Enhancing Rail Connectivity to Underserved Rural Communities

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16. Abstract This research will identify the actions, practices, and policies needed to attract, continue or expand adequate short-line and or Class I and regional rail service to rural communities. Factors to be considered will include identification of the infrastructure needs for retaining or expanding viable rail operations, potential markets and market development approaches to support rail connectivity, beneficial operational characteristics, , institutional, policy, program and , and incentives that have been successful used to attract and retain rail service. A number of factors (safety, shipping costs, roadway maintenance, pollution and congestion, business sustainability) will also be identified that offer benefits to the local communities and support livability, safety, sustainability and economic development opportunities from efficient operations of short-line railroads.		
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EXECUTIVE SUMMARY

This research project's objective is to identify actions, practices, and policies needed to attract, continue or expand adequate shortline and regional rail service to rural communities within the CFIRE region (Wisconsin, Tennessee, Alabama and Mississippi) or even intuitively assist stakeholders of other areas within the U.S. to better understand the shortline rail environment.

Studies have shown that reduction, elimination, underperformance or abandonment of shortline railroad service can cause a transfer from rail to other competitive modes and eventually result in negative economic, but also environmental impacts. Individual terminals, grain elevators, and industries in local communities, dependent on rail, cannot remain economically viable without reliable and cost-competitive rail service. When industries and support services leave rural communities, jobs are lost and people migrate from the area. In this direction, an effort was given to identify infrastructural needs, potential markets and market development approaches to support rail connectivity as well as beneficial operational characteristics, institutional policy programs and incentives that could successfully attract and retain a viable rail service. Safety, connectivity, shipping, operational and maintenance costs, pollution and congestion impacts, as well as other factors were included to provide information that will allow decisions supporting livability, sustainability and economic development, as well as efficient shortline railroad operations.

Within the context of this research, a survey has been conducted among different groups of stakeholders (agency personnel, shortline rail operators and industries/shippers). After analyzing stakeholder feedback, effort was given to rationalize and quantify community and market characteristics, infrastructural needs and factors that can decisively affect the functionality and sustainability of shortline railroads. Finally an effort was made to propose strategies, tactics and supportive policies/incentives, associated with attraction and retention of rail service for rural communities.

1. INTRODUCTION

As Class I[i] railroads have focused their operations on line haul services, rural communities and industries throughout the country have experienced a decline in connectivity to the nation's rail network. Rail provides shippers of heavy materials, or large volumes of materials, with a transportation option that is more efficient and cost effective than other competitive modes. Shortline railroads offer opportunities and are essential component for the development of logistic centers (e.g., freight villages) that offer a number of benefits to local communities (reliability of goods movements, decrease in vehicle miles travelled, congestion reduction, etc.). Studies have shown that reduction, elimination or underperformance/abandonment of short line service can cause a transfer from rail to other modes (usually trucks) and eventually result in a number of negative economic impacts (increase in shipping costs, decrease in local business volumes, decline in employment and property values, decreased economic development, increase in highway maintenance/user costs, and environmental/safety externalities). As already mentioned previously, individual terminals, grain elevators, and rail dependent industries in local communities, cannot remain economically viable without reliable and cost-competitive rail service. When industries and support services leave rural communities, jobs are lost and people migrate from the area. Research is needed to determine what steps communities, state DOTs, businesses and industry, and local entities can take to attract and retain rail service to support and drive community and economic growth in rural communities.

This research aims to identify actions, practices, and policies needed to attract, continue or expand adequate shortline and/or Class I and regional rail service to rural communities. Factors considered in this research include identification of infrastructural needs to retain or expand viable rail operations, potential markets and market development approaches to support rail connectivity, beneficial operational characteristics, policies, programs, and incentives that could be or have been successful in attracting and retaining rail service. A number of factors (safety, shipping costs, roadway maintenance, pollution and congestion, business sustainability) that offer benefits to the local communities and support livability, safety, sustainability and economic development opportunities from efficient operations of shortline railroads were also identified as part of this research.

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[i] According to Surface Transportation Board (STB), the U.S. railroads can be categorized on an annual revenue basis as:

Class I: Carriers with annual carrier operating revenues of $433.2 million* or more

Class II: Carriers with annual carrier operating revenues of less than $433.2 million* but in excess of $34.7 million*

Class III: Carriers with annual carrier operating revenues of $34.7 million* or less, and all switching and terminal companies regardless of operating revenues.

* These threshold Figures are adjusted annually for inflation using the base year of 1991.

The initial step in the research has been the identification of rural communities' characteristics in the CFIRE[ii] region that are actively working to attract and retain rail service directly, or through a shortline rail connection. Interviews were conducted with stakeholders (agency personnel, shortline rail operators and industries/shippers), to determine key issues that affect the provision of rail service. The main focus was the identification of the key characteristics that can impact communities, agencies, industry and local leaders and affect economic development in rural areas. Survey data were then used to rationalize community and market characteristics, infrastructural needs and factors that can decisively affect the functionality and sustainability of the shortline railroad. After quantification and rationalization of these specific characteristics an effort was given to propose strategies, tactics and supportive policies and incentives associated with the attraction and retention of rail service for rural communities.

The geographic boundaries of this study were set within a four-state area constituted by the States of Tennessee, Mississippi, Alabama and Wisconsin (CFIRE region). Within this geographical region shortline operators, industry officials and State DOTs were asked to participate in the study by providing feedback on what they currently experience. During this step of study and for different reasons, most of stakeholders were unwilling to provide information, even though they were assured about the confidentiality of the study on matters of sensitive commercial/operational data etc. This unwillingness became more obvious and intense when the research team members tried to come in contact with and survey industries served by shortline railroads. Either fear of misuse of sensitive data or unwillingness to participate in a study that would not explicitly and directly assist their goals ('how can a shortline study be beneficial for my company' or 'waste of time for me' replies), industries were the least willing to participate and, even though a large number of companies were contacted, only three were willing to reply and provide information, while still unwilling to answer questions relative with data considered sensitive. In a similar way only twelve shortline railroads were willing to provide information for the study purposes. Also, one out of four DOTs were willing to participate in this study.

Even though the sample group was not as large as expected, useful information was extracted. Especially, shortline railroad replies provided useful insight of their concerns and difficulties they face in their daily operation. At the same time, and even though the number of industry replies are prohibitive in making safe conclusions, they still provided a "real-time" overview of what the industrial sector seeks in matters of freight transport solutions.

Finally, a step-by-step guide for communities that face the possibility of short rail line abandonment is demonstrated. This guide provides information on the data that needs to be collected and how to run the numbers for a basic economic, transportation, and

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[ii] The National Center for Freight and Infrastructure Research and Education (CFIRE) is a Tier 1 University Transportation Center (UTC) funded by the U.S Department of Transportation (U.SDOT) Research and Innovative Technology Administration (RITA).

environmental forecast of the loss of the railroad. The results can be used by communities as a means to communicate what the loss of the railroad will mean for the region. It also provides some of the basic numbers needed for the policy process.
The results of a scenario exercise showed that the loss of the railroad will have a negative impact on the community. Because of the nature of the scenario with just a 20 mile rail line and two shippers, the results are not dramatic. The scenario did not include the loss of businesses (other than the railroad) or the ramifications of the decreased ability to attract new industry. In an actual analysis all the potential positive and negative consequences of rail line abandonment need to be considered.

1.1. Survey Participant General Information

During 2013 the CFIRE team conducted surveys within the previously aforementioned states. At each state the research team contacted three major groups of the shortline industry stakeholders: a) the shortline companies, b) their customers, and c) the respective State DOTs. Questionnaires distributed to each group are included in Appendix. Results from the survey of each stakeholder, are summarized in the following chapters.

1.1.1. Shortline railroads

As mentioned previously, questionnaires (shown in Appendix 8.1) were distributed to seventy-one shortline railroads out of which twelve responded (17% response rate). Representatives of the companies were asked to answer a set of questions that can be sub-grouped into the following categories:

- Shortline Railroad information (General information about the company, basic economic Figures, operational outline etc.)
- Rail infrastructure (infrastructure technical information, equipment, maintenance etc.)
- Rail connections (Shortline connectivity information, capabilities, competitors, etc.)
- State-specific DOT Shortline Assistance Programs funding information.

1.1.2. Shortline Customers

Similarly, questionnaires (shown in Appendix 8.2) were distributed to 65 shortline customers in four states. Representatives of these companies were asked to answer a set of questions that can be grouped in the following categories:

- Company Information: (General information about the company, basic economic Figures, operational outline etc.)
- Rail Usage: (Rail usage rationale, accessibility, transported goods etc.)
- Increasing rail transportation - Transportation's impact on company's' Supply Chain: (Rail transportation assessment, costs and competitiveness, transportation improvements, etc.)

1.1.3. State DOTs

State DOTs were also asked to participate in this survey. As mentioned previously, only one out of four DOTs were willing to complete the relative questionnaire (shown in Appendix 8.3).

The rest of the report is structured as follows. Section 2 presents a review of the pertinent literature and best practices highlighting the benefits and characteristics of rail access for community and economic development. Sections 3 through 5 present the survey results of the shortline railroad stakeholders. The last section, based on the data collected through the surveys, recommends guidelines and best practices to identify parameters that should be included in the preparation, decision making, and investments necessary to attract and retain rail access.

2. LITERATURE REVIEW

In this section an exhaustive literature review, identifying and describing all existing sources of information relevant to the scope of this project will be presented. The review utilized a broad range of government, private-sector and theoretical/research documents including state rail plans and state short line policies. The latter sources are important as states have differing policies regarding the establishment of railroad authorities, tax credits for scrapping, and other laws that impact railroads. These reviews focused on states within the CFIRE region, but also included other states, notably those within the Mid-American Freight Coalition area and Texas.

2.1. Railroads in transition in rural areas of the central U.S.

In the golden age of railroad construction from 1880-1920, when growth was expected and the service unchallenged by trucking, rail companies built redundancy into the network – double track, parallel routes, and intensively developed single track with sidings as frequent as every six miles (White, 2011). The existing rail network in the National Center for Freight and Infrastructure Research and Education (CFIRE) region was largely built during this time period and reflects the use of the railroad network for the numerous, but small by today's standards, freight trains of the late 1800s and early 1900s.

The development of the highway systems in the 1950s and 60s resulted in significant diversions of high value, high-revenue freight from the railroads. In a free market, resources could be reallocated over time in order to adjust to changes, but in the regulated railroad industry, the ability of firms to exit net-loss functions was greatly impeded by the political system (Conant, 2004). During the years of deterioration, railroads' share of intercity freight ton-miles decreased from 75% in 1920s to 35% in 1978 (AAR, 2005). As a result, in the early 1980s the railroad networks had an excess of capacity in track and personnel, which was true for the region in the study as well. After the Staggers Act removed most of the economic regulation of railroads in 1980, they increased productivity by eliminating redundancy in personnel and administration. Mergers reduced the number of Class I railroads from 40 in 1975 to 7 in 2006. As carriers merged, competitive access for many users disappeared. Underutilized lines were sold, often to shortline railroads, but sometimes even to the local communities or towns, who seek heavier forms of industry or agriculture and consider corridor preservation of utmost importance. Other rail lines which had little use were abandoned or banked in rail preservation programs for potential future use.

Concurrently, the railroads were gaining greater efficiency from new improved diesel locomotives, running longer trains, developing automated systems and central traffic control. As a result more freight is carried by fewer freight trains. A modern locomotive has tripled the pulling power of its 1950's predecessor. Today, one unit grain train equals four grain trains used during the 1950s. Rail cars have increased capacity with new 315,000 pound rail cars carrying almost twice the tonnage of the average rail car in the 1940s. Ton-miles carried by the railroads have increased by 64% since 1980 and ton-miles transported per employee have grown 500% from 2 million ton-miles to 10 million ton-miles (Richards, 2005).

The cost savings during the past 20 years have largely been passed on to the shippers so that the railroads could compete with trucking companies. Until the mid-2000s, rail freight rates were cut by up to 2% per year on average since 1980. Shippers have enjoyed a competitive transportation environment created by the Staggers Act and a highway financing system that provides infrastructure at a relatively low cost for the trucking industry. The Surface Transportation Board describes this development in their statement:

> *The fact that neither railroads nor their customers have captured the majority of these savings suggests that rail customers – because they tend to operate in highly competitive markets for widely available commodities such as coal, grain, or chemicals – have been forced to pass along the bulk of these saving to their own customers. Thus the ultimate beneficiaries of increases in railroad productivity appear to have been consumers* (Conant, 2004).

The Congressional Budget Office (CBO) compared a number of analyses on railroad rates (prices) that, when adjusted for inflation show a downward trend from 1980 to 2003 (CBO, 2006). The increased demand for transportation coupled with capacity and cost issues in trucking create a situation where railroads can raise rates. Rates can be raised to cover rising costs, provide funds for infrastructure improvements, and increase profitability. A negative side effect of the rising rates may be the loss of customers who cannot afford the increased price of rail service. The CBO also found that the railroads return on equity has been less than manufacturing. Standard business practice would indicate that the railroads will channel funds to more productive and profiTable areas of the business and spin off less profitable lines.

As a train's unit productivity increased, the network's flexibility to process trains appears to have decreased as parallel track, sidings, and spurs were abandoned. Network capacity is a function of many other factors such as axle weight, block signaling, electronic control, as well as terminal capacities.

The Association of State Highway and Transportation Officials (AASHTO), along with government agencies, predict that trade will double in the next 20 years or less, (AASHTO, 2002). The rail productivity gains of the past two decades cannot continue at the same rate because of limits on rail track weight capacity, overhead clearance, and functional train lengths. On some rail networks the system is currently at or near capacity and railroads must make considerable capital expenditures to improve and increase infrastructure. In order to handle the future demand, the U.S. rail system needs to upgrade and expand.

During the past 30 years railroad's capital expenditures have been in the billions of dollars but have provided only incremental improvements. The vast majority of the funding, approximately 85%, goes to the maintenance and upgrading of existing infrastructure and equipment, not for new rail infrastructure (Ritchie, 2004). Railroads have increased the level of investment to address the problem and on March 16, 2006, the Association of American Railroads (AAR) announced that U.S. Class I freight railroads will spend more than $8 billion in 2006 laying new tracks, buying new equipment, and improving infrastructure. The industry's capital expenditure budget is 21% greater than last year's and shatters the previous record for infrastructure spending in one year. Even this level of increased expenditure is not expected to provide sufficient improvement to meet the demand. It also does little to address the challenges faced by the shortline railroads, which are often operating on the old and poorly maintained infrastructure obtained from Class I railroads. Their capital funds are extremely limited and do not provide sufficient resources to upgrade their 50,000 miles of track infrastructure to accommodate the new and heavier cars they have interchanged with Class I carriers. The federal government has stepped up to assist with a new law that provides shortline railroads with a tax credit of 50% for eligible track improvement expenditures up to $3,500 per mile.

Shortline and Regional railroads are defined by Federal Railway Administration guidelines. Regional railroads operate at least 350 miles and must generate a minimum of $40 million dollars. Short Line railroads fall into two categories, typically local carriers that operate 350 miles or less and Short Line Switching or Terminal railroads that typically shuttle or transfer cars between Class I connections and local shippers. Frequently Shortline railroads are created when a Class I railroad sells or abandons a segment of track, because that segment does not fit the firm's business plan or network strategy. Today's low density, secondary rail segments may be tomorrow's shortline railroads. Shortlines usually have lower operating costs than Class I's, so can survive on less freight. When the shortlines cease to exist in rural areas there can be a wide variety of impacts to the region (Stewart et al, 2008).

According to a report entitled "Transportation - Invest in America: Freight - Rail Bottom Line Report," prepared by the Association of State Highway and Transportation Officials, (AASHTO, 2002):

- 40% of intercity freight ton-miles are handled by rail
- Rail freight moves over 600 miles on an average trip, while the average truck trip is about 245 miles
- 92 billion truck-vehicle miles of travel would be added to the nation's highway system without our rail freight system
- This additional truck traffic would cost federal, state, and local transportation agencies an additional $64 billion over the next 20 years
- If all rail freight were shifted to trucks, it would cost shippers an additional $69 billion per year - or $1.4 trillion over the next 20 years
- Rail freight is more fuel-efficient and generates less air pollution per ton-mile than trucking

- The rail industry today is stable, productive and competitive, with enough revenue and profit to operate, but not enough to replenish its infrastructure quickly or grow rapidly

A report “How America’s Freight Railroads Can Relieve Traffic Congestion” (Cox, 2005), investigates the potential of freight rail to reduce gridlock by taking trucks off the road. They conclude that if by 2025, 25% of truck traffic moved by freight trains, the following benefits could be achieved:

- The average person traveling during peak periods would save 44 hours per year (equal to more than to five 8-hour days) during peak travel periods as the reduced truck volume eases traffic congestion. In the most congested urban areas, this delay savings could exceed 100 annual hours. The overall hours of delay would be 3.2 billion hours less in 2025.
- The savings in travel time would also mean lower costs (congestion costs and fuel cost savings) for the economy. It is estimated that the annual economic cost per household during peak periods would be $620. This represents a savings in major urban areas of $44 billion in 2025.
- Fuel consumption would be reduced as a result of less truck traffic and faster automobile speeds on the less congested roadways. It is estimated that more than 17 billion gallons of gasoline and diesel fuel would be saved. This is more than 250 gallons of fuel annually per commuter.
- Fewer trucks and higher average vehicle speeds would improve air quality. The transfer of freight volumes from truck to rail is estimated to result in a reduction of nearly 900,000 tons of air pollution (Carbon Monoxide, Volatile Organic Compounds, and Nitrogen Oxide).

