Transportation Policy Brief #3

Global Logistics Hubs in Texas

Panama Canal Authority

Panama Canal Authority

Texas Ports Association

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May 2017

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FOREWORD

The Lyndon B. Johnson School of Public Affairs at The University of Texas at Austin has established interdisciplinary research on policy problems as the core of its education program. A major part of this program is a nine-month policy research project (PRP), during 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 public policy issues of concern to a government or nonprofit agency.

During the 2016–2017 academic year, the Texas Department of Transportation (TxDOT) funded, through the Center for Transportation Research (CTR), a PRP addressing six key transport/logistics policy issues related to Texas international trade with foreign countries and domestic trade with other US states. Overall direction and guidance was provided by Roger Schiller (Maritime Division) who participated in classroom discussions at the beginning of the academic year.

As a consequence, the following policy issues were selected for study:

1. Panama Canal Utilization;
2. Texas Ports and the Panama Canal: Commodities and Infrastructure;
3. Global Logistics Hubs in Texas;
4. Texas-Latin American Trade;
5. Port Competition and Best Practices; and
6. Transportation and Trade Forecasts.

The findings of each policy issue are presented within the context of separate policy briefs. This particular policy brief, “Global Logistics Hubs in Texas” was researched and written by Michael Finch and Brent Perdue.

ACKNOWLEDGMENTS

This PRP would not have been possible without the generous contributions of assistance from numerous individuals and organizations. In particular, we would like to thank:

- Chris Gutierrez, President, Kansas City SmartPort
- Steve Boecking, Vice President, Hillwood Properties (developer of Alliance Texas)
- Roger Schiller, Maritime Program Coordinator, Maritime Division, Texas Department of Transportation

We are also indebted to the following for participating in weekly class presentations or scheduled interviews, sharing information and data, and suggesting useful contacts:

- Steve Boecking, Vice President, Hillwood Properties (developer of Alliance Texas)
- Greg Conte, Senior Data Analyst, Data Analysis and Transparency Division, Texas Comptroller of Public Accounts
- TJ Costello, Senior Data Analyst, Data Analysis and Transparency Division, Texas Comptroller of Public Accounts
- Jack Foster, Director, Systems Planning, Texas Department of Transportation
- Kent S. Marquardt, PMP, Director, Strategic Planning, Texas Department of Transportation
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EXECUTIVE SUMMARY

This policy brief describes the characteristics of global logistics hubs. This report focuses on the typology and hierarchy of a logistics hub, best practices, and four case studies of logistics hubs within the state of Texas that handle global trade. A logistics hub is an important location of the supply chain which supports trade, manufacturing, and the distribution of goods. Its structure offers companies a competitive opportunity to reach economies of scale in their supply chain. It accomplishes this through aggregating services and modes to provide a competitive advantage. Services include customs services, foreign-trade zones (FTZ), information technology, and warehousing to third party logistics providers.

The research in this paper focuses on three levels of hierarchy for a logistics hub. The levels begin at level one, which is a single—often large—transloading warehouse for a single company. A level-two multimodal logistics hub includes multiple customers with separate facilities on a managed site that is explicitly recognized by highway planners. Level three designation reflects a recognition that the modal connectivity—marine, rail, air, and highway—available at the site is recognized by logistics providers and transportation planners. The hierarchy and typology are highly correlated and help to define the geographic reach of a hub as well as its economic impact.

Successful logistics hubs share commonalities in their geographic features, transportation and industrial infrastructure, and business environments. In order to be efficient, a hub must have multiple transportation options and substantial investment in transportation infrastructure that accommodates large volumes of goods shipments. Successful hubs establish competitive business environments with distribution centers and warehouses for processing, storing, distribution, and manufacture.

The four case studies, Alliance Global Logistics Hub, Port of Laredo, Port of Houston, and Port of Corpus Christi, each have unique attributes but share the commonalities described above. The case studies reveal the impact each hub has on the state of Texas and further solidify and support the subsequent recommendations. To support logistics hubs, the Texas Department of Transportation (TxDOT) should consider the following:[1]

- Explicit recognition of the highway needs at levels two and three in TxDOT planning
- Traffic management on key corridor access points
- Maintenance/rehabilitation of highway connectivity
- Letting/construction of new projects for capacity and safety

INTRODUCTION

Businesses across the world have increasingly turned to logistics hubs for freight transportation and supply chain management. This policy brief describes the characteristics of logistics hubs—their typology—based on freight facilities, third-party services, and regulatory framework. In addition, the policy brief will provide an overview of logistics hubs' best practices and coordination with the public and private sectors. Specifically, the brief will focus on four logistics hubs in Texas to illustrate the role logistics hubs play in facilitating trade. In particular, the focus will be on two inland ports—the Alliance Global Logistics Hub and the Port of Laredo—and two maritime ports—the Port of Houston and the Port of Corpus Christi. Finally, the policy

[1] "Border Corridors and Trade Report," *Center for Transportation Research*, 2015, http://library.ctr.utexas.edu/hostedpdfs/txdot/border-trade.pdf.

brief will discuss opportunities for improving and expanding the use of logistics hubs to move freight, and the Texas Department of Transportation's role in such opportunities.

LOGISTICS HUBS' ATTRIBUTES AND TYPOLOGY

Logistics centers are vital to trade throughout the local, national, and global levels. But what are they? What makes up and defines a logistics center? An oversimplified answer is that a logistics center is a facility that enables the movement of goods to its final destination. The hub, a type of logistics center, encompasses the small railyard that moves twenty-foot equivalent units (TEUs) from one train car to the next, but also includes the mega seaports that have services ranging from shipyards to container storage, customs enforcement to rail yards. From a policy perspective, the oversimplified answer does not provide enough information to make decisions about how these centers operate. For this section, we will define the different types of logistics centers, what roles they play, the amount of influence they have and the services they may offer.

HIERARCHY/TYPOLOGY DEFINED

As mentioned above, the definition of a logistics center varies tremendously throughout available literature. One reason is that the functions of a facility vary according to local, regional, and national characteristics.[2] Some researchers seek to define logistics centers by their primary mode of transportation, while others classify them based on the volume of freight that flows through them. There is however, a commonality in research that observes, "much more important than the size of the facility itself, is the complexity of logistics activities and the number of logistic service providers (LSP) that distinguishes among levels of hierarchy."[3] In other words, one can derive a logistics center's level based on its features/services.

