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16. Abstract

The North American Free Trade Agreement (NAFTA) was enacted in 1994 with the expressed intent of reducing barriers to trade. Since that time, however, transborder congestion and delays between the United States (US) and Mexico threaten achievement of this goal. As a partial mitigation strategy, maritime shipping offers a modal alternative for NAFTA trade with the potential for not only strengthening the resiliency of the North American transportation system, but also alleviating congestion for traditional overland modes. To that end, Gulf Coast economies are preparing for increased shipping activity in both vessel size and commodity volumes upon completion of the Panama Canal expansion by 2016. This study assesses the potential for maritime shipping corridors in the Gulf of Mexico between the US, Mexico, and Cuba. We document current trade patterns and infrastructure, analyze potential opportunities for trade expansion, and analyze the policy barriers that need to be addressed to strengthen these maritime trade corridors. The prospect of reduced transborder congestion, increased system resilience, and expanded economic cooperation with Cuba has opened a policy window for more deliberate coordination between national and state governments to make the necessary infrastructure investments and policy changes to bolster maritime shipping capacity.

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Assessing the Potential for Gulf Coast NAFTA Maritime Trade Corridors

by

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SWUTC/15/600451-00118-1

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December 2015

EXECUTIVE SUMMARY

The North American Free Trade Agreement (NAFTA) was enacted in 1994 with the expressed intent of reducing barriers to trade. Since that time, however, transborder congestion and delays between the United States (US) and Mexico threaten achievement of this goal. As a partial mitigation strategy, maritime shipping offers a modal alternative for NAFTA trade with the potential for not only strengthening the resiliency of the North American transportation system, but also alleviating congestion for traditional overland modes. To that end, Gulf Coast economies are preparing for increased shipping activity in both vessel size and commodity volumes upon completion of the Panama Canal expansion by 2016. Regional maritime trade, also known as short sea shipping (SSS) or marine highways, could bolster economic connections between Mexico and the US Gulf Coast and aid both countries in garnering a larger share of increased commodity flows through the region. Moreover, the recent US initiative to reestablish diplomatic relations with Cuba has economic implications for both Gulf Coast and Caribbean economies. Cuba's potential as a transshipment hub, thanks in part to its central location within north-south freight flows, provides regional stakeholders an opportunity to pursue a modal shift of NAFTA-related freight from land to sea.

This study assesses the potential for maritime shipping corridors in the Gulf of Mexico between the US, Mexico, and Cuba. We document current trade patterns and infrastructure, analyze potential opportunities for trade expansion, and analyze the policy barriers that need to be addressed to strengthen these maritime trade corridors. Findings suggest that efforts to expand SSS markets should target freight traveling across the Texas-Mexico land border, specifically the Laredo port of entry. The prospect of reduced transborder congestion, increased system resilience, and expanded economic cooperation with Cuba has opened a policy window for more deliberate coordination between national and state governments to make the necessary infrastructure investments and policy changes to bolster maritime shipping capacity.

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DISCLAIMER

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1. INTRODUCTION

The North American Free Trade Agreement (NAFTA) was enacted in 1994 for the purpose of streamlining the flow of commerce and trade among the United States (US), Mexico, and Canada. Although the necessary regulatory adjustments to tariffs and other economic policy barriers were effectively put into place, resulting in a notable transformation of the trading environment, the necessary complement of transformations in the US's transportation infrastructure were not realized. The intensifications of national security policy following the attacks of September 11th substantially increased the burden placed upon the flow of commerce at existing chokepoints, as well as adding new ones. In addition, the cross-border passage of goods from Mexico into the US has suffered from an upswing in criminal violence close to the border as fall-out from the war on drugs. The Stimulus Bill passed by President Obama in response to the recession of 2008, while it did include funds for general infrastructure improvements, was not equal to the necessary full overhaul of America's trade-related transportation infrastructure required if the intent of NAFTA was to be fully realized. In the face of uncertainty over future budgetary allocations for transportation infrastructure – which are dependent not only upon the political will of the American electorate, but also upon the political inclinations of Congress and the president – this paper serves as an exploration of the utilization of short sea shipping (SSS) to augment the US' freight transportation infrastructure in one of its key trading regions, the Gulf of Mexico.

The recent renovations to the Panama Canal have led to a significant expansion in both the volume of shipping traffic that is able to pass through the canal, as well as the passage of vessels with much larger cargo capacities than those in use when the canal was originally designed. As international freight continues to expand in the volume of goods and materials transported through the canal per vessel, the potential for the Gulf Coast regions of the US and Mexico to profit from this increased volume is obvious. Barring significant rehabilitation of America's freight transportation infrastructure, however, SSS is the transportation mode most likely for the US to be able to access the profit increase from this volume expansion due to its low operational costs and marine surplice equipment availability.

Additionally, in light of the recent reestablishment of diplomatic relations with Cuba, such an exploration is timely, as the island nation represents a potentially significant node in the sea lanes accessed by the process of SSS. In addition, full trade agreements with Cuba could have a significant positive impact upon the economies of the Mississippi River Valley, to say nothing of strengthening and expanding the cruise shipping functions of the port of New Orleans, which would of course be an economic boon to the city. Furthermore, while SSS is usually focused on shipping containers, in the event of full and open trade arrangements with the nation of Cuba, it is plausible to expect a new market for the Louisiana petrochemical industry, again operating from an expanded use of the port of New Orleans.

2. APPROACH

This paper seeks to illustrate the potential of SSS to promote economic growth and development within the US and Mexico in fulfillment of the objectives of NAFTA legislation. It shows how utilizing this freight transportation mode, utilized in the Gulf of Mexico, can compensate for some of the current weaknesses in this region of the aging US' freight transportation infrastructure. Specifically, SSS can partially mitigate the effects of the choke point encountered by the land trucking mode at the US-Mexico border. The SSS mode is also known to leave a smaller environmental footprint than land trucking or rail, as well as for being more fuel efficient.

This is a secondary-data driven approach, utilizing academic, governmental, and trade association related documentation to explain the processes of SSS. These data include an examination of current maritime corridors being utilized in the region, comparing the efficiency of these freight flows with those derived from the land trucking routes between Mexico. The US. Governmental data include information from the US Department of Transportation's Freight Analysis Framework, as well as its North American Transborder Freight Data. In addition, these data are used to delineate current obstacles and opportunities existing within the current intermodal freight transportation network of the Gulf of Mexico. Policy analysis is also be undertaken, focusing on the particulars of NAFTA legislation and the Jones Act of 1920. Opportunities to take pressure off of the land trucking freight transportation mode in relation to the US-Mexico border, as regards containerized shipping, are a particular focus. How these opportunities relate to the expansion of the Panama Canal and a potential trade partnership with the nation of Cuba are also discussed utilizing extrapolations from the aforementioned data sets. National and transnational policies which hinder the movement of freight and goods between the US and Mexico are also examined.

3. METHODOLOGY

Study methodology can be organized into four different areas of analysis: policy, trade patterns and infrastructure, commodity flows, and the Cuban market. The first phase involved both searching for and determining the impact of current policy governing marine trade in the Gulf, with a focus on the influence of the Merchant Marine Act of 1920 (Jones Act) and its subsequent cabotage provisions in addition to the Harbor Maintenance Tax (HMT) and the group of legislation comprising the present day Cuban embargo. This policy analysis is outlined in the literature review.

The second phase began with identification of freight transportation infrastructure in the US Gulf Coast states, Mexico, and Cuba. The US states of interest included Texas (TX), Louisiana (LA), Mississippi (MS), Alabama (AL), and Florida (FL), also referred to as the Gulf Coast megaregion (Ross, Barringer, & Yang, 2008). We reviewed the US interstate highway system to distinguish which roadways carried the bulk of NAFTA-related freight and which land ports of entry experienced most of this traffic. These corridors were identified via consultation of peer-reviewed journals, transportation trade journals, and US Department of Transportation reports. Next we investigated the existing rail and port operations throughout the Gulf coast region and then we evaluated the SSS market in the US. This entailed reviewing federal policy on SSS and past container on barge services along the Gulf coastline. Mexico received a similar analysis of top volume ports and their potential to participate in NAFTA-based SSS services. Then we analyzed Cuban highway, rail, and port infrastructure to identify its potential as a transshipment location.

In the third phase commodity flows were obtained from the US Bureau of Transportation Statistics database on North American Transborder Freight. This commodity flow data was then used to characterize present day truck freight across the US-Mexico border and was used to determine which land ports of entry are most significant in facilitating NAFTA trade. We developed recommendations for improvement to the freight transportation network by identifying infrastructure deficiencies along high traffic freight corridors.

Lastly, we used multiple streams theory to describe the SSS policy change opportunity created by expanded trade with Cuba. We also describe the impact of a potential increase in marine freight from Cuba as an intermediate shipment location on SSS demand from economic actors in the US and Cuba. And to the papers concludes with policy recommendations that help fulfill the SSS commitment outlined in the Energy Independence and Security Act of 2007 and the Coast Guard and Maritime Transportation Act of 2012

4. LITERATURE REVIEW

History of NAFTA

NAFTA, the North American Free Trade Agreement, took effect on January 1, 1994. The agreement was between North America, Canada, and Mexico and provided preferential treatment in terms of trade. NAFTA is under the control of the US Congress and relies on the US Department of Commerce, US Customs and Border Protection, the Department of Homeland Security, and the Secretary of the Treasury. Since the implementation of NAFTA, Congress and the President have enacted legislation, memorandums of cooperation, and executive orders to enhance and improve the original agreement.

While NAFTA initially focused on freight based commerce, since 2003 member states have opened discussions into other avenues of trade, including SSS. The US and Canada signed a Memorandum of Cooperation on Sharing SSS Information and Experience in July 2003. Shortly after signing the agreement, Mexico added their support to the Memorandum. The Memorandum looks at the potential of SSS as a means to decrease the amount of trucks on highways and increase the amount of environmentally friendly options for trade between the US, Canada, and Mexico. (Brooks, 3)

In 2014 by Executive Order, President Obama established the Border Interagency Executive Council (BIEC). (U.S. Customs and Border Protection). The BIEC is funded by the Department of Homeland Security and develops policies "to enhance coordination across customs, transport security, health and safety, sanitary, conservation, trade, and phytosanitary agencies with border management authorities and responsibilities to measurably improve supply chain processes and improve identification of illicit shipments." (Exec. Order 13659) In addition, the BIEC is charged with the implementation and management of the International Trade Data System (ITDS). The ITDS, first described in the Security and Accountability for Every Port Act of 2006 (SAFE Port Act), is a single system through which businesses will submit data regarding imports and exports of cargo to be shared with other businesses, agencies, and other users. (*ibid*) The intention of ITDS is to enhance and simplify the way traders and executive departments and agencies interact.

Mexico

NAFTA provisions and enforcement in Mexico are controlled by the Mexican Congress, the Secretariat for Communications and Transport, the Organisation for Economic Co-operation and Development (OECD),the Comisión Federal de Competencia (COFECO), and other specialized federal agencies.