Several factors in rail expansion adversely impact regions with marginal rail traffic. The return on equity for railroads averaged 7% in 2004. The rail industry has lagged behind other industries increasing the cost of borrowing in the competitive marketplace (Mercer, 2005). This forces railroads to concentrate their available capital on corridors that will generate the more profitable return on investment. With the growth trend of international intermodal traffic and the growth of unit trains moving out of Wyoming (Powder River Coal), investment has been focused on only a few routes and limited capital for infrastructure investment will go to those corridors of high revenue freight, high speed trains, high volume unit trains, with recognized growth potential, balanced loads and a large customer base. As Burlington Northern Santa Fe (BNSF) President and CEO Matthew Rose stated in a congressional hearing: “70 percent of investments go into 40 percent of our lines. We want to be able to put long-term investments in sustainable lines” (Gallagher, 2006)

Concentrating in fewer corridors with large volumes is shifting railroads back toward their earlier existence, when they operated on few major corridors instead of the spider web of rail lines. An editorial in *Trains magazine* (Hemphill, 2004) explains reasons for this trend by comparing United Parcel Service (UPS) to railroading. UPS is willing to accept losing money on some of its routes, because it's a network business and it can tolerate money-losing packages because it spreads the loss over the 1.2 million packages it delivers every day. Railroading cannot be a network business that serves marginal revenue sources, because they ship large quantities to a handful of locations for thousands of dollars and own and maintain their own extremely expensive fixed in place right-of-way while UPS uses virtually free government-owned right-of-way. Railroads became wide spread networks by accident, when there was no real competition from other modes, and strong rail lines could support low income rail lines. As the current rail network continues consolidating, big shippers will gain and small ones will merge with big shippers, relocate to key routes, or quit shipping by rail. Railroading is returning to its classic and most profitable network of point-to-point service on major corridors (Hemphill, 2004).

Long et al. (2014), presented a report that proposed different modeling approaches and methodologies for quantifying long-term benefits of rail infrastructure projects given the availability of data, relevant expertise and other social/technical information. According to the authors, traditional benefit-cost analyses, reduce the problem into single rates of return and usually provide limited understanding to the decision makers (of Missouri in particular). Thus, other approaches such as Leontief based approach, Bayesian frameworks and System Dynamics were proposed to assess such infrastructure investments and the "complex interplays of multitudes of relevant social and economic factors impacting, and impacted by, railroad infrastructure investments". The authors used "sociotechnical roadmapping" (included not only technological, but also social elements), to evaluate a project's performance and better quantify the derivative economic benefits from a rail infrastructure investment. Their major findings after comparing these three approaches are summarized in Table 2.1.

Table 2.1 Model Comparisons (Source: Long et al., 2014)

Criteria for comparison	Leontief Approach	Bayesian Approach	System Dynamics Approach
Data Availability	Historical data are required to solve the method	Can be used even when small data sets are available	Time-series data are required in this approach
Parameter Estimation	Estimated from historical data using regression analysis	Estimated after conducting expert interviews and surveys	Estimated from expert opinions, surveys and engineering data using regression analysis
Relevance to Railroad Infrastructure Investment	Highly relevant	Highly relevant	Highly relevant
Ease of Application	Straightforward method and easy to use	Easy to apply given the availability of expert opinions	Qualitative analysis is straightforward and easy, but quantitative analysis may get very complicated

2.2. Economic development issues for shortlines

Short line railroads role in economic development is relatively understudied, but growing in importance for moving freight and economic competitiveness (ASLRRA 2011). The energy efficiency and other advantages of rail transport are resulting in the extension of existing shortline railroads and the formation of new ones. They provide an economic boost to rural communities by providing an efficient alternate shipping option for bulk products such as minerals, lumber, and paper. Traffic on shortlines is also flourishing as a result of the booming energy industry. Both the oil and gas and biomass industries are large rail users often located in rural areas. For example, hydraulic fracking in the Marcellus Shale region has benefited the 34-mile Lycoming Valley Railroad in Pennsylvania, which hauls commodities related to the industry. The railroad went from 1,230 carloads in 2009 to 6,880 in 2011 (Borchardt 2012). Further, port expansion projects on both the West and East coasts are also resulting in the construction of new shortline railroads and expansion of existing lines. These factors have increased the economic importance of short lines for rural communities.

The criteria in the United States for classifying railroads has always been subjective since different regulations apply to the different classes, but generally the U.S. Surface Transportation Board has four classifications of railroads and each serves an important niche in the freight flow system. These categories include: 1) Class I national railroad, 2) Class II regional railroads, 3) Class III shortlines, and 4) switching and terminal railroads. Class I railroads are the major railroad companies including CSX Transportation, Union Pacific (UP), Canadian National (CN) Railway, Kansas City Southern Railway (KCS), Burlington Northern Santa Fe Railway (BNSF), and Norfolk Southern Railway (NS). The Class I railroads have operating revenues of at least $319.3 million and are generally national or international in scope. The major railroads had been earning record profits prior to the recent financial crisis and have been investing heavily, with public financial support, to enhance their performance. The 88% projected increase in demand for rail freight transportation by 2035 will require an investment in infrastructure of $148 billion (Cambridge Systematics Inc. 2007). Class I railroads' share is projected to be $135 billion, with $13 billion projected for shortline and regional freight railroads. The federal public policy focus is on the major railroads and their improvements, so each state must decide what policy to take toward local shortlines (AASHTO 2013).

While Class I railroads move goods across the country, shortlines tend to be locally or regionally operated, though there is a trend toward the consolidation of multiple shortlines under holding companies (Johnson et al., 2004). There is concern by short line operators that these mergers will decrease service levels and responsiveness to customers (Johnson et al 2004). Local railroad infrastructure is an underutilized asset that offers opportunities for future growth, but public investment will be required. Shortlines are closer to the smaller customers. Gathering, distribution, and customer service is their forte and they feed into the major rail lines, which are poised to expand significantly.

Shortlines (Class III), which have less than 350 miles of track, and regional railroads (Class II), with at least 350 miles of track, but less than $271.9 in revenue, are an important component of the railroad industry (American Short Line and Regional Railroad Association, 2011). Today, smaller railroads operate and maintain 29% of the American railroad industry's route mileage, and account for 9% of the rail industry's freight revenue and 11% of railroad employment. Due to competition from trucks and other industry factors, the number of shortline railroads declined from over one thousand in 1916 to around two hundred in 1970 leaving hundreds of lines abandoned.

The Staggers Rail Act of 1980 deregulated the railroad industry to a significant extent and replaced the regulatory structure that had existed since the 1887 Interstate Commerce Act. Changes in rail operations are aiding the revival of shortlines, but their business structure makes survivability difficult without public investment. After the Staggers Rail Act, Class I railroads were allowed more flexibility to sell and abandon sections of rail track leading to an increase in the number of non-class I freight railroads by about 260%. These sections of track were less profitable and had limited density per mile. Much of this track was taken over by rail carriers known as shortlines[iii], which have had mixed results with many of them being viable while others were not.

Shortlines average 20% or less of Class I line-haul revenue per car. They are not low-cost operators as they sometimes have similar labor costs[iv], lack economies of scale, and face equal or greater fuel costs than major railroads. Bitzan, et al. (2003) point out that shortlines could achieve greater cost savings if they were to increase their density (revenue ton miles per mile) and their size (mile of road). Existing railroads may have difficulty increasing their size because of their connections to Class I railroads and limited financial resources. Density is critical to the shortline operations, and by increasing their density on the rail, track shortlines could decrease their average cost.

It is estimated that 60% of shortlines may not meet minimum economic thresholds for viability under current conditions despite their importance to economic development (Blanchard 2006). Even many of the profiTable shortlines do not generate enough revenue to overcome the lack of investment from when they were underperforming Class I branch lines. Nevertheless, shortlines generally serve an important niche that will increase in value to the freight transportation system and economic development as fuel prices increase and carbon emissions become a bigger factor.

Further, shortlines play an important role in many distressed communities that need to be efficiently connected to world markets. Class I railroads now function under a new business model of long-distance, heavy volume hauling (wholesaling). Small railroads

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[iii] Seventy-eight percent are owned by private shortline operators, 13% by large shippers, 5% by government, and 3% are still operated by Class I railroads (ASLRA 2011).

[iv] Shortline railroads frequently are not required to use unionized labor, which means their labor costs can be lower than Class I railroads.

act as feeder lines and serve a retailing function (Allen, Sussman, and Miller 2002). Unless a company is near an intermodal facility, where groups of railcars can be agglomerated to provide sufficient volume, they will have difficulty using a Class I railroad, whereas shippers who cannot fill a full train can be serviced by a shortline railroad (Baldwin, 2001). With rising trucking prices and global supply chains, this ability to provide service to smaller shippers means small railroads are becoming more important particularly for rural economies (Babcock, et al. 1993; Batson 1997; Due, Leever, and Noyes 2002; Sternberg and Banks 2006).

2.3. Factors that impact shortline viability

The Staggers Rail Act of 1980 created a vastly different regulatory environment for the railroad industry. With the decrease in regulations, carriers were "given the freedom to set rates, abandon unprofitable routes, and consolidate with other carriers to a much greater degree than they were able to in the past." With the abandonment of unprofitable track and the abandonment of track due to mergers, the door was opened for small carriers to acquire these sections of track to continue rail service to these areas (Winston, 2005). In the years between the Staggers Act and 1993 a total of 339 short line railroads were founded operating over 30,000 miles of track (Prater and Babcock, 1998). These short lines face unique economic challenges, and many require public assistance to remain in operation. There is some indication that rail service is a key contributor to the economic wellbeing of a community, and if this is the case, then more effort should be spent on Communities have several tools at their disposal to assist in addressing these challenges. The use of public funds necessitates in-depth analysis, and many researchers have contributed to the understanding of the short line industry. As shown in the following literature, the success of these short lines has varied due to a number of factors.

2.3.1. Factors Determining Viability

Research shows that short line profitability is contingent on several varying factors (Fischer et al., 2000; Grimm and Sapienza, 1993; Keeler, 1974; Prater and Babcock, 1998). The viability of short line operation has significant implications for rural areas in particular. Methodologies vary across the studies, but there are some common conclusions. Traffic density has a positive relationship to the success of the railroad. Also, short lines are more profitable if they operate longer distances of track. Another common finding is that if the short line was highly concentrated in one commodity (e.g., grain) there was a higher risk of failure (Grimm and Sapienza, 1993; Prater and Babcock, 1998). Also, the railroad's management's experience and ability to control costs has an effect on profitability (Grimm and Sapienza, 1993; Prater and Babcock, 1998). In addition, the percentage of traffic originated by the railroad is linked to better performance, and the strength of intermodal competition has a negative impact on the performance of the line (Grimm and Sapienza, 1993).

2.3.2. Abandonment Issues

Other studies approach the issue of track abandonment from the perspective of its environmental and economic impact on the community. For the most part, these studies found numerous potential negative externalities related to track abandonment (Babcock and Bunch, 2007; Betak, 2009; Stewart et al, 2008). One common finding was expected increased traffic on highways, which would have numerous implications. First, this result in increased wear and higher maintenance costs for roads which would be an added cost to taxpayers. Second, there would be more congestion leading to more frequent delays, more dangerous driving conditions, and subsequently higher costs to highway users. In cases involving already congested metropolitan areas, shortlines may be a necessary tool in alleviating this growing problem (Betak, 2009). In addition to increased highway traffic, there is evidence that a shift from rail to truck freight is less energy efficient. This could lead to even higher costs to shippers and consumers. While it is commonly assumed that rail has lower emissions relative to trucking, further study is needed to prove this assumption (Babcock and Bunch, 2007).

2.4. Federal Policy and Programs that Impact Short Lines

To address these types of transportation issues, programs have been started at the federal and state level. In many cases, these programs can offer financial assistance to local projects, like the creation, expansion, or renovation of short lines. Cultivating these public-private partnerships may help to establish the sustainability of the short line rail model as whole. For short line railroads, the Surface Transportation Board (STB) oversees federal policy regarding the operation and maintenance, while the Federal Railroad Administration (FRA) is only concerned with the safety aspect of these rail businesses. The FRA sets in place structural safety measures that seek to guarantee that the national rail system mitigates threats to other operators and the general public. This agency, also housed in the Department of Transportation, sets in place regulations that can be costly to implement. To lessen this burden on rail operators, the FRA offers assistance through grants and loans. One of the FRA's assistance programs is the Transportation Infrastructure Finance and Innovation Act of 1998 (TIFIA), via the Department of Transportation (DOT), makes three forms of credit assistance available – secured (direct) loans, loan guarantees and standby lines of credit – for surface transportation projects of national or regional significance. The fundamental goal of the TIFIA credit program is to leverage Federal funds by attracting substantial private and other non-Federal investment in critical improvements to the nation's surface transportation system. Some freight rail projects may be eligible for the TIFIA program.

2.4.1. Transportation Investment Generating Economic Recovery (TIGER) Grant Program

Another federal program is the Transportation Investment Generating Economic Recovery (TIGER) grant program. This allows the Department of Transportation to award $500 million dollars (as of 2012) to invest in "road, rail, transit and port projects that promise to achieve critical national objectives" (dot.gov). In 2010, over 17 million dollars was awarded to the Appalachian Regional Shortline Rail Project to rehabilitate five separate short lines across three states. This project also had around $4.5 million in other funds, and "benefits several economically distressed counties." TIGER grants were also awarded to several rail projects that were improving intermodal systems (U.S. Department of Transportation 2010).

2.4.2. Rail Rehabilitation and Improvement Financing (RRIF) Program

Yet another program is the Rail Rehabilitation and Improvement Financing (RRIF) which is federal financing that can be used to finance up to 100 percent of rail rehabilitation capital project. Through direct loans to the public or private entity that is undertaking the project, the program can fund acquisition, development, improvement and rehabilitation. The loans are repaid over 25 years with interest at the cost of borrowing for the federal government. When the program was authorized to use $35 billion in the SAFTEA-LU legislation, it set aside $7 billion specifically for use on short line railroads. The FRA has only approved 25 RRIF loans to private railroads since its 1998 creation, totaling about $700 million and with an average loan of $27 million. Table 2.1 displays a ledger of the projects awarded RRIF since 2002 along with the amount of financing allocated (Federal Railroad Administration, 2012). The FRA decides on RRIF loans with input from other agencies, after extensive review and requires the applicant pay a risk premium to borrow the money. They can be issued for up to 35 years, at low interest rates equal to the government's borrowing costs, and require no budget outlays.

The $35 billion RRIF loan pool has sat largely unused despite pleas by short line railroads to make its credit more available. In September 2012, the FRA announced new guidance on how it plans to issue RRIF loans including judging loan requests for "public benefits" and broader policy goals rather than simply by whether they make rail operations more efficient to handle freight. The American Short Line and Regional Railroad Association (ASLRA) has requested the FRA withdraw that guidance and instead "maximize the use of this program for a short line industry" that was meant to be one of its main borrowers. The ASLRA argues that the public benefit test is "nonsensical" and illegal under the RRIF law, and that any FRA plans to link the loans to passenger rail service or the administration's livable communities strategy are "baseless, whole-cloth creations" of new rules. The ASLRA argues that the establishment of broader policy goals like noise reduction, reduction of highway freight traffic, development of interconnected livable communities, and expanded access for people with disabilities has nothing to do with short line railroads that are preserving light density rail lines in rural and small town America.

2.4.3. Short Line Federal Tax Credit

The 45G tax credit creates an incentive for short line and regional railroads to invest in track rehabilitation and improvements by providing a tax credit of 50 cents per dollar spent on those improvements. In the realm of additional business tax relief, the railroad track maintenance credit is a relatively small and inexpensive assistance mechanism.

This tax credit was first established under Republican-controlled Congress in 2004 and cost $165 million over 10 years. This credit entitles the responsible entity to a tax credit in the amount equal to 50 percent of a qualifying track maintenance expenditure paid or incurred during a taxable year. The tax credit is capped at $3,500 per mile of rail track maintained in a taxable year. When the tax credit was established in 2004 it was set in law to expire at the end of 2009. In December 2009 the tax credit was extended for another year along with a package of other tax provisions that had expired. Currently the tax credit awaits its fate with a group of expiring tax provisions in the tax extenders package. This package could be dealt with in terms of revenue that might be considered for dealing with budgetary considerations before 2013. Because of the size, cost, and purpose of this tax credit, the 45G tax credit has been extended until Jan. 1, 2014, as part of the "fiscal cliff" deal.

Table 2.1 Rail Rehabilitation and Improvement Financing Projects

Fiscal Year	Organizations	Amount
2012	Alameda Corridor Transportation Authority	$83,710,000
2012	Kansas City Southern Railway Company	$54,648,000
2011	Northwestern Pacific Railway Company and North Coast Railway Authority	$3,180,000
2011	Amtrak	562,900,00
2011	C & J Railroad	$56,204
2010	Denver Union Station Project Authority	$155,000,000
2010	Great Lakes Central Railroad	$17,000,000
2009	Georgia & Florida Railways	$8,100,000
2009	Permian Basin Railways, inc	$64,400,000
2009	Iowa Interstate Railroad	$31,000,000
2007	Nashville and Eastern Railroad	$4,000,000
2007	Nashville and Eastern Railroad	$600,000
2007	Columbia Basin Railroad	$3,000,000
2007	Great Western Railway	$4,030,000
2007	Dakota Minnesota & Eastern Railroad	$48,320,000
2007	Iowa Northern Railroad	$25,500,000
2006	Virginia Railway Express	$72,500,000
2006	RJ Corman Railway	$11,768,274
2006	RJ Corman Railway	$47,131,726
2006	Wheeling and Lake Erie Railway	$14,000,000
2006	Iowa Interstate Railroad	$9,350,000
2005	Great Smoky Mountain Railroad	$7,500,000
2005	Riverport Railroad	$5,514,774
2005	The Montreal Maine & Atlantic Railway	$34,000,000
2005	Tex-Mex Railroad	$50,000,000
2005	Iowa Interstate Railroad	$32,732,533
2004	Stillwater Central Railroad	$4,675,250
2004	Wheeling and Lake Erie Railway	$25,000,000
2004	Dakota Minnesota & Eastern Railroad	$233,601,000
2003	Arkansas & Missouri Railroad	$11,000,000
2003	Nashville and Western Railroad	$2,300,000
2002	Amtrak	$100,000,000
2002	Mount Hood Railroad	$2,070,000

***Source**: Federal Railroad Administration, 2012*

The ASLR argues that the tax credit is success story in that it reduces federal taxes and interference with small businesses. It allows the market, not government, to prioritize infrastructure investment decisions. Further, the tax credit allows those businesses to invest more of what they earn in ways that benefit all Americans by keeping millions of additional heavy trucks off of the publically maintained highways each year, reducing wear and tear, pollution and congestion and preserves jobs and economic development opportunities. The Railway Tie Association estimates that when the 45G credit is in effect, between 500,000 and 1,500,000 additional railroad ties are installed each year. Finally from the short line perspective, competing highway infrastructure is maintained by federal and state governments so the privately funded short line infrastructure needs to be compensated.