Figure 1 is Higgins, Ferguson, and Kanaroglou's attempt to combine typology and hierarchy together by "assembling a standardized typology...[and applying them] to create a standardized hierarchy according to facility size, influence, scope of functionality, and value-added activities."[4] The three levels of a logistics center on the far left are connected to the typology inside the triangle. It is important to note that the typology does not strictly adhere to each level. In fact, as you go up in hierarchy you will find more (if not all) of the attributes from the lower levels along with additional value-added services within their area of operation. As noted in the article, "In general, as these facilities move up the scale in functionality and value-added services they can be understood to incorporate and expand on many of the features of the logistics centers below them in the hierarchy."[5]

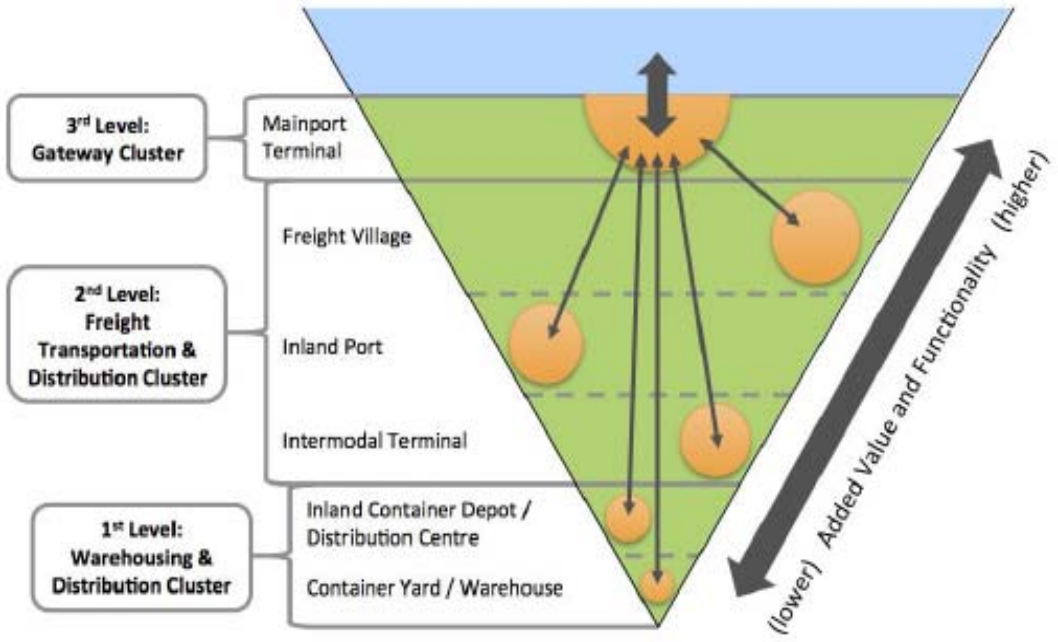
[2] Higgins, Ferguson, and Kanaroglou, "Varieties of Logistics Centres: Developing a Standardized Typology and Hierarchy," *Transportation Research Record*, 2012, http://trrjournalonline.trb.org/doi/10.3141/2288-02.

[3] Vieira, Catapan, and Luna, "An Updated Perspective on the Concept of Logistics Hubs," December 10, 2016, https://www.pomsmeetings.org/ConfProceedings/065/Full%20Papers/Final%20Full%20Papers/065-0083.pdf.

[4] Higgins, Ferguson, and Kanaroglou, "Varieties of Logistics Centres: Developing a Standardized Typology and Hierarchy," *Transportation Research Record*, 2012, http://trrjournalonline.trb.org/doi/10.3141/2288-02.

[5] Ibid.

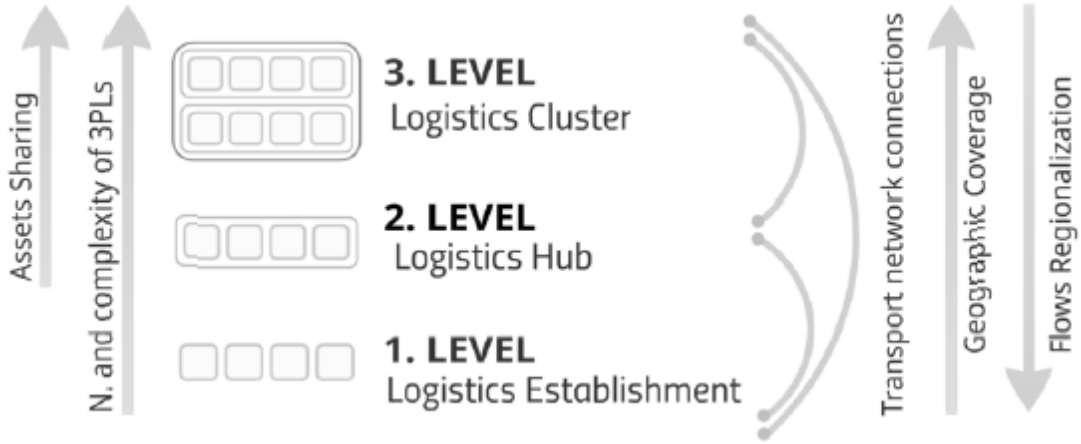
Figure 1. Standardized Typology



Source: Higgins, Ferguson, and Kanaroglou

A layman's definition that supports the three levels is given in Vieira, Catapan, and Luna's article. Seen in Figure 2, level one is simply called a logistics establishment. In this level, there exist "standalone facilities" operating either publicly or privately (warehouses, container yards, etc.). Level two is a "Logistics Hub" which has functional facilities, in a single location, that can be used by "several LSPs." The third level is the cluster. These facilities cover an area (or cluster) such as a metropolitan area and are not necessarily well defined to a specific location.

Figure 2. Standardized Typology



Source: Santos Vieira, Catapan, and Luna

CHARACTERISTICS WITHIN HIERARCHY

As noted above, level one facilities are standalone in that they do not share or affect the operation of other facilities. As facilities become more diverse they move up in hierarchy. "Diverse" is meant to describe the availability, number, and type of LSPs and their ability to share assets. Vieira, Catapan, and Luna single this out as "key-points that account for leveling up in hierarchal structure."[6] They go on to say that "there is a tendency for facilities to organize themselves together in a specific area as they level up in hierarchy. Having common goals, LSPs operating in such facilities also tend to increase asset sharing among themselves, seeking to improve service performance and add value to logistics flows."[7] In terms of "sharing," LSPs may use the same forklift to unload cargo from trucks or may engage in more complex forms of sharing, such as sharing information and communication technologies for inventory control.

