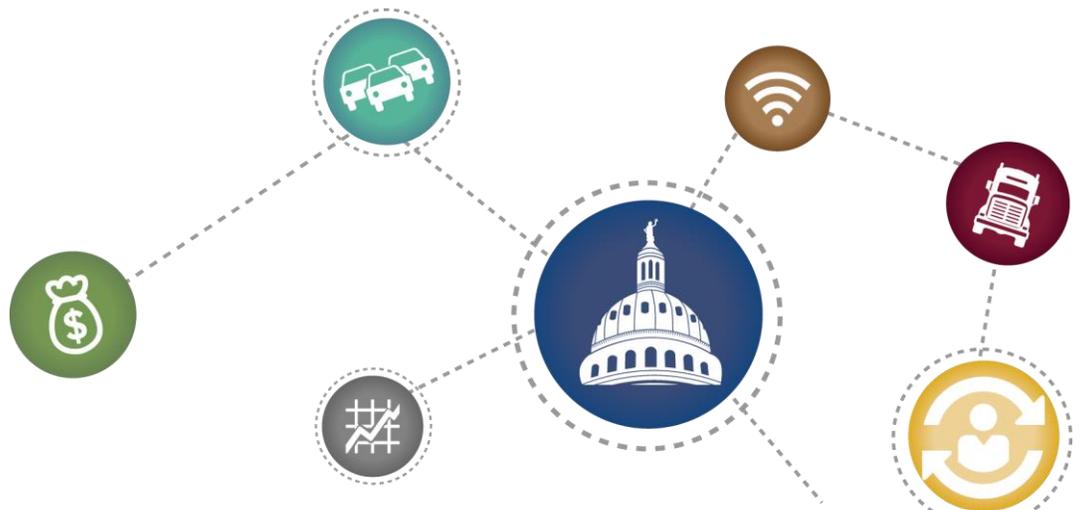# Texas Freight Survey

Final report

PRC 15-43 F

Texas Freight Survey

Texas A&M Transportation Institute

PRC 15-43 F

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Table of Contents

List of Figures

List of Tables

Executive Summary

In summer 2015, the Texas A&M Transportation Institute (TTI) implemented the Texas Freight Pilot Survey, during which more than 500 Texas establishments (businesses) were interviewed to assess how well the transportation system is serving those that use it to move goods and/or services. Respondents were presented with 12 transportation-related factors and were asked to rank how well the current transportation system is performing across four transportation infrastructures (highways, rail, ports and border crossings). Respondents ranked their system performance satisfaction levels using a numerical scale, which was then converted and expressed in letter-grade rankings for this report.

This report presents a top-level synopsis of the survey findings.

With respondent sentiment generally hovering between neutrality and moderate satisfaction, the analysis suggests that highways are not only the most familiar type of infrastructure, but also the infrastructure type with which respondents are most satisfied (overall grade of C+). Conversely, not only does the data suggest that border crossings are the least familiar among participants, but also the infrastructure type with which respondents are least satisfied (the numerical rating is equivalent to an overall grade of C-).

The highway system is not only the most familiar infrastructure type among respondents, but also the type respondents are most satisfied with when compared with rail, ports, and border crossings. However, industry respondents were far less satisfied with the capacity, condition, and funding of Texas's highway system, the public-sector functions relating to the highway system.

The survey results suggest that industry is the most satisfied with the performance of the highway system. Specifically, the results point to industry satisfaction with the amount of loss and damage experienced (theft, damage en route), service availability/frequency (readily available), and technology adoption (visibility of shipments/tracking of shipments as they move along the supply chain between the various origin and destination points). These seem to be actions/initiatives implemented by trucking companies (private sector actions) to improve the efficiency of the trucking sector. On the other hand, the establishments surveyed were far less satisfied with the capacity, condition, and funding of Texas's highway system, which are the public-sector functions relating to the highway system.

Port infrastructure and service ranked second in terms of establishment satisfaction (the numerical rating is equivalent to an overall grade of C). Industry expressed most satisfaction with safety levels (accidents/incidents), loss and damages experienced, and infrastructure condition. Less satisfaction is, however, experienced with port connectivity, infrastructure capacity, and timeliness (intermodal transfer times).

Rail infrastructure and service ranked third in terms of establishment satisfaction (the numerical rating is equivalent to an overall grade of C). The establishments surveyed seemed the most satisfied with the rail sector's safety performance, loss and damage experienced, and the condition of the rail infrastructure. The establishments are, however least satisfied with a number of operational/service aspects (i.e., time and service availability/frequency) and rail funding.

Border crossing infrastructure and operations ranked last in terms of establishment satisfaction. The establishments surveyed were neutral to somewhat satisfied with safety, loss and damage, and infrastructure condition, but were neutral to somewhat dissatisfied with border reliability, time, and infrastructure capacity. Similarly, funding for border infrastructure also rated neutral to somewhat dissatisfied.

> *Of the establishments surveyed:*
> - *39 percent project an increase in deliveries*
> - *33 percent project an increase in inventory*
> - *32 percent project an increase in employment*

For all infrastructure types, "loss and damage" was identified as one of the top three most satisfying characteristics. Similarly, "infrastructure condition" and "safety" were top 3 across rail, ports and border crossings.

At the opposite end of the satisfaction spectrum, "infrastructure capacity" was identified as one of the top three least satisfying characteristics associated with highway, port and border crossing infrastructure, while "funding" was identified as least satisfying for highway and rail infrastructure, as well as to some extent for border crossings. There thus seems to be a general concern from establishments about the capacity and funding of Texas's transportation system. This is of specific concern in light of the fact that a greater percentage of establishments anticipate an increase in business activity than a decrease, with 39 percent of the establishments surveyed foreseeing an increase in deliveries, 33 percent foreseeing an increase in inventory, and 32 percent foreseeing an increase in employment. These business indicators may suggest an increase in demand and usage of Texas's transportation industry by the establishments surveyed, assuming a similar distribution between those that foresee a decrease and increase in business indicators.

This increased demand coupled with infrastructure capacity and funding concerns may result in the Texas transportation system struggling to meet the future needs of Texas shippers and carriers. This is of further concern given that "access to transportation" was deemed most important with regard to facility siting.

Overall, the survey results may forecast increased demand and pressure on the Texas transportation system at a time when concerns about infrastructure capacity and funding are emerging.

Background

If an out-of-state visitor were to ask one of metropolitan Amarillo's 250,000 residents to describe their city in the Texas Panhandle, the phrase "freight transportation crossroads" may not qualify as one of the top 10 responses (phrases such as "half-buried Cadillacs," "72 ounce steak," or "Route 66" might come up more readily). Yet walking up the steps of the City Hall downtown, someone in the freight industry could clearly identify the sounds of two nationally important transportation arteries less than a mile away. To the south, the roar of tires on Interstate 40 tells the story of trucks connecting the West Coast to markets in the East and South. A few blocks to the east, in a major rail yard located on BNSF's Transcon main line, trainloads of cargo containers stream from the Ports of Los Angeles and Long Beach to Chicago.

In Amarillo and throughout the state of Texas, freight transportation matters. Industries like mining, construction, manufacturing, agriculture, and wholesale and retail trade produce 50 percent of the state's $1.5 trillion gross state product. Half of the state's economic health depends on freight transportation—roads, railroads, cargo airports, pipelines and ports. Businesses employing millions of Texans rely on freight transportation as a matter of business necessity. Someone driving to work at a recreational boat manufacturing plant in Abilene, a vegetable distribution warehouse in McAllen, a grocery store in Beaumont, a craft brewery in Dallas or a gas well in Odessa may not realize it, but their jobs depend on products getting to their businesses on Texas' freight network.

Texas consumers also depend on this same freight network to connect them to the global economy. Whether they drive to a store or order online, their new running shoes or rolling luggage came to them on a worldwide journey through supply chains involving ocean vessels, tractor-trailers and light delivery trucks, and railroads across public and private infrastructure. Globalization may be a talking point for politicians and pundits, but consumers and the businesses that provide goods and services to them have already voted favorably with their feet and their dollars. Freight transportation makes this international commerce possible.