2.4.4. Moving Ahead for Progress in the 21st Century (MAP-21) and Short Lines

The final version of the Moving Ahead for Progress in the 21st Century (MAP-21) was passed as reauthorization legislation for surface transportation funding commonly known as “the Highway Bill.” Despite the road centricity of its affectionate name, this legislation has regularly included provision for freight rail transportation. There were, however, freight rail provisions that were passed in the Senate-version of the legislation that were in carried over to be enacted in the final legislation after conferring with the House of Representatives. The final act did retain some planning language that included the identification of infrastructure components for freight and the designation of a “primary freight network.” Given the findings of transportation studies in the recent past, short line railroads should play a prominent role in make such a determination (Kirk, et. al, 2012).

2.4.5. Federal Freight Capacity Program

These programs target improving the freight network by adding capacity and removing bottlenecks, upgrading shared-use infrastructure in terminal areas, safety enhancements and rail line relocation, and even shortline capital upgrades. Federal money has started to become available for short lines to improve their roadbed so they can handle the heavier 286 cars.

2.4.6. Rail Line Relocation Program

Congress did not appropriate any funding for the Rail Line Relocation program in FY 2012 and all available funding has been awarded. Under the program, States and local governments were eligible for a grant from the FRA for any construction project that improves the route or structure of a rail line and involves a lateral or vertical relocation of any portion of the rail line, or is carried out for the purpose of mitigating the adverse effects of rail traffic on safety, motor vehicle traffic flow, community quality of life, or economic development. For example, a 57-mile stretch of Florida Central Railroad's (FCEN) track between Orlando and Umatilla received a $2.2 million grant to improving tracks, ties, bridges and grade crossings.

2.5. State Rail Plans and Short Line Railroads

2.5.1. Introduction

Many states have developed their own railroad funding programs and comprehensive rail plans (AASHTO, 2013). Generally, these plans are created with input from a variety of stakeholders in the railroad industry from holding companies, to shippers, to the general public. Plans vary from state to state, but most contain specific objectives designed to support the short line railroads in their state. Short line specific strategies are crucial to meeting larger goals such as increased connection to the national rail system, sustainable and efficient statewide transportation, and general economic development.

2.5.1.1. Funding Programs and Plans in Mississippi

Some states, like Mississippi, have their own programs that specifically target rail projects. Specifically in Mississippi, there are two programs through the Mississippi Development Authority that can assist short lines. The first is the Mississippi Rail Grant Program, which is a competitive grant that attempts to “stimulate growth and economic development through rail transportation infrastructure in the state” (Mississippi Development Authority, 2010). The state also has the Freight Rail Service Revolving Loan Program that specifically loans money to cities and counties for freight rail projects. These loans can be up to 15 years and 1 million dollars per year. The interest rate on the loan is 1% below the Federal Reserve Discount Rate when the loan is approved (Mississippi Development Authority, 2010).

The Mississippi state rail plan makes note of the benefits of short line railroads and rail service they provide to rural communities. During the development of the plan, short line operators were surveyed, and their main concern was financial assistance to upgrade tracks and improve operations to accommodate the industry standard 286,000 pound cars. They were also interested in programs to improve public relations and educate the public on the benefits of rail freight. The state’s vision for short lines is to develop a freight system capable of handling these higher weighted cars, to improve access to the national rail system, and to provide funding programs for these endeavors. The state has a short range and a long range rail investment program. In the short range program, there are provisions for short line rehabilitation projects (Mississippi Department of Transportation, 2011).

2.5.1.2 Funding Programs and Plans in Ohio

The Department of Transportation in Ohio has also addressed the issue of short line railroads. According to the DOT, “5-10% of companies looking to expand or locate in Ohio require direct rail service.” The Rail Spur Program is designed to fund new rail infrastructure with the ultimate goal of business retention. Ohio also has other funds set aside for line acquisition and rehabilitation (Ohio Rail Development Commission, 2013). The Ohio Rail Development Commission created their state rail plan with input from railroad firms around the state. One major concern was improving the relationships between Class I carriers and the short lines. Another key goal of the plan was to rehabilitate critical short line and regional rail lines. Increased connectivity with shippers was also a goal of the plan, as only one third of Ohio manufacturers have rail access despite the fact that 62% are located within 1 mile of a rail line. The preservation of short lines is vital to the freight transit system of the state, as the short line system is estimated to divert over 900,000 truck trips from the state highway system every year (Ohio Department of Transportation, 2010).

2.5.1.3 Funding Programs and Plans in Alabama

The Alabama rail plan focuses on issues surrounding abandonment. After gathering basic information about the operating lines in the state, the plan outlines in detail the process of line abandonment in the state. This is followed by an explanation of potential negative effects of abandonment, and the possible alternatives. The key alternative to abandonment, as laid out in the plan, is short line operation and railroad subsidies. In cases where the negative impact of abandonment would be significant in the community and the current operators find the line unprofitable, short lines may be able to operate the line more effectively, even if the acquisition of the line must be subsidized (Alabama Department of Transportation, 2008[v]).

2.5.1.4 Funding Programs and Plans in Illinois

One key goal of the Illinois rail plan is an improved intermodal system of transportation. This goal is measured in the number of rail served ports and carloads transferred over short lines, among other things. Another goal of the plan is to emphasize projects that have economic development implications, whether they be passenger or freight. In order to make the necessary improvements to the short lines, the state plans to make use of federal grant programs. For example, a number of short lines have utilized the Rail Rehabilitation and Improvement Financing program and the Railroad Track Maintenance Credit Program (Illinois Department of Transportation, 2012).

2.5.1.5 Funding Programs and Plans in Tennessee

The Tennessee rail plan recommends three goals for short lines. The first is the development of performance measures for the short line programs. The second is the development of an updated engineering basis for the program. And the third is the development standard procedures for adding or discontinuing mileage for the rehabilitation program. The Tennessee Department of Transportation allocates funding for track rehabilitation to cover construction, engineering, and administration costs. The plan also addresses specific measures to ensure that the railroad is sustainable and economically viable (Tennessee Department of Transportation, 2003).

2.5.1.6 Funding Programs and Plans in Michigan

The Michigan rail plan was formed after significant outreach to railroad stakeholders, such as railroad companies, shippers, local agencies, and the general public. The plan outlines several goals and objectives including promoting the efficient movement of freight, encouraging intermodal connectivity, and enhancing state and local economic development. Practically, the plan promotes the upgrading of track to handle larger carloads, the creation and growth of intermodal facilities, and the preservation of critical track that may be at risk of abandonment (Michigan Department of Transportation, 2011).

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[v] http://www.dot.il.gov/ilrailplan/pdf/Illinois State Rail Plan_Report_Final_Dec-2012.pdf

2.5.1.7 Funding Programs and Plans in Minnesota

The recurring theme of the Minnesota rail plan is the lack of adequate funding for rail projects in the state. One practical solution proposed is the expansion of the Minnesota Rail Service Improvement Program, which currently provides loans no greater than $200,000 for infrastructure improvements. The lack of funding is viewed as particularly harmful to short lines, who have taken on lower density lines that the Class I railroads could not continue to operate. While short lines can typically operate these lines at a lower cost, and therefore maintain profitability, there is a higher risk associated with these previously unprofitable sections of track. The plan suggests that short lines that may have difficulty receiving federal assistance should be a focus of state programs. The Minnesota plan stresses the importance of a strong rail system, and suggests significant increases to rail project funding, including tax credits and the state's Transportation Revolving Loan Fund (Minnesota Department of Transportation, 2010).

2.5.1.8 Funding Programs and Plans in Wisconsin

The Wisconsin rail plan emphasizes economic development, increased connectivity, and economic and environmental sustainability. The Wisconsin Department of Transportation plans to work with local governments to develop local rail access. As a part of this plan, the WisDOT plans to increase support for short line expansion as a tool for economic development. Increased rail access gives shippers more options and could lead to lower shipping costs for local companies. An increased emphasis on projects related to safety and the environmental impact of the rail system is also an integral aspect of the plan (Wisconsin Department of Transportation, 2010).

2.5.1.9 Funding Programs and Plans in Indiana

The Indiana state rail plan targets the needs of short line railroads, among a variety of other issues. The key issue facing Indiana short lines is the need to upgrade tracks to accommodate the industry standard 286,000 lbs. car loads. The plan identifies several federal funding options, as well as suggested increases to state programs. One of these programs, the Indiana Industrial Rail Service Fund, offers assistance to regional and short line railroads to service new business development. These types of funds strengthen the connection between rail service and economic development (Indiana Department of Transportation, 2011).

2.5.2 Summary of State Rail Plans

Several types of actions have been suggested and are being implemented in various States throughout U.S, as previously discussed. These funding programs and comprehensive rail plans contain specific objectives designed to support the short line railroads.

In Mississippi there are two programs through the Mississippi Development Authority:

a) Mississippi Rail Grant Program: a competitive grant that attempts to "stimulate growth and economic development through rail transportation infrastructure in the state".

b) Freight Rail Service Revolving Loan Program that specifically loans money (up to 15 years and 1 million dollars per year with interest rate 1% below the Federal

Reserve Discount Rate when the loan is approved) to cities and counties for freight rail projects.

In Ohio the Rail Spur Program is designed to fund new rail infrastructure with the ultimate goal of business retention. Ohio also has other funds set aside for line acquisition and rehabilitation. The State's main plan concern is improving the relationships between Class I carriers and the short lines as well as rehabilitating critical short line and regional rail lines in order to increase connectivity with shippers.

The Alabama rail plan focuses on issues surrounding abandonment and after gathering basic information about the operating lines, the plan outlines in detail the process of line abandonment in the state. The key alternative to abandonment, as laid out in the plan, is short line operation and railroad subsidies.

In order to make the necessary improvements to the short lines, the state of Illinois plans to make use of federal grant programs. A number of short lines have utilized the Rail Rehabilitation and Improvement Financing program and the Railroad Track Maintenance Credit Program.

The Tennessee Department of Transportation allocates funding for track rehabilitation to cover construction, engineering, and administration costs. The plan also addresses specific measures to ensure that the railroad is sustainable and economically viable and sets the following goals:

a) The development of performance measures for the short line programs.

b) The development of an updated engineering basis for the program.

c) The development of standard procedures for adding or discontinuing mileage for the rehabilitation program.

The Michigan rail plan outlines several goals and objectives including promoting the efficient movement of freight, encouraging intermodal connectivity, and enhancing state and local economic development and promotes the upgrading of track, the creation and growth of intermodal facilities, and the preservation of critical track that may be at risk of abandonment.

In Minnesota there is a recurring lack of adequate funding for rail projects. One practical solution proposed is the expansion of the Minnesota Rail Service Improvement Program, which currently provides loans no greater than $200,000 for infrastructure improvements. The plan suggests that short lines that may have difficulty receiving federal assistance should be a focus of state programs. The Minnesota plan stresses the importance of a strong rail system, and suggests significant increases to rail project funding, including tax credits and the state's Transportation Revolving Loan Fund.

The Wisconsin Department of Transportation plans to work with local governments to develop local rail access. As a part of this plan, the WisDOT plans to increase support for short line expansion as a tool for economic development with an increased emphasis on projects related to safety as well as the environmental impact of the rail.

The key issue facing Indiana short lines is the need to upgrade tracks to accommodate the industry standard 286,000 lbs. car loads. The plan identifies several federal funding options, as well as suggested increases to state programs. One of these programs, the Indiana Industrial Rail Service Fund, offers assistance to regional and short line railroads to service new business development.

2.6. Summary of Literature Review

In summary of the literature, there are numerous aspects of shortlines that communities must consider when making decisions about projects. First, the factors that make shortline railroads economically viable should be at the forefront of conversations between communities and the ownership of the railroad. Traffic density, railroad size, commodity diversity, and management's performance can either be beneficial or detrimental to a short line. Communities should analyze each of these areas, and help short lines find ways to build on their strengths or improve their weaknesses in these areas. If changes in the organization can make the line more profiTable, the need for public subsidies can be reduced or even eliminated. Economic developers and policy makers also need to be aware of the benefits that short lines bring to an area, as opposed to the alternative of line abandonment. In addition to the direct loss of jobs from the organization previously operating the line, abandonment can cause inefficiencies in the local economy. Shippers who relied on rail service must look to other modes of freight shipping, usually trucking, which tends to be more expensive. This increases their shipping costs and decreases their shipping options. This also is a major detriment to the community in terms of business attraction. Without the community asset of rail transportation, many companies cannot operate their business at all. It follows that a plethora of companies cannot even consider locating operations in the area without an operating rail line. On top of the negative effects to the business community, the taxpayers and highway users also experience many negative effects. As shown in the literature, highway maintenance can become a financial burden on the community. Also, the increase in traffic causes higher congestion on highways, resulting in lower fuel efficiency and lower highway safety. Short lines prevent these externalities, while potentially making unprofiTable sections of track profiTable. Therefore it greatly benefits communities to be aware of the potential avenues for financial assistance that can be utilized to strengthen local short lines.

2.7. The Case of Shortlines in Wisconsin

The rural Northern Wisconsin/Upper Peninsula (NW/UP) region has comparatively low volume rail traffic, significant portions of one-way traffic and has several subdivisions off the mainline with light gauge track and rail lines not capable of sustaining a high speed. Shortly after the 2001 merger CN started to apply the Class 1 business model to the NW/UP region. The goal of CN was to increase productivity, improve asset utilization, lower operating costs and improve the rate of return on capital. Following standard railroad business practices, CN raised rates to cover higher operating costs, decreased frequency of service to build longer trains, reduced the number of stops to increase velocity, and centralized customer support and services. The impacts to shippers were higher freight costs, longer shipping times, and a feeling of deteriorating relationship with their rail carrier. In such a business climate shippers will likely switch to another mode such as trucking or marine if they are available and can meet the supply chain needs of the shipper.

The changes in rail service could precipitate a chain reaction where shippers move even less cargo by rail and the railroads continue to reduce service in response to the economies created by diminished freight volumes to the point where rail service would no longer be sustainable for CN's operations. The preferred solution from the perspective of Class I railroads in such situations has traditionally been to sell the local operations to one or more Shortline railroads, while maintaining the long haul of the products. If there is no basis for sale or interest within local railroads, the lines in the region would join the 8,000 route-miles of rail lines that are at risk of abandonment over the next decade (Schwieterman, 2006) with potentially significant economic impact to the region.

In 2004 an economic impact analysis of rail service in northern Wisconsin was completed by the Wisconsin Department of Transportation (WisDOT), (Leong, Russell, Mohamud, 2004). The study examined rail service in parts of WisDOT's North West, North Central, and North East Regions. The study used a Reebie based commodity flow database to determine the types and volumes of freight in the seventeen counties in the region. A sample of thirteen large manufacturers and producers in the region were surveyed to determine how dependent their businesses were on rail service. The study determined that the two districts' rail service had an annual impact of over $780,000,000 in the two districts. The study also found that in 2002 there were over 300,000 rail carloads in District 8 and over 1 million rail carloads in District 7. The data in this published study is under review by the Wisconsin DOT and there may be revisions in the future on the data in that study. However the DOT study does provide valuable insight to the importance of rail service to the region. Note: Since the publication of the 2004 study these districts have been combined into larger regions under the WisDOT 2005 reorganization plan.

Superior, Wisconsin is part of the Northwest District, has the largest port on the Great Lakes and is served by four Class I railroads, the UP, CP, CN, and BNSF. The fact is that the 19 million plus tons of coal cited in the study for Midwest Energy Resources in Superior is carried by BNSF and UP trains that come from the Powder River Basin in Wyoming. These coal trains move only though a small Northwest corner of Douglas County, Wisconsin on BNSF and UP's routes and thus this cargo adds little to CN's or regional Shortline railroads revenue base. Some trains traveling to and from the study region are made up in CN's Pokegama yard and the UP's Itasca yard with cars switched from BNSF or CP. The switching costs (approximately $1.00 per ton) tends to inhibit shippers from switching between rail lines.

Many of the products shipped in the region are bulk commodities with low unit cost that benefit from economies of scale provided by rail. Trucking will not be able to compensate for the reduction in rail transport without increasing the cost of transportation for inbound and outbound goods in the region. The elimination of rail service in the region would result in adverse impacts on manufacturing, agriculture, natural resources, tourism, and energy production (WisDOT, 1994).

Rail abandonment in the U.S. has been regularly undertaken and since 1960 almost 50% of trackage in the U.S. has been abandoned (see Figure 2-1). In most cases those corridors are gone permanently, if no steps have been taken to preserve corridors at the time of abandonment. Restoring rail service in rural communities that have not preserved a right-rail right-of-way for this purpose is rarely feasible.

U.S Rail Miles in Existence

- 1960 – 207.334
- 1980 – 164,822
- 1990 - 119,758
- 2000 – 99, 250

Net loss of 108,084 miles from 1960-2000

(Bureau of Transportation Statistics, 2003)

Figure 2-1 Rail Abandonment in the U.S since 1960

Schwieterman (2006) estimated that roughly 750 U.S. cities with a population of over 3,000 have permanently lost their rail service for this reason. As a result some states such as Wisconsin have a history of providing economic support for preserving rail service even to the extent of buying trackage and then leasing it to a Shortline operator (Leong et al., 2004). The infrastructure costs remain but some are put into the state budget. The Wisconsin DOT does not operate the railroad; the operating certificate is held separately and transferred to the Shortline operator.

2.8. Examples of strategies to preserve rail service

In 1994, WisDOT proposed strategies to retain and improve rail service in the state and has at least partially implemented the following strategies:

Alternative Strategy #1: Under this strategy, the Department could leave line, routing, investment, and service decisions to private rail operators following the dictates of the marketplace. So that those private decisions might accurately reflect true social costs and tradeoffs between different modes, the Department could take steps to ensure that all highway users pay their full share of the cost of the public highways that they use.

Alternative Strategy #2: Preserve existing rail infrastructure through WisDOT rail funding programs: Under this strategy, the Department could administer rail programs with a goal of preserving existing levels of service. These programs would allow the Department to loan funds directly to railroads, as well as to acquire and preserve rail lines that might otherwise be abandoned.

Alternative Strategy #3: Preserve and improve service through existing WisDOT rail funding programs: Under this strategy, the Department could administer current rail programs, the Freight Railroad Preservation Program, and the new Freight Railroad Infrastructure Improvement Program, with a goal of preserving existing levels of service and increasing the level of service on rail lines where warranted.