On the right of Figure 2 is "Transport Network Connections," "Geographic Coverage," and "Flows Regionalization." This indicates that the higher the level, the more extensive the logistics center's transportation network and the greater its geographical reach. A level-one facility is likely to use less sophisticated means of transportation (a road or highway). A logistics hub is likely to use intermodal transportation such as train-to-train, while a cluster will rely on multimodal connections such as train-to-truck or truck-to-air. Using network connections helps to determine a facility's geographic coverage and the volume/type of cargo it can carry. The utilization of multimodal connections gives a cluster the ability to handle all types of cargo to/from worldwide destinations while an "establishment's" network option (highways or roads) limits both its ability to reach significant geographic regions, and the type of cargo it can deliver. According to one article, there are "four key pillars of strength—highways, railroads, air centers, and ports."[8] These four factors are crucial for any logistics center to increase in influence, or levels, on the standardized hierarchy presented above.

LOGISTICS HUBS

Figures 1 and 2 highlight that a logistics hub falls within the second level of hierarchy; therefore, one can generally assume its characteristics and typology. In general, it is likely to have intermodal/multi-modal operations, a few value-added services such as third-party logistics providers (3PLs), and a large regional reach for distribution. In the details, Higgins, Ferguson, and Kanaroglou make the point that "shared access to facilities" separates the hub from a standalone facility.

The primary reason asset sharing is so important is that it allows companies within the hub to obtain economies of scale. Additionally, asset sharing doesn't just pertain to logistics activities as pointed out by Vieira, Catapan, and Luna. They state that sharing could include "services provided by shipping agents, brokers, shippers, and packing companies, as well as those related to support activities, e.g., foodservice, hospitality, and banking."

Another takeaway in logistics hub typology is the availability of different companies and/or options for a shipper. Bill Luttrell, Senior Locations Strategist at Werner Global Logistics, points out that "all logistics hubs give shippers multiple choices regarding the movement, storage, and transfer of their freight. Multimodal opportunities and warehousing are

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[6] Santos Vieira, Catapan, and Luna, "An Updated Perspective on the Concept of Logistics Hubs," December 10, 2016, https://www.pomsmeetings.org/ConfProceedings/065/Full%20Papers/Final%20Full%20Papers/065-0083.pdf.

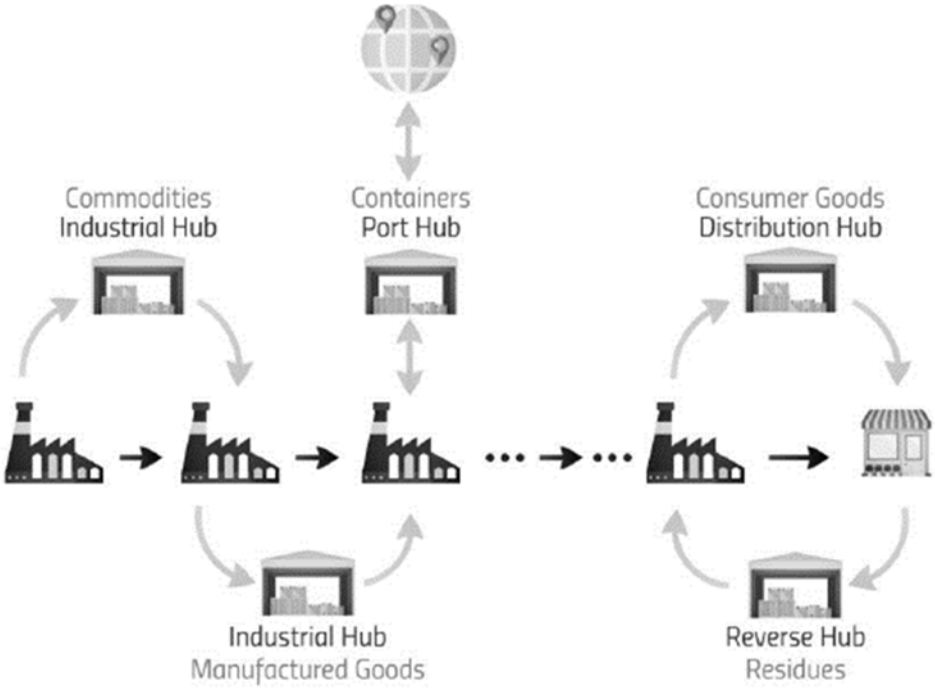
[7] Ibid.

[8] Chris Lewis, "Great Logistics Sites: Prime Destinations, Unmistakable Results," *Inbound Logistics*, Accessed December 12, 2016, http://www.inboundlogistics.com/cms/article/great-logistics-sites-prime-destinations-unmistakable-results/.

located here and companies experience greater utilization rates and less backhauling headaches."[9]

A logistics hub's typology is largely based on where the hub falls on the supply chain for a given good and market. Figure 3 is an illustrative example. The figure is based on Vieira, Catapan, and Luna's analysis "that the classification could be related to the point of the supply chain where the hub is positioned, the characteristics of products' flows and the served market." Figure 3 emphasizes the different hubs that exist based on supply chain and market. For instance, the industrial hub moves commodities throughout the different levels in the manufacturing process until it reaches the port hub where it is typically shipped to a distribution hub for final delivery. The final hub is the reverse hub, which can be separate from a distribution hub, or the same but used in a different manner to move unwanted, broken, or repurposed goods back into the supply chain.

Figure 3. Integration of Supply Chain



Source: Santos Vieira, Catapan and Luna

SUMMARY

The importance of logistics hubs and how they improve the supply chain cannot be understated. A hub's hierarchy is directly related to the availability, number, and type of LSPs and their ability to share assets. Additionally, the diversification and complexity of a hub's transportation network is an indication of its hierarchy. The more complex and diverse the hub, the more geographical coverage it will have. These two observations allow LSPs to obtain an economy of scale that drives down transportation costs and increases economic output. Where the hub lies in relation to the supply chain gives the policy maker an idea of the typology that makes up the hub. As will be seen in the case studies to follow, some even utilize all parts of the

[9] Bill Luttrell, "Freight Corridors & Logistics Hubs Shape the Location Decision," *Area Development*. Accessed December 10, 2016, http://www.areadevelopment.com/logisticsInfrastructure/Intermodal-Sites-Q1-2015/site-selection-process-supplychain-optimization-linked-74421.shtml.

supply chain. Lastly, in almost every piece of literature discussing logistics hubs, the importance of having multiple companies grouped together offering differing and competing services but sharing assets is addressed. This necessity for LSPs to share assets provides an opportunity for governmental organizations to facilitate the creation of hubs in the form of public-private partnerships.