After the passage of NAFTA, the US offered conditional loan guarantees to strengthen the Mexican economy after a peso devaluation crisis. (Davis & Bartilow, 124) Since then, Mexico and other Latin American countries have embraced economic policies that operate on the premise that by increasing its operations in the global economy they will acquire capital, trade, and technology (*ibid).* As a result of these policies and free trade agreements, Mexico is now the US' third-largest trading partner, behind Canada and China respectively. (Boske)

However, starting in 2011, the Mexican government has taken steps to increase regulation while investing funds in infrastructure improvements meant to increase trade. The Mexican Congress passed amendments to strengthen the power of COFECO in regards to regulating dominant industries in Mexico. While OECD retains most of the power when it comes to regulating trade between Mexico and foreign entities, the amendments are intended to increase enforcement in the areas of telecommunications, transportation, financial services, and energy. (U.S. Department of State) On July 15, 2013, the Programa de Inversiones en Infraestructura de Transporte y Comunicaciones 2013-2018 ("NIP") debuted. The NIP plants to invest approximately $102.5 billion on road, rail, port, and airport projects in Mexico. (Boske 1)

Cuba

Since the transition of power to Raul Castro in 2008, the Cuban government has undergone restructuring in regards to state run entities and agencies. The Ministry of Foreign Trade and Foreign Investment oversees all trade operations. In 2013, The Ministry created a new Foreign Trade enterprise group called Grupo Empresarial del Comercio Exterior ("GECOMEX") which consolidates twelve export and import companies under one organization. (Havana Times) In the first year, GECOMEX took over 36% of Cuba's pre-existing exports for 2014 and was responsible for 16% of new exports in 2014. ("Results of Cuban Group GECOMEX Highlighted") The production of Cuban exports is controlled by mostly State Operated Entities ("SOE"). However, since 2012, there has been a gradual shift from SOEs to co-operatives between SOEs and private individuals and entities in many fields including transportation and construction. (Ashby) Today, Cuba enjoys trading relationships with many regional and state entities including the European Union and CARICOM.

CARICOM

In 1973, the islands of Barbados, Guyana, Jamaica, and Trinidad and Tobago formed the Caribbean Community (CARICOM). Since its inception, CARICOM now serves 15 nations in the Caribbean. The purpose of CARICOM is to promote and expand trade between member nations and third party states. (Caribbean Community Secretariat) CARICOM serves as the coordinating entity for united trade and economic policies across the Caribbean. In 2000, CARICOM and Cuba signed a cooperation agreement to allow free entry into one another's markets for certain goods. (Caribbean Export Development Agency, 16-17)

With regards to the US, the Caribbean has a variety of agreements with both individual countries and multination agreements. One of the first agreements passed was the Caribbean Basin Initiative (CBI) in 1983. The CBI served as a part of the Caribbean Basin Economic Recovery Act, which allowed 27 beneficiary countries to receive reduced or duty free access for selected exports. (Hornbeck, 4) After the passage of NAFTA in 1994, Caribbean countries were excluded from the benefits granted to both Mexico and Canada. In response, the Caribbean Basin Trade Partnership Act ("CBTA") was signed in 2000. The CBTA provided trade benefits, specifically in textiles, to Caribbean nations for a transition period of 8 years or until the country entered into a more formal free trade agreement with the US. (Hornbeck, 7) In addition, the US also entered into trade agreements with Haiti, known as the HOPE Act of 2006, HOPE II, and the Haiti Economic Lift Program (HELP) of 2010. (*ibid)* These programs provide economic support and tariff preferences to Haiti.

South America

South America has signed at least 65 trade agreements, 54 of which are with developing countries and 11 with developed countries. (WTO, 57) Within South America, trade agreements have been historically linked to efforts of economic integration. Currently, the Latin American Integration Association (ALADI), created by the 1980 Montevideo Treaty, serves as the main mechanism for integration and preferential trading among its Latin American member countries. (Mendoza, 17). This agreement extends to countries in South America and Central America. Since the 1980 treaty, its members have signed at least 214 trade agreements with one another. (Mendoza, 18)

The US attempted to enter a FTA with certain countries in South and Central America in 2005. Called the Free Trade Area of the Americas (FTAA), the act would have created one free trade area between Latin America, Caribbean States, and the US. (Pinder) The FTAA never passed as several countries including Brazil and Venezuela would not sign. As a result, the US introduced the Central American Free Trade Agreement (CAFTA), which included several countries not party to the original agreement. Once the Dominican Republic entered negotiations, the agreement name was changed to CAFTA-DR. Under this agreement, member countries have nearly full free trade with one another and provisions related to textiles and apparel are permanent. (Pinder)

Congestion from Freight Trucking

International trade agreements are intended to increase economic activity among member nations through greater trade liberalization. Bradbury (2002) asserted that the signing of NAFTA did just that, increased trade, while simultaneously ignoring the consequences to the transportation, security, and immigration systems. Thanks in part to significant US investments in its domestic highway infrastructure throughout the twentieth century and the lack of adequate regulation of trucks compared to rail, trucking is the most common form freight transportation today (Goddard, 1996). Freight transportation by truck (value) represents the vast majority of shipments of US merchandise with Canada and Mexico at 60 percent, compared to 15 percent rail, 9.5 percent water, 4 percent air, 6.9 percent pipeline, and 4.5 percent other (FHWA, 2013). And with regard to the US-Mexico economic relationship, approximately 89 percent of trade travels through land borders (Brooks, 2005). The result is an overloaded and under capacity roadway system that cannot efficiently transport freight between these border sharing nations. Winston and Langer (2004) explored the futility of increased highway spending as a means of alleviating congestion and concluded that every US$1 spent on highways resulted in a US$0.11 reduction in congestion costs that year. This ineffectiveness led the authors to label highway spending as more of a political tool than a viable transportation planning solution considering the inability of land-locked cities to expand infrastructure and create more capacity in high volume areas. A modal shift of some of this truck-based cargo in the Gulf of Mexico towards marine transportation represents an opportunity to reduce land border congestion.

Short Sea Shipping and Trade Flow Differentials

SSS is defined as the movement of cargo and/or people by sea between ports along a coastline. This is distinct from traditional maritime trade supporting the import and export of commodities between different nations. Traditional maritime trade accounts for approximately 90 percent of all international goods movement. Within global supply chains, logisticians employ

multiple modes including trucking, rail, ship, barge, and air to deliver freight from producers to consumers. Freight is defined here as any good or commodity container, bulk) carried via multiple modes of transport. The domestic European freight transportation market is dominated by roadway and sea shipments with 45.6 percent and 40 percent, respectively (Morales-Fusco, Saurí, and De Melo, 2013). Zhang (2006) chronicled the progression of European Commission's *Motorways of the Sea* initiative, encouraging SSS on Europe's four major sea corridors including the Baltic Sea, the sea of Western Europe, the sea of south-east Europe, and the sea of south-west Europe. According to Bradbury (2002), the transportation systems of the US, Canada, and Mexico developed in relative isolation, which contributes to the freight flow mismatch between nations. The US and Canada experiencing colonization originating on the eastern shorelines experienced a gradual diffusion of population westward, resulting in east-west flow disposition. Mexico's freight transportation system developed outward from the capital, Mexico City, located in the central portion of the country. The latitudinal boundary constraints of Mexico combined with the economic contribution of Mexico City created a north-south flow disposition. In NAFTA all three nations agreed upon a north-south trade flow and the result has been a disjointed transnational transportation system.

The Jones Act

The Merchant Marine Act of 1920, often referred to as the Jones Act, governs SSS along the US coastline and inland waterways. The intent of the Jones Act was to protect the domestic maritime shipping industry by restricting the penetration of foreign flagged vessels in US markets. Generally, the Jones Act states that vessels operating in domestic shipping routes must be built in the US, owned by US citizens, and operated by a crew of US citizens or permanent residents. From a construction standpoint, 98.5 percent of the vessel's hull and superstructure weight must be made in American (Tirschwell, 2005). This restriction does not apply to ship components, resulting in high cost vessels comprised of foreign made components in an unsuccessful attempt to reduce costs. Tirschwell (2005) argued that European SSS vessels are more competitive because they are constructed from imported pre-fabricated ship sections made by low cost manufacturers in Eastern Europe. Foreign vessel operators can apply for exceptions to Jones Act restrictions if their operations are related to US national security concerns such as in the aftermath of a national hazard event, but these are very difficult to obtain.

Canada and Mexico have similar cabotage laws protecting their domestic marine shipping markets, the 1992 Canada Coasting Trade Act and 2006 Ley de Navigación y Comercios Maritimos, respectively. These laws hinder SSS expansion among NAFTA partner nations through limitations on foreign flagged vessel's ability to make multiple port calls within the same country. As Lopez (2013) described, Mexico's cabotage laws have proven problematic in that the SSS market lacks enough vessels to service current service demand from companies like state-owned Petróleos Mexicanos (PEMEX). As a result, Mexico must grant temporary SSS permits with a three month duration, which can be renewed up to seven times within two years. With the passage of the Ley de Inversión Extranjera (FIL), Mexico set a limit on foreign investment in cabotage businesses to 49 percent. However, the law has some exceptions for businesses providing port services like towage, launching, line handling and for foreign businesses with registered Mexican branches (Lopez, 2013). These cabotage laws create policy-based barriers to greater SSS cooperation in North America.

Pros & Cons of SSS

Beyond reductions in roadway congestion, the benefits of SSS include improved energy efficiency, reduced pollution, spatial displacement of emissions, reduced roadway maintenance costs, extended transport infrastructure, applied roll-on/roll-off technology, and the ability to support economies of scale (Daduna 2013; Kennedy 2008). Increased freight shipment via SSS also comes with drawbacks such as increased transportation time, high vessel costs, added transshipment costs and administrative efforts. Hjelle (2010) raised concerns about the environmental impact of SSS due to the 'sluggish' pace of updating maritime environmental policies compared to the trucking industry, the longer economic life of marine vessels, and the push for faster vessels with worse fuel consumption. At the global level the main environmental concern is direct emissions of greenhouse gases from vessels and the emissions related to vessel manufacturing. Regionally, the emission of sulfur dioxide and nitrogen oxides can lead to environmental acidification negatively impacting crops and buildings. Finally, at the local level concerns include poor air quality, noise effects, landscape impairment, soil effects, and water pollution. Daduna (2013) summarized the benefits and drawbacks of SSS in a strengths, weaknesses, prospects, risks (SWOT) analysis (see Figure 1). The risks associated with expanding SSS operations are related to port congestion, new bureaucracies, prioritization of other modes, and stricter environmental regulations. The potential for new economic markets also factors in to decisions to expand SSS.