Alternative Strategy #4: Preserve and expand service through aggressive state acquisition of entire rail systems: Under this most active strategy, the Department could aggressively acquire all track and other fixed assets from freight railroads in the state, and enter into non-exclusive leases or franchises with multiple railroad companies to operate the systems.

The preferred alternative of Wisconsin and most states is the first listed. However, all of these strategies have been at least partially implemented in the state of Wisconsin. The State of Michigan uses the same methods, but at least so far, there are no state-owned rail lines in the Upper Peninsula. While state funded loan and grant programs can be extremely beneficial for Shortline railroads, many larger railroads have policies of not using public funds except as a last resort. They prefer to stay on their own or receive assistance in the form of tax credits for projects that expand track capacity, but to survive in competition railroads must be on a level playing field with other modes. Trucks cause the majority of pavement deterioration and have a high impact on increasing roadway congestion and environment pollution, but there is considerable debate on whether or not they are paying their full price of highway usage. If the trucking industry is in effect receiving a public subsidy it may place that industry at an economic advantage over the rail industry (FHWA, U.S DOT, 2000), (FHWA, U.S DOT, 1997). A study at Texas A&M attempted to evaluate the tradeoff between rail and truck traffic on lower density rail lines by estimating the needs to upgrade the infrastructure of Shortline railroads and comparing the cost to the estimated savings in pavement damages due to reductions in truck traffic. Based on the study, tracks with medium density traffic (40 to 200 carloads per mile) had a benefit-cost ratio of up to 4.4 making it economical to maintain them in operation (Warner, 2005).

The changes in economy and in our lifestyles have increased the need for a safe and efficient transportation system. In 2001, surface transportation comprised 8% of the gross domestic product and about 18% of average U.S. household expenditures, second only to housing (TRB, 2003). If rail services were abandoned in the NW/UP region the situation would be likely to lead to situations where the region's businesses are unable to compete in other markets and the costs of production and living could increase faster than the national average. These economic factors would drive away existing companies, discourage future development, lead to unemployment, and other negative economic outcomes for the area. Addressing the issues of retaining viable rail service for the region and also providing a reasonable return on investment for railroads is essential for the economic health of Northern Wisconsin and the Upper Peninsula of Michigan.

A study completed in 2006 used stakeholder outreach to bring rail roads, users and potential users together to improve service while maintaining rail operating margins. The project had modest success with an additional finding that a significant portion of the region's rail lines were not accurately mapped in rural areas and this resulted in users being unable to determine where train service was available, (Stewart et al, 2006). The study also produce an on-line Rail took kit to help first time rail users. The tool kit has been expanded into Iowa and Minnesota.

Rural areas are at a disadvantage when trying to containerize freight and ship by rail. Not only are intermodal terminals located away from rural markets but the export containers may not be available for rural business as they are kept close to the high volume rail terminals, (Stewart et al, 2013).

3. SHORTLINE RAILROAD SURVEY

This section of the report presents an analysis of the data collected through the surveys of the shortline railroads.

3.1. Business Structure of the company

The majority of the companies surveyed (75%), were commercially oriented. Government controlled organizations (16.7%) and non-profit organizations (8.3%) complete the list of participants (Figure 3-1).

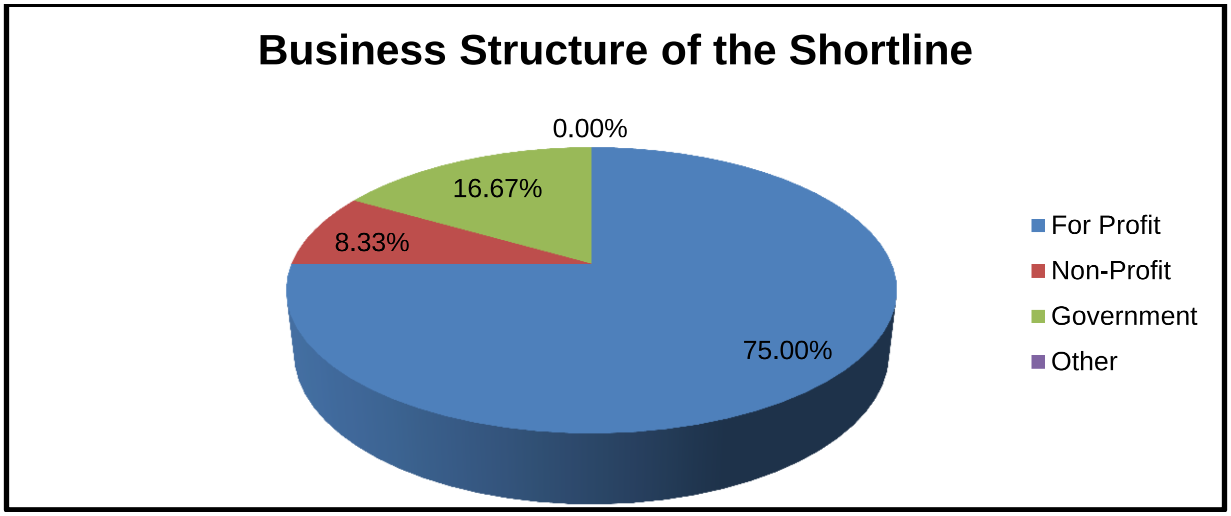


Figure 3-1 Company business structure

3.1.1. Type and number of employees

The shortline railroads surveyed, employ a total of 333 persons of which 325 (or 97.6%) are full-time employees, one (or 0.3%) is part-time and seven (2.1%) are contracted labor. The full time employee number by company varies between 3 and 150 employees with an average of 27. The sample's standard deviation was 40.91 employees.

3.1.2. Equipment proprietorship status and maintenance tactics

Fifty percent of the companies surveyed own the equipment they use, 16.7% lease their equipment, while 16.7% are using a combination of both. Due to issues of proprietary/sensitive information 16.7% of the shortline representatives preferred not to provide an answer (Figure 3-2).

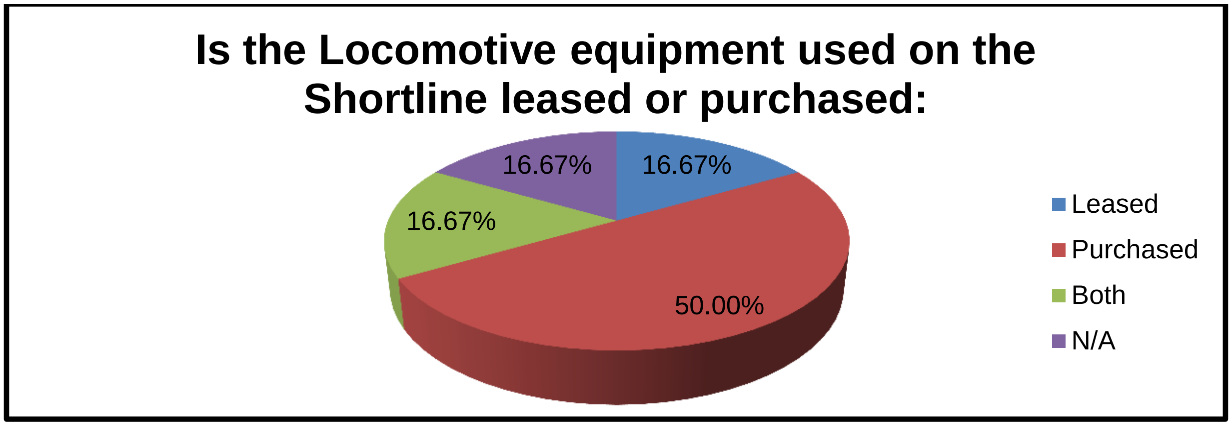


Figure 3-2 Equipment ownership distribution

Fifty percent of the companies perform “in-house” maintenance, 8.3% outsource maintenance, while 16.7% perform “in-house” and outsource equipment maintenance when necessary. Twenty-five percent of the companies were reluctant to respond to this question citing proprietary reasons.

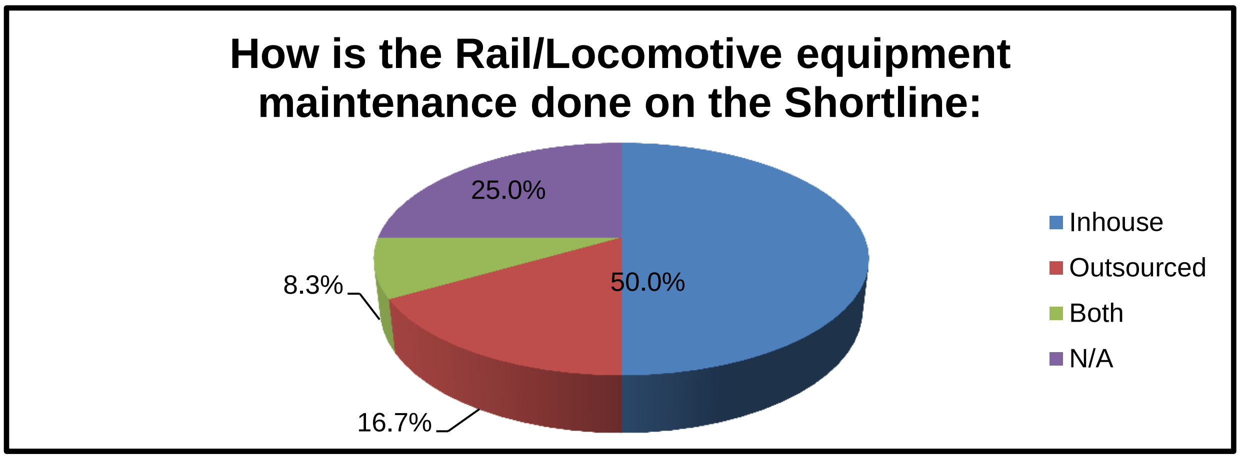


Figure 3-3 Equipment maintenance distribution

3.1.3. Revenue Status

Many shortline representatives were reluctant to provide revenue information for the time period of 2003 to 2012, either because of the sensitive/proprietary character of the data or because some of the shortline companies had been recently bought by other business schemes and were unaware of past data (official reply). Fifty percent of the companies did not reply to this question while other representatives provided partial answers. Figure 3-4 summarizes the information collected. On average, total yearly revenue within the decade had a positive trend, except 2009, which may be attributed to the downturn of the U.S. economy.

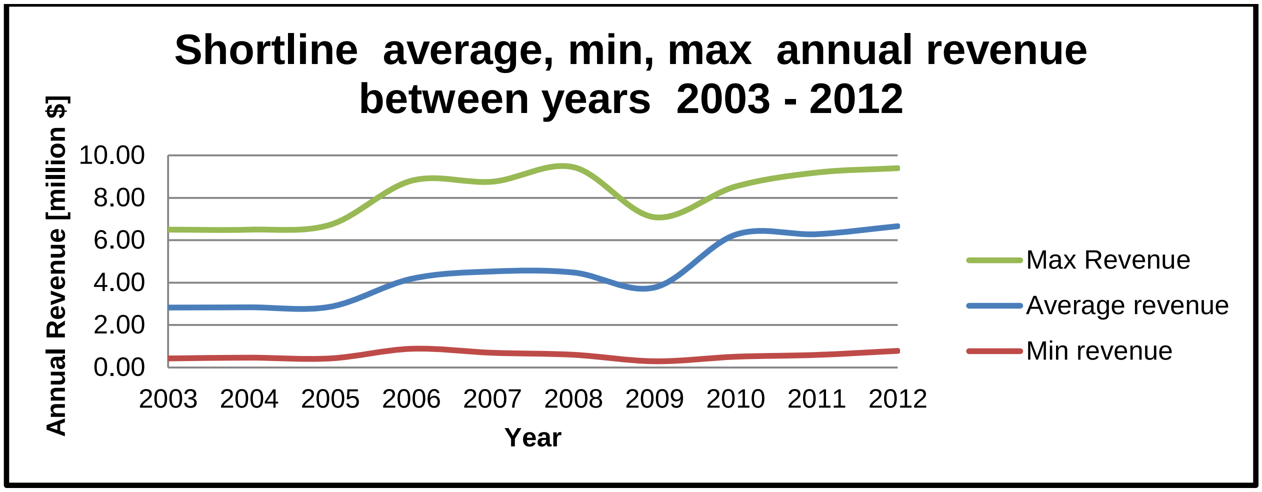
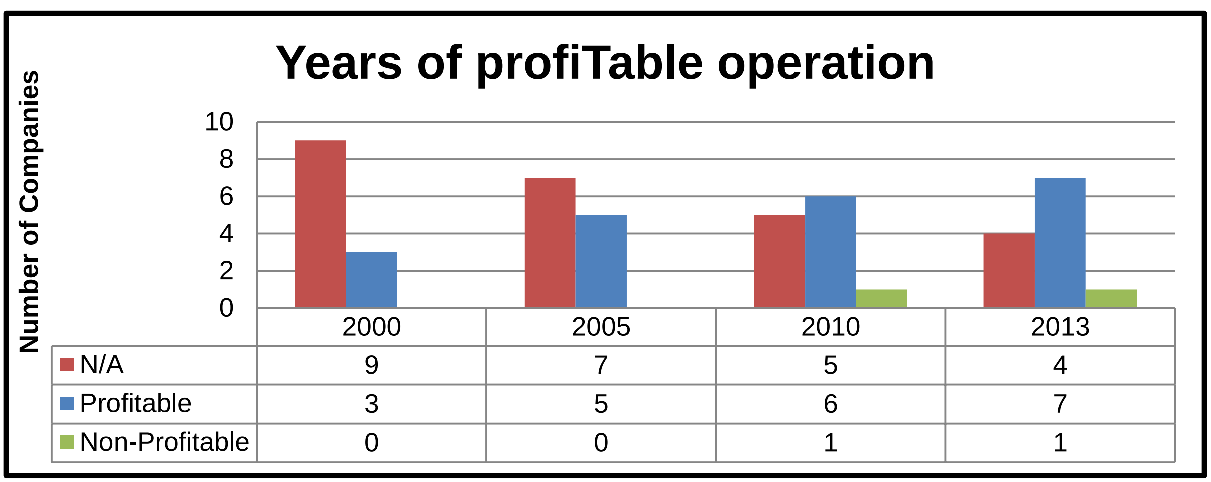


Figure 3-4 Shortlines' decennial maximum, average and minimum annual revenue

Within the time period surveyed (2003-2012), the minimum revenue value for small companies (less than $1 million in revenue) was $0.29 million (in 2009) and the maximum $0.88 million (in 2006), while for larger shortline companies the minimum revenue was $6.5 million (in years 2003 and 2004) and the maximum was $9.5 million (in year 2008).

3.1.4. Profitability

The bar chart of Figure 3-5 illustrates the positive trend of profitability of the shortline companies for years 2000, 2005, 2010 and 2013. All companies that responded to the question were profitable through all four years. However, conclusions about shortline profitability should not be drawn due to small sample size as companies who did not answer this question may have been unprofitable during the time period in question. The inability to draw conclusions is, also, supported by the fact that some companies provided only partial information (i.e. data for some of the years) citing missing data, proprietary considerations, or company takeover.



	2000	2005	2010	2013
N/A	9	7	5	4
Profitable	3	5	6	7
Non-Profitable	0	0	1	1

Figure 3-5 Shortline companies profitable years of operation

3.1.5. Alternative economic sources

Fifty percent of the railroads surveyed, stated that no alternative means of funding, other than their own, were used (e.g. state funding, federal grants, etc.), 16.7% did not reply at all, while 33.3% replied positively. Railroads that used other funding sources cited DOT Equity Funds for Rehabilitation. Notably, in their explanatory comments, interest was shown in TIGER Grants, but no information was provided as to whether the companies had used or applied for grants of any type in the past. Some representatives considered leasing of infrastructure/equipment or the provision of storage services to other companies as external funding, or as financial support to their main economic activities, but these considerations were not taken into account as external source funding, by the study.

3.1.6. Volume of clients

The shortline railroads responding to the survey serve on average 14 customers (with a minimum of three and a maximum of 30 customers). Approximately, 60% of the companies serve less than 14 clients and 40% serve 15 or more.

3.1.7. Weekly schedule and operational availability

Fifty percent of the shortline companies operate seven days a week, 8.3% operate Monday through Friday, 8.3% operate Monday through Saturday and 16.7% operate on a five day schedule, but are flexible to operate on any given day according to clients' needs (Figure 3-6). This question was not answered by 16.7% of the survey participants

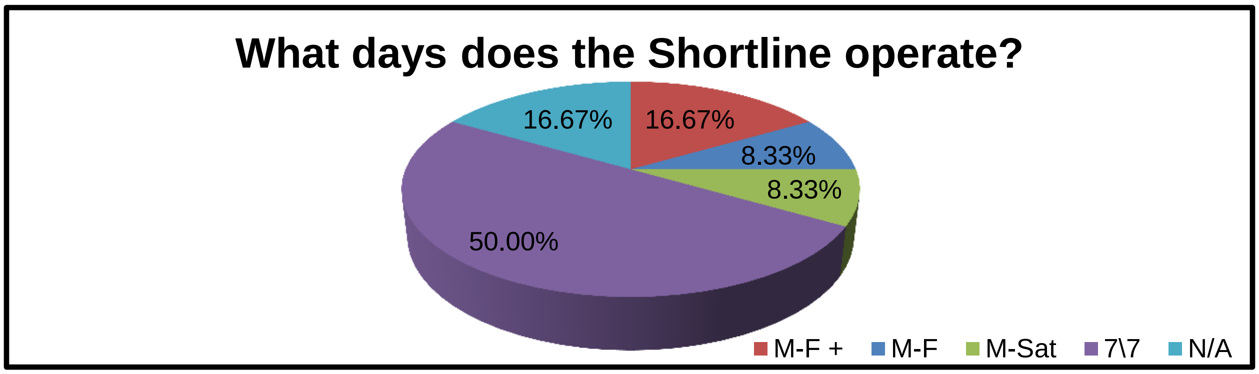


Figure 3-6 Weekly operation schedule distribution of shortline companies

3.1.8. Maintenance costs

Most representatives (75%) did not provide a response to the question of annual line maintenance costs. Results of those who responded are summarized in Figure 3-7. The small sample size is not sufficient to draw any reasonable conclusions on line maintenance costs.