LOGISTICS HUBS' BEST PRACTICES

The most sophisticated logistics hubs share a number of geographical features, transportation infrastructure, industrial infrastructure, and the business environment that facilitate global competition. Global logistics hubs collocate this range of features in order to achieve economies of scale to compete globally for customers, tenants, and trade.

GEOGRAPHIC FEATURES

Geographically, global logistics hubs develop at strategic crossroads with access to major maritime, rail, road, and air transportation modes. Typically, these transportation modes are already developed as logistics hubs make real estate decisions. To achieve a global scale, logistics hubs locate in relative proximity to population centers. Logistics hubs that are located within one-day (or approximately 500 miles of road transportation) of major population centers tend to be more competitive. A large population catchment area allows for logistics hubs manufacturers and traders to distribute their product in that area and beyond to other distribution centers and so "correlates closer to the status of a hub" than other factors.[10]

TRANSPORTATION INFRASTRUCTURE

Logistics hubs offer multiple transportation options for cost effective distribution of goods.[11] The intersection of sea, air, rail, and road transportation infrastructure allows for efficient transshipment in order for goods to reach their final destination. Premier logistics hubs invest in transportation technology infrastructure that facilitates a smooth and controlled transshipment of goods. For example, the Port of Houston offers a Container Toolbox for customers to track their containers.[12] Often, logistics hubs are sited at key highway interchanges for distribution of goods in the population catchment area. Private-sector logistics hubs generate vehicle trips, which impacts public-sector transportation infrastructure.

INDUSTRIAL INFRASTRUCTURE

Logistics hubs have on-site distribution centers and warehouses for customers to process, store, and distribute their goods. Customers may lease existing industrial infrastructure or purchase real estate on-site to develop industrial infrastructure that specifically suits the customer's needs. Often times, industries will cluster logistics hubs, creating opportunities for businesses to achieve economies of scale. Industrial infrastructure, such as shared roads and

[10] "Global & Emerging Logistics Hubs," *CBRE Research*, 2015, http://www.cbre.com/research-and-reports/Global-Emerging-Logistics-Hubs-2015.

[11] "Global & Emerging Logistics Hubs," *CBRE Research*, 2015, http://www.cbre.com/research-and-reports/Global-Emerging-Logistics-Hubs-2015.

[12] "Terminal Toolbox," *Port Houston*. Accessed January, 2017, http://porthouston.com/portweb/terminal-toolbox/.

power plants, allows for efficient supply chain management by reducing transportation costs and customs costs if paired with a foreign-trade-zone (FTZ).

BUSINESS ENVIRONMENT

Premier logistics hubs establish a favorable business environment for customers through the creation of FTZs. U.S. Customs and Border Protection confer FTZ status to applicants creating a "restricted-access site, on or adjacent to a customs port of entry" that is considered to be "outside the U.S. Customs Territory."[13] FTZs facilitate international trade in the US, which creates direct and indirect economic and employment benefits.[14]

Businesses may move foreign and domestic goods into a FTZ for "storage, exhibition, assembly, manufacturing, and processing."[15] Utilization of a FTZ for business operations offers a number of benefits, such as reduction of inventory tax, improvement of supply chain management, and deferral, reduction, or elimination of duties.[16] While goods are present in a FTZ, duties are deferred until the goods leave the facility for consumption, resulting in cash flow flexibility for businesses.[17] In addition, duties on certain individual products, such as electronic components, may be eliminated as the individual components are assembled and taxed as one unit.[18] Lastly, foreign goods utilizing FTZs do not clear customs when imported from abroad. Rather, these goods clear customs as they exit the FTZ resulting in logistical cost-savings for businesses.[19]

LOGISTICS HUBS' PROFILES

The following section provides profiles of a sample of Texas ports to demonstrate the importance and economic impact of inland and maritime ports in Texas and related logistics hub facilities.

ALLIANCE GLOBAL LOGISTICS HUBS

Alliance Global Logistics Hub is an 18,000-acre master-planned inland port developed and managed by Hillwood Properties. The port offers multi-modal transportation infrastructure strategically located in the central United States. Originally developed as the world's first industrial airport, Alliance sits on US Interstate Highway 35 (I-35), also known as the NAFTA Highway, from Mexico to Canada, and it has grown to include two Class I rail lines operated by Burlington Northern Santa Fe and Union Pacific. The BNSF hub is currently 50 percent developed and estimates that in the next ten to twenty years that will double its current volume of containers.[20]

In terms of transportation infrastructure, complexity aligns with hierarchy at Alliance. Three major modes of transportation, along with its central location, provide a competitive

[13] "About Foreign-Trade Zones and Contact Info," Accessed January 15, 2017, https://www.cbp.gov/border-security/ports-entry/cargo-security/cargo-control/foreign-trade-zones/about.

[14] Steve Boecking. "Alliance Texas: Global Supply Chain," 2016, Presentation.

[15] "About Foreign-Trade Zones and Contact Info," *U.S. Customs and Border Protection*, Accessed January 15, 2017, https://www.cbp.gov/border-security/ports-entry/cargo-security/cargo-control/foreign-trade-zones/about.

[16] Steve Boecking. "Alliance Texas: Global Supply Chain," 2016, Presentation.

[17] Ibid.