Just as the interstates, pipelines, and railroads carry goods across the Panhandle and rest of the state to Texas consumers, Texas's freight system connects businesses and industries throughout North America. Billions invested in automotive manufacturing plants in Mexico bank on frequent, fluid crossings of the U.S.-Mexico border by trucks and trains moving through Texas. New power plants being built in the Southeast depend on abundant natural gas from Texas, which requires Texas pipelines to take product out and highways to carry drilling supplies coming into Texas. Manufacturing facilities in the Midwest require plastic pellets on railcars coming from Gulf Coast petrochemical plants. Corn harvested in Iowa and South Dakota travels by hopper cars to Texas feedlots or export elevators at Texas ports.

So, since Texans depend on the freight network to such a significant extent as consumers, business owners, or employees, determining the system's strengths and weaknesses is important for policy development. To that end TTI has launched this pilot survey of shippers and carriers.

This information on how the freight network functions for its users can help inform project planning and policymaking alike.

Overview of Methods

In summer 2015, the Texas A&M Transportation Institute (TTI) implemented the Texas Freight Pilot Survey, a survey of more than 500 Texas establishments, to assess how well the transportation system is serving businesses that use it to move goods and/or services. This report presents a top-level synopsis of the survey findings.

Objectives

The objectives of the project were to:

- Assess shipper and carrier opinion about a variety of Texas's transportation system attributes,

- Analyze factors affecting facility siting, and

- Investigate trends in key business indicators (revenue, employment, inventory, etc.).

Where Was the Survey Conducted?

The sampling methodology involved stratification by two variables: geography and industry sector. With regard to geography, Texas was stratified into 8 survey regions. This stratification scheme was predicated upon earlier research conducted by members of the research team.[1] See Figure 1 for a map of the stratification.
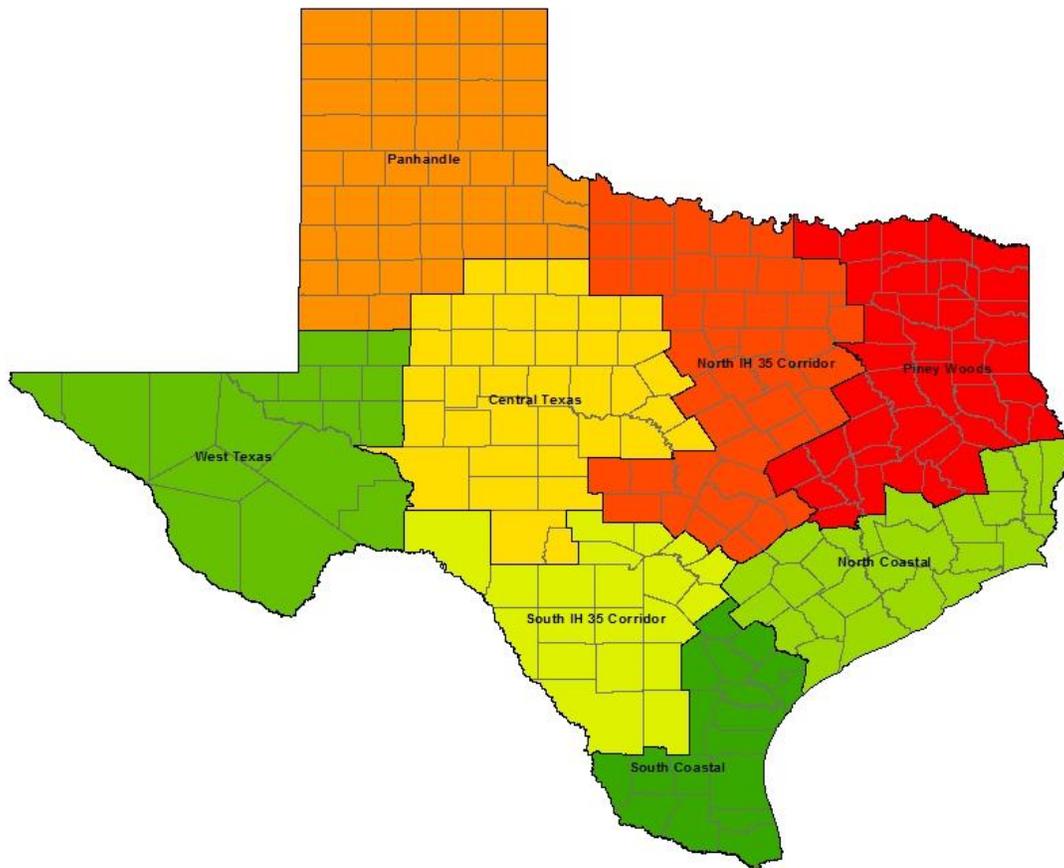
Figure 1.Texas Freight Pilot Survey Regions.

Source: (1)

With regard to the industry sector, establishments were selected from a series of nine North American Industry Classification System (NAICS) categories, each of which is presented in Table 1. 2015 Texas Freight Pilot Survey NAICS Sampling Categories—Texas Distribution. It should be noted that this stratification methodology has been used for other establishment surveys conducted at the federal level. As such, it has been vetted.

Table 1. 2015 Texas Freight Pilot Survey NAICS Sampling Categories—Texas Distribution.

NAICS	Industry Sector	Count of Establishments	Proportion of Establishments
11	Agriculture, Forestry, Fishing and Hunting	32,495	8%
21	Mining, Quarrying, and Oil and Gas Extraction	9,704	2%
22	Utilities	3,156	1%
23	Construction	96,241	24%
31-33	Manufacturing	47,944	12%
42	Wholesale Trade	66,545	17%
44	Retail Trade	97,913	24%
48-49	Transportation and Warehousing	43,421	11%
5111	Newspaper, Periodical, Book, and Directory Publishers	3,413	1%
Total		400,832	100%

Note: Counts provided by Marketing Systems Group, Inc.

A minimum of 50 establishments was established as a data collection target for of the survey regions. There were not minimum targets established for the industry sector.

What Did the Survey Cover?

Researchers conducted a detailed review of the literature and public policy issues to gain a better understanding of the current issues in the freight industry, as well as current research methods being implemented to learn more about these issues. Based on this review, the final survey contained 14 primary questions distributed over three topic areas: (1) opinion about a variety of Texas's transportation system attributes, (2) factors affecting facility siting and (3) trends in key business indicators. Because many of the primary questions had sub-questions, as many as 58 data points could be collected for each establishment. The final questionnaire design was strongly influenced by the Texas Manufacturing Outlook Survey conducted by the Federal Reserve Bank of Dallas.[2] Respondents had the option of completing the survey by phone, web or mail.

How Were the Survey Respondents Selected?

Establishments eligible to be surveyed were located in Texas and associated with one of nine previously mentioned industry sectors. The survey was then administered to an individual within the organization who was knowledgeable about the establishment's use of the transportation network in their business dealings (preferably a logistics manager or an individual within the organization responsible for making transportation decisions). The survey was administered in English and Spanish. The sample was drawn from an InfoGroup® database of all known Texas establishment addresses.

A goal of 50 surveys per region (400 statewide) was established at the onset of the survey. This would provide a statewide-level confidence interval of 4.4 percent +/− at the 95 percent confidence level.

Respondents were mailed a survey packet, including an introductory letter and mail survey.

How Was the Survey Conducted?

Data collection began May 18, 2015, with an initial pilot of 100 establishments. This small beginning effort was conducted to both assess the efficacy of the various data-collection methods (mail, web and phone) and review the data. These 100 establishments were mailed a survey packet indicating they had been selected for survey participation. Of these 100, a total of 2 participated by phone and 3 participated by mail. Zero participated by web.

Following the pilot, the decision was made to initially mail 1,000 survey packets. This mailing yielded 43 completes (40 by mail and 3 by web). Given that a 4.3 percent participation rate was lower than estimated for the budget and schedule, a decision was made to continue surveying, with phone being the major data collection mode. From this point forward, no further advance notification packets were mailed.

Data collection concluded on June 15, 2015. A total of 2,600 establishments were selected for participation throughout all phases of the survey. Of these, 509 (approximately 20 percent) completed a survey.

What Was the Final Distribution of Surveys Across Regions and Industry Sectors?

The original goal of 50 surveys in each geographic region was met or exceeded. Table 2 provides the final distribution of surveys across region and industry sector.

Table 2. Texas Freight Pilot Survey Distribution Across Industry Sector and Geography.