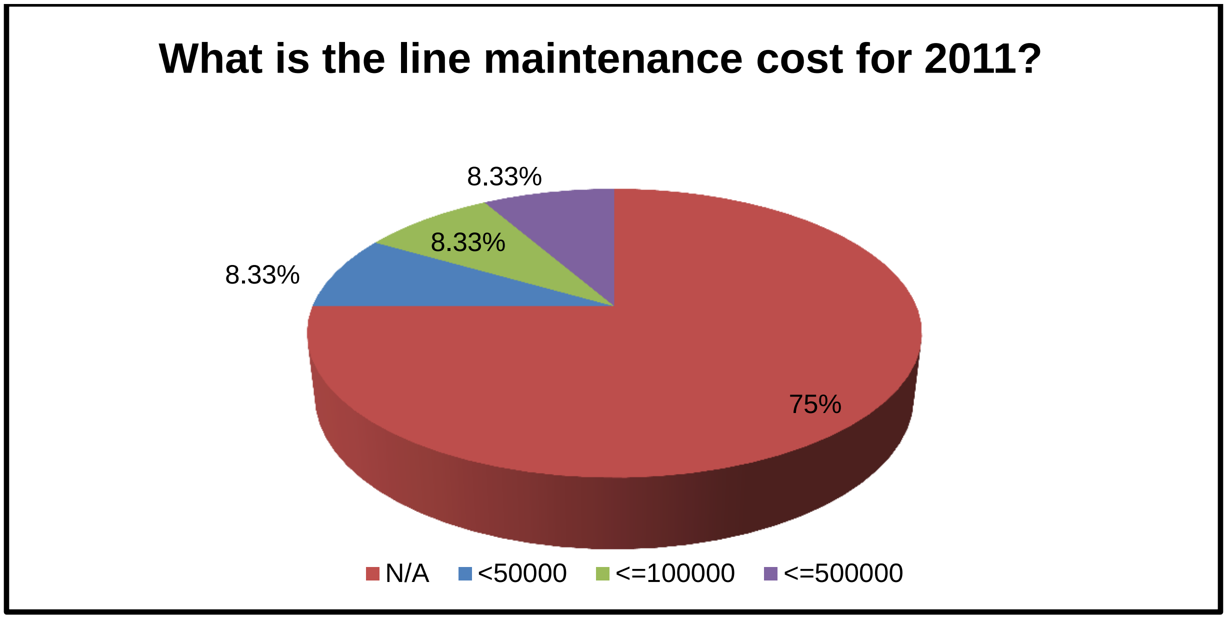


Figure 3-7 Annual line maintenance costs for 2011

In a similar question, regarding equipment maintenance costs for 2011, most representatives (66.7%) did not provide answers. Figure 3-8 summarizes results from the shortline companies who did respond. Similar to the annual maintenance cost question the small sample size does not allow any reasonable conclusions to be drawn on equipment maintenance costs.

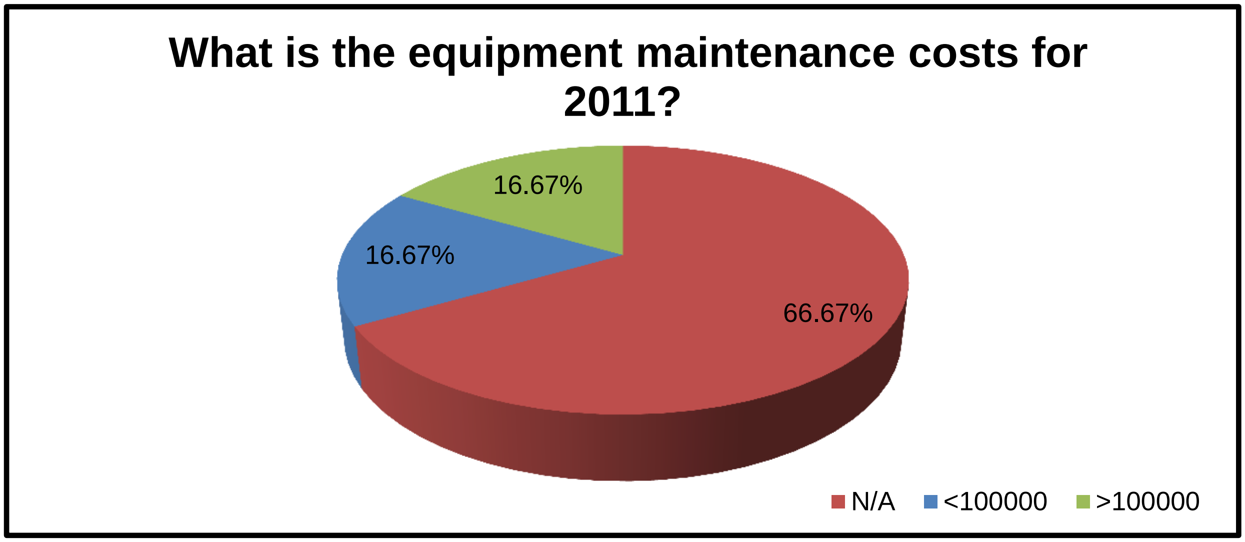


Figure 3-8 Annual equipment maintenance costs for 2011

3.2. Rail infrastructure

3.2.1. Railroad length and car serving capability

The average railroad track length of the shortline railroads responding was 71.5 miles (with an eight miles minimum and 180 miles maximum). The most common track mileage (50% of the cases) ranged from 41 to 80 miles. Twenty-five percent of respondents reported track mileage less than 40 miles, 8.3% reported track mileage between 81 and 120 miles, and 16.7% reported track mileage over 120 miles (Figure 3-9).

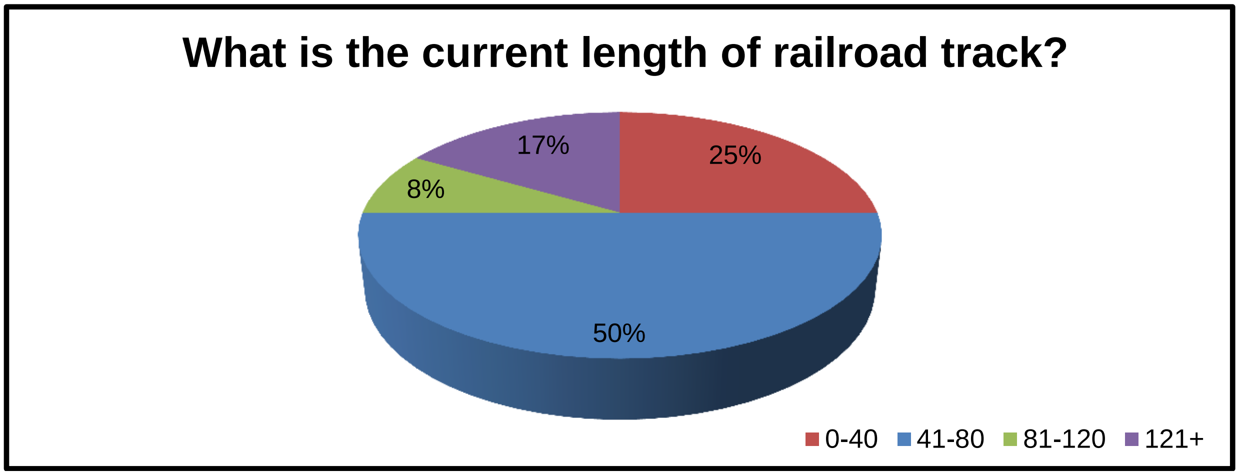


Figure 3-9 Railroad track length

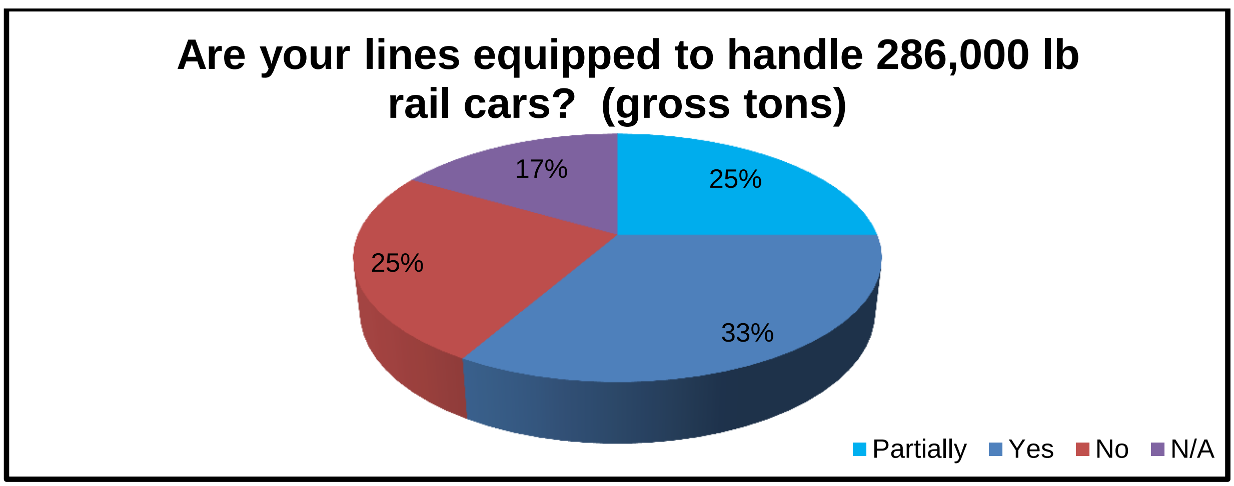


Figure 3-10 Load capacity of the railroad track network

In terms of weight serving capability, 33% of the railroads are capable of serving 286,000 lbs. cars, 25% of the lines cannot, while the remaining 25% indicated that only part of their network is capable of serving 286,000 lb. cars. Roughly 17% of the representatives were reluctant to respond to this question (Figure 3-10).

3.2.2. Infrastructure/equipment condition

Shortline representatives were asked to rate their infrastructure and equipment as Good, Fair or Poor. Results are summarized in Table 3.1, where the majority of responses were either Good or Fair for most of the infrastructure equipment. Rail bridges were the only infrastructure type that received a “poor” grade from the shortline companies. Note that the high percentage of ‘N/A’ answer for rail cars can be attributed to the fact that many companies surveyed, do not own the rail cars they use.

Table 3.1 Infrastructure component condition rating

Infrastructure	Good	Fair	Poor	Other (= N/A)
Rail Bed	50.00%	33.33%		16.67%
Rail Ties	50.00%	33.33%		16.67%
Rail Line	33.33%	50.00%		16.67%
Rail Bridges	33.33%	41.67%	8.33%	16.67%
Rail Cars	25.00%			75.00%
Intersection Signals	58.33%	16.67%		25.00%

3.2.3. Capital improvement plan (CIP)

Results, summarized in Figure 3-11, show that 58% of the shortline companies developed a capital improvement plan, 25% of the companies did not, while 16.7% chose not to respond to this question.

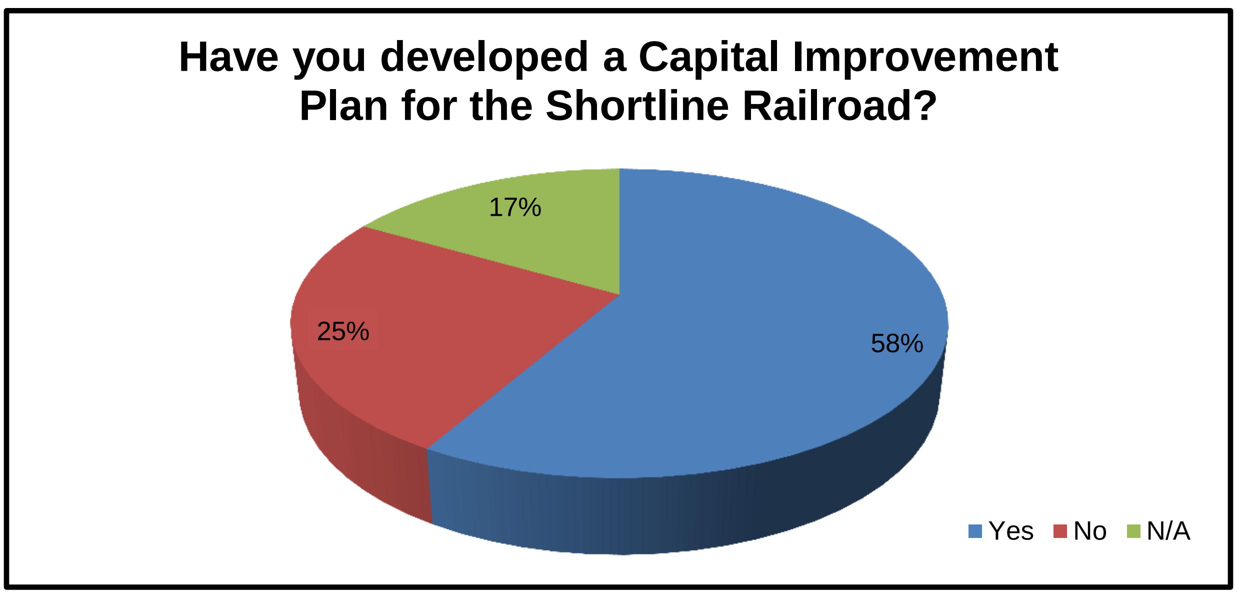


Figure 3-11 Capital Improvement Plan development

Furthermore, for the purposes of this survey, 25% accepted to reveal their CIP, 25% responded negatively, 8.3% responded that they might reveal their CIP after company authorization (Figure 3-12). Approximately 41.7% did not respond at all.

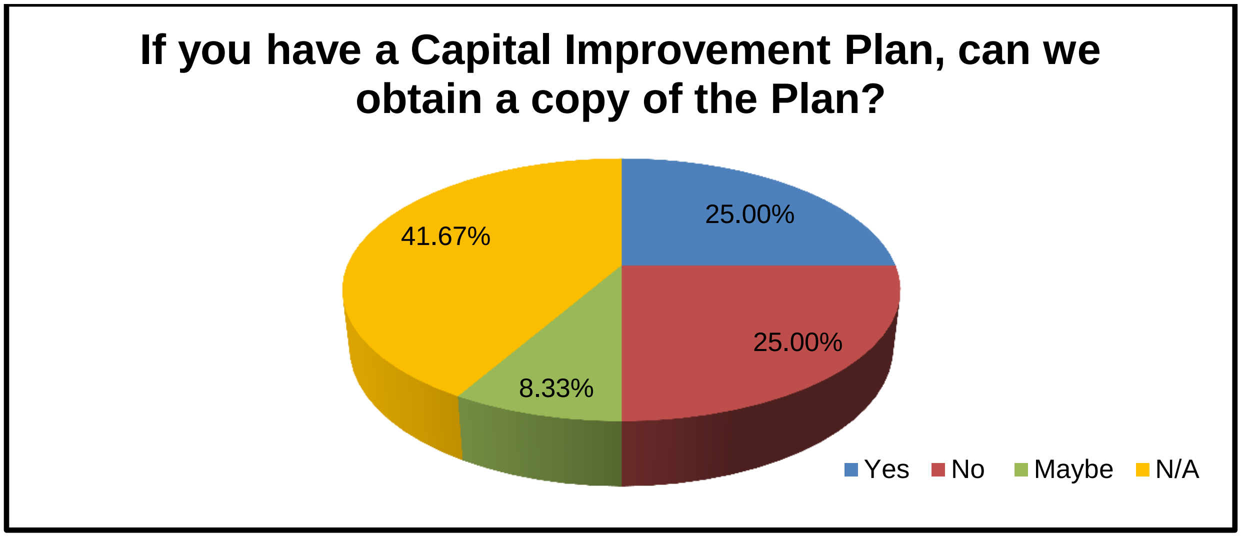


Figure 3-12 Willingness to provide data on CIP

3.2.4. Necessary improvements in infrastructure – Expected benefits

As shown in Figure 3-13, most critical improvements, within in a five-year planning horizon, were considered those related to bridges (31.6%) and rail tracks (31.5%). Also, according to the representatives' opinion, space limitations dictate yard improvements and expansion (15.8%), if possible, while a small percentage of representatives regarded as necessary facility/equipment (5.3%) and switch improvements (5.3%). Approximately 10.5% were reluctant to provide any answer.

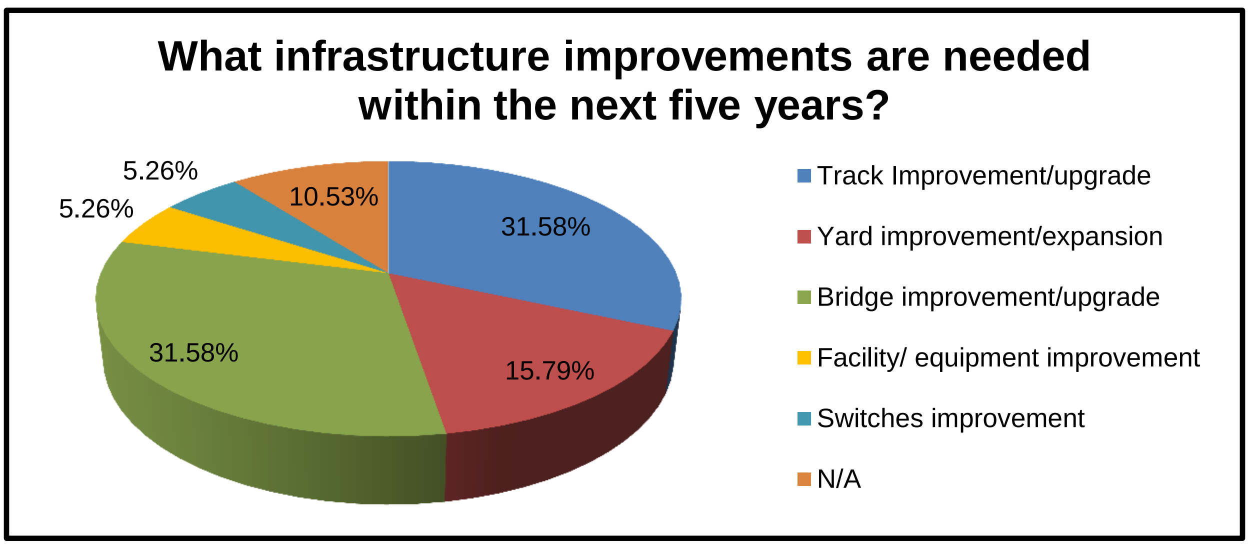


Figure 3-13 Infrastructure improvements in the near future

When asked what infrastructure improvements they would implement instantly, if they had the opportunity to do so, shortline representatives provided similar answers (as summarized in Figure 3-14). Their replies focus on urgent (or considered as such) improvements like track and bridge improvements that account for 78% of the responses. Facility/equipment improvements and switches improvements account for roughly 11% (5.56% each). Approximately 11% were reluctant to provide any answer.