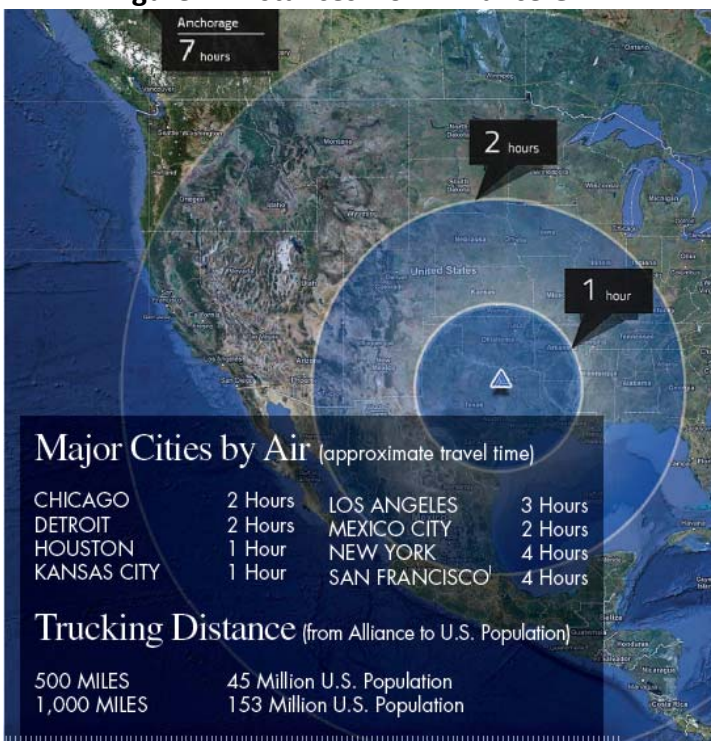
[18] Ibid.

[19] Ibid.

[20] Ibid.

advantage over some of the other inland ports within the state and nation. AS shown in Figure 4, companies can reach more than 153 million people within a two-day drive (1,000 miles) of Alliance.[21] Two days is significant in the age of on-demand consumerism and services such as Amazon Prime. Alliance is also located just under 500 miles from the Laredo, Texas Port of Entry (POE), making it a natural stop for truck traffic.[22]

Figure 4. Distances from Alliance GLH



Source: "Alliance Global Logistics Hub"

If trucking is not the preferred method for a company, the two Class I railroads servicing Alliance offer competitive alternatives. The intermodal and direct rail provide service across the continent to include ports in Long Beach, Oakland, Kansas City, Chicago, Atlanta, Charleston, Savannah, Mexico, and Canada. A total of sixteen trains per day arrive at Alliance from the Ports of Los Angeles/Long Beach (LA/LB) alone, bringing in products that originate from the Asian market for distribution or manufacturing within Alliance's FTZ. These ships do not come through the Panama Canal because of economic reasons or gulf port depth limitations.

The airport provides distributors with the fastest shipping option available. While expensive, air transport may be a necessity when moving items like perishable goods, which can be delivered to nearly all four corners of the contiguous US and Central America within four hours. According the Texas Comptroller's Office, "263 million pounds of air cargo were loaded and unloaded at Alliance Airport in 2015."[23]

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[21] "Alliance Global Logistics Hub," *State of Texas Comptroller*, Accessed December 18, 2016, http://www.alliancetexas.com/Portals/0/PDF/Alliance_Global_Logistics_Hub_Brochure.pdf.

[22] Authors note: at the time of publication the future of NAFTA has not been clearly defined and may impact the significance of this fact.

[23] " Port of Entry: Alliance Global Logistics Hub," *State of Texas Comptroller*, Accessed January 10, 2017, https://www.comptroller.texas.gov/economy/docs/ports/96-1791-fortworth.pdf.

"Value added" services at Alliance include a top-ranked active FTZ with consulting and compliance, on-site customs, direct aircraft ramp access, container/storage yard, and more than twenty third party logistics providers and freight forwarders. In a presentation from Steve Boecking, Vice President of Hillwood Properties, he noted that there are more than 470 corporate residents, with more than sixty-five listed on the Fortune 500, Global 500, or Forbes' Top List of Private Firms. These companies utilize all four modes of transportation and are located on all parts of the supply chain. The Texas Comptroller estimated in 2015 that Alliance contributed 67,000 jobs (direct and indirect) and $6.4 billion dollars to the Texas GDP.[24]

Hillwood Properties, the firm that owns and manages Alliance, is a real estate company that develops, sells, and manages the property within the 18,000-acre community. This includes housing for Alliance employees and those working for the companies operating within Alliance. In fact, Mr. Boecking noted that Hillwood Properties is the largest residential lot developer within the Dallas-Fort Worth Metroplex. Homes range from multiplexes and apartments to $800k single-family homes. In terms of typology and hierarchy, having your workforce living on site is a significant value-added service.

Having this many 3PLs and private companies, as well as a large amount of the workforce located within one logistics hub, provides each company with the ability to reach economies of scale. Specific examples include: the reduction of "non-billable" time for trucking companies at Alliance, reducing the costs for all customers needing drayage support; distribution centers and manufacturing plants benefit from on-site vendors providing forklift maintenance, packaging, conveyor maintenance, and the standardized landscape throughout the logistics park; electricity, phone, and data services are triple-redundant and provide a more reliable utility for resident companies; the workforce can be moved between companies by a staffing agency as demand changes; the ease of using public transportation allows companies to attract high quality workers at a lower wage.[25]

Due to traffic and congestion, being located close to the Metroplex may be a challenge if not addressed properly. Major inland ports like Chicago experience problems with congestion that can cause delays in shipping or force companies to locate further from the population center in order to find space for a distribution center. As Alliance plans to double in size in the next ten to twenty years, it has developed a strong working relationship with TxDOT and the North Central Texas Council of Governments. Collaboration between the three agencies helps to identify population and cargo growth and the highest priority routes used by Alliance. Forecasting potential problem areas far enough in advance can help to provide funding and resources early enough to prevent a negative impact on the trade industry.

PORT OF LAREDO

The Port of Laredo is the number one inland port located along the US-Mexico border. It is situated at the intersection of major freight highways and railroads connecting Canada, the US, and Mexico. In addition to road and rail, the Laredo International Airport services air cargo and passengers. As shown in Figure 6, it is different from other hubs in that the port does not occupy one cohesive area, and industrial and economic development of the port is managed by The Laredo Development Foundation (LDF), a private, not-for-profit company. Its mission is to "promote and foster the economic and industrial development of the Laredo region."[26]

The LDF executive committee is comprised of an elected and appointed board of directors, and special advisors. It is divided into four divisions: the Industrial Attraction