Industry Sector	Region								Total
	Panhandle	West	Central	North IH-35	Piney Woods	North Coastal	South Coastal	South IH-35	
Agriculture, Forestry, Fishing and Hunting	12	5	3	4	0	1	3	3	31
Mining, Quarrying, and Oil and Gas Extraction	1	0	1	1	3	5	0	2	13
Utilities	1	2	5	3	7	5	2	4	29
Construction	2	3	7	10	0	10	13	6	51
Manufacturing	8	9	10	30	5	18	9	5	94
Wholesale Trade	15	13	6	19	15	28	5	8	109
Retail Trade	7	10	9	23	13	16	14	14	106
Transportation and Warehousing	2	8	10	14	7	15	7	8	71
Newspaper, Periodical, Book, and Directory Publishers	2	0	2	0	1	0	0	0	5
Completed Surveys	50	50	53	104	51	98	53	50	509

How Can the Survey Be Improved?

To assess the efficacy of the overall design, the survey was essentially conducted as a pilot. Throughout the project, researchers noted some potential aspects of the methodology that could be improved upon in order to enhance the overall quality of data. These items are listed below.

- Due to low participation by web and mail, offer respondents the opportunity to participate via telephone as soon as data collection is launched.

- TTI suggests that future iterations of the survey collect a greater number of surveys, increasing the overall sample size to perhaps 1,000 statewide establishments. This would decrease the margins of error associated with statistical estimates, and make it easier to identify statistically significant differences observed across industry sectors and geographies.

- Establishment survey participation rates tend to be very low. Because of this, the sampling plan had a great degree of flexibility with regard to the final distribution of surveys. While minimum sample targets were established for the survey regions, no such minimums were identified for the industry sector. TTI suggests that future iterations of the survey consider enhancing the overall design by introducing minimum targets for the industry sector.

- The survey questions designed to collect information on port, rail and border crossing infrastructure were characterized by significantly higher non-response than questions designed to collect information on highway infrastructure. TTI suggests that future iterations of the survey consider targeted oversampling of establishments that may be more likely to rely on these modes.

Results

It is important to note that the survey responses were not weighted or expanded so that inferences could be made of all establishments across the state of Texas. The weighting process is highly dependent on the availability of high-quality information about the survey universe (Texas establishments in specific industry sectors). The quantity and quality of information available in establishment databases used for survey sampling are, historically, not ideal for accurate weighting. Additionally, since this survey was a pilot effort, the sample size was intentionally kept smaller than would be associated with a full-scale deployment, complete with a weighting and expansion plan. As such, the decision was made not to weight and expand the data; and, the statistical estimates presented here are only valid for the establishments that were surveyed in the Texas Freight Pilot Survey.

Transportation Factors That Affect Freight Business Decisions

Respondents were presented with twelve transportation-related factors that freight establishments may or may not take into account when making business decisions. These factors are listed below.

- Infrastructure Capacity (congestion/service levels)

- Infrastructure Condition (maintenance of existing facilities)

- Time (transit time, border processing times, intermodal transfer times)

- Service Availability/Frequency (readily available, mode choices)

- Reliability (within specified/expected time windows)

- Costs (competitive rates)

- Loss and Damage (theft, damage en route)

- Safety (accidents/incidents)

- Funding (investment levels)

- Connectivity (access to intermodal facilities, access to downtown areas)

- Transportation Policies/Regulations (oversize and overweight loads, hazardous material transport)

- Technology Adoption (visibility of shipments, traffic and incident management systems)

Using a scale of 1 to 5, respondents were asked to evaluate how well the current transportation system is performing with regard to the above factors across various transportation infrastructures (highways, rail, ports and border crossings). A score of 1 meant they were very

dissatisfied in how the transportation system is performing, while a score of 5 meant they were very satisfied in how the transportation system is performing. In the event that any response was not applicable to the respondent's situation (such as the respondent's establishment not being familiar with any of the four infrastructure types), they were instructed to assign a value of "N/A".

Figures Figure 2 through Figure 4 present mean scores for each factor by infrastructure type (highway, rail, ports, and border crossings). The number in parentheses next to each factor represents the number of respondents that provided a response.

Figure 2 provides respondent's average ranking of each transportation-related factor for highway infrastructure. The data suggests that respondent satisfaction levels are highest with regard to loss and damage (mean score of 4.05), service availability (mean score of 3.98) and technology adoption (mean score of 3.93). These mean scores generally correspond to respondents being somewhat satisfied. Conversely, the data also suggests that respondent satisfaction levels were lowest for funding (mean score of 3.15), infrastructure condition (mean score of 3.32) and infrastructure capacity (mean score of 3.47). These mean scores generally correspond to respondents being neutral to somewhat satisfied.
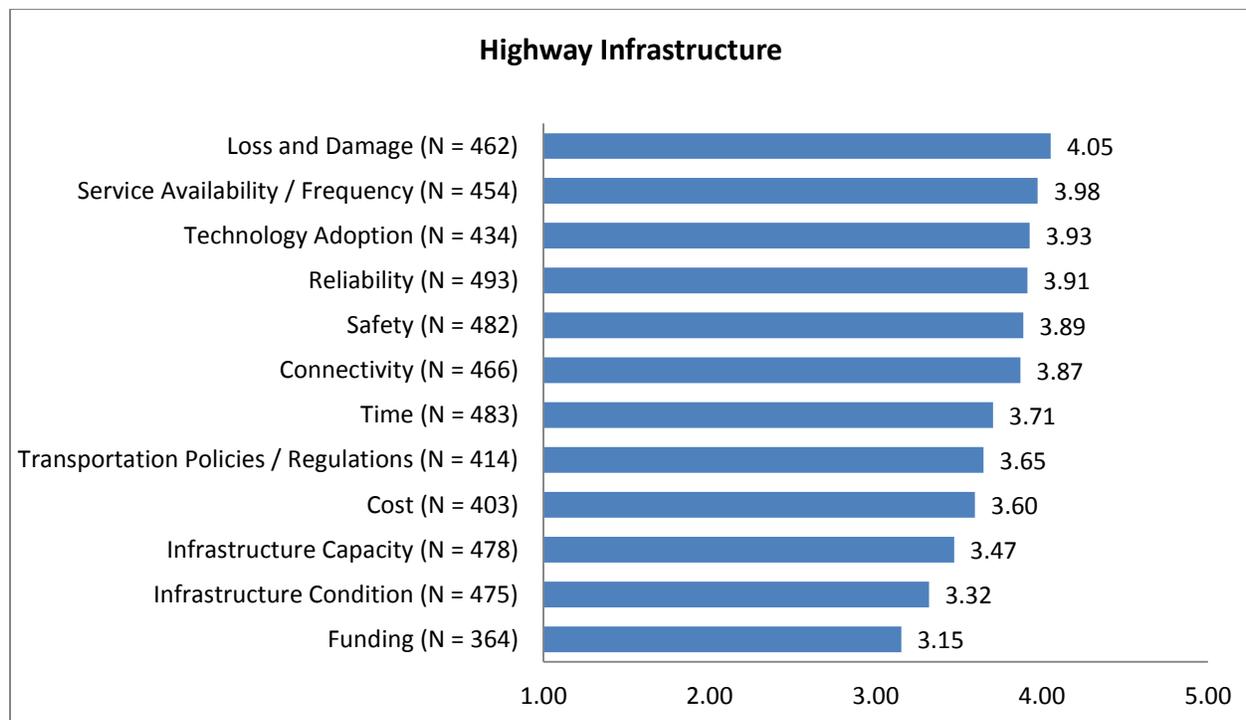

Highway Infrastructure

Factor	Score
Loss and Damage (N = 462)	4.05
Service Availability / Frequency (N = 454)	3.98
Technology Adoption (N = 434)	3.93
Reliability (N = 493)	3.91
Safety (N = 482)	3.89
Connectivity (N = 466)	3.87
Time (N = 483)	3.71
Transportation Policies / Regulations (N = 414)	3.65
Cost (N = 403)	3.60
Infrastructure Capacity (N = 478)	3.47
Infrastructure Condition (N = 475)	3.32
Funding (N = 364)	3.15

Figure 2. Average Ranking of Transportation Factors for Highway Infrastructure.

It is noteworthy that respondents most often provided a response to questions about highway system rather than the other modes of transport — rail, ports, border crossings. This suggests that the surveyed establishments were much more likely to be familiar with and rely on the highway system than any of the other three modes.