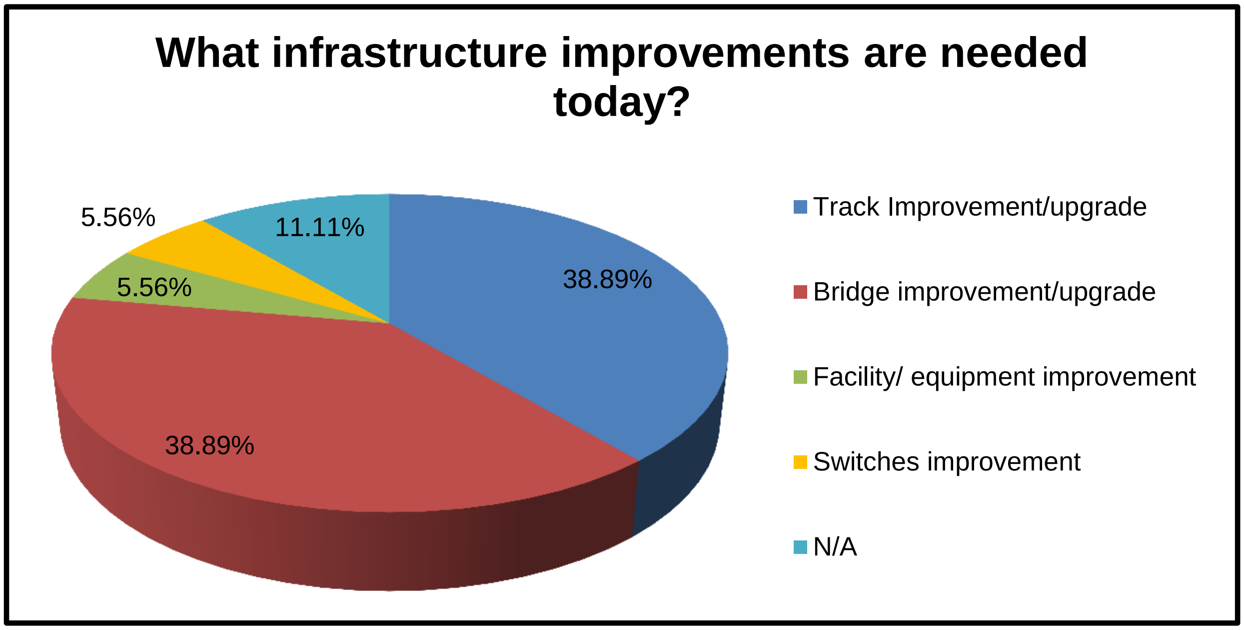


Figure 3-14 Infrastructure improvements that are needed today

Table 3.2 summarizes the response to the question of important infrastructure improvement in a pre-specified set of components. According to Table 3.2 and as discussed previously, the representatives consider bridge and line improvements as the most important, while ties improvement is considered of relative importance as well. Note that the high percentage of no response for rail cars and signal improvement can be attributed to the fact that many of the shortline companies surveyed do not own rail cars. As for the intersection signals representatives consider that due to continuous maintenance (for safety reasons) there is no need for further improvement.

Table 3.2 Pre-specified components importance for improvement

	Abs. Critical	Very	Important	Somewhat	Not At All	N/A
Rail Bed	0%	0%	25%	33.3%	8.3%	33.3%
Rail Ties	0%	25%	25%	8.3%	8.3%	33.3%
Rail Line	8.3%	33.3%	8.3%	8.3%	8.3%	33.3%
Rail Bridges	33.3%	25%	0%	8.3%	8.3%	25%
Rail Cars	0%	0%	0%	8.3%	16.7%	75%
Intersection Signals	0%	0%	8.3%	0%	25%	66.7%

Shortline representatives were then asked to evaluate the expected benefits from these improvements and results of their responses are summarized in Figure 3-15. Speed and capacity seems to be the primary benefits of the proposed infrastructure improvements.

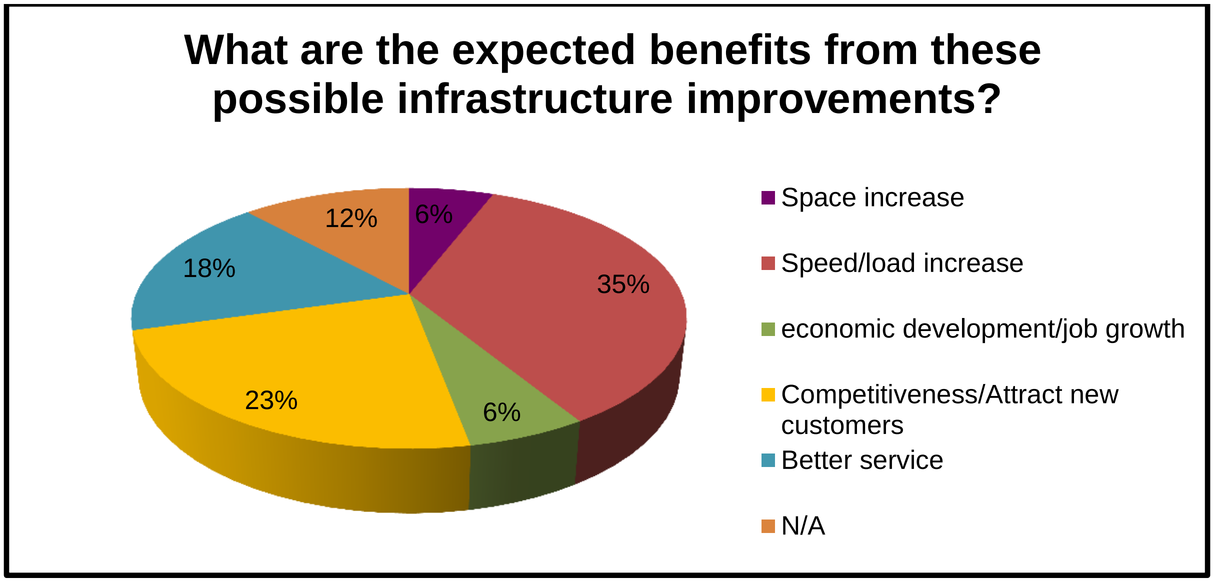


Figure 3-15 Expected benefits from infrastructure improvements

The shortlines recognize that through these improvements they will be more competitive and able to attract more customers that are now using alternative modes to transport products/raw materials etc., from/to their facilities and/or even attract new investments (e.g., relocation of industries) in their area because of the improved rail network attributes.

Shortlines considered that infrastructure improvements can generate new jobs (in some cases in highly depressed regions). Furthermore, and as shown in the second pie chart of Figure 3-16, the majority of the shortline representatives, consider that infrastructure improvements can (and most probably will) result in an increase of traffic levels (as demand for freight rail transportation will grow) and therefore, increase their revenue.

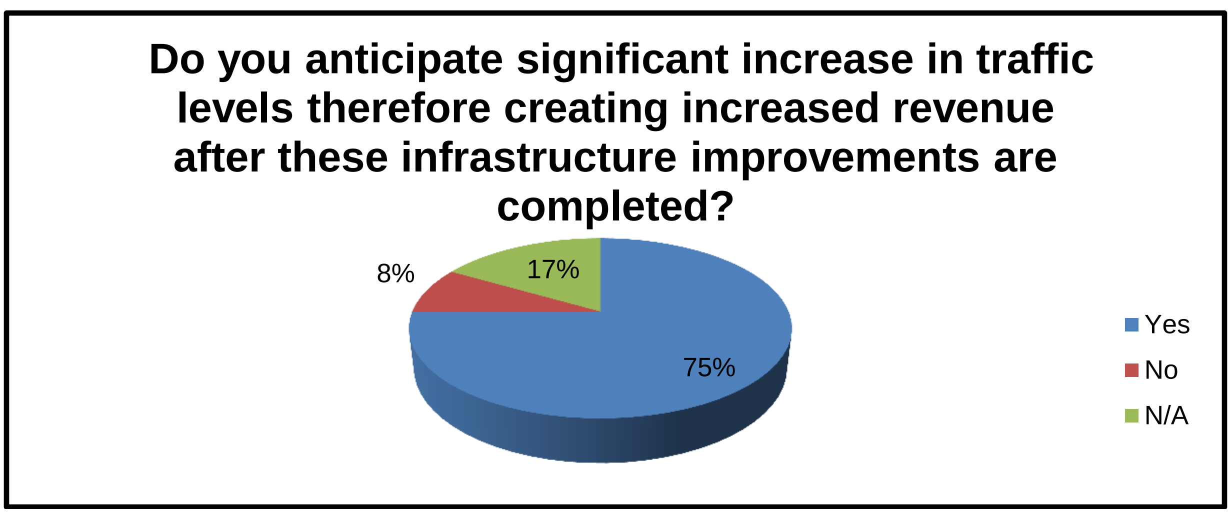


Figure 3-16 Expectations of benefits due to infrastructure improvement

As for the types of the new customers that could be attracted, a variety of customers were identified by the shortline companies representatives, with industrial sectors that handle “bulky” raw materials like agricultural, steel products, chemicals, coal, etc. being the common choices. According to some representatives, larger facilities could also, attract customers interested in trans-loading. However, notable are the expectations of business increase with existing customers and the attraction of railcar maintenance companies in the neighboring areas.

3.2.5. Goods transported

A list of goods currently transported by the shortline companies that participated in the study is summarized in Figure 3-17. Metals and steel products (27%) was the primary category of transported goods, followed by agricultural products(19%) like frozen food, grain and livestock feed, chemicals, fertilizers and plastics (18%), lumber, pulp, paper (14%), oil/coke (12%), minerals, stone and cement (8%) and empty/repaired cars (2%).

3.2.6. CMAQ or other tax incentives for rail usage by shortline customers

The shortlines knew little about their customers’ funding opportunities, available through the (CMAQ) programs or through tax incentives for rail savings. Sixty-seven percent did not reply at all (most probably because of unawareness) or replied negatively (33%) on whether their customers benefit from this type of incentive. The results are summarized in Figure 3-18.

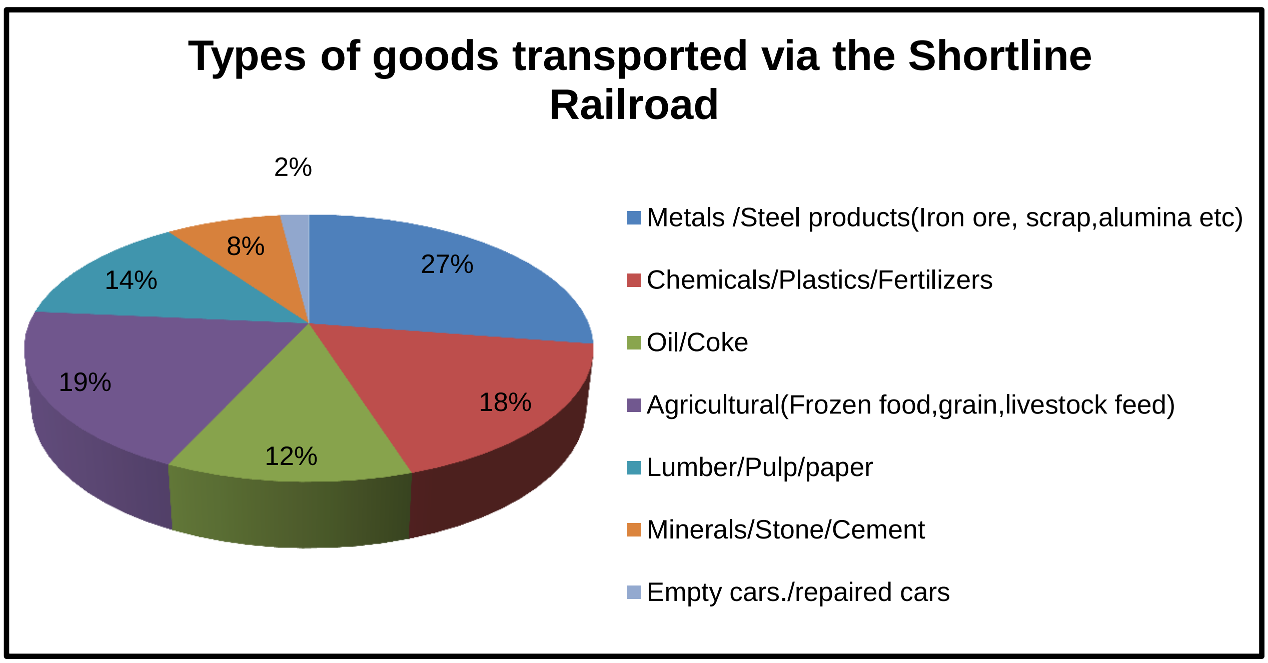


Figure 3-17 List of goods currently transported by shortlines

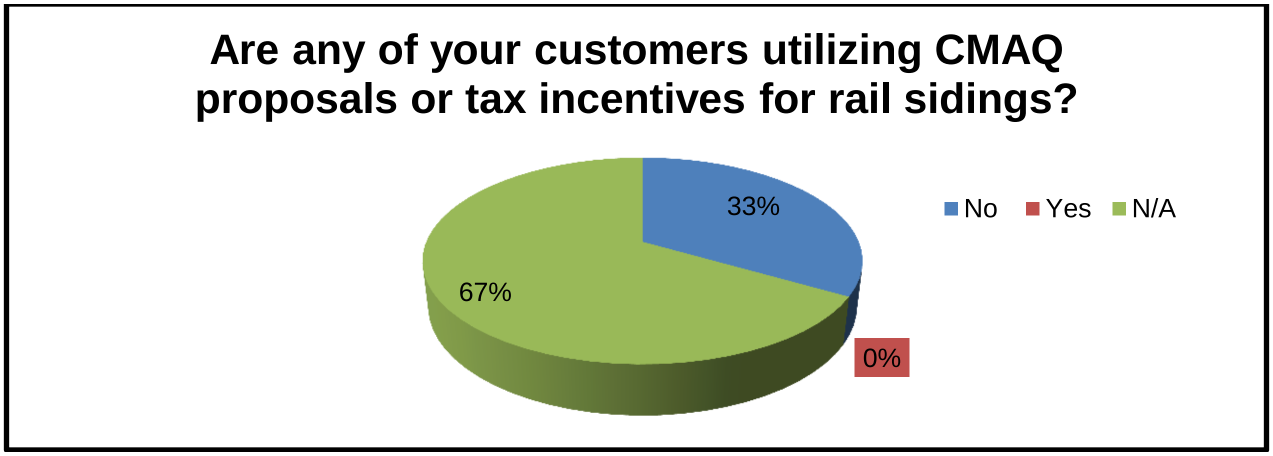
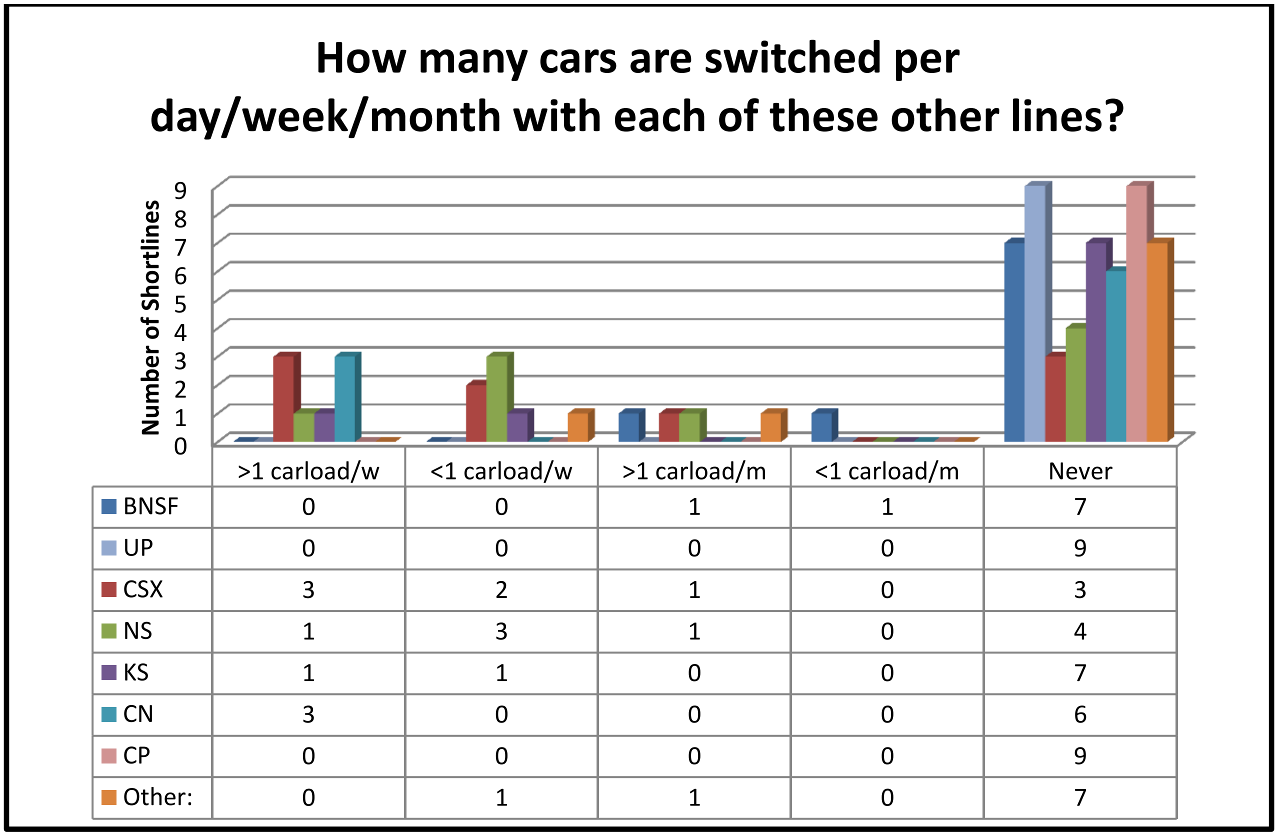


Figure 3-18 CMAQ or tax incentives for rail sidings

3.3. Rail Connections

3.3.1. *Connectivity with other railroads*

Connectivity with other railroads is crucial for shortline companies. Fifty percent of the participants indicated they are connected with at least one, but no more than two Class I railroads, while 25% are connected with four Class I railroads. The volume of carloads that are switched, as well as the rate of collaboration with Class I railroad companies, are shown in Figure 3-19. In two cases, the shortlines switch averagely 20 carloads per week or more, while in one case the volume switched was 45 carloads per day, on average.



