threats to air, water, and soil quality, as well as produce high levels of waste products. Gasoline- and diesel-powered engines can emit hydrocarbons, CO, CO_2, NO_x, SO_2, CH_4, VOC, sulfur compounds, particulates, and a host of other trace compounds that have been found to be harmful to human health. Multimodal hubs serve to bring these various modal vehicles into one area, concentrating their emissions. If the hub is not run efficiently, it can also result in long periods of vehicle idling due to congestion, leading to greater concentrations of harmful emissions.

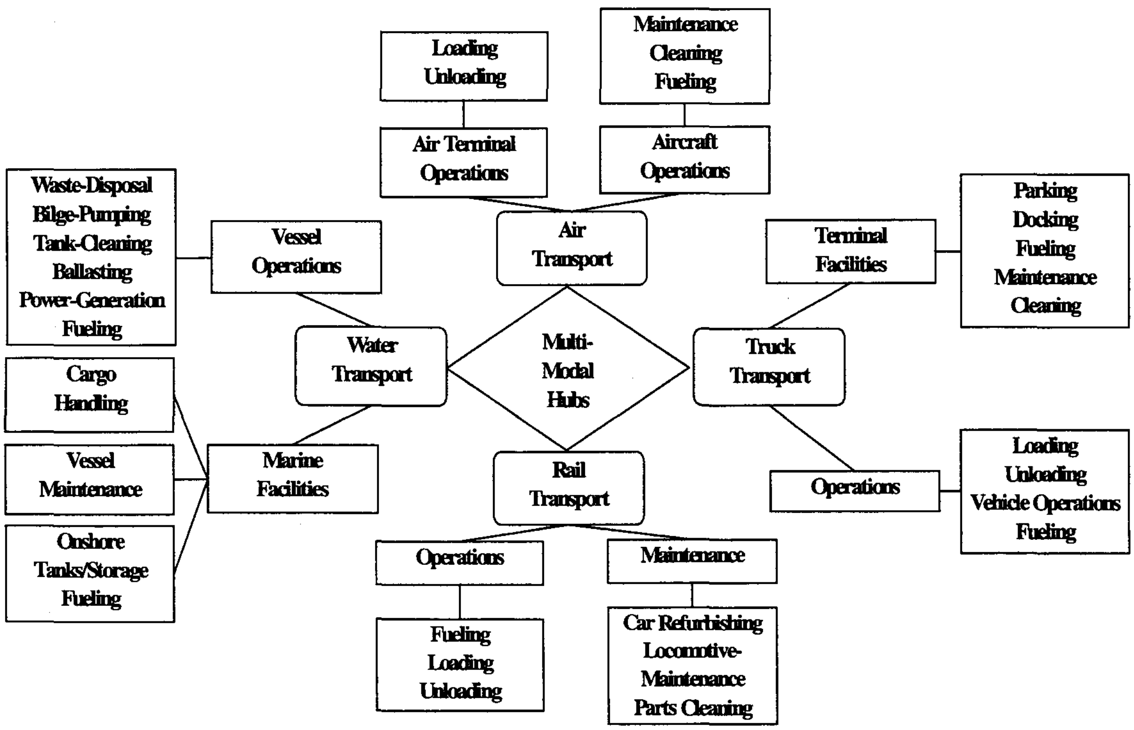
Harmful effects can also emanate from fueling, freight loading and unloading, parking, docking, and so on. As vehicles move through these multimodal hubs, the potential for accidents and mishandling of cargo increases. The transfer of cargo from one set of handlers to another, from one mode to another, from one company to another, creates a risk of misunderstood directions, failure to take necessary precautions, or the opportunity for human error.

Equipment Maintenance

Maintenance and refurbishing of transportation equipment can also contaminate water and soil from waste fuel disposal; spent solvents; used oils, lubricants, and degreasers; and heavy metal paints and sludges. As these materials are stored, transferred, or disposed of, there is the potential risk that these materials can spill, seep into soil, or contaminate storm water and reach local water systems.

As multimodal hubs are constructed and as existing ports, airports, rail terminals, and trucking and distribution complexes expand to provide intermodal transportation services, the potential environmental impacts associated with each type of transportation can be compounded.[37] As various modal vehicles require fueling, cleaning, painting, and servicing, this diversity of activities can generate significant volumes of residuals.