The overall highway mean score calculated by taking a weighted average of each individual mean score is 3.72. This suggests that, overall, respondents are between neutral and somewhat satisfied with the current highway transportation system.

Because the overall sample sizes for the highway infrastructure questions were adequate for a deeper investigation, a more detailed analysis was conducted to identify statistically significant differences across geography and industry sector.

With regard to geography, significant differences were identified in 4 of 8 geographic regions (North IH-35, Panhandle, Piney Woods, and South Coastal). Respondents in the North IH-35 region were less satisfied (mean score of 3.71) than was the balance of the state (mean score of 4.05) with regard to highway-service availability and frequency (capturing the availability of trucking capacity and mode choice). Conversely, respondents in the Panhandle region were more satisfied (mean score of 4.30) than was the balance of the state (mean score of 3.94) with regard to highway service availability and frequency. Respondents in the Panhandle region were also more satisfied (mean score of 4.02) with regard to highway infrastructure and capacity than was the balance of the state (mean score of 3.42). Respondents in the Piney Woods were more satisfied (mean score of 4.34) with highway-service availability and frequency than was the balance of the state (mean score of 3.94). Lastly, respondents in the South Coastal region were more satisfied (mean score of 3.65) with highway infrastructure and condition than was the balance of the state (mean score of 3.28).

With regard to industry sector, significant differences were identified in 3 of 8 sectors (Mining, Quarrying, Oil and Gas Extraction, and Utilities; Retail Trade; and Transportation and Warehousing). Respondents in Mining, Quarrying, Oil and Gas Extraction, and Utilities were more satisfied (mean score of 3.92) with regard to highway infrastructure and capacity than was the balance of the state (mean score of 3.43). They were also more satisfied with both highway time (mean score of 4.10) and highway reliability (mean score of 4.26) than was the balance of the state (mean scores of 3.67 and 3.88, respectively). Respondents in Retail Trade were more satisfied with highway connectivity (mean score of 4.16) and highway-transportation policies and regulations (mean score of 4.00) than was the balance of the state (mean scores of 3.79 and 3.60, respectively). Lastly, respondents in transportation and warehousing were less satisfied with highway time (mean score of 3.32), highway reliability (mean score of 3.55), and highway connectivity (mean score of 3.54) than was the balance of the state (mean scores of 3.77, 3.97, and 3.93, respectively).

Figure 3 provides respondents' average ranking of each transportation-related factor for rail infrastructure. The data suggests that respondent satisfaction levels are highest for safety (mean score of 3.87), loss and damage (mean score of 3.72), and infrastructure condition (mean score of 3.57). These mean scores generally correspond to respondents being between neutral and

somewhat satisfied. Conversely, the data also suggests that respondent satisfaction levels were lowest for service availability/frequency (mean score of 3.01), funding (mean score of 3.17), and time (mean score of 3.23). These mean scores generally correspond to respondents being neutral to somewhat satisfied.

The overall rail mean score—calculated by taking a weighted average of each individual mean score—is 3.38. This suggests that respondents are between neutral and somewhat satisfied with the current rail transportation system.
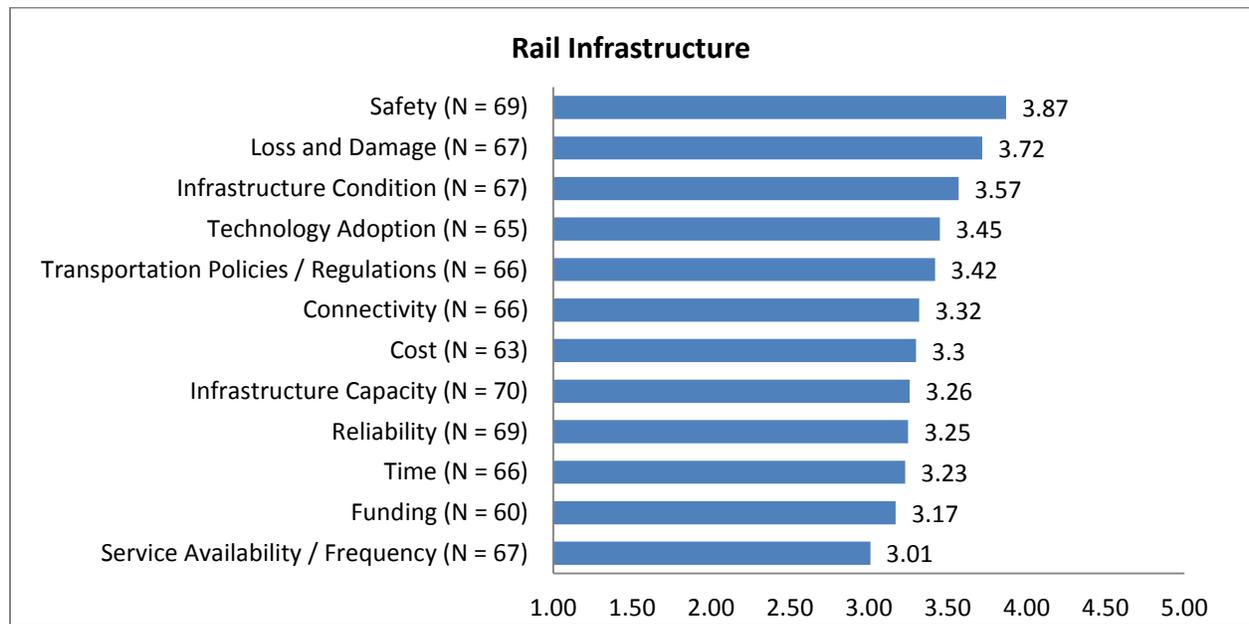
Rail Infrastructure

Factor	Score
Safety (N = 69)	3.87
Loss and Damage (N = 67)	3.72
Infrastructure Condition (N = 67)	3.57
Technology Adoption (N = 65)	3.45
Transportation Policies / Regulations (N = 66)	3.42
Connectivity (N = 66)	3.32
Cost (N = 63)	3.3
Infrastructure Capacity (N = 70)	3.26
Reliability (N = 69)	3.25
Time (N = 66)	3.23
Funding (N = 60)	3.17
Service Availability / Frequency (N = 67)	3.01

Figure 3. Average Ranking of Transportation Factors for Rail Infrastructure.

Figure 4 provides respondents' average ranking of each transportation-related factor for port infrastructure. The data suggests that respondent satisfaction levels are highest with regard to safety (mean score of 4.00), loss and damage (mean score of 3.72), and infrastructure condition (mean score of 3.67). These mean scores generally correspond to respondents being between neutral and somewhat satisfied. Conversely, the data also suggests that respondent satisfaction levels were lowest with regard to time (mean score of 3.13), infrastructure capacity (mean score of 3.22), and connectivity (mean score of 3.26). These mean scores

generally correspond to respondents being neutral to somewhat satisfied.

The overall port mean score—calculated by taking a weighted average of each individual mean score—is 3.45. This suggests that respondents are between neutral and somewhat satisfied with the current port transportation system.
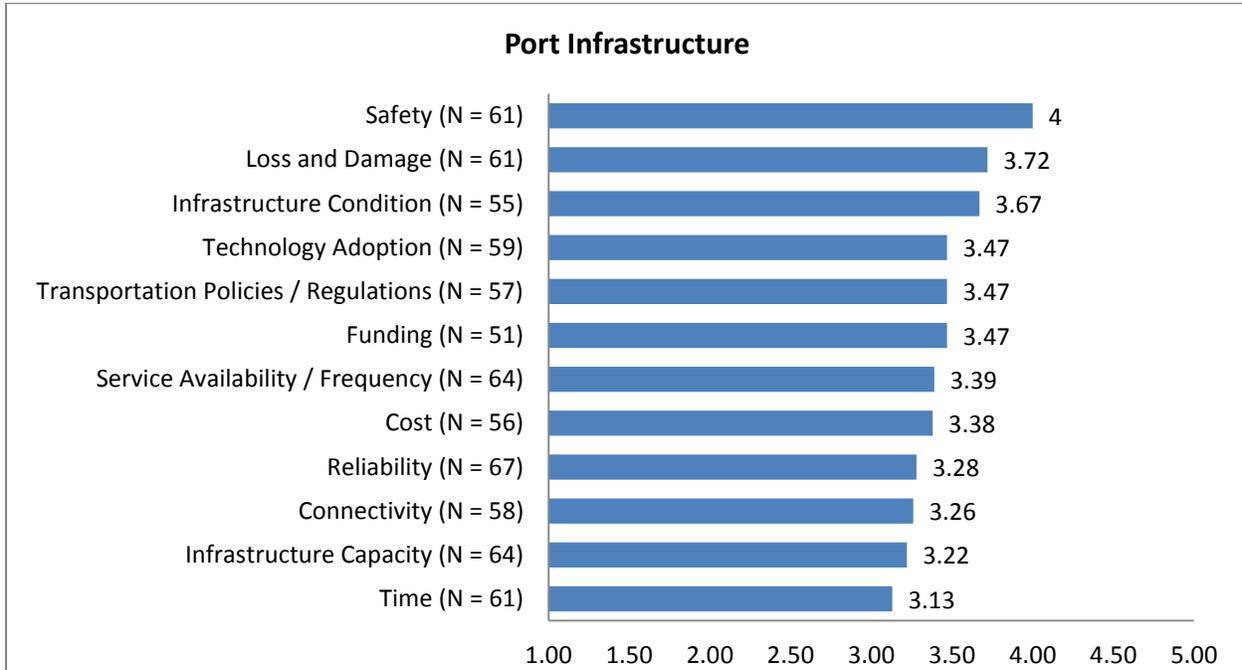