Strengths	Weaknesses
° Relatively high energy efficiency ° Low pollution (in comparison to other means of transport) ° Capacitive relief on road (and rail) networks ° Reduction in expenditures for construction and maintenance of traffic infrastructure	° Low speed ° Integration of additional ports (with partly insufficient technical equipment) ° Additional handling costs (especially for container transport) ° High coordination costs (planning, control and monitoring of load unit movements)
Prospects	**Risks**
° (Transport) policy prioritization of SSS and RSS ° Long-term growth in multi-modal freight transport ° Relief of central SCT ° Unfavorable cost developments in road transport (fuel costs, wages, road user fees, etc.) ° Foundation of diagonal cooperation in the transport and logistics sector	° Possible bottlenecks in the ports at rising of the SSS and the RSS ° Development of administrative cost structures (port taxes, bureaucracy, etc.) ° Prioritization and subsidization of competing modes of transport (in particular rail freight transport) ° Tightening of environmental regulations in maritime transport (aiming at the use of low-emission fuel)

Figure 1 SWOT analysis of SSS and river sea shipping (RSS) from user perspective (Daduna, 2013)

Impact of the Cuban Embargo

The US embargo of Cuba is the main obstacle to increased trade between these neighboring nations. SSS is a viable transportation option for US-Cuban trade based on Cuba's strategic position in the north-south flow of goods between the US and South America. Given the opportunity, Cuban flagged vessels have the potential to serve multiple Gulf Coast ports in the US. The six US statutes constituting the embargo are: the Trading with the Enemy Act of 1917 (TWEA), the Foreign Assistance Act of 1961 (FAA), the Cuba Assets Control Regulations of

1963 (CACR), the Cuban Democracy Act of 1992 (CDA), the Cuban Liberty and Democratic Solidarity Act (Helms–Burton Act) of 1996, and the Trade Sanctions Reform and Export Enhancement Act of 2000 (TSRA). TWEA allows the US president to restrict trade with any country in times of war. Cuba remains the only country whose trade with the US is still constrained by TWEA since North Korea's removal from the restricted list. The FAA restructured the US mechanism for delivering foreign aid creating US Agency for International Development (USAID) and it further codified prohibitions of aid to Cuba. The CACR imposed an immediate freeze of all Cuban assets in the US, implemented strict regulation of any US commercial activity with Cuba, and prohibited direct or indirect export of US goods or services to Cuba. The CDA, also known as the Torricelli Act, prevented US subsidiary companies to trade with Cuba, forbade US nationals from traveling to the island, and prohibited the of delivery of remittances. The Helms-Burton Act further strengthened US sanctions against Cuba, which included restricting Cuba's economic ties with other partners and opposing Cub's membership in international financial institutions. TSRA was the first piece of legislation to ease restrictions against the Cuban government; it allowed the US to export food, agricultural products, forestry products, and medicine to Cuba while US import restrictions persist (Amnesty International, 2009).

5. FINDINGS

NAFTA Freight Corridors

The US and Mexican freight transportation systems are spatially mismatched. In the US case, its combination of a large landmass and large population (4th world rank) places greater significance on freight shipments to serve a regionalized populace (CIA, 2015). And to facilitate these shipments the US freight corridor system maintains an east-west disposition as seen in Figure 2 developed by the Federal Highway Administration (FHWA) showing a prevalence of east-west freight corridors. Light red corridors represent high volume highways that support more than 8,500 trucks per day. These highways are concentrated along the eastern and western coastlines in addition to the Gulf coast and are critical to the import and export of goods. They also link major metropolitan areas (more than 1 million residents), identified by the circle symbol on the map. The dark red corridors are high volume highway and rail carrying more than 8,500 trucks per day as well. Where the strictly highway corridors have a greater mix of north-south and east-west flows, the combined highway and rail corridors are primarily oriented towards east-west flows. The blue corridors are high volume waterways and the green corridors are high volume railways both carrying more than 50 million tons per year. Waterway freight corridors of note are the Mississippi River and the Ohio River that facilitate freight movement between the central, eastern, and Gulf coast of the US. The busiest rail corridors operate in the mid-western states, which can be attributed to ongoing energy extraction in the Powder River Basin area (coal, oil, natural gas) and large-scale agriculture operations.

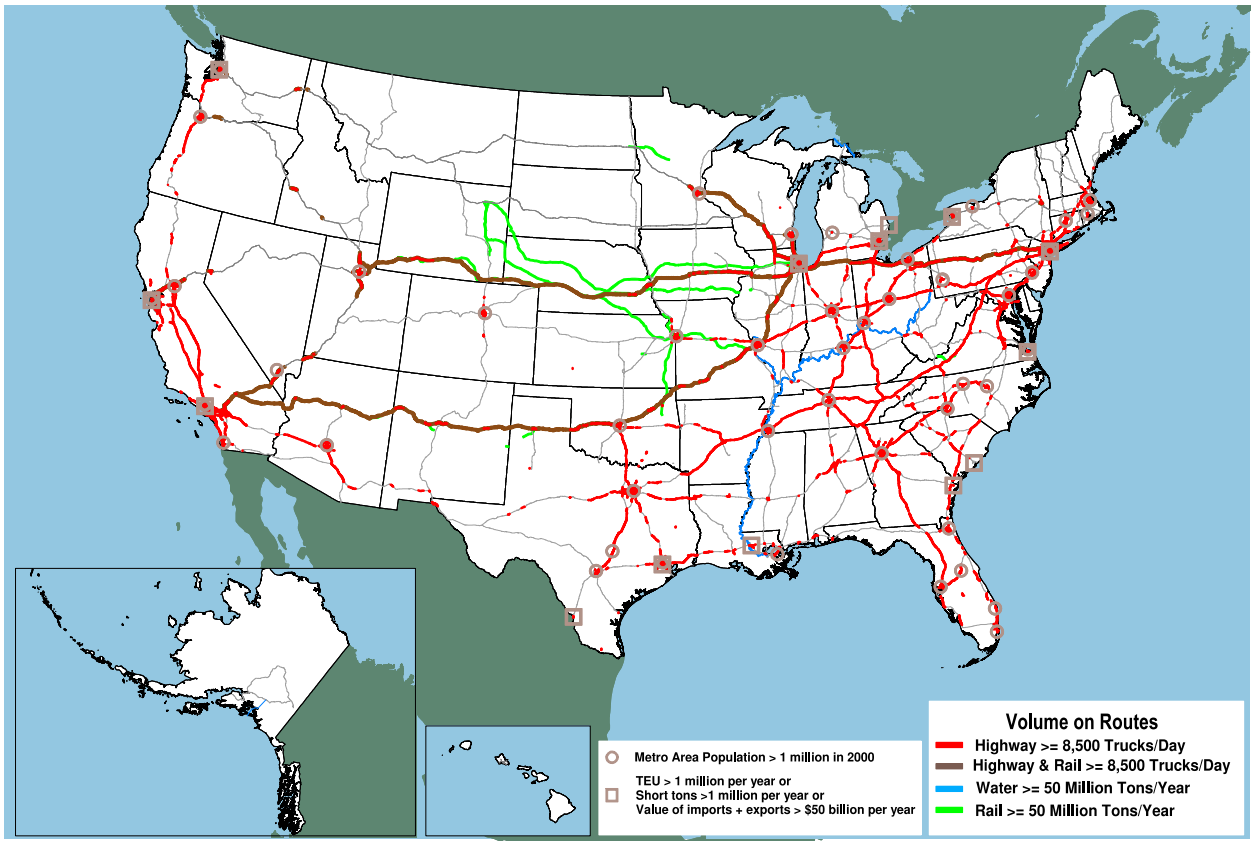


Figure 2 Map of major freight corridors in the US by volume (FHWA, 2008)

For Mexico, a nation with a smaller landmass and population (12th world rank), its system developed from the center (Distrito Federal [DF]), outwards towards the northern and southern provinces establishing a distinct north-south freight flow. This orientation expedites the north-south flow of goods linked to trade with South America and Asia that pass through the Panama Canal and Gulf of Mexico. The freight infrastructure mismatch between the US and Mexico becomes more significant considering both countries over-reliance on trucking for freight shipment. The result is increasing traffic bottlenecks along the southern US and northern Mexico land border at major points of entry. Within Figure 2 we can see that the coinciding sites of high volume freight corridors and ports sharing a border with Mexico are located in Texas and California.

Six highways in the US are considered 'NAFTA' highways facilitating trade with Mexico: Interstate-5 (I-5), I-15, I-19, I-10, I-35, and I-69. I-5 is the main north-south freight corridor of the west coast states originating in Tijuana, Mexico and terminating at the US-Canada border. I-15 originates in San Diego, California and runs through Nevada, Arizona, Utah, Idaho, and Montana up to the US-Canada border. The comparatively shorter I-19 originates at the US-Mexico border in the city of Nogales and connects with I-10 in Tucson Arizona. I-10 is the main highway supporting east-west freight flows along the southern border of the US. This highway also connects key north-south freight corridors along the east and west coasts, I-95 and I-5, respectively. I-35, also referred to as the 'NAFTA Superhighway' originates in Laredo, Texas indicated by the square along the US-Mexico border shown in Figure 2. The square designation signifies annual movement of more than 1 million twenty-foot equivalent units (TEU) or more than 1 million short tons per year or a value of imports and exports greater than US$ 50 billion per year. I-35 enables increased north-south trade flows connecting metros throughout the southwest and mid-west like San Antonio, Austin, Dallas, Fort Worth, Oklahoma City, Wichita, Kansas City, Des Moines, Minneapolis/St. Paul, and Duluth. Lastly, the unfinished I-69 will support north-south flows from Laredo, Texas through the following cities: Houston, Texarkana, Memphis, Evansville, Indianapolis, and Lansing (Vogel, 2006).

NAFTA has achieved greater binational trade but the aggregation of freight corridors along the border creates congestion points. The greatest prevalence of transborder connections occurs in Texas and highlights its relatively higher responsibility in NAFTA-related traffic. Figure 3 is a map of various binational trade corridors between the US and Mexico (Barton-Aschman and La Empresa, 1998). Many of The dark green lines represent high volume corridors supporting more than 40,000 trucks per year and they show a shift in flows from mostly north-south in Mexico to east-west above the border. The dashed green lines show corridors with less than 40,000 trucks per year, while the red lines are highways serving US-Mexico binational trade. If SSS is to make inroads in international freight shipping between the US and Mexico, then Texas represents the largest entrance opportunity based on geographic connectedness.