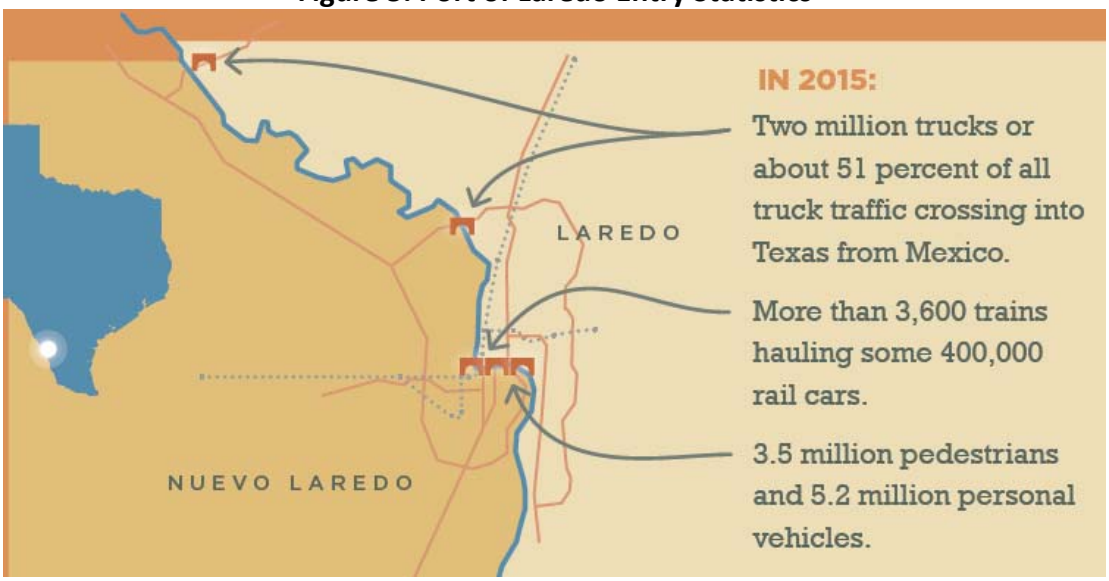
[24] Ibid.

[25] Steve Boecking, "Alliance Texas: Global Supply Chain," 2016, Presentation.

[26] "The Port of Laredo," *Laredo Development Foundation*, Accessed January 8, 2017, from Laredo Development Foundation: http://www.ldfonline.org/CP%202016.pdf.

Division, Business Development Division, Small Business Development Division, and the Special Projects Division. Each division has a specific purpose to further the interest of the Port. It can advise companies interested in relocating to the area on incentives from the city/county, recent trends in trade-related data, and provide mapped out locations for industrial sites.

Figure 5. Port of Laredo Entry Statistics



Source: "Port of Entry: Laredo"

According to the U.S. Bureau of Transportation Statistics (BTS), more than 1.1 million trucks moved through the port into the US during the first seven months of 2016.27 Currently, the port is reporting a 6.1 percent increase in commercial truck traffic compared to this time last fiscal year,28 and since 2010 Laredo has seen a 33 percent increase in truck traffic (1.5 to 2 million crossings). The World Trade Bridge is one of four international bridges located in Laredo, and it is the busiest as it is dedicated solely to commercial trucks. According to a 2015 TxDOT report, combining the commercial traffic of the World Trade Bridge and the Laredo-Colombia Solidarity Bridge would account for more than 51 of the northbound truck crossings in the state of Texas.29 This amount of truck traffic is likely due to the complexity of the highway network on the US side of the border. Upon crossing into the US, commercial trucks have the opportunity to take four different highways (I-35, Hwy 59, Hwy 369, and Hwy 83).

The BTS also reports 2,062 trains with more than 141,000 loaded rail cars entered into the US from January to July 2016. This is more 40 percent of the trains and 50 percent of the loaded rail cars entering Texas during that same period.[30] The data shows a slow but steady increase in train traffic over the past five years, almost 20 percent increase from 2010 to 2015

[27] "Border Crossing/Entry Data: Query Detailed Statistics," *Bureau of Transportation Statistics*, Accessed January 10, 2017, https://transborder.bts.gov/programs/international/transborder/TBDR_BC/TBDR_BCQ.html.

[28] "The Port of Laredo," *Laredo Development Foundation*, Accessed January 8, 2017, http://www.ldfonline.org/CP%202016.pdf.

[29] "Border Corridors and Trade Report," *Center for Transportation Research*, 2015, http://library.ctr.utexas.edu/hostedpdfs/txdot/border-trade.pdf.

[30] "Border Crossing/Entry Data: Query Detailed Statistics," *Bureau of Transportation Statistics*, Accessed January 10, 2017, https://transborder.bts.gov/programs/international/transborder/TBDR_BC/TBDR_BCQ.html.https://transborder.bts.gov/programs/international/transborder/TBDR_BC/TBDR_BCQ.html.

(the last full year data is available on the BTS website). This increase may be attributed to increased congestion at the LA/LB port and improvements to port and rail infrastructure in Mexico. The Kansas City Southern (KCS) de Mexico, a leading railroad that interchanges at Laredo, has been a leading force in convincing shippers to ship through the Port of Lazaro Cardenas in south-central Mexico. KCS notes that it would "extend the supply chain to the Gulf region by two days compared to shipping through the Southern California port complex but would be 18–20 percent cheaper."[31] Laredo is also serviced by Union Pacific Railroad, which allows companies to reach more than twenty-three states on their lines.

The Laredo International Airport consists of two parallel and one perpendicular runways. According to the LDF, it "has dedicated freight facilities in excess of 200,000 sq. ft. Scheduled Air Cargo service is provided by UPS and FedEx."[32] Additionally, there are charter operators for on-demand service needs. Data from 2012 shows the Laredo International Airport handled over 460 million pounds of air cargo (measured by gross landed weight).[33] This places it as the sixth busiest in Texas behind DFW, Houston, Alliance, San Antonio, and El Paso.

In addition to land, rail and freight, the Port of Laredo has an active FTZ, is a part of the third largest customs district, has multiple 3PLs, 24/7 customs brokers on site, available industrial/storage sites for expansion, and received appropriation from Congress in 2014 to expand two of the four POEs. Additionally, in October 2015, Union Pacific announced the expansion of its intermodal facility at Laredo.[34] All of this is good news for the port, which the state comptroller estimates accounts for $52 billion in the state GDP.[35]

PORT OF HOUSTON

The Port of Houston is the largest port in Texas, boasting "44 percent of Texas market share by tonnage and 95 percent Texas market share in containers landed at Texas ports by total TEUs in 2015."[36] Nationally, Port Houston is ranked second in national tonnage, first in foreign trade, and second in domestic trade, in large part due to oil and gas trade.[37] In fact, the Port of Houston is home to the nation's largest petrochemical complex.[38] In 2014, 2,130,544 TEUs flowed through Port Houston creating 56,113 direct jobs and 80,451 indirect jobs with an annual economic impact of $264.9 billion.[39]

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[31] Chris Brooks, "KCS pushes Lazaro Cardenas as alternative to congested LA-Long Beach," *JOC.com*. October 24, 2014, http://www.joc.com/port-news/us-ports/kcs-pushes-lazaro-cardenas-alternative-congested-la-long-beach_20141024.html.