	>1 carload/w	<1 carload/w	>1 carload/m	<1 carload/m	Never
BNSF	0	0	1	1	7
UP	0	0	0	0	9
CSX	3	2	1	0	3
NS	1	3	1	0	4
KS	1	1	0	0	7
CN	3	0	0	0	6
CP	0	0	0	0	9
Other:	0	1	1	0	7

Figure 3-19 Carload volumes that are switched with other lines

3.3.2. Competitive advantages

Shortlines indicated that yard capacity, which allows them to store more cars for their customers (40% of replies), was a key competitive advantage (Figure 3-20). Connectivity with Class I railroads was the next more important advantage (20%), while other capabilities such as connection with waterways (10%), truck trans-loading (10%), location advantages (10%) and maintenance services to third parties (10%), were also identified. Twenty-five percent of the participants did not respond to this question.

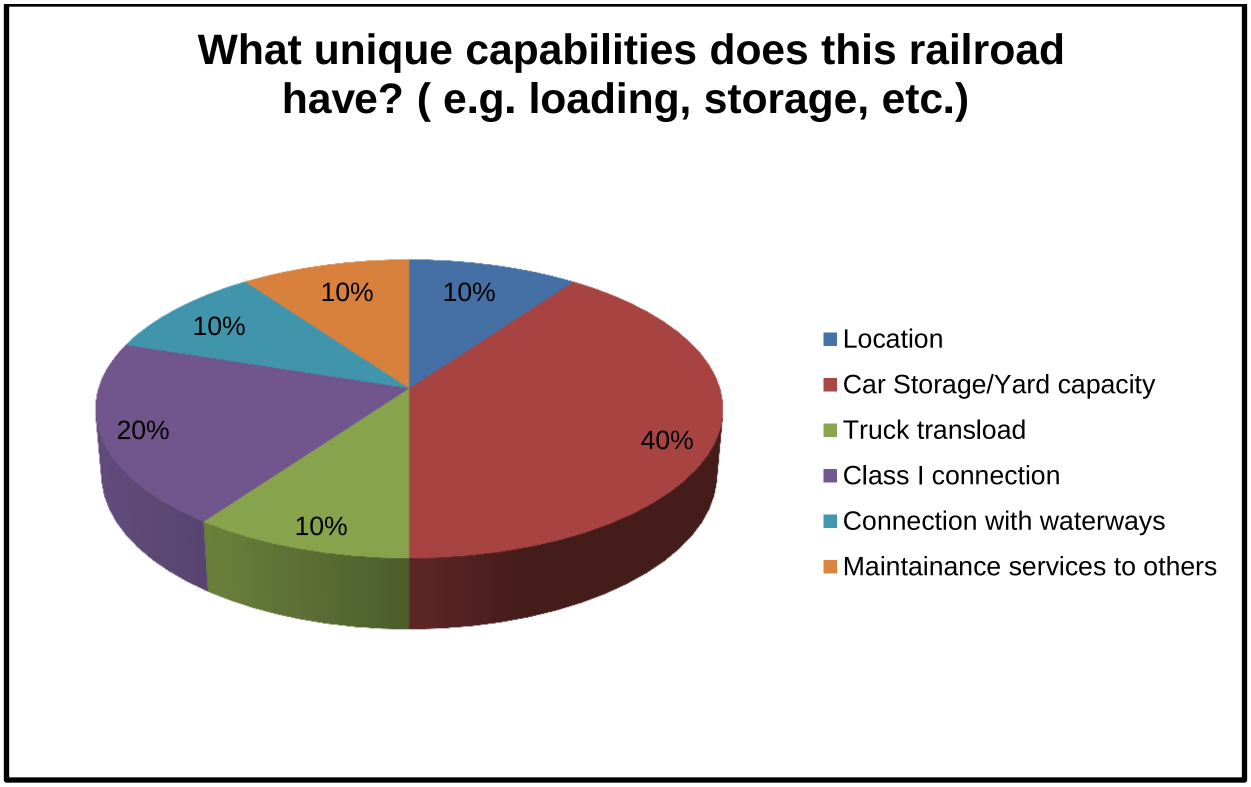


Figure 3-20 Unique capabilities of each company's infrastructure

3.3.3. Transport alternatives for shortline customers

Trucking mode was identified as shortline main competitor. Other rail companies were the next mentioned competitor, while waterways (barges) were indicated as a significant competing mode as well. Results for this question are summarized in Figure 3-21. Shortline representatives consider their strongest advantage against competitive alternatives, lower costs for both inbound and outbound materials transportation (Figure 3-22). The small difference between the two main answers (75% and 66.7%) is due to the fact that some companies do not move outbound materials for their customers.

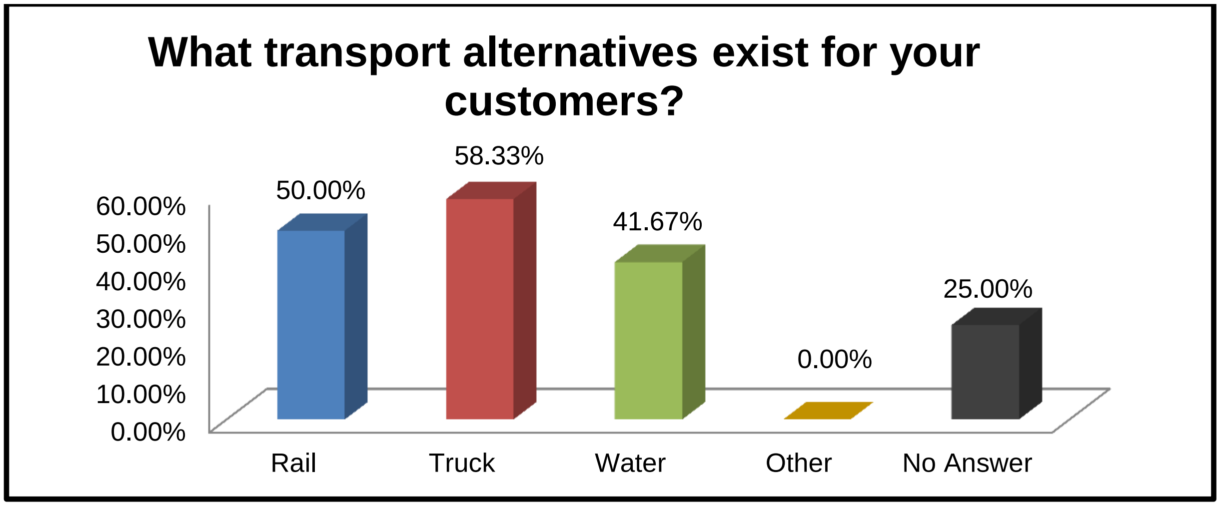


Figure 3-21 Shipping alternatives for shortline customers

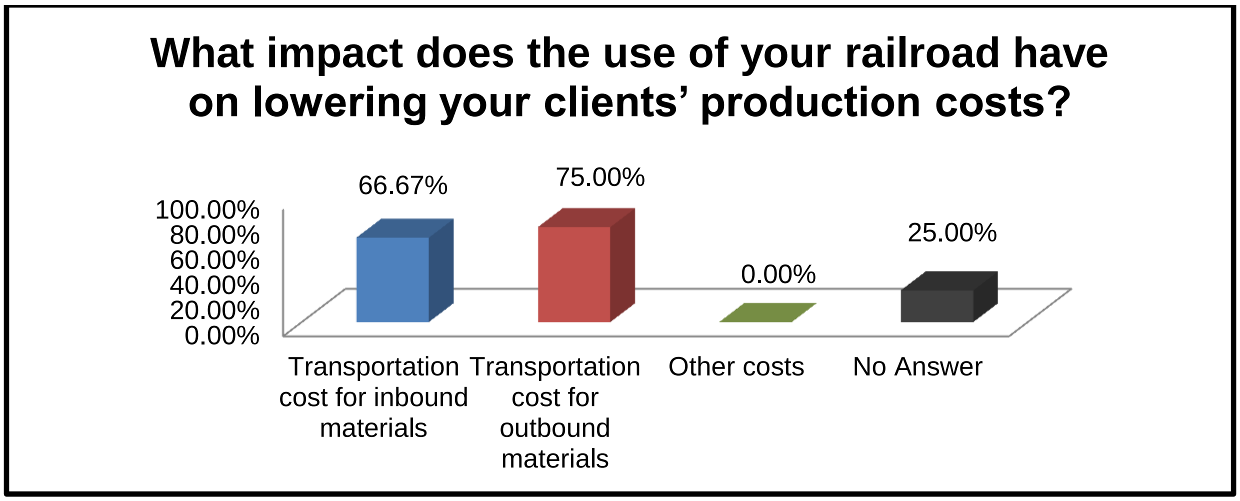


Figure 3-22 Impact on transportation cost of shortline customer

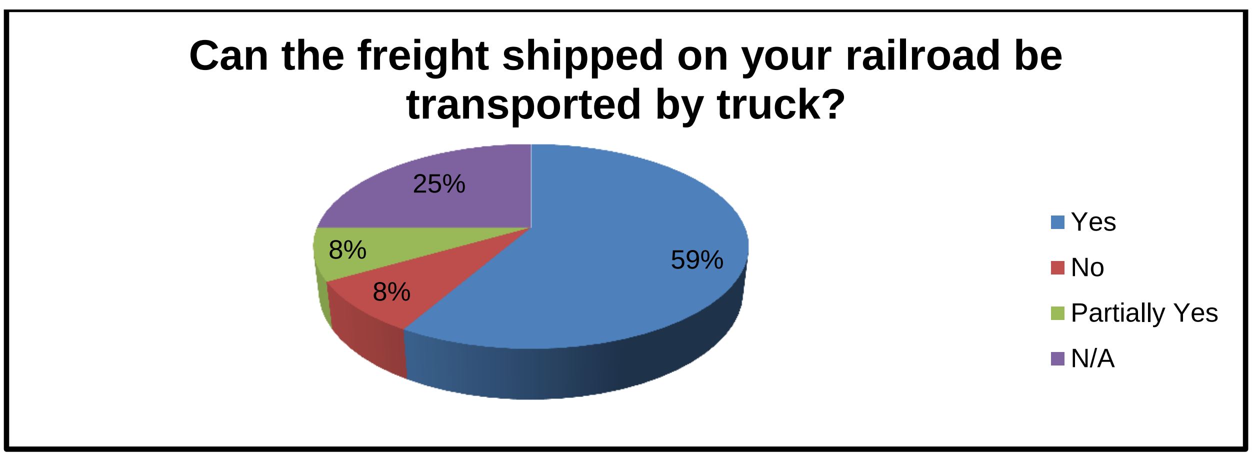


Figure 3-23 Truck as an alternative to shortline railroad

Lower transportation costs can also be an important factor for sustainability of the shortline companies, as most of their customers can move(at least partially) their goods by trucks. According to the results summarized in Figure 3-23 only 8% of the cases the sole alternative for transporting goods is the shortline railroad.

Participants were also asked to provide information on the road miles displaced by trucks. Figure 3-24 shows the results of their answers where we observe that if trucks were to be deployed instead of rail, in most cases (42%) the road miles displaced would be at least 51 per shipment and in one case (8%) would be somewhere between 6 to 25 miles per shipment. Notably, 50% of the participants did not answer this question.

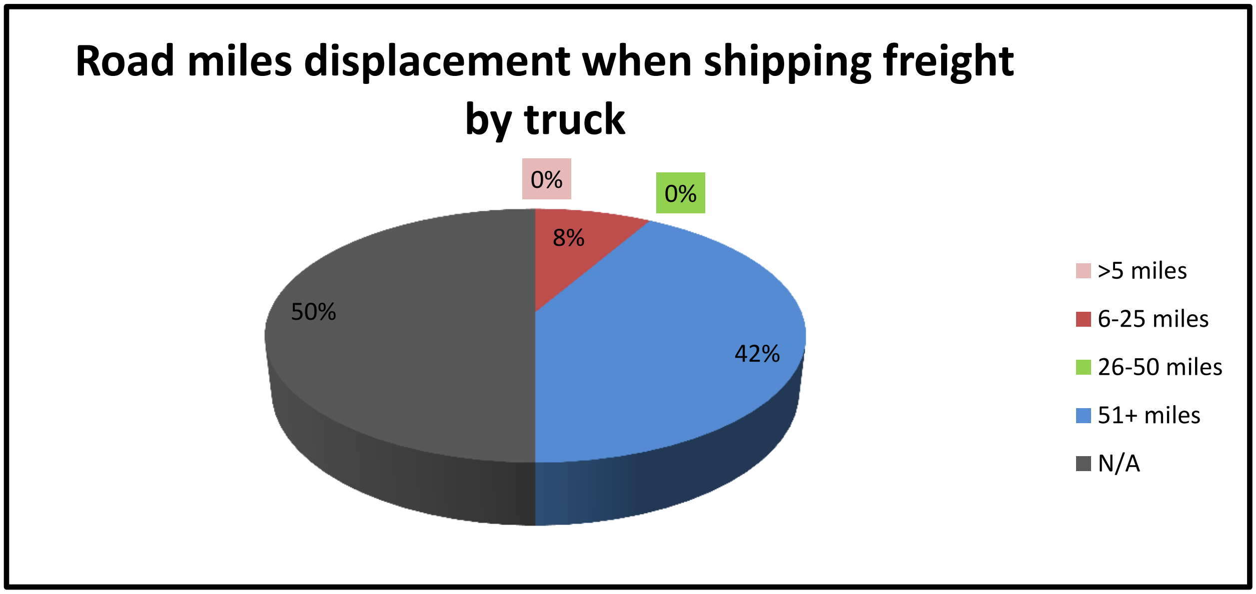


Figure 3-24 Truck as an alternative to shortline railroad

3.3.4. Company expansion potentials – new customer attraction

Shortline operation in a region can be a growth agent for nearby companies or a reason for the establishment of new business initiatives. This was generally accepted and indicated by the vast majority of the shortlines (Figure 3-25) and by the customer representatives as well as shown in the next section. Most of shortlines indicated that a customer with access to the shortline network has a competitive advantage over competitors that do not, as the latter are forced to move products with other, more expensive means of transportation. What is also undisputed amongst the responses is that the absence of shortlines, would possibly force industries to move from their present location with all expected and/or unexpected consequences. Even when companies chose to move their goods with other modes, shortline railroad service is still beneficial for the region. As for new customer attraction and new industry establishment, the results of this survey were, almost, identical. According to the shortlines, there are cases of certain types of industries that would not even consider a location, if it cannot be served by rail. Unfortunately, they did not provide any information on the type of industries they were referring to.

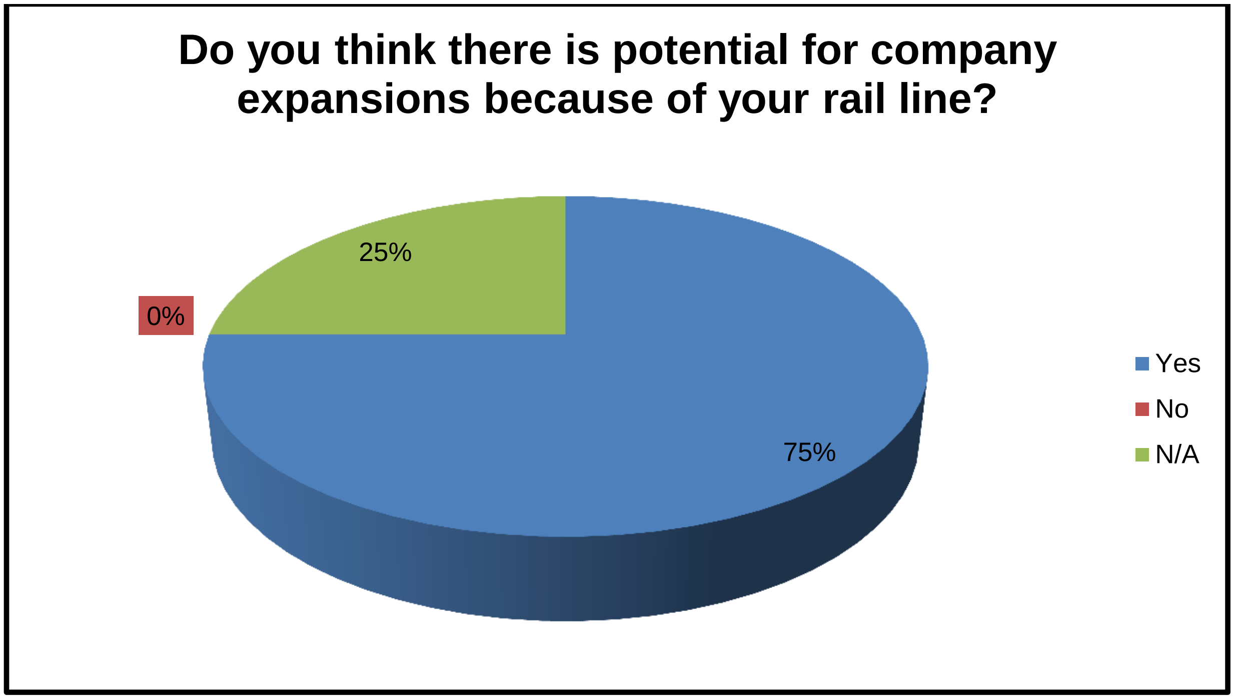


Figure 3-25 Customer growth potentials due to shortline railroad presence

3.3.5. Operational challenges and barriers

Most of the shortline railroad companies have to overcome a number of operational challenges and barriers. According to most of the participants (54%), obstacles faced in daily operations are funding, space limitations, difficulty to economically support maintenance and improvement projects, weight limitations due to the capacity of the line, and problems in finding qualified personnel. In some cases the shortlines even mentioned how legislation (especially new regulations, i.e., FRA regulations, that change constantly and often without previous notification) can be a barrier and a complicating influence on operational efficiency. Notably, even local politics were indicated as an obstacle for sustainable operation of the shortline companies, while in some cases there are no State programs, according to the shortline representatives, for supporting Class III railroad activities.