Figure 4. Average Ranking of Transportation Factors for Ports.

Figure 5 provides respondents' average ranking of each transportation-related factor for border-crossing infrastructure. The data suggests that respondent satisfaction levels are highest with regard to safety (mean score of 3.65), loss and damage (mean score of 3.47), and infrastructure condition (mean score of 3.32). These mean scores generally correspond to respondents being between neutral and somewhat satisfied. Conversely, the data also suggests that respondent satisfaction levels were lowest with regard to infrastructure capacity (mean score of 2.74), time (mean score of 2.74), and reliability (mean score of 2.92). These mean scores generally correspond to respondents being somewhat dissatisfied and neutral.

The overall border-crossing mean score—calculated by taking a weighted average of each individual mean score—is 3.15. This suggests that respondents are between neutral and somewhat satisfied with the current rail transportation system.

The overall border-crossing mean score—calculated by taking a weighted average of each individual mean score—is 3.15. This suggests that respondents are between neutral and somewhat satisfied with the current rail transportation system.
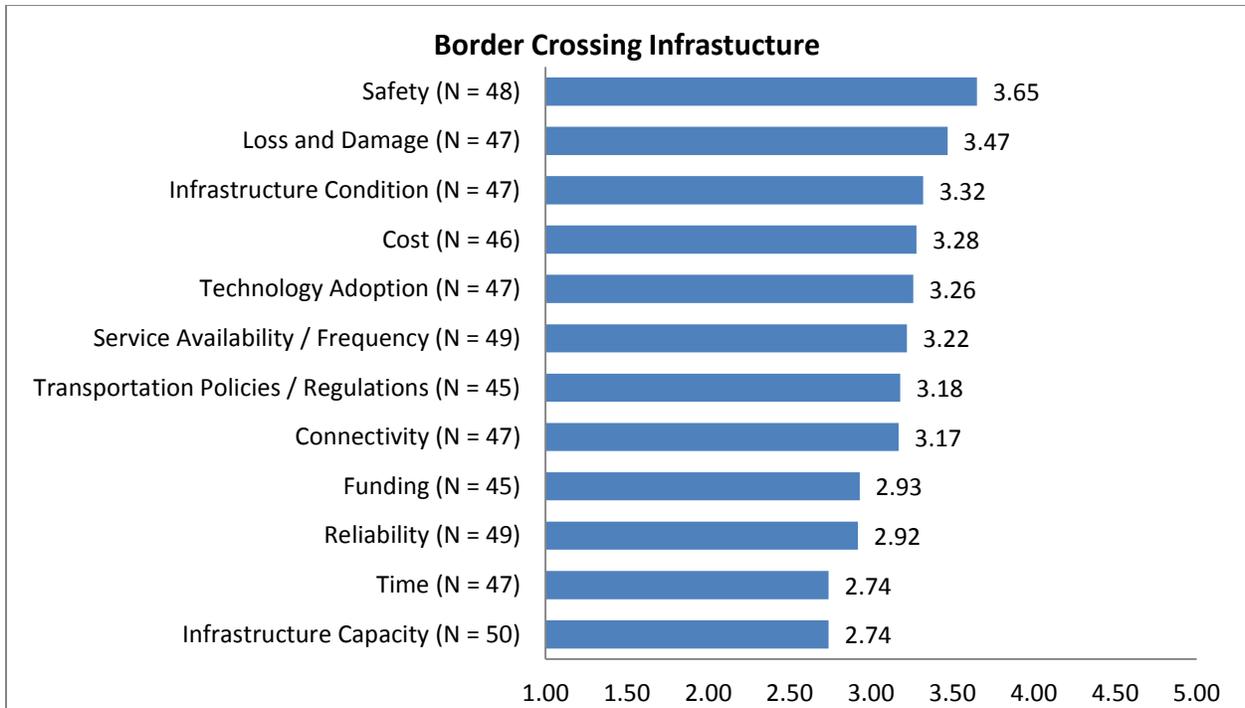
Border Crossing Infrastucture

Factor	Score
Safety (N = 48)	3.65
Loss and Damage (N = 47)	3.47
Infrastructure Condition (N = 47)	3.32
Cost (N = 46)	3.28
Technology Adoption (N = 47)	3.26
Service Availability / Frequency (N = 49)	3.22
Transportation Policies / Regulations (N = 45)	3.18
Connectivity (N = 47)	3.17
Funding (N = 45)	2.93
Reliability (N = 49)	2.92
Time (N = 47)	2.74
Infrastructure Capacity (N = 50)	2.74

Figure 5. Average Ranking of Transportation Factors for Border Crossings.

Figure 6 presents the weighted mean scores for highways, ports, rail, and border crossings. These estimates suggest that respondent sentiment is between neutral and somewhat satisfied, with highway infrastructure characterized by the highest levels of respondent satisfaction. Conversely, respondents report the lowest levels of satisfaction with border crossings. Overall, opinion is more positive than negative; however, there is a definite opportunity to increase satisfaction across the spectrum of infrastructure types.

Respondent sentiment is between neutral and somewhat satisfied, with highway infrastructure characterized by the highest levels of respondent satisfaction. Conversely, respondents report the lowest levels of satisfaction with border crossings.
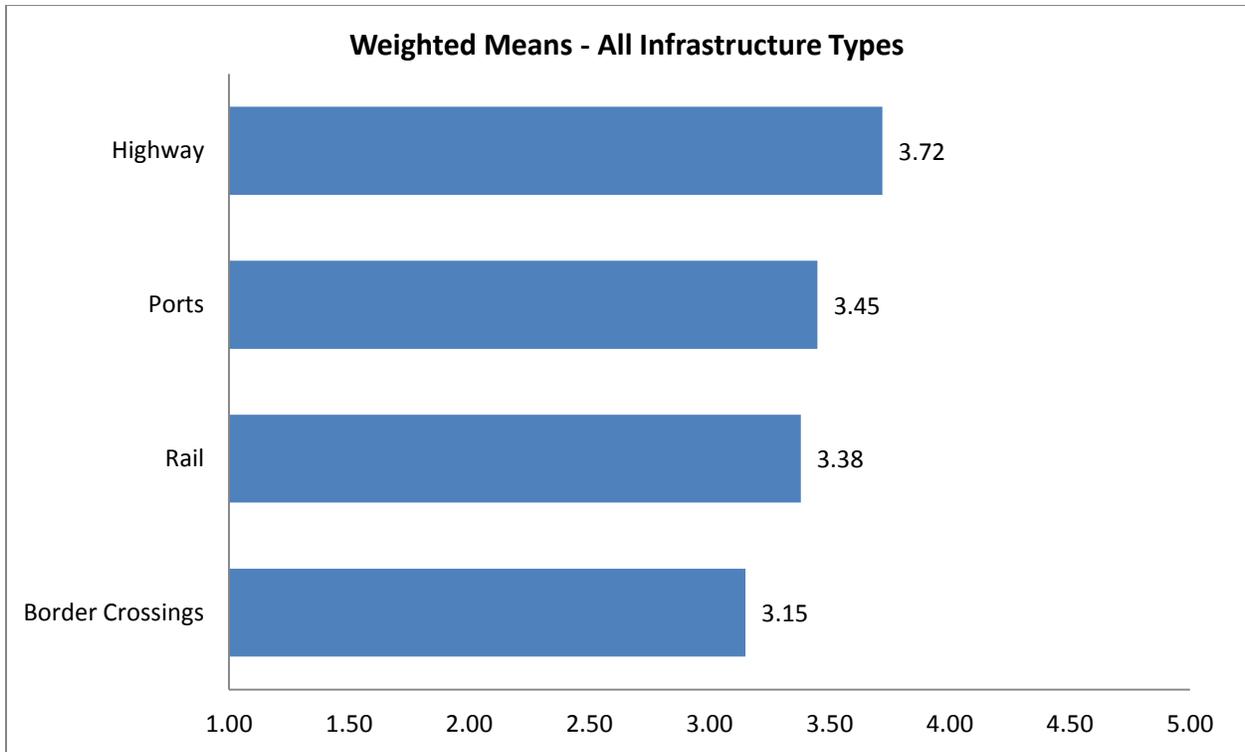
Figure 6. Weighted Mean Scores for Highways, Ports, Rail, and Border Crossings — All Factors.