[32] "The Port of Laredo," *Laredo Development Foundation*, Accessed January 8, 2017, http://www.ldfonline.org/CP%202016.pdf.

[33] Airport Statistics," *Laredo International Airport*. Accessed January 10, 2017, http://www.graphitiks.com/laredo_airport/index.php/about/laredo-airport-statistics.

[34] "Union Pacific Launches Port Laredo Expansion Project," *Union Pacific*, Accessed December 14, 2016, http://www.up.com/aboutup/community/inside_track/port-laredo-10-07-2015.htm.

[35] "Port of Entry: Laredo," *State of Texas Comptroller*, Accessed January 10, 2017, https://www.comptroller.texas.gov/economy/docs/ports/96-1791-laredo.pdf.

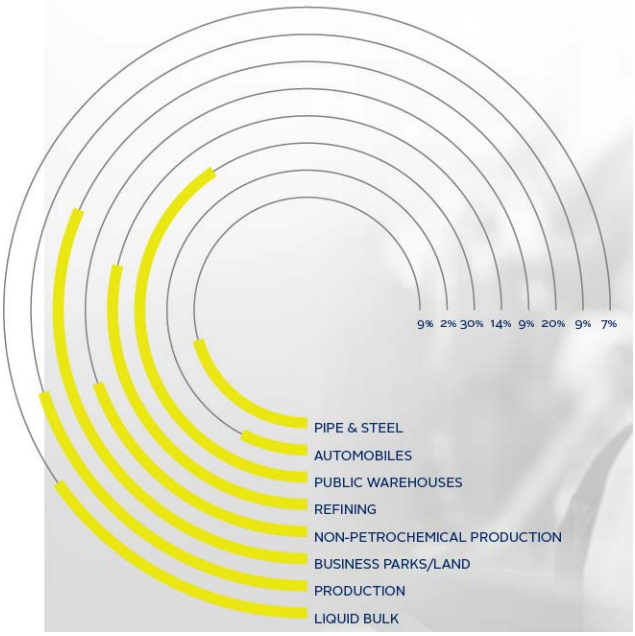
[36] "Statistics," *Port Houston*, Accessed January 15, 2017, http://porthouston.com/portweb/about-us/statistics/.

[37] "Senate Select Committee on Texas Ports," *The Senate of Texas*, Accessed January 15, 2016, http://www.senate.texas.gov/cmtes/84/c638/c638.InterimReport2016.pdf.

[38] "Port of Entry: Houston," *State of Texas Comptroller*, Accessed January 10, 2017, https://comptroller.texas.gov/economy/docs/ports/overview-houston.pdf.

[39] "Senate Select Committee on Texas Ports," *The Senate of Texas*, Accessed January 15, 2016, http://www.senate.texas.gov/cmtes/84/c638/c638.InterimReport2016.pdf..

Figure 6. Port of Houston FTZ Storage Facilities



Source: "Explore FTZ 84: Benefits and Implementation"

Union Pacific and BNSF operate intermodal facilities at the Port of Houston.[40] The port is also connected to the Intercoastal Waterway, and manages a Foreign-Trade Zone with public and private warehouse facilities and liquid bulk storage and blending.[41] The Port of Houston also leases and sells real estate for businesses to develop.[42] Currently, more than 150 private companies lease or own facilities on the twenty-five-mile-long complex.[43] Figure 6 shows the storage facilities available in the Port of Houston's FTZ.[44]

Landside investments, outside the direct control of the Port of Houston, play critical roles in facilitating trade growth at the port. Harris County is the destination of around 50 percent of loaded containerized imports, and the Texas Triangle—Dallas-Fort Worth, Austin, San Antonio, and Houston— accounts for more than 40 percent. A large inland hub, dominated by a 4 million sq. ft. Wal-Mart distribution center which transloads international containers, is located nineteen miles north of the Bayport Terminal Facility and has attracted other big box facilities to the location. The ability of the port to serve a wide variety of customers including a growing state population, key local distribution and manufacturing centers, and a large cluster of refineries, drives its success and underlines its relevance. Trucks and pipelines move product and TxDOT planning and programming activities play a critical part in maintaining landside efficiencies and safety.

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[40] "Texas: Logistics Hub of the Americas," *Texas Office of the Governor*, 2016, http://gov.texas.gov/files/ecodev/Logistics_Report.pdf.

[41] "Foreign Trade Zone," *Port Houston*, Accessed January 15, 2017, http://porthouston.com/portweb/ftz/.

[42] "Real Estate," *Port Houston*, Accessed January 15, 2017, http://porthouston.com/portweb/real-estate/.

[43] "Port of Entry: Houston," *State of Texas Comptroller*, Accessed January 10, 2017, https://comptroller.texas.gov/economy/docs/ports/overview-houston.pdf.

[44] "Explore FTZ: Benefits and Implementation," *Port of Houston*, Accessed January 15, 2017, http://porthouston.com/portweb/wp-content/uploads/2016/08/PHA-FTZ-BenefitsImplementation.pdf.

PORT OF CORPUS CHRISTI

The Port of Corpus Christi is an important Texas port as the fifth-largest US port in total tonnage.[45] The port is connected to the Intercoastal Waterway and the BNSF, KCS, and Union Pacific rail lines service the port.[46] In 2015, the Port of Corpus Christi had a $13.1 billion dollar annual economic impact creating 13,746 direct jobs and 15,607 indirect jobs.[47] The port is developing the La Quinta Trade Gateway, a 1,100-acre greenfield to be developed with a multipurpose dock, container facility, and intermodal rail yard.[48] On April 7, 2017, port officials determined that the planned container facility was no longer a viable option due to its proximity to the North Shore residential community.[49] The planned LNG terminal to support Cheniere Energy's Liquefaction plant, scheduled to open in 2019, remains a key element of La Quinta Gateway planning. As shown in Figure 7, the Port of Corpus Christi's FTZ encompasses seven counties within its jurisdiction for private-sector development of foreign trade zone activities and facilities (see Figure 7).[50] The Port of Corpus Christi offers 125 acres of open storage and 625,000 square feet of covered storage within its FTZ.[51]

[45] "Port Overview," *Port Corpus Christi*, Accessed January 15, 2017, http://portofcc.com/wp-content/uploads/Port-2016-GeneralBrochure-web.pdf.