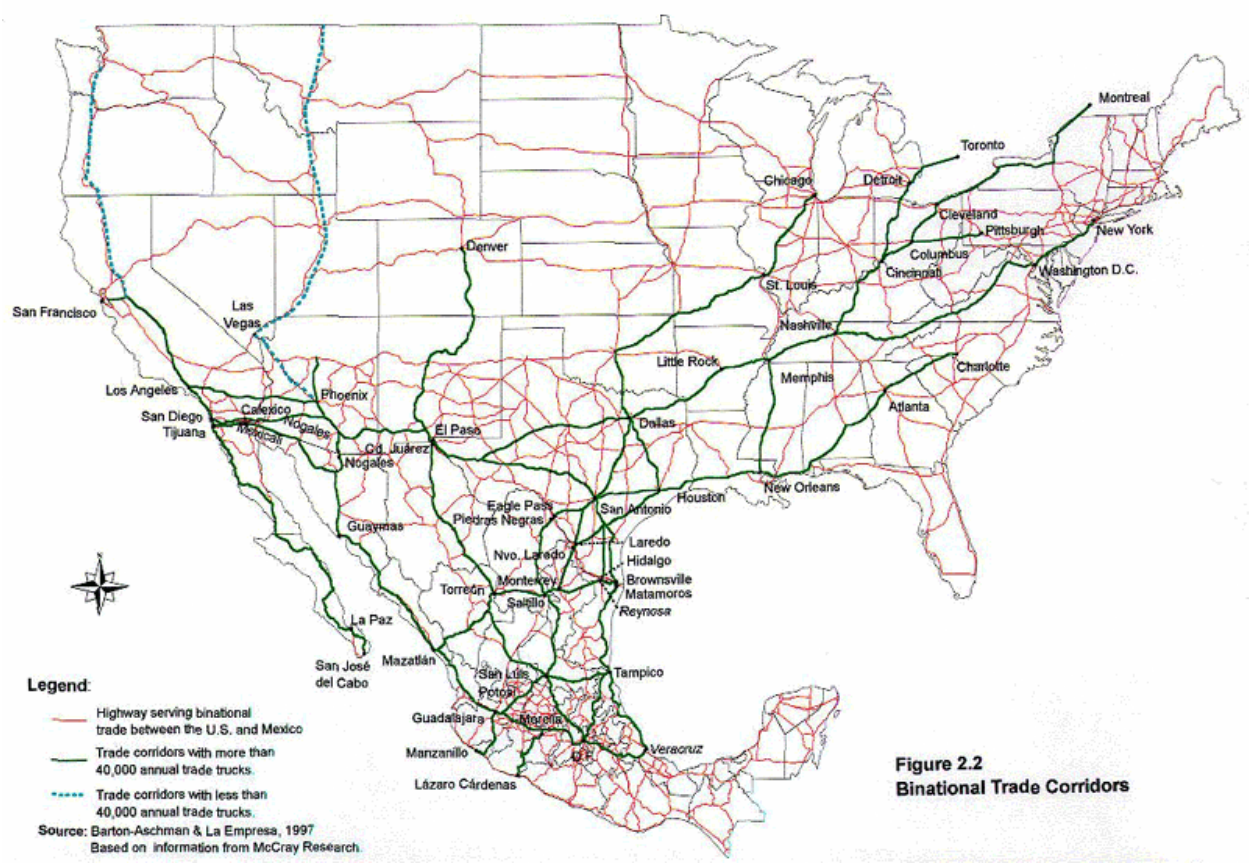


Figure 3 Map of binational trade corridors (Barton-Aschman and La Empresa, 1998)

Infrastructure Assessment

The quality and capacity of a region's freight transportation system plays a major role in its ability to capture and grow international freight flows. Both the US and Mexico maintain extensive highway transportation networks that, combined with conducive regulatory environments, have led to the dominance of trucking in their respective freight shipping markets. The US also has an advanced freight rail industry and network of inland waterways supporting domestic marine vessel traffic. The major impediment to marine shipping is maintaining adequate draft depth for vessels through continual dredging efforts. Potential investments in SSS infrastructure include investments in dredging of key waterways, on-/off-load equipment, storage facilities, truck queue areas, and intermodal access (Stich, 2015). The following is an assessment of the US, Mexican, and Cuban transportation infrastructure systems.

United States

The Gulf Coast megaregion houses ten of the top twenty busiest ports by volume in the US (short tons). In descending order of annual cargo volumes: Houston TX (229,246,833), Beaumont TX (94,403,631), New Orleans LA (77,159,081), Corpus Christi TX (76,157,693), Baton Rouge LA (63,875,439), Plaquemines LA (56,875,748), Lake Charles LA (56,577,328), Mobile AL (53,992,615), Texas City TX (49,674,036), and Port Arthur TX (34,699,150) (AAPA, 2013c). The region capitalizes on its geographical trade advantages such as access to an advanced network of rivers, bays, and canals termed the Intracoastal Waterway, the Mississippi River, as well as direct access to the Gulf of Mexico. Beyond this proximity to major bodies of

water, the strength of the Gulf Coast economy is rooted in the oil and natural gas, petrochemical refining, chemical products, and transportation and logistics industries. According to the US Energy Information Administration (EIA, 2015) the Gulf Coast accounts for 46 percent of the total US refinery capacity and 50 percent of the US' natural gas processing capacity. With this significant share of the energy economy and access to major domestic and international markets, Gulf Coast ports have developed a strong multi-modal transportation infrastructure to support US imports and exports.

The Gulf Coast is one of the most connected regions in the US for freight movements via rail, highway, ship, and barge. All seven class I freight railroads are accessible from Gulf Coast ports. In the three tier classification system, class I railroads are the largest lines with annual operating revenue of $US 250 million or more. This list includes BNSF Railway, CSX Transportation, Grand Trunk Corporation, Kansas City Southern Railway, Norfolk Southern Combined Railroad Subsidiaries, Soo Line Corporation and Union Pacific. Both Grand Trunk Corporation and Soo Line Corporation are the US-based operations of two Canadian railroads, CN and Canadian Pacific, respectively. The top commodities shipped by class I rail in tons originated are coal (39.5 percent), chemical and allied products (10 percent), non-metallic minerals (8.1 percent), farm products (7.4 percent), and mixed shipments (5.7 percent). Crude petroleum and natural gas make up 2.2 percent of freight carried on class I railroads (Association of American Railroads, 2014).

Trucking is the dominant freight mode in the US. Across the Gulf Coast, the major highway freight corridor is Interstate-10 that runs east west from Florida to California. Ross (2008) highlighted the differences in mode choice between import and export goods in the US. In the case of trade with Canada and Mexico, more than 70 percent of US exports were carried by truck, 20 percent by rail, and less than 5 percent by pipeline and unknown. Alternatively, trucks carried approximately 30 percent of US imports from Canada and Mexico, 25 percent by rail, and more than 40 percent by pipeline and unknown.

Among current freight modes, SSS is underrepresented in NAFTA trade activities. MARAD defined the current SSS corridors in the US as shown in Figure 4. Beyond the three major coastlines, SSS is active in the Great Lakes region, the southern Alaska coastline, and throughout the Mississippi River watershed (Barami and Dyer, 2009). Historically, SSS services have experienced some successes and failures shipping containers on barge including America's Marine Express in 1994, Osprey Line, LLC in 2000, Port Authority of NY NJ in 2003, and Port of Stockton/Savage in 2011 (Stich, 2015). Since then the US has pledged to develop a short sea transportation program under the requirements outlined in the 2007 Energy Independence and Security Act in addition to the Coast Guard and Maritime Transportation Act of 2012. This new program initiative was titled "America's Marine Highway Program" (AMH) with goals of increasing economic competitiveness, mitigating roadway congestion, reducing greenhouse gas emissions, bolstering the domestic shipbuilding industry, and improving system resilience (MARAD, 2011).

Figure 4 Existing SSS corridors in the US, where dark blue areas represent SSS operable water (Barami and Dyer, 2009)

In 2010 the acting US transportation secretary designated marine highway corridors shown in Figure 5 and publicized the availability of grant funds for corridor development, of which the M-10 corridor received funding for its Cross Gulf Container Expansion Project. The project entailed expansion of container on barge services between Port of Brownsville TX and Port Manatee FL. This was a public-private partnership in that the aforementioned ports would make investments in container handling equipment, while a private entity would operate the lines. The initial container on barge service operator was SeaBridge Freight whose "headhaul" freight strategy targeted high-value cargo and manufactured products that were dense, heavy and well suited for SSS. These commodities included steel coils, steel wire and rods, base organic chemicals, ceramic tile, roll paper, gypsum board, other building products, and ceramic plumbing fixtures. On the "backhaul" service from Florida, SeaBridge Freight targeted resins, department store merchandise, tires, steel products, and paper products (AAPA, 2011). By 2011 the M-10 line proved to be unprofitable and SeaBridge Freight ended its container on barge service. Although SSS has some political support in Gulf waters with the establishment of the AMH program, it still faces challenges from inadequate demand, fluctuation of sea shipping rates, and trucking competition.

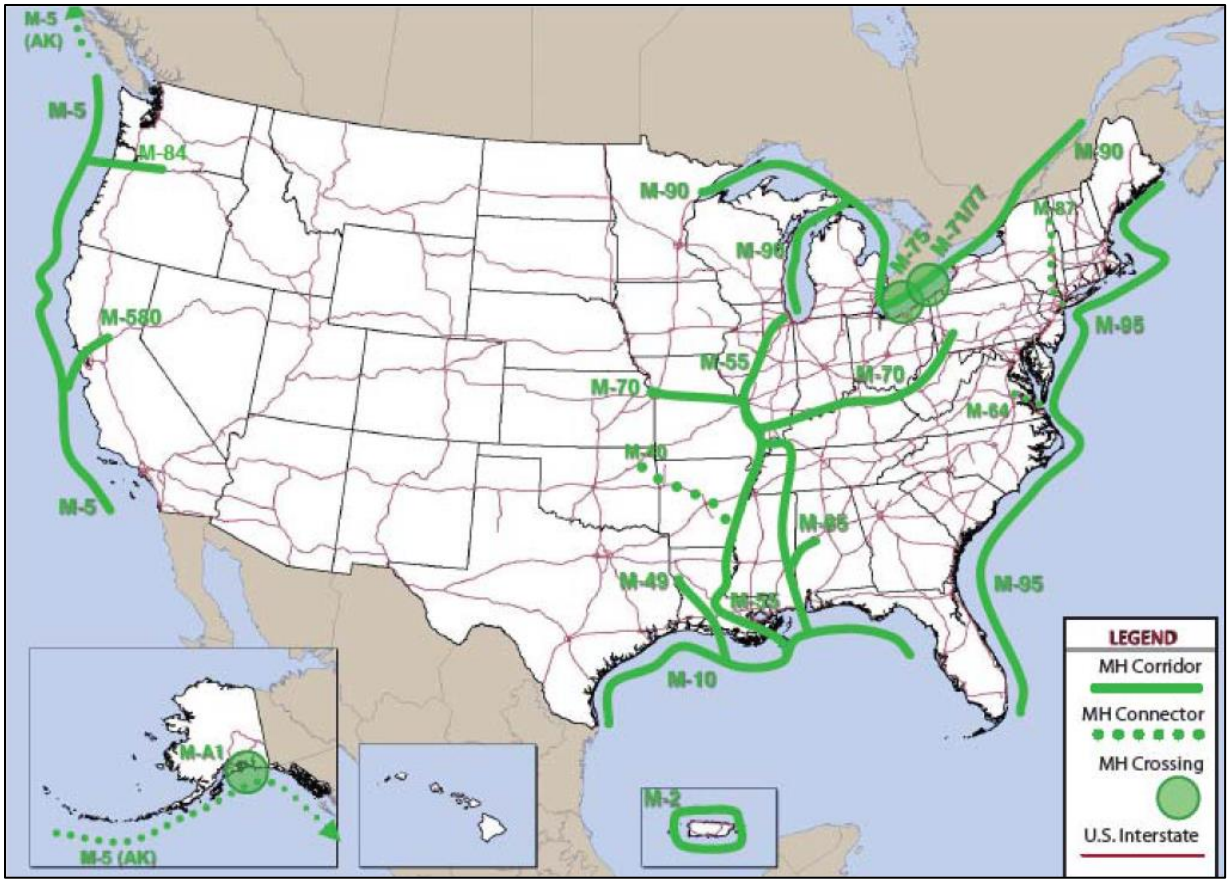


Figure 5 Map of America's Marine Highways system, where solid green lines are marine highway corridors, broken green lines are connector routes, green circles are crossing areas, and red lines are US interstates.