Figure 5.5
Multimodal Hub Operations



Source: Michael Brown, *Managing the Environmental Impacts of Multimodal Transportation and Integrated Logistics Systems* (Austin, TX: The University of Texas at Austin, August 1998), p. 5 (Figure 1).

Facility Operations

Development in and around transportation hubs changes land uses, primarily increasing density by attracting new businesses and construction of new industrial plants, warehouses, and light manufacturing in surrounding areas. Multimodal hubs generate more intensive local and regional traffic that can create additional environmental problems.[38] As multimodal facilities expand, land once used for farming or pasture may be converted to industrial purposes. Groundwater or surface water resources may be tapped at an increasing rate. Then facilities will produce wastewater and storm-water runoff, carrying possibly toxic materials. Noise and light pollution will begin to intrude on local residents.

Multimodal facility operations require equipment and space for loading and unloading to and from various modal vehicles. This equipment (cranes, forklifts, tugs, elevators, etc.) will produce air discharges, as well as waste products. As these facilities increase in activity, the risk of potential spills, cargo release, and so on will increase. This risk will be talked about in the next section dealing with the potential for man-made disaster.

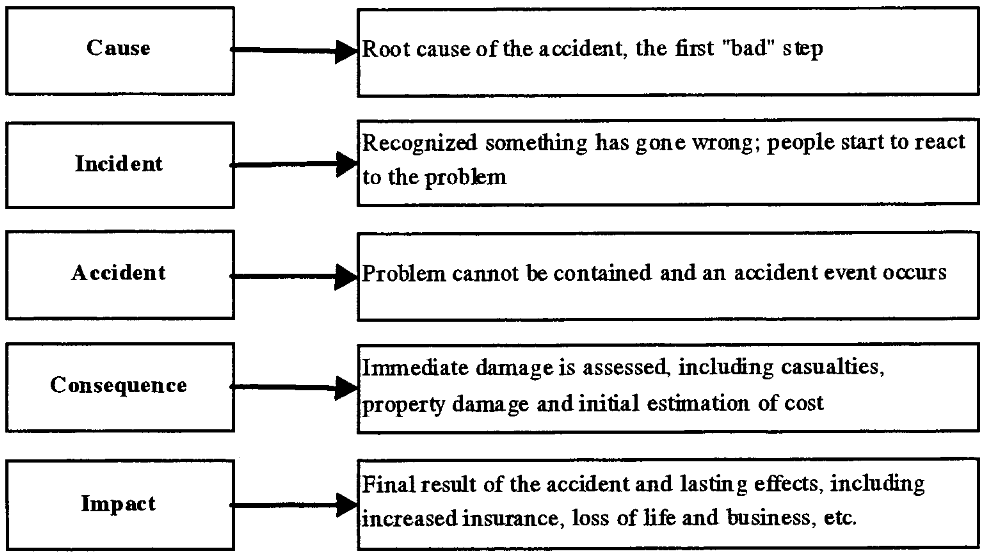
Potential for Man-Made Disasters

All modes of transportation share the fact that human beings operate them. No matter what the vehicle, or the action, human decision has a part in the process of transporting goods from point to point. As a consequence, human error is a potential risk in any transportation endeavor. While it is difficult to quantify the environmental impact of judgment error, this section will focus on the various potential outcomes that may be possible through modal transportation and what the consequences of those outcomes may be. Erroneous decisions resulting in environmental damage can be made by various members of any given transportation industry–the pilots, the equipment designers, the people in the front office, the company boardrooms, the labor halls, and even regulators.[39] Each of these groups of people has the responsibility to create a transportation entity that is designed well, run efficiently, and executed safely. Studies have shown that nearly 80 percent of all modal accidents have human elements as their root cause.[40] Figure 5.6 illustrates stages of an accident and the environmental consequences.

Rail

Within the rail industry, there are three main sources of environmental impacts that can be directly attributed to human error: fuel spills, train derailment, and train collision. A majority of fuel spills occur during refueling when the fuel level within the engine is misjudged, causing overflow. This overflow of diesel fuel many times can contaminate soils and cause a potential threat to local surface- and groundwater systems. A large quantity of hazardous material, which can be combustible, corrosive or poisonous, is hauled via rail. In the event of a train derailment or collision, railcars can rupture and release these harmful substances into local ecosystems.