Factors That Affect Facility Siting Decisions

Respondents were next presented with five factors that freight establishments may or may not take into account when deciding where to locate their establishments. These factors are listed below.

- Access to transportation (all modes)

- Inexpensive real estate

- Tax incentive package

- Low tax climate

- Pro-business climate

Using a scale of 1 to 10, respondents were asked to assign a score of importance to each when deciding where to locate their establishment. A score of 1 meant the factor was not at all important in the decision-making process, while a score of 10 meant the factor was extremely important in the decision-making process.

Figure 7 presents the mean scores calculated for each factor. Access to transportation (mean score of 7.85) and pro-business climate (mean score of 7.48) were estimated as most important to all responding establishments in the decision-making process, while tax incentive packages

(mean score of 6.21) and inexpensive real estate (mean score of 6.52) were deemed least important to all establishments in the decision-making process.
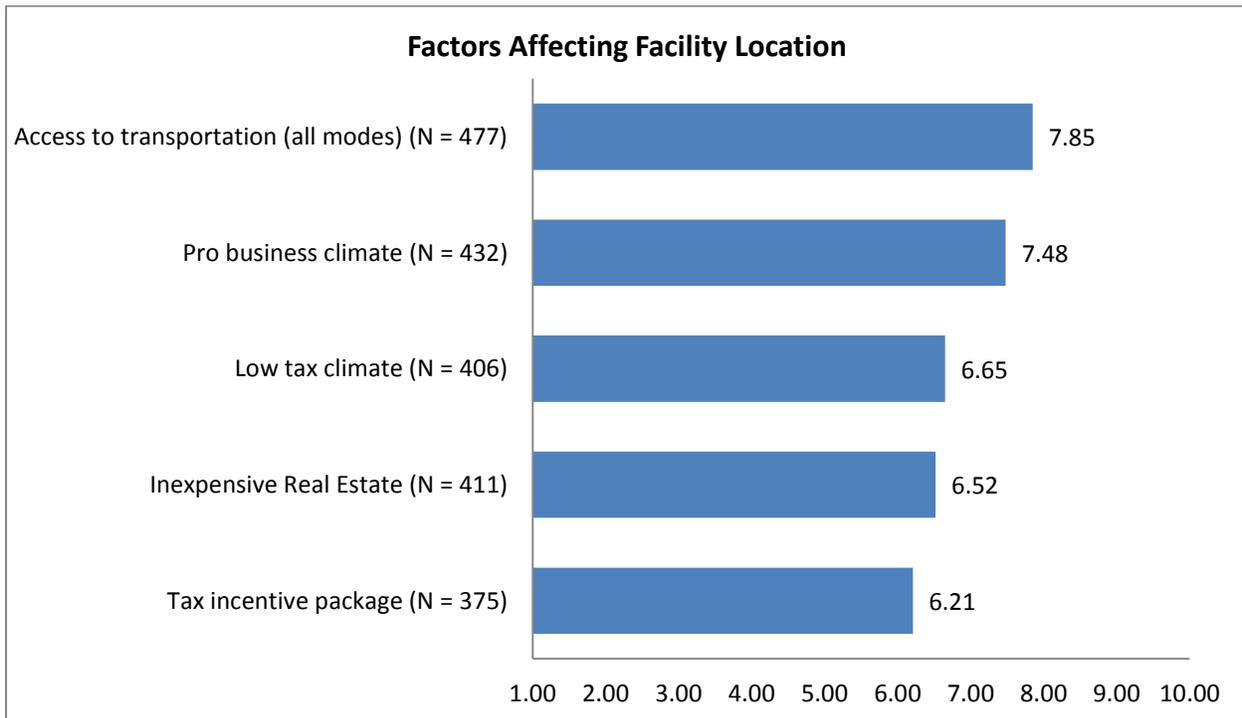
Factors Affecting Facility Location

Factor	Score
Access to transportation (all modes) (N = 477)	7.85
Pro business climate (N = 432)	7.48
Low tax climate (N = 406)	6.65
Inexpensive Real Estate (N = 411)	6.52
Tax incentive package (N = 375)	6.21

Scale: 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00

Figure 7. Importance Scores for Factors That Impact Facility Location Decisions.

Because of the robust sample sizes associated with this question, an analysis similar to the detailed regional and industry sector analysis that was conducted for highway infrastructure satisfaction was replicated here. The only significant difference was identified for the North Coastal region. Respondents there reported access to transportation more important (mean score of 8.53) than did the balance of the state (mean score of 7.69).

Access to transportation (mean score of 7.85) and pro-business climate (mean score of 7.48) were estimated as most important to all responding establishments in the decision-making process.

Business Indicators for Freight Establishments

The final section of the questionnaire asked respondents to assess their establishment's business activity in 2015 relative to 2014 for the following business indicators:

- Business revenues,

- Employment,

- Number of deliveries/loads shipped,

- Inventory, and

- Capital/fixed investment.

Figure 8 provides a summary of respondents' answers about business revenues. Approximately one-fourth (24 percent) reported they would experience decreased 2015 business revenues, while nearly four of ten (39 percent) suggested they would experience increased 2015 business revenues. Approximately one-fourth (24 percent) said they would experience no change in business revenues, while 13 percent reported they did not know or refused to provide an answer.
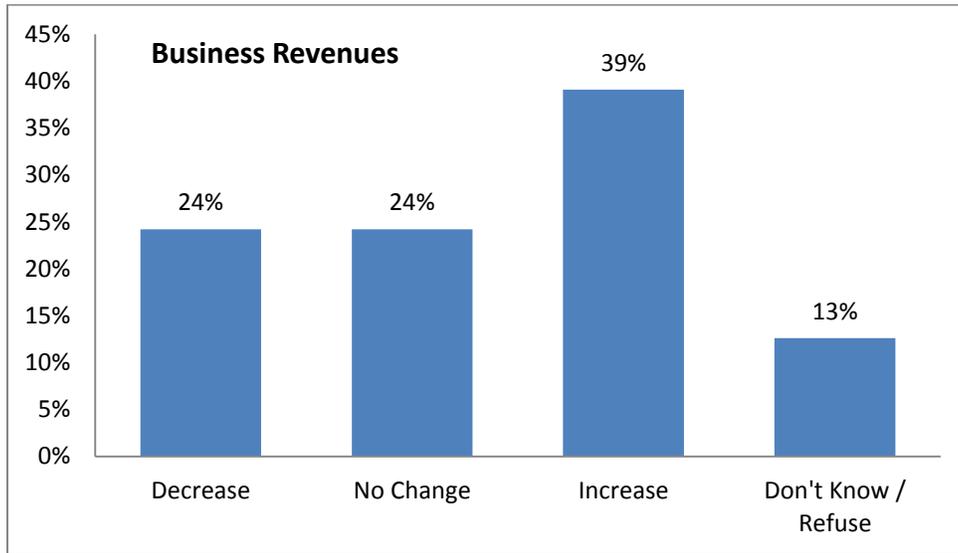

Figure 8. Change in Business Revenue in 2015, Relative to 2014 (N = 509).