Mexico

Like the US, Mexico's major marine ports act as hubs for the flow of freight and in the Gulf of Mexico they could contribute to expanded SSS activities such as an extended M-10 corridor. According to the American Association of Ports (2014a) the top five seaports in Mexico by cargo volume are Altamira, Isla de Cedros, Lázaro Cárdenas, Manzanillo, and Veracruz (Table 1). Located on the Pacific Ocean side of Mexico, west of the capital, DF, Port of Manzanillo is the busiest port in Mexcio by total cargo volume with 25,942,814 metric tons moved in 2014. Lázaro Cárdenas is a close second place with 25,822,205 metric tons. The ports of Manzanillo and Lázaro Cárdenas are the two largest container terminals in Mexico by total number of TEUs handled as well (AAPA, 2013a). The next three largest ports are in Veracruz, Altamira, and Isla de Cedros. Petroleum occupies the largest share of Mexican cargo volumes at 42.5 percent while containerized cargo volumes are 13.9 percent of the total. Over the last four years the number of containers moved in Mexico has increased 69.6 percent, ship arrivals have decreased 10 percent, the number of cruise passengers has decreased 20 percent, and auto exports/imports have increased 114.2 percent (AAPA, 2013b). Based on these trends SSS could initially target commodities from the petroleum and chemical products industry in addition to the automotive industry and other types of high-value containerized freight.

Table 1 Table of top five busiest ports in Mexico by cargo volume (AAPA, 2014a; AAPA, 2013a)

Port	State	# of TEU	Total Cargo (metric tons)
Altamira	Tamaulipas	597,760	17,313,847
Isla de Cedros	Baja California	--	16,706,956
Lázaro Cárdenas	Michoacán	1,051,183	25,822,205
Manzanillo	Colima	2,136,157	25,942,814
Veracruz	Veracruz	866,966	19,311,165

Mexico is well situated geographically and industrially to facilitate the expansion of SSS operations in the Gulf of Mexico. As shown in Figure 5, Mexico has major north-south freight corridors spanning the Pacific Ocean, Gulf of Mexico coastlines and the central terrain with access to main ports of entry along the US-Mexico land border. The top four marine ports have direct freight corridor access to DF indicated by the green star. Port of Veracruz and Port of Altamira are the most likely shippers and receivers of container on barge traffic. Port of Veracruz has freight rail access to the north-south running Ferromex-Ferrosur rail line, which also serves the Mexican states of Veracruz, Hidalgo, Puebla, Tlaxcala, Oaxaca, and State of Mexico before crossing into the US at Laredo TX. Kansas City Southern De México (KCSM), a subsidiary of Kansas City Southern Railway, also serves Port of Veracruz with 12 connections before crossing the US border at Laredo as well (Puerto de Veracruz, 2015). The Mexican state of Tamaulipas, home to the Port of Altamira, bills itself as the "petrochemical corridor" of Mexico as it accounts for 70 percent of Mexico's national plastic resins production capacity, 30 percent of all private chemical and petrochemical production, and 100 percent of synthetic rubber production. Port of Altamira also houses an industrial park with main products like chemicals, petrochemicals, electricity, galvanized steel, liquefied natural gas, and wood furniture. The port is served by KCSM rail line (Port Authority of Altamira, 2014). Both Altamira and Veracruz port infrastructures are adequately equipped to handle increased SSS activity and considering their proximity to the Texas border, they will be the two of the most significant actors in shifting NAFTA freight from trucks to marine vessels.

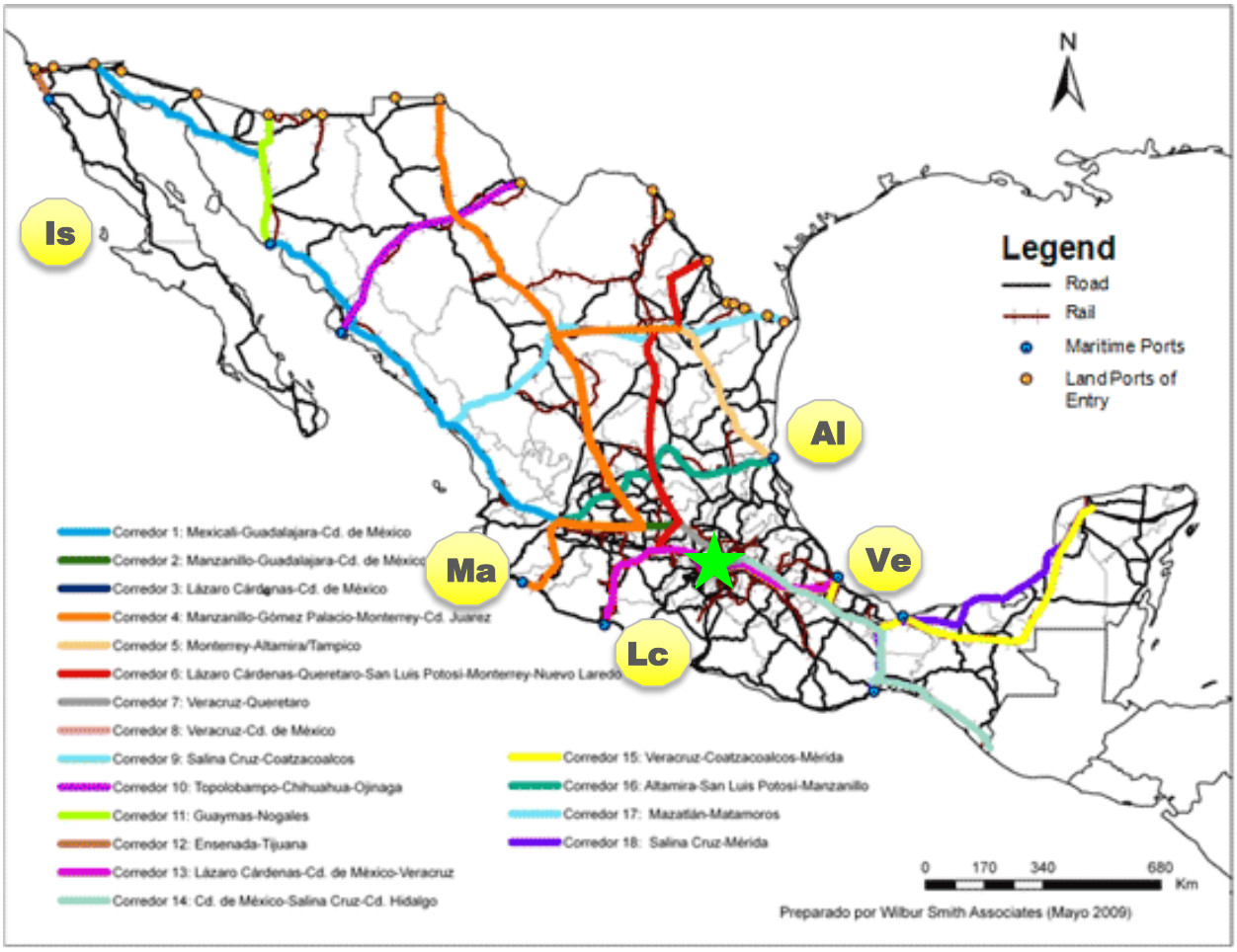


Figure 6 Map of major freight corridors in Mexico including rail, highway and ports. Freight corridors are differentiated by color, small blue circles represent maritime ports, small orange circles represent land ports of entry, large yellow circles represent the location of the top five Mexican ports by volume (FHWA, 2014)

Cuba

The Cuban transportation system is comprised of roads, railways, seaports, and airports that serve both passenger and freight traffic. Pre-1960 embargo, the Cuban highway system estimated at 20,000 km (6,100 km unpaved) was one of the most efficient in all of Latin America. Since the embargo the freight transportation infrastructure has suffered from disjointed maintenance and investment efforts. Historically, Carretera Central and Via Blanca, the two main highways, were supported by a network of secondary roads and local streets (mostly unpaved) that provided farmers access to small towns and small towns access to other parts of the island. Today the roadway system has grown to approximately 60,000 km (20,000 km unpaved) while adding more highways beyond the original two including the Circuito Norte, Circuito Sur, Carretera Granma, and Carretera Santiago-Guantanamo-Baracoa. (Alfonso et al., 2009). The Cuban rail system dates back almost 200 years and it originally operated on standard gauge track for passenger and freight movements and a separate narrow gauge track for shipment of sugar cane to processing mills. Presently Cuba has 8,193 km of rail track that represents a 45 percent reduction from the system in 1958 and 170 airports of which 77 have paved runways (Nations Encyclopedia, 2015). The main airport on the island is Jose Martí International Airport

located in Havana, while Antonio Maceo Airport also provides international flights from Santiago de Cuba. After years of maintenance neglect the transportation system is need of significant investment. Short- and long-term estimates for investment total US$ 11 billion in roadways, US$ 2.5 billion in rail, and US$ 6.6 billion in airports (Alfonso and Penin, 2009).

Cuban roads and rail connect a series of seaports across the island that maintain the movement of import and export goods. Figure 5 highlights Cuba's port infrastructure with orange markers and those ports with container facilities with blue. The top seaports in Cuba are located in Havana, Mariel, Matanzas, Nipe, and Santiago de Cuba. The major northwest region ports are Havana and Mariel while the port of Santiago de Cuba is the largest port in the southeast region. With the normalization of diplomatic relations with the US, Cuba could contribute to NAFTA-related freight flows by serving as transshipment hub in the Gulf of Mexico. Given its proximity to US and Mexican coastlines, SSS could garner a significant share of the freight movements and the North American mainland.