Figure 5.6
Human Error Stages



Source: Adapted from US DOT, U.S. Coast Guard, *Prevention through People Outreach Package* (Wasington, D.C., April 1998), p. 4-5.

Aviation

Most environmental impacts attributed to human error within the aviation industry can be attributed to commodity transfer and loading; however, there are instances of fuel spills and occasional accidents en route. Incidents during goods handling can come in the form of dropping and rupturing containers, moving unsecured loads, or failing to handle cargo according to instructions. Fuel spills can occur on occasion (see the subsection on rail), except that these events are rare in comparison. There is also the potential for accidents while in transit, although it is generally difficult to pin down the cause or causes behind air accidents.

Trucking

The trucking industry may have the highest potential for environmental impacts due to human error. Hazardous material releases can come from the transfer and loading of goods, fuel spills, unsecured loads, and highway collisions. Hazardous material releases from commodity transfer and loading are similar to such events in the aviation industry. These sorts of accidents, along with fuel spills, are usually small in any particular incident because of the relative size of a truck in comparison with an airplane or ocean vessel. Hazardous material releases can occur either through improper loading (creating an unsecured load that can cause a truck to lose cargo in transit) or from truck accidents. Truck accidents can occur when the truck leaves the ROW, when the truck hits another object, or when another object hits the truck. Because of the measurable possibility of one of these events occurring, human error plays a key role in potential impacts. The trucking industry's high versatility allows trucks to haul almost every form of hazardous material that ever needs to be transported, making the risk even greater.

Maritime

The maritime industry faces a unique concern–scale of human error–related to environmental impacts. Because of the relative efficiency of water transportation, usually a vast quantity of a commodity is transported under the control of a single captain. When an accident does occur in an ocean vessel or a series of connected barges, there can be serious impacts due to the size of the release and the dispersion effects on or into water. The most frequent human error-related incidents in the maritime industry occur in commodity transfer and loading and in transit. The environmental impacts due to the transfer and loading of goods are comparable to those described in the aviation industry. Vessels in transit can release large amounts of hazardous cargo in a variety of ways. Human error can be attributed to vessels running aground or hitting another object in the water, causing a breach in the hull or commodity containers. While such events are rare, when they do occur, the impact can be disastrous, as will be discussed in the next section.

Pipeline

The pipeline industry is relatively free from environmental impacts related to human errors. Occasionally, design flaws can lead to pipe ruptures, but many times these faults can be discovered before large amounts of potentially hazardous materials are sent through the pipelines. However, human error in the pumping stations can cause pressure levels to rise beyond safe levels, sometimes causing pipe ruptures. These events are rare but can pose a serious risk, depending on the nature of the material that can be released when a rupture occurs.

Severity of Consequences

The severity of environmental impacts due to human error depends on the type and quantity of the material released, amount recovered in cleanup, chemical properties (such as toxicity and combustibility), and impact area characteristics, such as climatic conditions, flora and fauna density, and topography.[41] For example, a small fuel spill at a rail yard will not have nearly the environmental impact of a hull breach resulting in the release of almost 4 million liters (1 million gallons) of crude oil into a wildlife-rich harbor.

The longevity of the contamination and permanence of the environmental alteration also factor into measuring severity. For example, a tank-truck rollover can release petroleum products in a localized area. The material may be contained and disposed of in a rapid fashion, but its effect on local flora and fauna may be irreversible. The altered chemical makeup of the soil may kill vegetation for years. In addition, this long-term alteration may permanently alter wildlife populations because of habitat loss and changes to migration patterns.

Remoteness of an incident may also play a factor in determining the severity of an impact due to human error. For example, transporting flammable materials via rail through dense vegetation can run the risk of a derailment causing a large fire in a remote area, making it logistically difficult to fight the fire quickly. If an accident occurs a considerable distance from response entities, the original effect may be compounded through time, either through additional spread of contaminants from storm-water runoff, wind, or seepage into soils or from increased exposure to potentially hazardous fumes or lethal substances.