Figure 9 provides a summary of responses about employment. Less than two of ten (18 percent) reported they would downsize staff in 2015, while approximately one third (32 percent) suggested they would hire employees. Nearly half (47 percent) said they would experience no change in staffing, while 3 percent reported they did not know or refused to provide an answer.
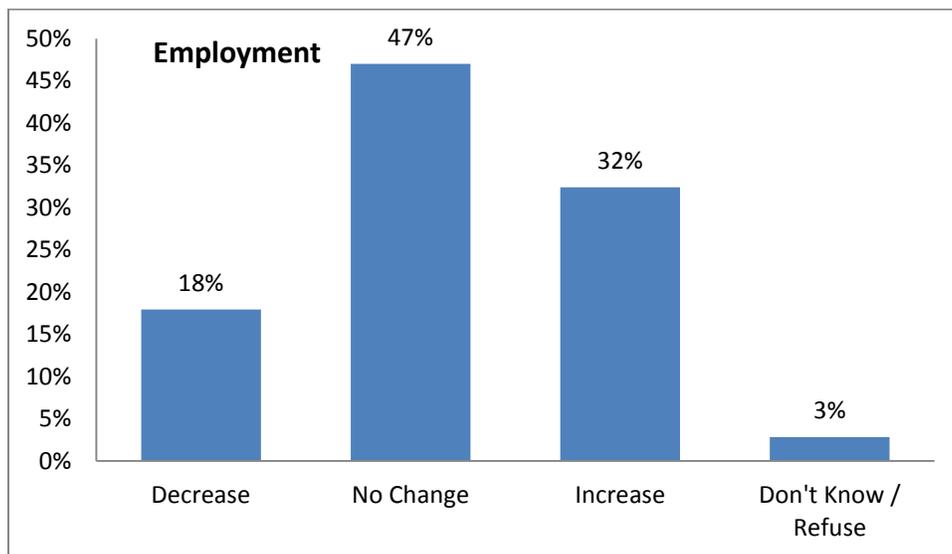

Figure 9. Change in Employment in 2015, Relative to 2014 (N = 509).

Figure 10 provides a summary of how respondents indicated that their business performed in 2015 as compared to 2014, with respect to number of deliveries. Nearly two of ten (19 percent) reported they would decrease deliveries in 2015, while four of ten (39 percent) suggested they would increase deliveries. More than a third (36 percent) said they would experience no change in deliveries, while 6 percent reported they did not know or refused to provide an answer.
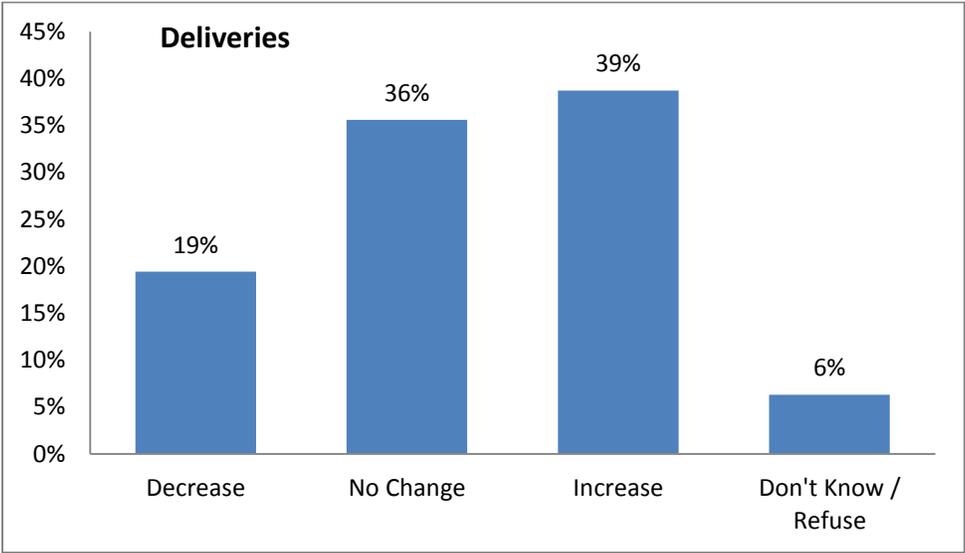

Figure 10. Change in Number of Deliveries in 2015, Relative to 2014 (N = 509).

Figure 11 provides a summary of how respondents indicated that their business performed in 2015 as compared to 2014, with respect to inventory. Nearly two of ten (18 percent) reported they would decrease inventory in 2015, while nearly four of ten (38 percent) suggested they would increase inventory. One third (33 percent) said they would experience no change in inventory, while 6 percent reported they did not know or refused to provide an answer.
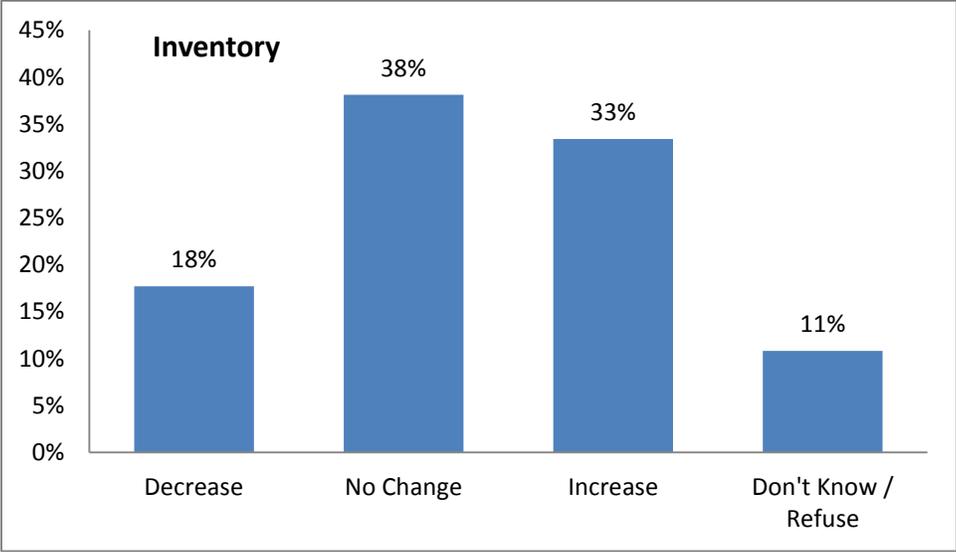

Figure 11. Change in Inventory in 2015, Relative to 2014 (N = 509).

Figure 12 provides a summary of how respondents indicated that their business performed in 2015 as compared to 2014, with respect to capital/fixed investment (hereafter referred to as "investment"). Slightly more than one of ten (12 percent) reported they would decrease investment in 2015, while one-fourth (26 percent) suggested they would increase investment. Forty two percent said they would experience no change in investment, while 20 percent reported they did not know or refused to provide an answer.
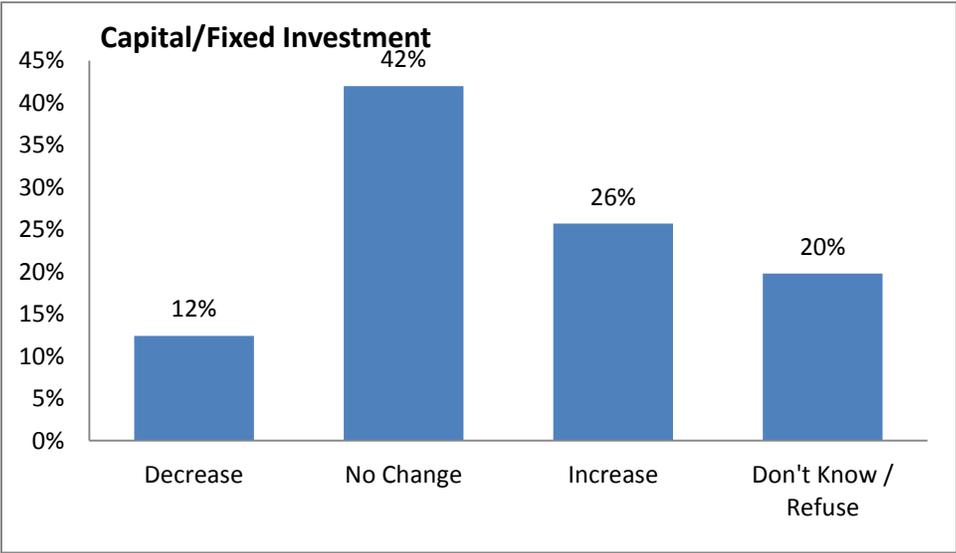

Figure 12. Change in Capital/Fixed Investment in 2015, Relative to 2014 (N = 509).