Figure 7 Map of Cuban port infrastructure, blue markers represent container terminals and orange markers represent sea ports (Searates, 2015)

Current and Projected Freight Flows

The US is the largest economy in the world with a 2014 GDP of roughly $US 17.4 trillion and as such exercises trade influence over global freight flows. Other significant global actors include China with the second largest economy at $US 10.4 trillion, followed by Japan ($US 4.6 trillion), Germany ($US 3.9), and the United Kingdom ($US 2.9 trillion) (The World Bank, 2015). The top five US seaborne trade partners (by volume) around the world are the European Union, China, Mexico, Canada, and Saudi Arabia (AAPA, 2014b). Shippers must employ multi-modal freight strategies to meet the transportation demands of trans-Atlantic and trans-Pacific trade. Mexico and Canada are in a unique position with the US compared to other partners due to their shared land borders. Trends over the last decade in mode choice for transborder shipment of goods are identified by examining changes in freight values over time (see Table 8 and Table 9 in Appendix A). Trucking remains the dominant shipping mode facilitating trade between the US and Mexico with both average annual imports and exports growing 46.9 percent and 44.2 percent, respectively, over the last 5 years. Over that same time

period, transborder freight flows by marine vessel experienced a decrease of 32.2 percent for imports while exports increased 33.2 percent. Generally, US imports from Mexico represents an area of potential growth for SSS.

Transborder freight flows (by value) with Mexico over the last 11 years are shown in Table 8 (imports) and Table 9 (exports). Data are displayed from 2004 through August 2015 and are organized by mode including truck, rail, pipeline, vessel, and air. Monthly values were averaged (mean) to achieve annual values. The end of each row shows percent change at the 11 year, 5 year, and 2 year marks. Generally, a significant reduction in freight values for both imports and exports is evident in 2008 and 2009 as the result of economic recession. By 2010, freight values begin to increase indicating expansion of trade post-recession. Mexico is currently the US' largest trading partner in the Gulf of Mexico region and trucking is the most prevalent mode of freight shipment. Imports from Mexico to the US have increased significantly since 2004 with truck growing 56.8 percent, rail 80.6 percent, pipeline 53,218.3 percent, and air 48.3 percent. During this same time vessel imports from Mexico decreased 22.4 percent (Table 8). Post-recession, truck, rail, and pipeline values increased at 46.9 percent, 70.2 percent, and 23 percent, respectively while vessel (-32.2 percent) and air (-37.7 percent) values decreased. The most recent export value trends from the last 2 years showed continued growth for truck (23.6 percent) and rail (20.3 percent) whereas pipeline (3.7 percent), vessel (33.7), and air (3.0 percent) all showed a decline.

Overall, US exports to Mexico displayed growth in each mode over the last 11 years (Table 9). Truck export values increased 70.1 percent, rail 76.5 percent, pipeline 3,434.4 percent, vessel 154.2 percent, and air 29.9 percent. Exports showed a more modest growth trend since 2010 with truck values increasing 44.2 percent, rail 45.5 percent, pipeline 74.5 percent, vessel 33.2 percent, and air 24.1 percent. In the past 2 years, this growth trend reduced even further with truck increasing 15.2 percent, rail 11.1 percent, and pipeline 6.5 percent. The two outliers in this trend were vessel values that declined 10.6 percent and air that actually increased its growth rate with a 31 percent rise in value.

Total trade by truck between the US and Mexico has increased over the last decade. This increased freight traffic combined with passenger vehicles can congest roadways at major land border crossings. Table 3 contains the top 10 US ports of entry ranked by total trade with Mexico by truck in 2014. Six of the top 10 ports are located in Texas, which has the largest land border with Mexico among US states. The Laredo port of entry facilitates 43 percent of all truck trade between the US and Mexico, followed El Paso, TX (15.3 percent), Otay Mesa CA (10.8 percent), Hidalgo TX (7.8), and Santa Teresa NM (5.2 percent) comprising the top 5 trading points. Combined these 5 ports of entry handle 82.1 percent of all truck trade with Mexico. By comparison, the state of Texas handles 73.5 percent of US-Mexico truck trade. Collectively, the ports of entry in El Paso and Santa Teresa, located less than 30 miles apart, account for 20.5 percent of truck trade with Mexico. Based on these figures, expanded SSS operations in the Gulf of Mexico should focus on capturing freight from Texas-Mexico flows, specifically traveling through the Laredo port of entry.

Table 2 Top 10 US ports/districts ranked by total trade value ($US) with Mexico by truck in 2014

Rank	Port Name	Total Trade Value ($US) by Truck	Total Trade Value (%) by Truck
1	Laredo - Texas	155233222527	43.0
2	El Paso - Texas	55081811361	15.3
3	Otay Mesa - California	38839226951	10.8
4	Hidalgo - Texas	28144490415	7.8
5	Santa Teresa - New Mexico	18893713041	5.2
6	Nogales - Arizona	16287997347	4.5
7	Calexico-East - California	14070437916	3.9
8	Brownsville - Texas	13543124090	3.8
9	Eagle Pass - Texas	7905975317	2.2
10	Del Rio - Texas	5026257304	1.4
Total of Top 10	Top 10 Ports	353026256269	97.9
Grand Total	All	360667818370	100.0

Based on the values in Table 2, the Laredo port of entry is the largest attracting force of freight truck traffic along the US-Mexico border. The top 10 US states trading with Mexico through Laredo in 2014 are shown in Table 3. Texas is the top state accounting 27.4 percent of freight value through Laredo. The other 9 states in descending order are Michigan, Illinois, California, Tennessee, Ohio, North Carolina, Indiana, Georgia, and Pennsylvania. I-35 is the main freight corridor connecting Laredo to major Texas metropolitan statistical areas (MSA) like San Antonio, Austin, Dallas, and Fort Worth. Once in San Antonio, north-south freight flows from Laredo can connect with I-10 and travel east towards Houston, New Orleans, and Mobile or west towards El Paso. Michigan (8.8 percent) and Illinois (6.6 percent) truck freight traveling through Laredo must eventually flow north south to reach its destination. Trucks carry 78 percent of freight tonnage by value in Michigan and Insterstate-75 is the busiest freight corridor spanning from Detroit to Toledo, Ohio (MDOT, 2013). California only accounts for 6.6 percent of the freight traveling through Laredo, which must flow east west to and from Texas. Tennessee freight must flow both north south and east west to pass through Laredo, and the same can be said for Ohio, North Carolina, Indiana, Georgia, and Pennsylvania freight flows (Figure 3).

Table 3 Top 10 states trading with Mexico by truck through Laredo - Texas, ranked by total trade value ($US) in 2014 (BTS, 2015)

State Name	Total Trade Value ($US) by Truck	Total Trade Value (%) by Truck
Texas	42583114835	27.4
Michigan	13687374994	8.8
Illinois	10219207606	6.6
California	9473862505	6.1
Tennessee	7356068703	4.7
Ohio	7265489102	4.7
North Carolina	5481179825	3.5
Indiana	5217289748	3.4
Georgia	4216375718	2.7
Pennsylvania	3903182815	2.5

El Paso is the second busiest US port of entry for Mexican trade by truck. The top ten states using El Paso as a transshipment point (descending) are Texas, Michigan, Ohio, California, Illinois, Pennsylvania Minnesota, Arizona, Kentucky, and Missouri as seen in table 8. In the case of El Paso, Texas garners an even larger share of the total trade value at 69.7 percent. Michigan (7.7 percent) once again is responsible for the second most trade value flowing through El Paso. Ohio (2.3 percent), California (2.3 percent), and Illinois (1.9 percent) complete the top 5 ports of entry but none of these states account for more than 3 percent of the truck trade value. Key freight corridors include I-35 for north south flows to and from the mid-west and I-10 for east west flows.

Table 4 Top 10 states trading with Mexico by truck through El Paso - Texas, ranked by total trade value ($US) in 2014 (BTS, 2015)

State Name	Total Trade Value ($US) by Truck	Total Trade Value (%) by Truck
Texas	38384413396	69.7
Michigan	4018953507	7.3
Ohio	1278380393	2.3
California	1272225488	2.3
Illinois	1042492648	1.9
Pennsylvania	785108021	1.4
Minnesota	773883193	1.4
Arizona	660661483	1.2
Kentucky	595679867	1.1
Missouri	552007741	1.0

The Otay Mesa port of entry in California is currently the third busiest port for truck-based freight with Mexico. As expected, California accounts for three-quarters of the transshipment freight with Mexico through Otay Mesa (Table 5). The second largest state trading through Otay Mesa is Illinois (4.1 percent) followed by Texas (2.1 percent), and Massachusetts (2.0 percent). Kentucky, Georgia, New York, Indiana, New Jersey, and Arizona contribute approximately 1 percent to Otay Mesa transshipment traffic. I-5 is a key freight corridor in north south freight flows given the California's predominance of trade with Mexico through Otay Mesa.

Table 5 Top 10 states trading with Mexico by truck through Otay Mesa - California, ranked by total trade value ($US) in 2014 (BTS, 2015)

State Name	Total Trade Value ($US) by Truck	Total Trade Value (%) by Truck
California	29469838092	75.9
Illinois	1575381374	4.1
Texas	961016474	2.5
Massachusetts	764500181	2.0
Kentucky	486977086	1.3
Georgia	479891026	1.2
New York	469758402	1.2
Indiana	452567550	1.2
New Jersey	435293325	1.1
Arizona	388932348	1.0

Hidalgo, Texas is the fourth busiest port of entry for trade with Mexico by truck, representing a 7.8 percent share of transborder flows. Hidalgo is southernmost land port of entry in to and out of the US located less than 90 miles from access to the Gulf of Mexico. Texas represents the largest share of freight trade with Mexico (62.2 percent) as with other Texas ports of entry in Laredo and El Paso. The next largest state contributors in descending order are Michigan, California, Indiana, Ohio, Illinois, Georgia, Maryland, Tennessee, and Alabama. A portion of I-69 service north south freight flows within the immediate vicinity of Hidalgo and eventually become highway-281, highway-77, and I-37 through Corpus Christi towards San Antonio. Highway-83 facilitates eastward freight flows from Hidalgo to Laredo, where trucks can access I-35 north to San Antonio and tie into I-10 to facilitate east west flows.

Table 6 Top 10 states trading with Mexico by truck through Hidalgo - Texas, ranked by total trade value ($US) in 2014 (BTS, 2015)

State Name	Total Trade Value ($US) by Truck	Total Trade Value (%) by Truck
Texas	17506437446	62.2
Michigan	1514354408	5.4
California	1323048792	4.7
Indiana	1087005240	3.9
Ohio	836051272	3.0
Illinois	760176562	2.7
Georgia	726191025	2.6
Maryland	457823762	1.6
Tennessee	444384293	1.6
Alabama	367402678	1.3

The fifth busiest port of entry for trade with Mexico by truck is Santa Teresa, New Mexico. Santa Teresa is located approximately 16 miles from the El Paso port of entry. This location at the New Mexico-Texas border allows Santa Teresa to benefit from Texas freight flows, which account for 85.7 percent of total trade value by truck. New Mexico accounts for the second most trade value traveling through Santa Teresa at 5.5 percent. The other top states contributing to Santa Teresa trade values (descending) are Utah, Michigan, Florida, California, Connecticut, New York, Arizona, and Indiana. Due to freight demand from Texas, I-10 and I-20 are the main east west freight corridors in this region.