In general, commodity spills of hazardous materials may impose substantial costs of product loss, carrier damage, property damage, evacuations, and the need for response personnel and equipment.[42] Not only may there be serious harm to the environment but also a great deal of effort will be needed in cleanup and assessment. Fortunately, as with many aspects of transportation, there are methods for reducing the potential for human error, which will be discussed later in this chapter.

Potential for Natural Disasters

People have always coexisted with natural hazards, but in the last century what has changed is the impact of natural disasters when they hit.[43] Thus far this chapter has dealt with the impact of transportation and trade on the environment. However, it is also important to look at the degree of impact the environment has on transportation and trade. The following subsections will discuss the geological and hydrometeorological phenomena that can cause a significant disruption to transportation operations.

Geological

Geological hazards include earthquakes, tsunamis, volcanoes, and landslides that occur from time to time across the North and South American continents. All these phenomena are rooted in the movement of the Cocos, Nazca, Caribbean, and American plates. Mountains have literally risen to dominate the landscapes of Latin America. The Andes, Central American, and Caribbean ranges were born from the movement of these large tectonic plates, creating seismic movement. As these plates continue to shift, volcanic eruptions and earthquakes will continue to be a part of life and can affect transportation infrastructure and vehicle operations.

Earthquakes, depending on their size, intensity, and distance from a particular point, can cause destruction to roads, rail lines, air landing strips, and pipes buried underground. If the size and intensity are small, only minor repairs may be needed. Powerful earthquakes can collapse bridges, cause fissures, bend rails, and create a host of other land disruptions. Earthquakes may have among of the most persistent impacts on transportation corridors in Latin America. Unfortunately, earthquakes are difficult to predict and not much can be done to avoid them. However, construction techniques have been designed to reduce the potential damage.

Seismic activity originating underwater creates tsunamis, or tidal waves as they are known in the Atlantic Ocean. They can be caused by earthquakes, volcanic activity, and landslides on the ocean floor, and can travel hundreds of miles building up force. About 80 percent of tsunamis occur in the Pacific Ocean, but there have been significant events in the Caribbean, too.[44] These destructive waves can reach tens or hundreds of feet in height and can pose a significant threat to ports, shipping lanes, and operations located in coastal regions. Their damage can be severe, leaving little to salvage or repair, and there may be little to no warning before they happen.

Volcanic activity can pose a significant threat to transportation infrastructure, due mainly to its destructive force. Eruptions can send millions of tons of lava or ash out over surrounding areas–burying roads and rail, destroying bridges, and damming rivers. Although there is sometimes sufficient time to predict an eruption or lesser activity, the only way to mitigate against this natural threat is to refrain from constructing transportation infrastructure anywhere near an active volcano.

Landslides constitute the second most predominant natural threat after floods facing Latin America. As a geological impact, landslides are unsettled soil jarred loose by seismic and volcanic action. As the ground shakes, loose soils on mountainsides and steep valleys can slide, sometimes traveling at over a hundred miles an hour. Landslides can be devastating, burying roads and rail lines, wiping out power and communication lines. Recovering after a landslide can also take a significant amount of time and capital.

Hydrometeorological

Hydrometeorological hazards include hurricanes and tropical storms, floods, landslides, and drought. Latin America is a region that is particularly susceptible to these phenomena because of the sharp changes in topography, trade winds, and the El Niño and La Niña effects: a series of atmospheric and oceanic changes around the equatorial Pacific that is responsible for floods and droughts at irregular intervals.[45]

Annually some 80 hurricanes form over warm tropical waters during typical summer months.[46] An average of 10 hurricanes threaten the West Indies and the East Coast of Central America and Mexico between June and November every year. These fierce storms bring extremely high winds, torrential rain, and choppy seas and can destroy almost everything in their path. Hurricanes not only pose a dangerous threat to coastal cities and port, but also can seriously disrupt shipping channels or sink unwary vessels. While the frequency of hurricanes can sometimes be alarming, their formation and path of travel can usually be predicted far enough in advance to avoid losing ships to them.