Figure 13 provides a summary of all five factors in one figure, essentially making a comparative analysis easier. With the exception of investment (where 26 percent of respondents reported an increase in 2015), nearly all indicators are characterized by an increase of approximately a third or more. However, a majority or near majority of respondents reported a lack of positive movement across business indicators. These estimates also suggest the highest level of uncertainty regarding investment, where 1 of 5 respondents reported not knowing how 2015 investment would compare to those made in 2014.
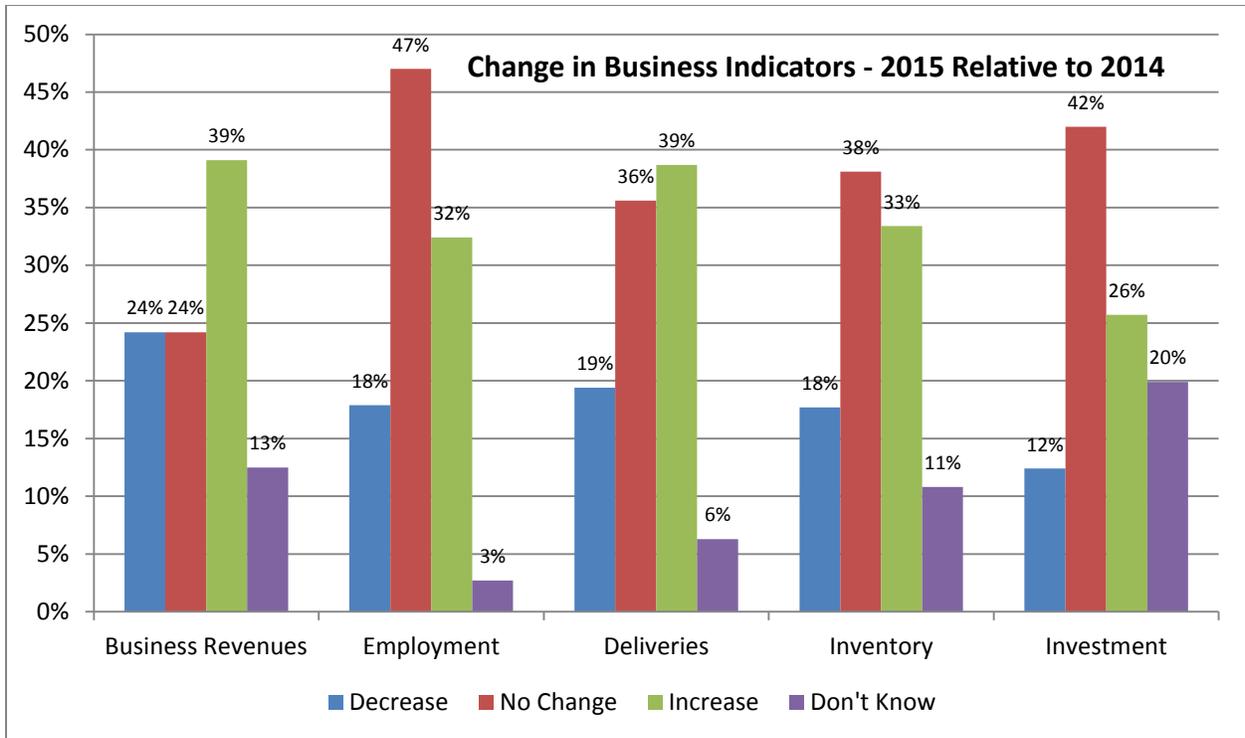
Figure 13. Change in All Factors in 2015, Relative to 2014 (N = 509).

Conclusions

The Texas Freight Pilot Survey sought to collect opinions from establishments in Texas that rely on the Texas transportation system as part of their business model.

The analysis suggests that highways may be the most familiar infrastructure type when it comes to goods and service movement in Texas. This lines up well with national statistics that suggest nearly 70 percent of all freight tonnage moved in the United States is moved by trucks.[3] The estimates suggest that highways are also the infrastructure type with which respondents are most satisfied. Conversely, not only does the data suggest that border crossings are the least familiar among participants, it is also the infrastructure type with which respondents are least satisfied.

With respondent sentiment generally hovering between neutrality and moderate satisfaction, the data suggest some interesting trends that highlight both areas in which the state transportation system is doing well and those where improvements could be made.

The survey results showed that industry is the most satisfied with the performance of the highway system compared to other freight modes. Specifically, the results point to industry satisfaction with loss and damage experienced, service availability/frequency, and technology adoption. These are actions/initiatives implemented by trucking companies (private sector actions) to improve the efficiency of the trucking sector (i.e., users of the highway system). On the other hand, the establishments surveyed were far less satisfied with the capacity, condition, and funding of Texas's highway system. Overall, the mean satisfaction score equates to a grade of C+.

Port infrastructure and service ranked second in terms of establishment satisfaction. Industry expressed most satisfaction with safety levels, loss and damages experienced, and infrastructure condition. Less satisfaction is, however, experienced with port connectivity, infrastructure capacity, and timeliness. Interesting to note, is that port funding did not emerge as a particular issue for the establishments surveyed, while funding was characterized by dissatisfaction with regard to the other transportation modes. Overall, the mean satisfaction score equates to a grade of C.

Rail infrastructure and service ranked third in terms of establishment satisfaction. The establishments surveyed seemed the most satisfied with the rail sector's safety performance, loss and damage experienced, and the condition of the rail infrastructure. The establishments are, however, least satisfied with a number of operational/service aspects (i.e., time and service availability/frequency) and rail funding. Overall, the mean satisfaction score equates to a grade of C.

Border-crossing infrastructure and operations ranked last in terms of establishment satisfaction. The establishments surveyed were neutral to somewhat satisfied with safety, loss and damage, and infrastructure condition, but were neutral to somewhat dissatisfied with border-crossing reliability, time, and infrastructure capacity. Similarly, funding for border-crossing infrastructure

also rated neutral to somewhat dissatisfied. Overall, the mean satisfaction score equates to a grade of C-.

For all infrastructure types, "loss and damage" was identified as one of the top 3 most satisfying characteristics. Similarly, "infrastructure condition" and "safety" were top 3 across rail, ports, and border crossings.

At the opposite end of the satisfaction spectrum, "infrastructure capacity" was identified as one of the least satisfying characteristics associated with highway, port, and border-crossing infrastructure, while "funding" was identified as least satisfying for highway and rail infrastructure (as well as to some extent for border crossings). There thus seems to be a general concern about the capacity and funding of Texas's transportation system. This is of specific concern in light of the fact that a greater percentage of establishments anticipate an increase in business activity than a decrease, with 39 percent of the establishments surveyed foresee an increase in deliveries, 33 percent foresee an increase in inventory, and 32 percent foresee an increase in employment. These business indicators may thus point to an increase in demand and usage of Texas's transportation industry by the establishments surveyed, assuming a similar distribution between those that foresee a decrease and increase in business indicators.

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It is interesting to note that the recently conducted Texas Transportation Poll of Texas voters identified both congestion ("infrastructure capacity") and funding as two of the most challenging transportation issues facing Texas today. While the Texas Freight Pilot Survey was intentionally kept brief to maximize participation among a known hard-to-reach population, it would be interesting to explore if, like Texas residents, Texas establishments have yet to make significant changes to their business models to proactively address infrastructure capacity issues. Or, like Texas residents, do Texas establishments feel that they have yet to reach a "breaking point?" Or have they just come to accept the issue at face value, and adapted their business models to the best of their ability? It is, however, clear that increased demand coupled with infrastructure capacity and funding concerns may mean that Texas's transportation system may struggle to meet the needs of Texas's shippers and carriers in the future. This is of further concern given that "access to transportation" was deemed most important among five factors considered when making decisions on facility siting by the survey respondents.

To conclude, the Texas transportation system is critical to business competitiveness. The survey results seem to point to increased demand and pressure on Texas's transportation system at a time when concerns about infrastructure capacity and funding are emerging.

References

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