Table 7 Top 10 states trading with Mexico by truck through Santa Teresa - New Mexico, ranked by total trade value ($US) in 2014 (BTS, 2015)

State Name	Total Trade Value ($US) by Truck	Total Trade Value (%) by Truck
Texas	16193260256	85.7
New Mexico	1042874203	5.5
Utah	579174424	3.1
Michigan	377228893	2.0
Florida	250906741	1.3
California	179396762	0.9
Connecticut	80236476	0.4
New York	41976663	0.2
Arizona	39052529	0.2
Indiana	27009648	0.1

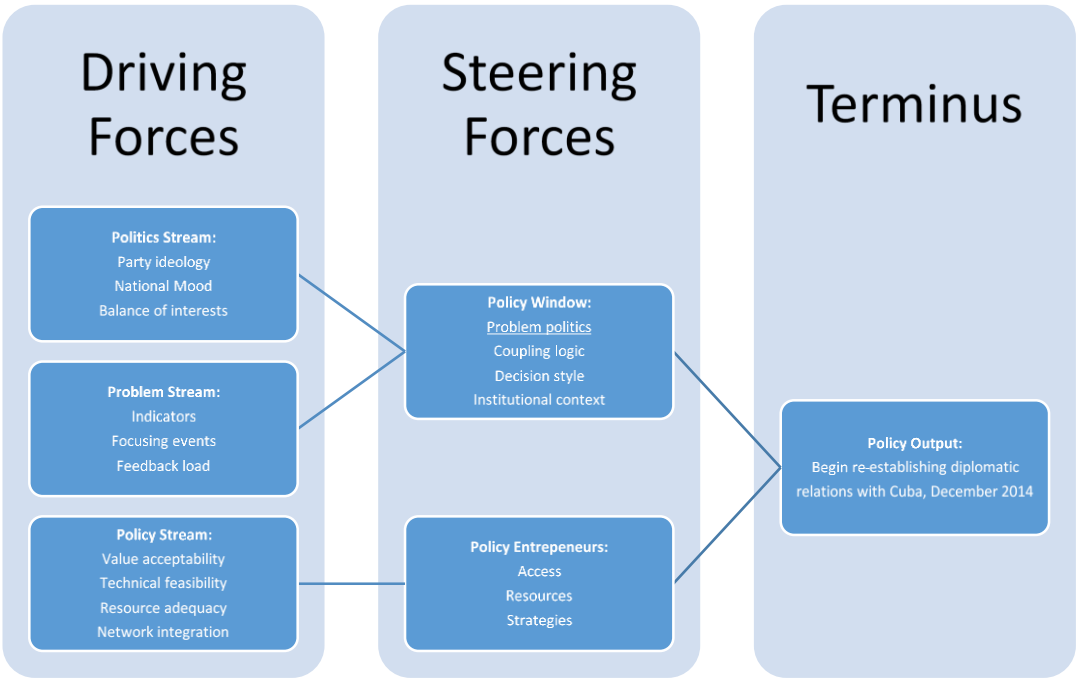
The Cuban Effect

The game-changer in the potential for the facilitation of freight transportation between the United States and Mexico – because, along with the Panama Canal Expansion, it opens the potential for SSS in the most substantive ways – is the opening of diplomatic relations with Cuba, and the long-term goal of lifting the embargo. The theoretical construct we use to analyze this comparatively radical policy shift is Multiple Streams Analysis (MSA). For purposes of this discussion, we rely on the summation of the latest theoretical developments in MSA contained in Sabatier 2014. To summarize:

"[MSA] yields insight into the dynamics of the entire policy process – agenda setting, decision making, and implementation. Three streams are identified as flowing through the policy system: problems, policies, and politics. Each is conceptualized as largely separate from the others, with its own dynamics and rules. At critical points in time, termed "policy windows," the streams are coupled by policy entrepreneurs using a variety of strategies. The combination of all three streams into a single policy package dramatically enhances the chances that policy makers will adopt a specific policy" (Sabatier 2014, pp. 25-26).

For purpose of this discussion, we parse MSA along additional lines of conception generally referred to in the social sciences as Driving Forces and Steering Forces, culminating in a policy endpoint or Terminus. Refer to chart 1 for a summation of the elements of MSA (this is a rendition of figure 2.1, Sabatier 2014, p. 31):

CHART 1- MSA AS APPLIED TO RECENT CHANGES IN THE CUBA POLICY OF THE UNITED STATES:



We turn now to an explication of the categories of MSA as they apply to shifts in the United States' policy regarding the nation of Cuba.

DRIVING FORCES: the Politics Stream, the Problem Stream, and the Policy Stream

Politics Stream

The Driving Forces of MSA consist of the Politics Stream, the Problem Stream, and the Policy Stream, and at their core they can be attributed to generational and demographic shifts. The Politics Stream consists of the National Mood, Pressure Group Campaigns, and Administrative/Legislative Turnover (see ibid, p. 34). Regarding Cuba policy, demographic shifts – the advent of the Millennials, particularly the children and grandchildren of the Bay of Pigs generation of Cuban American Expats (CAEs), in combination with a perception of the end of the Cold War with the fall of the Soviet Union, have led to significant attitudinal changes on the part of a newly ascendant significant portion of the American electorate. Specifically, in 2014, wide majorities of the American public surveyed by Pew favored the re-establishment of diplomatic relations with Cuba, as well as ending the trade embargo and the travel ban (see Council on Foreign Relations, 2015).

Pressure Group Campaigns relevant to the issue involve the tension between the perennial status of the CAEs as potential deciders in presidential elections due to their disproportionate influence in the electoral swing state of Florida, and the changing attitudes of their children and grandchildren (ibid). These attitudes are a microcosm of the demographically-driven rejection of American conventional wisdom in general (Fournier, 2013).

The final piece of the Politics stream involves Administrative/Legislative Turnover. The election of Barack Obama in 2008, who campaigned on a platform specifically oriented towards normalization of relations with Cuba (Council on Foreign Relations, 2015), is the salient example of this phenomenon for purposes of applying MSA to current U.S.-Cuba policy. The effects of this Administrative Turnover have been manifest despite the intransigence of Congress, again due to the demographic shift which was so evident after the 2012 elections (Sweig & Bustamante, 2013).

Problem Stream

The Problem Stream consists of Indicators, Focusing Events, and what Sabatier refers to as "Feedback Load" (see Sabatier 2014, pp. 31, 32). Indicators that a problem exists with U.S.-Cuba policy include the fact that China and post-Soviet Russia have been making significant investments in the Cuban economy, and it is counterproductive for the United States to deal itself out of similar economic opportunities because of outdated Cold War ideology (Filip, 2015). In addition, the cumulative harm the embargo has caused generations of Cubans is both well-known and routinely decried in the international community (Siegelbaum, 2013).

Probably the single most relevant focusing event in terms of Cuba policy has been the retirement of Fidel Castro and the transition to power of his brother Raul which began in 2006. Fidel's effective exit from the world stage can be seen as signifying the ultimate "End" of the Cold War

to a degree not seen since the fall of the Berlin Wall. His brother's gradual moves towards partial economic liberalization of the Cuban economy have led many to the conclusion that America's embargo of Cuba is a policy effectively "frozen in time" (Sweig and Bustamante 2013).

Another significant focusing event was the resolution of a perennial sore point between the two nations in the form of a prisoner swap. Five Cubans held prisoner in America – thereby becoming living icons of national pride for the island's population – were exchanged for an American prisoner held for nearly two decades (Council on Foreign Relations, 2015). This exchange, in addition to the 2015 long-overdue acknowledgement by the United States that Cuba no longer deserved the status of a state-sponsor of terrorism (Department Of State. The Office of Website Management, 2014; Council on Foreign Relations, 2015), also underscored to many people the antiquated nature of the relationship between the two nations. This growing sense both in the international community, and among the American population, in particular those descended from the original CAEs yet demographically detached from their forbears' raison-d'etre, compose what Sabatier refers to as Feedback Load. This essentially is the overflow of policy outcomes that illustrate the given level of effectiveness – or lack thereof – of any given policy (Sabatier 2014, p. 32).

Policy Stream

The policy stream consists of Value Acceptability, Technical Feasibility, Resource Adequacy, and Network Integration.

The factor of Value Acceptability is for now an insurmountable roadblock to the lifting of the embargo per se, in spite of the re-establishment of diplomatic ties. Value Acceptability refers to the fact that "…alternatives that do not conform to prevailing norms or the values of policymakers are less likely to be considered for adoption" (Sabatier 2014, p. 33). This keys into the vocational intransigence of the current Tea-Party dominated congress regarding initiatives of the Obama administration. Recall that in 2010, then-senate minority leader, Mitch McConnell (R-Kentucky), charged his party colleagues in both houses with the single task of "…making Obama a one-term president" (Kessler, 2012).

Technical Feasibility and Resource Adequacy are not really applicable when it comes to the mechanics of lifting the embargo; this is ultimately a vote on legislation. In terms of Network Integration, however, we construe the current popular pushback against the perceived intransigence of the embargo as Sabatier's "More integrated" small (compared to the whole U.S. population) groups composed of aging generations of congressional Cold Warriors, with a consensual modus operandi, restricted access (lobbyists and campaign donors), and a high administrative capacity - VERSUS - "Less integrated" large networks of younger generations of Miami Cubans, American Millennials, and the international community, particularly the general population of Latin America (see Sabatier 2014, p. 33; Florida International University News 2014; Siegelbaum 2013; Partlo and Martinez 2014).

STEERING FORCES: Policy Window, Policy Entrepreneurs

Policy Window

A Policy Window is a very short-lived historical moment of confluence of the three Driving Forces which generates the potential for substantive changes in existing policy or the enactment of entirely new ones (see Sabatier 2014, p. 34). The main elements which contribute to a policy window are the political nuances of the given problem – known in Sabatier as Problem Politics – the Coupling Logic, i.e. the rationalization(s) used for deciding that the confluence of the Driving Forces has reached a point of critical acting potential; the Decision Style of the actors involved; and the Institutional Context in which the Policy Window is being accessed.

We have discussed above the Problem Politics of American policy towards Cuba. To summarize, the international community sees this policy – particularly the embargo – as a Cold War hangover. On the domestic front, the embargo stays in place largely due to the fact that Florida enjoys its status as a Republican-oriented swing-state, said orientation derived from the Miami Cuban expat community, although demographic shifts have begun to erode its support for the embargo (see Council on Foreign Relations, 2015; Lopez-Levy 2010).

We have also already discussed two major components of The Coupling Logic. One consists of Obama spring boarding off of a major demographic shift in the American voting population; this is widely acknowledged as the linchpin of his electoral victories. With very few exceptions, there simply is no Cold War fever among Millennials in general and second or third generation Cuban expatriates in particular. The second is Fidel Castro's effective exit from the international stage. A third element is the election of Pope Francis, the social justice liberal from Latin America who energizeses this component of the support base of the Policy Window objective even further (see Lee 2015; Benedetti 2014).