Floods present the number one natural threat to transportation in Latin America. Floods may come quickly and unexpectedly, as in flash floods from hurricanes or landslides, or they can come slowly, as often is the case, with prolonged rains and swelling rivers. When the onset of a flood is slow, its dissipation is almost equally as long. Roads and rail can be submerged for weeks, and in some cases even bridges can get washed out. Added to this prolonged hazard is the time needed to repair damage caused by water submersion. River transportation can also be severely hampered by high river levels that can submerge docks, change river courses, and add large amounts of suspended particles and debris into the navigable channel.

Landslides caused by strong rains and flooding have had devastating effects in Latin America, particularly in deforested areas and in areas where housing and transportation ROW is constructed on unstable soils.[47] These landslides and mudflows can bury roads, rail and power lines, warehouses, and other infrastructure components, making transportation virtually impossible. Landslides caused by hydrometeorological effects can be particularly devastating because of the inordinate weight and mass associated with these soil movements. In addition, unlike rock slides, which can be removed literally as soon as the dust settles, these types of landslides are not easily contained or cleaned up until a large amount of moisture is removed from the soil.

Droughts can also have a negative impact on some transportation systems, particularly river navigation. As water resources are not replenished, river levels drop, making river traffic difficult or impossible. Water molecules act as binding material for soil particles, and as moisture in the soil decreases, it loses stability. Drought can also cause soils to be vulnerable to wind erosion, which can affect road integrity, along with increasing the chance for geological landslides.

Impact Alternatives

A number of alternatives exist in the transportation sector to eliminate, minimize, or alter environmental impacts. The first alternative is to eliminate impacts by employing mitigation techniques and technologies in construction projects and operations. Impact minimization comes through efficiency and reduction of waste and resource use. Environmental impacts can also be altered, or channeled away from population centers, through effective environmental planning.

All of these efforts aim at creating sustainable transportation systems that will not create more adverse effects than positive advantages. In the long run, it is more economical and desirable to plan ahead and manage for future environmental impacts, instead of dealing with disastrous impacts after the fact. It can be looked at much like doing preventive maintenance on a vehicle; why wait until it's broken to fix it?

Mitigation

One of the most effective ways to reduce the overall environmental impact of a transportation corridor is to mitigate individual effects. By employing many small remedies to persistent impacts, the collective environmental effect can be reduced. It is beyond the scope of this chapter to describe or assess all the mitigation options for all transportation modes. However, the following subsections will discuss a few mitigation opportunities that exist for the environmental impacts discussed throughout this chapter.

Construction and Maintenance

More can be done to mitigate environmental effects during the construction and maintenance phase of a transportation corridor than at any other time. Many disastrous impacts can be reduced or eliminated in the design of the ROW and the way in which the construction activity is carried out. Projects, regardless of their scope, should attempt to disturb the smallest possible land area and include comprehensive removal of all waste materials once construction is completed.

During construction, one possible mitigation measure to reduce levels of harmful runoff reaching freshwater systems is to build roadways with drainage and filtering systems that remove a large amount of harmful substances from runoff. To minimize damage to wildlife habitats and harmful erosion, construction projects may reforest or reclaim damaged land after the ROW is completed. Where possible, natural or man-made barriers should be utilized to deflect noise pollution from population centers and sensitive wildlife refuges.

Operations

Mitigating environmental impacts during operations deals directly with controlling effects from the vehicles themselves. Proper maintenance and upkeep of vehicles can ensure that engines minimize harmful emission, and that parts wear and fuel use are kept at normal levels. When possible, transportation entities should utilize new technologies that allow for cleaner-burning fuels, better fuel efficiency, and reduction of harmful substances in air emissions. Another alternative is to ensure that operators are fully trained on the equipment they operate to minimize wrongful use and subsequent undue wear and tear.

Efficiency is one key to reducing environmental impacts from operations. Transportation planners and shippers can play a big role in choosing appropriate modes of transportation for particular goods, selecting efficient routes, and ensuring that vehicles are used to the maximum capacity. Accomplishing these goals reduces the amount of time vehicles spend in operation and decreases the amount of raw materials needed to transport a certain amount of commodity.

Man-made Disaster

In mitigating the potential and occurrence of man-made disasters, there are a number of factors that can be tailored to create an atmosphere conducive to safety. These factors include rules, regulations, and standards; management of vehicles; work environment; professional behavior; and new technology.[48] Each of these areas contributes to the effectiveness and efficiency of a transportation mode; any weakness in one of these areas can increase the possibility for a serious man-made error leading to a potential environmental disaster.