[46] "Port Overview," *Port Corpus Christi*, Accessed January 15, 2017, http://portofcc.com/wp-content/uploads/Port-2016-GeneralBrochure-web.pdf.

[47] "Senate Select Committee on Texas Ports," *The Senate of Texas*, 2016, http://www.senate.texas.gov/cmtes/84/c638/c638.InterimReport2016.pdf.

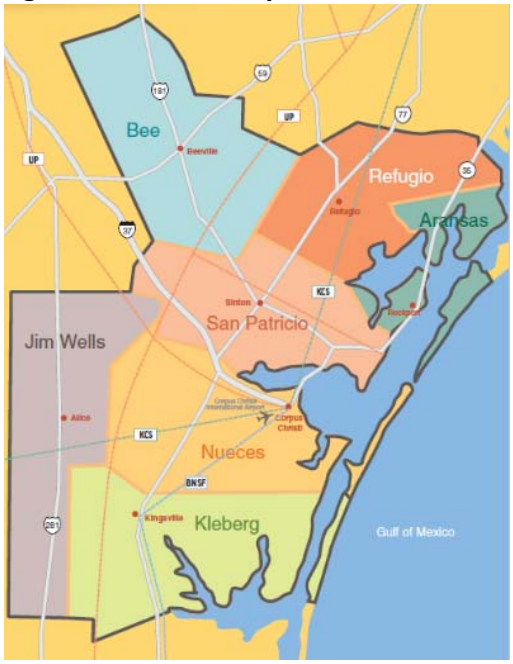
[48] "Port Overview," *Port Corpus Christi*, Accessed January 15, 2017, http://portofcc.com/wp-content/uploads/Port-2016-GeneralBrochure-web.pdf.

[49] "Corpus Christi cancels plan for container terminal" American Shipper May 1 2017

[50] "Foreign Trade Zone #122," *Port Corpus Christi*, January 15, 2017, http://portofcc.com/wp-content/uploads/Port-FTZ-OneSheet-web.pdf.

[51] "Port of Entry: Corpus Christi," *State of Texas Comptroller*, Accessed January 10, 2017, https://comptroller.texas.gov/economy/docs/ports/overview-corpus-christi.pdf.

Figure 7. Port of Corpus Christi FTZ 122



Source: "Moving America's Energy"

OPPORTUNITIES FOR IMPROVEMENT

In 2013, the Texas Office of the Governor released Texas: Logistics Hub of the Americas, a report claiming that Texas ports and related logistics activities are geographically situated to continue to serve as the major hub for the movement of goods throughout the Americas.[52] For that reason, logistics hubs and related ports will continue to have major impacts on Texas's transportation infrastructure.

In 2016, the Texas Department of Transportation released the Texas Freight Mobility Plan to plan for this fact. The Texas Freight Mobility Plan aligns freight mobility planning with overall TxDOT planning, assesses the state of freight mobility, and makes recommendations for freight mobility planning.[53] The plan is comprehensive and TxDOT should continue to monitor and implement the recommendations provided in the report. Furthermore, the Center for Transportation Research at The University of Texas recommends that TxDOT can assist logistics hubs and ports in the following ways:[54]

- Explicit recognition of the highway needs at level-two and level-three hubs in TxDOT planning
- Traffic management on key corridor access points
- Maintenance/rehabilitation of highway connectivity

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[52] "Texas: Logistics Hub of the Americas," *Texas Office of the Governor*, 2016, http://gov.texas.gov/files/ecodev/Logistics_Report.pdf.

[53] "Texas Freight Mobility Plan" *Texas Department of Transportation*, Accessed November 15, 2016. http://ftp.dot.state.tx.us/pub/txdot/move-texas-freight/studies/freight-mobility/plan.pdf.

[54] "Impacts of Inland Ports on Trade Flows and Transportation in Texas: A Summary," *Center for Transportation Research*, 2002, http://library.ctr.utexas.edu/hostedpdfs/txdot/border-trade.pdf.

- Letting/construction of new projects for capacity and safety

The State of Texas could play a larger role in the development and use of logistics hubs through legislative action. In 2015, the Senate Select Committee on Texas Ports released an interim report that provided an overview of Texas ports and their competitive positions. The primary recommendation was that the State of Texas create funding mechanisms to improve the Gulf Intercoastal Waterway and port channels.[55] These projects are particularly important after the Panama Canal expansion that will allow for bigger ships to call on Texas ports.[56] Louisiana and Florida have developed policy initiatives that could improve Texas ports and related logistics hubs' competitive positions.[57] Florida's Strategic Port Investment Program provides direct investment for port development, while Louisiana provides loans, backed by general obligation bonds, for development of port facilities.[58] Private-sector ports report that they can meet development needs, but are seeking access to favorable loan conditions.[59] The Texas Legislature should create policy initiatives that provide favorable loans for channel, waterway, and freight road infrastructure improvements.

CONCLUSION

Logistics hubs play a significant role in the economy of Texas. The movement of goods through logistics hubs in the state accounts for a large portion of the state's GDP and therefore TxDOT and the state legislature should facilitate the efficient flow of trade. The four case studies provide examples of successful hubs that coordinate between the public and private sectors to achieve their goals of economic efficiency and public prosperity. Each case exemplifies the described hierarchy and typology of logistics hubs or clusters. Their typology of complex transportation networks, services offered, and ability to share assets provides an advantage to companies located within the hub. TxDOT's ability to provide more advantageous business environments through traffic management, lobbying for legislature support, or forecasting needs of these hubs will allow increased efficiency for the hubs and in turn continue to enhance the GDP of the state.

[55] "Senate Select Committee on Texas Ports," *The Senate of Texas*, 2016, http://www.senate.texas.gov/cmtes/84/c638/c638.InterimReport2016.pdf.

[56] "Senate Select Committee on Texas Ports," *The Senate of Texas*, 2016, http://www.senate.texas.gov/cmtes/84/c638/c638.InterimReport2016.pdf.

[57] Ibid.

[58] Ibid.

[59] Ibid.

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