The Decision Style regarding this policy window was derived from the current obstructionist Tea-Party congress. This dynamic has forced Obama into a more executive leadership approach (Wilson 2014). However, in this instance he has been skilled in selling his détente with Cuba as part of the Grand Narrative of The Will of the American People (see Earnest 2014).

The Institutional Context involved Obama's historically successful, implied appeal to the trope of Young vs. Old. In a sense, the discourse that the "Old White Male Conservative" is fading away as a political species is what legitimized Obama's executive style to people who supported his decision to go through this window (see Capehart, 2013). This window opened primarily within the context of the executive branch, rather than the congress. Also involved, with the election of Pope Francis, was the sense of need for a more populist change in the "feeling tones" of the Catholic Church as an institution in general and in the context of the abuse scandal in particular (see Piggott 2013; Magazine 2013).

Policy Entrepreneurs

Sabatier defines Policy Entrepreneurs as "…individuals or corporate actors who attempt to couple the three streams" (Sabatier 2014, p. 35). The primary components of action on the part of Policy Entrepreneurs are Access, Resources, and Strategy. For purpose of this particular application of MSA analysis, we identify three specific individuals as the key Policy Entrepreneurs in transitioning to the normalization of American relations with Cuba: President Barrack Obama, President Raul Castro, and Pope Francis. This is not to say that corporate actors had no influence on the evolution of this policy. Rather, it is an acknowledgement that no corporate entity, not even the United Nations, has historically been able to overcome the Cold War-era influence of the older Generation of Miami-based Cuban expatriates (Siegelbaum, 2013; Lopez-Levy, 2010).

To say that President Obama, Pope Francis, and President Raul have Access to the levers of power within their respective institutions is stating the obvious. However, Obama has the least access of the three, because he is dealing with an intransigent congress bent on defying his every policy move. Francis has the ear of the world in general and Latin America in particular. Raul has the ear of a portion of the American Cuban expatriate community, because he has evidenced some degree of economic liberalization compared to his brother (Frank, 2010). He also has the ear of the Latin American people, who feel the embargo is an extreme injustice being committed against the island.

These three actors obviously have resources – "…the ability to spend more time, money and energy" (Sabatier 2014, p. 36). Again, Obama had to work much harder in order to leverage his political capital by making a discursive end-run around congress to attempt a demographically driven change in the hegemony regarding America's Cuba policy. Specifically in terms of Strategy, he has been forced to abandon the traditional political processes of bipartisan compromise and networking because this congress is basically his mortal enemy. To that end, he used the Francis-Raul driven, demographically fueled, narrative of A New Day in Cuba to play to his base, thereby legitimizing his executive actions in the eyes of that segment of the American people.

Ultimately, it was the end of the Cold War, and demographic shifts, primarily in the United States, which were the historical processes that began to open the Window for these three Policy Entrepreneurs to act. This statement is a brief summation of the processes detailed above, which we apprehended within the theoretical policy construct of Multiple Streams Analysis to explain how these Driving Forces were Steered by Policy Entrepreneurs through a momentarily open Window in order to reach their Destination- the reestablishment of diplomatic relations between Cuba and the United States in December of 2014.

The potential implications for the facilitation of Gulf of Mexico Megaregion-based Short Sea Shipping, and the resultant simplification of freight movements through the expanded Panama Canal, are obvious (see figure 8). They make the nurturance of this détente essential for the maritime freight community, particularly that of the United States, which projects infeasible increases in the degree of freight trucking over the next twenty-five years (see for example Texas Department of Transportation, 2015).

Figure 8: Map of current Caribbean transshipment hubs (MARAD, 2013)

6. CONCLUSIONS

This study assessed the potential for expansion of maritime trade corridors in the Gulf of Mexico between two NAFTA member nations, the US and Mexico. Analysis focused on policy barriers, overland freight corridors, marine port facilities, mode choice trends, and transborder freight flows to increase understanding of obstacles and opportunities to SSS operations in Gulf of Mexico waters. The opportunity for increased container on barge shipping is evident given the US Department of Transportation's AMH investments in marine corridors off the Gulf coast. The impact of increased trade with Cuba was considered from a policy and infrastructure perspective. Report findings suggest that one area of immediate consideration for mode shift from truck to marine vessel is US imports from Mexico. Texas ports of entry represent the greatest opportunity to shift mode and alleviate roadway congestion, as they handle almost three quarters of all US-Mexico transborder freight flows by truck. If the goal of SSS is to increase economic competitiveness and relieve overloaded border crossings, then the Laredo TX land border should be the first point of entry investigated as to which commodities could be handled by SSS providers. Container on barge in the gulf is not a new concept, private companies have tried it before as recently as 2008 and it failed, mostly due to lack of upriver freight demand. Despite the lack of demand, expansion of SSS markets is still impaired by legislative obstacles from the Jones Act and HMT. But the recent US push to normalize relations with Cuba has opened a policy window allowing state representatives and private actors to make the necessary policy change to grow SSS in the Gulf of Mexico. SSS becomes a more viable option in transshipment trade flows covering the short distance from Cuba to the North American mainland.

7. RECOMMENDATIONS

Policy discussion

Many of the barriers preventing the implementation of SSS today revolve around navigating the challenges presented by the Jones Act. Barriers to widespread implementation of SSS within the US includes restrictions on manufacturing of vessels, the harbor maintenance tax, longer shipping times, and lack of financial incentive to implement a SSS program. Benefits to implementing SSS in the US include reduction of congestion on US highways, reduction of environmental impact, and low cost maintenance. However, since many of those benefits are not factored into the current cost structures associated with land or sea based shipping, land based shipping by rail or by truck currently stands as the most economic option.

Under the current provisions provided in the Jones Act, ships operating within the boundaries of US ports must be US flagged vessels and be owned by a documentation citizen. If the owning entity is a corporation, then seventy-five percent of the company must be owned by US citizens and the CEO and chairman of the board must both be US citizens (Kennedy, 216-217). In order to qualify as an US flagged vessel, a ship must be manufactured in a US shipyard with all major components produced in the US (Kennedy 21). Once these requirements are met, the owning entity must apply for a coastwise endorsement issued by the US Coast Guard to allow the ship to engage in port-to-port shipping. Currently, the cost for building a ship within the US is 3 to 4 times more expensive than a ship built in Europe or Asia and lacks the newest technological innovations pioneered by those markets (Kennedy 218). The demand for US made ships remains around 1.7 deep-water vessels per year and as a result, the demand for ship production is not in place to create a competitive market for shipbuilding (Tirschwell).

In addition to the ownership and build requirements, ships engaged in commerce between US ports are required by the Jones Act to be crewed by US citizens. While the provision is intended to ensure that employment opportunities are provided to US citizens; the result is a decrease in the utilization of sea transport due to the higher cost associated with staffing a ship with US citizens instead of utilizing cheaper sources of labor (Tirschwell). In comparison to the costs associated with hiring for freight transportation, SSS is a costly alternative.

The HMT also serves as a deterrent to SSS in the US. Originally designed to tax imports, the HMT provides for a tax of 0.125 percent of a ship's cargo value if it is loaded or unloaded within US borders (Kennedy 214). This tax, as applied to export goods, was struck down in a Supreme Court decision in 1998 but the wording of this law still provides problems for SSS today (Kennedy 215). Currently, a SSS vessel would be charged the HMT tax twice, once at loading and once at unloading. Freight shipping within the US does not incur these taxes. In order for merchants to view SSS as a feasible option for shipment of goods, the law would need to be adjusted to something competitive with the freight alternative.

In order for SSS to become a feasible option for shippers, there needs to be a shift in regards to logistics. Currently, many shippers tend to opt for transportation that is quick, time-definite, and able to be accelerated (Tirschwell). The success of SSS in the US shipping market depends on whether it can adapt to the needs of shippers and offer quicker, more time definite

service or whether shippers can be persuaded to adjust their demands to account for weather and other uncertainties associated with sea transport.

While current laws serve as a hindrance to the growth of the SSS industry, SSS provides many incentives to traditional freight modes of transportation. Many supporters of SSS shipping modes cite increased cargo capacity, greater shipping efficiency, reductions in highway congestion, and lower environmental impacts as benefits associated with SSS (Kennedy 204). While these benefits would greatly improve the public's quality of life, in order for SSS to become competitive with traditional freight and land based modes of transportation these benefits must be reduced to an economic value in order for shippers to make the switch. A 2004 study by the University of New Orleans analyzing the benefits of SSS showed that the benefits of SSS are not reflected in the services pricing structure (Kennedy 211). They noted that the costs of maintaining land-based transportation are distributed among several parties: the shippers, the governments, and the taxpayers while the cost of sea-based transportation is less distributed and a greater financial burden is placed on the shipper. To ease this and make sea transportation a more attractive option, the government must engage in market correction to make SSS by offering financial incentives to shippers, assisting with the cost and development of US made vessels, or other means to ensure the growth of SSS in the US.

8. APPENDIX A

Table 8 US-Mexico transborder freight flows, annual average value ($US) of imports

	Year												11 year	5 year	2 year
Mode	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	% Change	% Change	% Change
Truck	8520164340	8504761292	8938740860	9059269857	7813829558	7518138689	9092714327	9491518014	10496587972	10809302588	11934776806	13360149601	56.8%	46.9%	23.6%
Rail	1638231886	1573175170	1829164972	1785010679	1475255497	1228408588	1738068961	1831062791	2127039152	2459100824	2637346259	2958813188	80.6%	70.2%	20.3%
Pipeline	25566	0	3869624	11143757	11116144	9857106	11082004	15935832	12334962	14148895	12297467	13631520	53218.3%	23.0%	-3.7%
Vessel	2005008341	2336044799	2750705282	2523290987	2684749037	1801222551	2297117550	2764716006	2605075944	2349027204	2278395074	1556667083	-22.4%	-32.2%	-33.7%
Air	280301671	295431419	291111002	307666352	347984163	490376557	667682544	567140486	498686191	428685912	416037691	415647754	48.3%	-37.7%	-3.0%

Table 9 US-Mexico transborder freight flows, annual average value ($US) of exports

	Year												11 year	5 year	2 year
Mode	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	% Change	% Change	% Change
Truck	6478091143	6594156574	7107273718	6782109861	6887365929	6438364064	7644761122	8137928676	8916708718	9569705552	10300014953	11021267555	70.1%	44.2%	15.2%
Rail	1112777261	1245795277	1319534026	1408162378	1508216737	1100341813	1349507407	1586141311	1740968758	1767895173	1891906035	1963544512	76.5%	45.5%	11.1%
Pipeline	7097233	42894670	54040105	57088101	85433902	56642914	143735818	222037019	214963464	235527263	305852927	250846494	3434.4%	74.5%	6.5%
Vessel	608603449	738542219	767970437	797580059	1019846157	822629253	1161089929	1732938829	1803657712	1729963233	1732355793	1546830530	154.2%	33.2%	-10.6%
Air	490983815	509333694	562865263	496888557	482890867	517189160	513909216	480845879	469652684	486745124	554714599	637746860	29.9%	24.1%	31.0%

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