Periodic review of operating procedures can help transportation planners use better practices. Vehicle maintenance and upkeep, along with continual professional training, can aid operators in feeling confident about vehicles they are operating and their ability to do so. This attention to high standards helps maintain a positive work environment, one in which workers make a personal investment in the work they are doing, thus minimizing shortcuts and unsatisfactory attention to vehicle operations. Use of new technologies, when feasible, can contribute to assisting operators in avoiding errant decisions.

Natural Disaster

The accelerated rate of urbanization in Latin America contributes to its vulnerability.[49] Natural disaster mitigation is related directly to decreasing vulnerable exposure. Seismic or hydrological risks in an area should influence construction standards. In regions where there is a high potential for natural disasters such as floods, volcanic eruptions or deadly landslides, prevention would be more cost effective then repair after the fact. A significant portion of mitigation alternatives exists in the operation and construction of transportation corridors. In operations, transportation planners need to stay alert to shifting weather patterns and long-range weather trends and anticipate natural disasters before they strike. Contingency plans that include alternate routes, proximity to emergency rescue, and opportunities for salvage are an essential part of decreasing vulnerability.

There are many mitigation alternatives to natural disasters available during the construction and rehabilitation phase of a transportation corridor as well. One example in road and rail construction is to build on compacted soil and rock and to use semi-pliant materials in surfaces and track beds to absorb earthquake shocks. To reduce the effects of soil erosion, floods, and possible landslides, the amount of land cleared should be minimized before the ROW is constructed. Another possibility is to construct an elevated ROW anywhere flooding is possible, and line the ROW with heavy vegetation to reduce the risk of landslides and minor flooding. The only effective means of mitigating the effects of volcanic action is to restrict construction of major ROW routes to an area outside the blast and flow radius of the volcano.

Multimodal Hub Alternatives

Multimodal hubs play a strong role in developing efficient transportation systems. They create an opportunity for goods to be transported from origin to destination, utilizing the most-efficient modes of transportation for a given commodity. In Latin America, these hubs may be the most economically feasible and desirable way to minimize environmental impacts. The key is to ensure that multimodal hubs themselves are run efficiently, with local environmental impacts in mind.

In the construction of new hubs, or the expansion and maintenance of new hubs, the crux of the efficiency problem is ensuring that the level of incoming commodities equals the level of outgoing commodities.[50] For example, in utilizing a seaport as a multimodal hub, there must be the rail and truck capacity to transport the amount of commodities coming in by ocean vessel. No one benefits if goods pile up on the dock, either because there are not enough ocean vessels to transport them out or enough trucks and trains to transport them into the mainland.

Environmental Planning

Environmental planning is possibly the most difficult aspect of impact reduction. It is one thing for planners to calculate risks and another for people to accept the calculation, want to act on them, or have the means to do so.[51] Latin America is hampered by a lack of the necessary resources, capital, and technology to create an impact-free transportation corridor. However, there are opportunities for planning that can provide significant control on adverse environmental effects.

Some vehicle operation pollution can be reduced through careful attention to goods operating processes, including proper engine maintenance, goods operating techniques, and the purchase of newer vehicles with cleaner-burning engines.[52] While many transportation firms may not be able to afford new vehicles, concentrating on proper and thorough maintenance is feasible. Proper goods transfer through training and clear labeling can also greatly reduce the environmental impacts of mishandling of cargo.

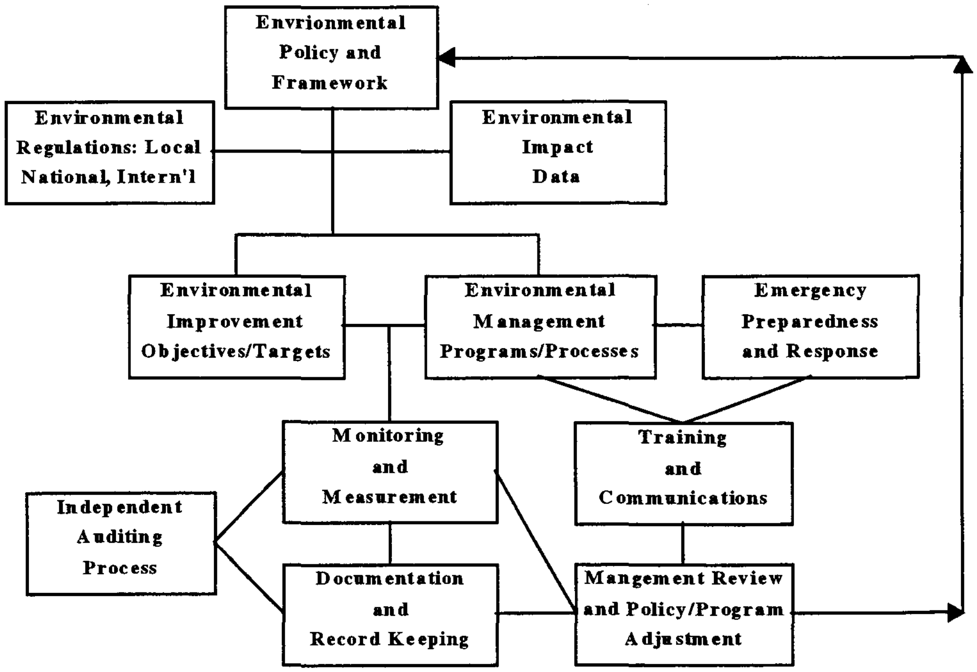
Careful analyses of operations processes have led several large transportation service firms to improve environmental performance by recycling and reusing waste materials–for example, recycling freon, scrap metal, waste antifreeze, and scrap tires and batteries.[53] Finding an alternative use for spent materials is an area of the transport industry that could be further explored. Only recently have transportation firms considered significant reductions in their solid and toxic waste generation by reusing these materials. In many cases, a less-polluting or less-hazardous alternative is relatively inexpensive and, in the long, run can increase operational efficiency.

Environmental planning requires careful identification and assessment of potential environmental impacts and innovative and creative means of preventing pollution before it occurs (see Figure 5.7).[54] This chapter has explored environmental impacts of transportation; with any impact there exists a possibility for mitigation, reduction, or elimination. Transportation planners need to set priorities for environmental objectives and enact those measures that are feasible and most effective for the effort expended.

Conclusions

The goal of any transportation corridor over which trade occurs is to build economic prosperity. Transportation projects can raise social and economic standards and improve the quality of living for surrounding communities. However, as this chapter has outlined, this development comes with an environmental cost. The biggest challenge for transportation planners is to design, build, and operate corridors that achieve their goals without causing irreparable damage to the surrounding environment. Greater economic wealth is welcomed in any city, country, or region, but if the people have to breathe polluted air or drink degraded water supplies, those developments are not in the best interest of the general population.

Figure 5.7
Environmental Management Process



Source: Michael Brown, *Managing the Environmental Impacts of Multimodal Transportation and Integrated Logistics Systems* (Austin, TX: The University of Texas at Austin, August 1998), p. 5 (Figure 3).

As transportation projects multiply and roads, rail, and canals are constructed, the natural resiliency of the environment is affected. Deforestation, environmental degradation, and the irrational use of land create precarious conditions that can multiply the effects of disasters.[55] Potential for natural and man-made calamities increase as land is developed for ROW and other infrastructure needs. As the natural landscape is altered the ecosystems may be less resilient and less able to absorb or cope with humans or nature's environmental damages. As concentrations of people grow around these areas, the number of those affected increases when an unexpected event does occur.

Fortunately, there are various mitigation techniques that can be employed to decrease adverse effects. Alteration in corporate culture and formation of contingency plans for natural phenomena can reduce the number of accidents attributed to man-made and natural disasters. Efficiency is the single most effective measure transportation planners can incorporate in environmental impact prevention.

Because resources of capital are limited in Latin America, it may be more profitable and sustainable to invest money in prevention (design and implementation) than spending money in cleanup, disposal, and rehabilitation. The main conclusion of this chapter is that transportation planning involves considering long-range sustainability in addition to short-term gains, human health in addition to human wealth, and environmental quality in addition to environmental degradation.

Notes

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[16] Ibid., p. xvii.

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