3.3.6. State policies and incentives

Shortline representatives indicated that, state policies and incentives should be given to both shortlines and existing/potential industrial investors. The most crucial incentives (Figure 3-26) are those relating to infrastructure improvement and maintenance (36% of the answers). Interestingly, although incentives for attracting new industries are not directly/explicitly beneficial (at least in economic terms) for the shortlines themselves, their representatives consider this incentive as the second most crucial incentive (29%) for their operational functionality. Lower taxation and land concession/grants follow with 7%. Twenty-nine percent of the representatives did not respond to any of question.

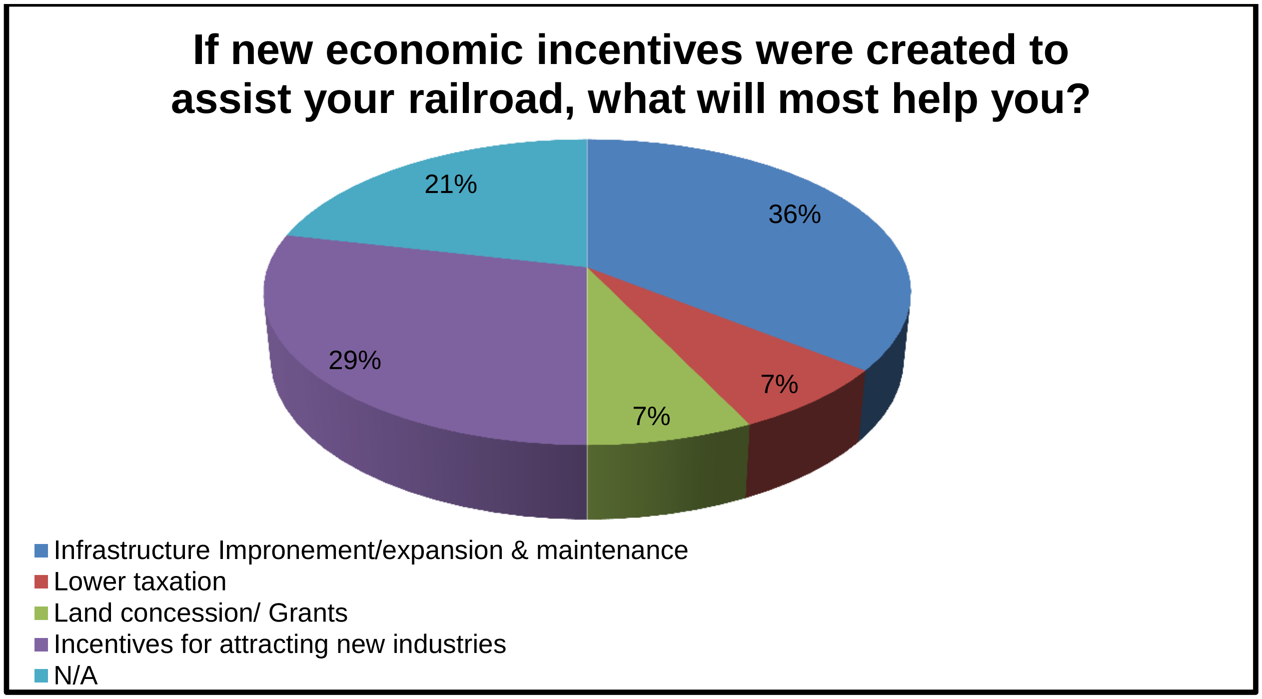


Figure 3-26 Economic incentives from the shortlines perspective

3.3.7. Disclosure of economic information

The vast majority of the shortline railroads (a sizeable 80%) declined to disclose relative economic and economic impact information.

3.4. State-specific DOT Shortline Assistance Programs funding information

Only 25% of the shortlines admitted having requested State DOTs Shortline Assistance Program funding in the years 2003 - 2012. The rest (75%) either answered negatively or did not respond at all. Funding was used mostly for bridge rehabilitation (48%), replacement of cross-ties (29%) and rail rehabilitation (23%). The size of funding/assistance varied from $0.5 million to $2.5 million

4. SHORTLINE RAILROAD CU.STOMER SURVEY

This part of the survey encountered the most difficulties as industry representatives were unwilling to provide information, considering the survey irrelevant to their commercial goals or showing reluctance to expose sensitive data, for a study they felt would most likely have no explicit or direct benefits for their companies. Consequently, only four customers were willing to participate out of a total of 65 customers contacted (6.15 %).

4.1. Shortline customers' profile

Industries that participated in the survey are existing (and not prospective) shortline railroad customers and ship/receive products and raw materials (chemicals, wood pulp, metals and others). The companies surveyed employ shortlines continuously for their freight transportation needs, while in one case service was interrupted primarily by the end customer because of receipt of damaged product and from service unreliability, both to the industry and the end customer. Currently, all four companies responded that they use shortline rail for freight transport. The main reason for using (or reusing) rail transportation is low cost and type of cargo transported, which in all cases is best suited for rail shipments ("bulky", heavy, low cost raw materials etc.).

4.2. Rail accessibility

All industrial facilities surveyed have direct (on–site) rail access, and the ramp/spur being used is not affecting shipment processing time (due to busy spur) except in one case and only during the winter months where there can be critical delays from the main terminal (2 - 3 days). Three out of four companies that responded to the survey, connect with a rail, serving an intermodal terminal (150 miles away from the first and 3 miles from the other two). These companies also cooperate with Class I railroad companies for their freight shipping needs as shown in Table 3-1. It should be noted that the distance the freight has to be hauled from the facility to the rump or spur is per case negligible (a few hundred feet up to 13 miles).

Table 4-1 Class I Railroad usage

Class I Railroad	More than one carload a week	Less than one carload a week	More than one carload a month	Less than one carload a month	Never
BNSF	**1**	0	0	**1**	**2**
UP	0	0	0	0	**4**
CSX	**1**	0	**3**	0	0
NFS	**1**	0	**2**	0	**1**
KS	0	0	0	0	**4**
CN	0	0	0	0	**4**
CP	0	0	0	0	**4**

4.3. Governmental support and incentives to use rail

When asked if their companies ever used any CMAQ funding the representatives responded negatively (three out of four) while one did not respond at all (most likely due to unawareness of whether or not CMAQ programs where used in the past.

4.4. Volume of business in carloads, tons or dollars that the company ships/receives

To this question one company replied that for the year 2000 they shipped/received 8000 carloads while for years 2000, 2005, 2010 and 2011 they shipped received 4000 carloads. After 2004 they moved to truck for receiving raw materials. The second company replied only for years 2010, 2011 and 2012 in which they shipped received commodities valued $ 11,000,000, 19,000,000 and 25,000,000 respectively. The third company replied only for year 2012 when they shipped/received 4080 tons of commodities.

4.5. Shipping/receiving time comparison

When trucks are employed shipping/receiving time varies from a few hours up to four days, while, as indicated by the company representatives, when rail is employed the minimum required time is six days and in some cases as long as fourteen (for receiving raw materials).

4.6. Willingness to increase rail usage

In terms of willingness to increase rail usage if some conditions are met (i.e. new rail spurs, improved rail access, etc.), two out of the four representatives replied positively, one replied negatively, while one did not respond at all. The determinative factor for using other transportation alternatives was the need for quicker delivery times. One company that was willing to increase rail usage is currently landlocked and existing space does not allow adding rail lines.

4.7. Transport cost analysis

Cost analyses (relative to shipping/receiving products/raw materials costs) are regularly performed by the companies (annually for three cases and monthly or whenever there is a price shift form truck to rail for one). Based on responses, the companies are well informed on the cost differences between rail and the main competitor, truck. However, the differences of these two modes and their specific characteristics (shorter delivery times when trucks are employed, low cost for rail when large volumes must be carried, etc.) are the main reason for selecting one mode over the other. For example when it comes to daily transportation needs, where time is the only criterion to be considered, truck is the only reasonable solution, while when large volumes are to be shipped/received or line-hauling is needed, rail is more attractive. Furthermore, one representative of a company that currently (only) receives raw materials by rail, mentioned that it would be profitable to ship finished products by rail (in some cases), but the company does not have the necessary equipment for loading these products on railcars.

4.8. Crucial factors for increasing rail usage

Different factors affect the choice of the companies to increase rail usage with the most important being consistency of delivery times (both for shipping and receiving). Additional land to add more spur tracks was the second factor, followed by availability/purchase of necessary handling/loading equipment. All four companies consider transportation costs as a key part of their operating costs. Transportation costs are considered very crucial in terms of competitiveness, whether they ship/receive locally, regionally or internationally.

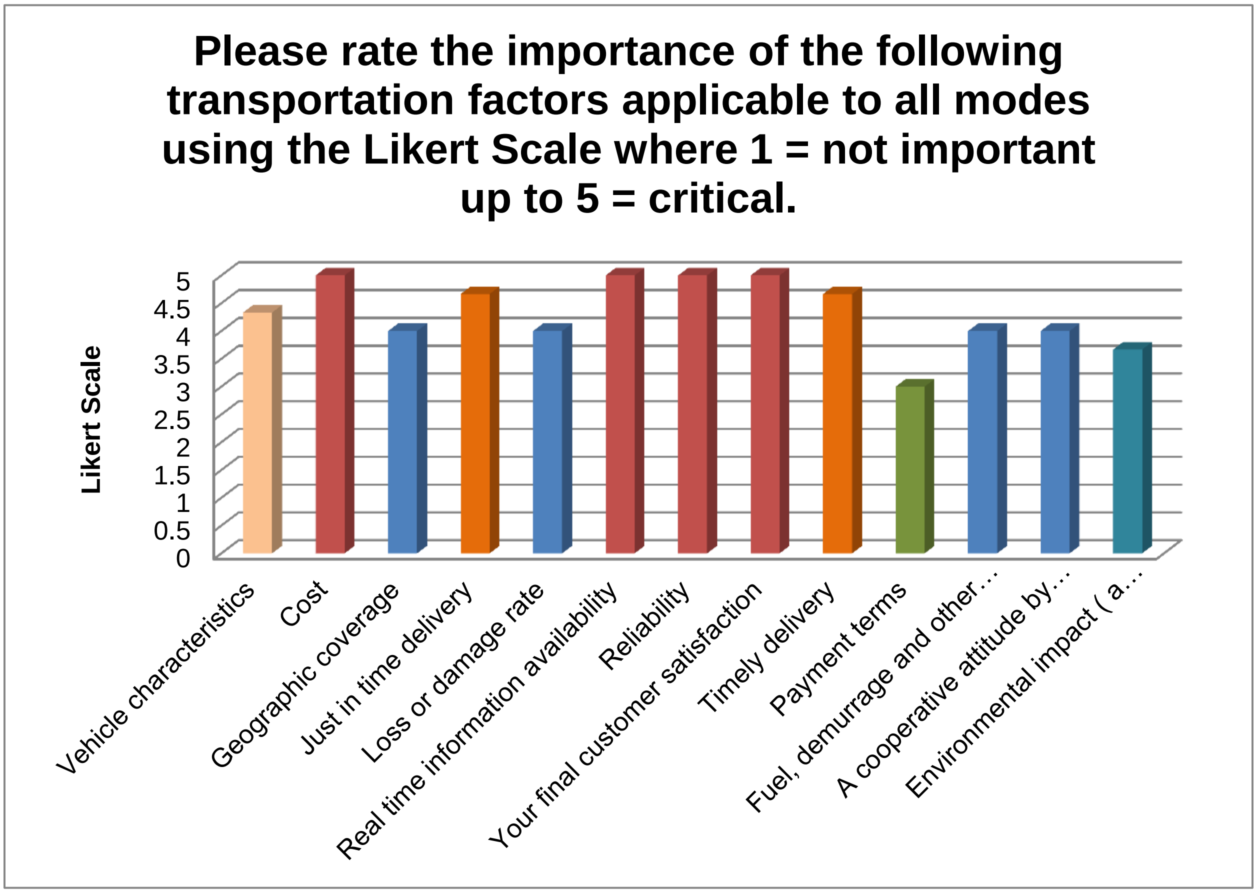


Figure 4-1 Important factors affecting the choice of companies to increase rail usage

Figure 4-1 shows the representatives' perception of importance for a number of transportation factors. The most important factors are cost, real time information availability, reliability and customer satisfaction, followed by delivery time reliability and loss or damage rate. Answers were based on the Likert Scale (i.e. weight of 1 for factors considered less important up to weight of 5 for factors considered crucial).

4.9. Federal and state and local authorities initiatives to improve competitiveness

The industries did not provide any specific response and seemed to be quite satisfied with current conditions, when asked on transportation initiatives that should be taken by local, State or Federal officials and authorities, to improve their companies' competitiveness domestically or internationally.

4.10. Shortline initiatives to improve competitiveness

When asked about improving competitiveness, time consistency was identified as the most crucial factor. The industries placed a high emphasis on having a reliable shipment tracking tool for their shipments/raw materials. For example some raw materials and their timely arrivals are important to the production schedule, and delayed arrivals could even stop production. Similarly, timely arrivals are important to outbound shipments of finished or semi-finished products to their customers. Finally, the need for better equipment (weighing scales, new rail cars to avoid leakage issues, providing higher delivery speeds, reducing claim filing due to damage etc.) was highlighted.

When asked about the same matter and on what the private transportation companies should do in order to help in this direction the replies were more solid. Time consistency was again the most crucial factor that shortlines should be prompted to focus on while interestingly enough, the companies representatives required a shipment tracking tool that will enable them to track their shipments/raw materials position in a reliable manner as for example some raw materials and their time of arrival could be significantly important for the production schedule or the absence of them could completely stop production. For similar reasons this could apply when these companies ship their finished or semi-finished products to customers. Finally, better equipment (weighing scales, new rail cars to avoid leakage issues, providing higher delivery speeds, reducing claim filing due to damage etc.) was requested.

5. STATE DOT SURVEY ASSESSMENT AND RESULTS

This section of the report presents data collected by state DOTs. Out of four DOTs in the CFIRE region only one participated in this survey. The answers given are presented in the following sections. Note that not all questions presented in the questionnaire were answered (see appendix 8.3).

5.1. General state DOT information

The agency/bureau within state DOT that has the primary duty of supporting or regulating railroads is the “Traffic Engineering Division”. At the time of the survey 18 -20 employees were primarily responsible to support and or regulate railroads. Furthermore, the state under survey did not justify a State Railroad Commissioner position.

5.2. Shortline RR infrastructure

According to the information provided the specific state’s total length of rail lines is 2542 miles. In 2010, 33 miles of rail tracks were abandoned in 2012, 22 while in 2013 there was no rail track abandonment. At the same time in 2012, 81 miles of rail tracks were taken out of service (used previously by shortlines) while zero miles were built from 2010 to 2013 either for shortline or other class rail usage. From this rail network shortlines exploit 898 miles (35.3% of the total network) statewide, 253 of which (or 28.2% of the current shortline network) were taken over by shortlines in 2010. In 2010, shortlines abandoned 33 miles of rail road network, in 2012 thy abandoned 22 while in 2013 the network remained as was. The shortline network is owned and operated by ten shortline companies seven of which are private while three are public. All shortlines are carrying freight only (no passenger services provided). The agency relies on state inspections in order to obtain information about the condition of the shortline railroads.

5.3. Shortline RR Revenue and Customer Base

None of this section questions were answered by S-DOT representatives.

5.4. State Support for Railroads

According to the information given, the state provided a total amount of $1,200,000 in grants (Multi-Modal Funds) for the year 2012. No other incentive information (e.g., property/income tax or planning incentives) was given. Furthermore, the state owns and maintains 22 miles of these railroads while it does not own any rolling stock such as scale cars. In order to promote rail usage the state DOT works with MPO and State Economic agencies as well as with Chambers of commerce, but these collaborations are infrequent. In Table 5.1 the funding that shortlines requested along with the funding appropriated for the years 2001 – 2012 is summarized (just Multi-Modal Funds). Information was provided only for the years 2005 and after.

Funding as shown in Table 5.1 was requested for various reasons. Table 5.2 summarizes these reasons for state funding requests. It appears that the most frequent reason for funding requests was rail truck rehabilitation and cross-ties replacement followed by ballast replacement. Less frequently, shortlines requested funding for rail expansions, surface improvements, bridge rehabilitation or other improvements.

5.5. Commentary on Shortline Rail Service in your state

None of this section questions were answered by S-DOT representatives.

Table 5.1 State funding requests by shortlines

Year	Funding Requested in dollars	Funding appropriated
2001	-	-
2002	-	-
2003	-	-
2004	-	-
2005	$1,115,507	$600,000
2006	$663,562	$600,000
2007	$1,583,420	$1,200,000
2008	$1,532,743	$1,200,000
2009	$1,778,054	$1,200,000
2010	$2,327,357	$1,200,000
2011	$1,906,223	$1,200,000
2012	$2,918,779	$1,200,000

Table 5.2 Reasons for fund requests

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Replacement of cross-ties					X	X	X	X	X	X	X	X
Rehabilitation of Rail					X	X	X	X	X	X		X
New Rail(System Expansion)									X		X	X
Maintenance of Rolling Stock												
Purchase of new cars												
Bridge Rehabilitation						X						X
Replacement of ballast					X			X	X	X	X	X
Surface Improvements										X	X	X
Other												X

6. GUIDE FOR ANALYZING SHORTLINE RAILROADS IMPACT IN RURAL COMMUNITIES FROM THE ECONOMIC, ENVIRONMENTAL AND TRANSPORTATION COST PERSPECTIVE

6.1. Introduction

Studies have shown that reduction, elimination or underperformance/abandonment of short rail line service can cause a transfer from rail to another mode (usually trucks) and eventually results in a number of negative economic, environmental, and transportation network impacts (increase shipping costs, decrease local business volumes, decline in employment and property values, decreased economic development, increase highway maintenance/user costs, and environmental/safety impacts). There are negative consequences because individual terminals, grain elevators, and industries in some local communities are dependent on short rail and might not remain economically viable without reliable and cost-competitive rail service. If the industries and support services leave the rural communities, then jobs are lost and people migrate from the area. Therefore, extensive research is needed to determine what steps communities, state DOTs, businesses and industry, and local entities can take to attract and retain short rail line service to support and drive community and economic growth in rural communities.

This document provides a step-by-step guide on the actions, practices, and policies needed to attract, continue or expand adequate short-line and or Class 1 and regional rail service to rural communities. This particular section presents an easy to follow methodology that communities can use when faced with a potential rural shortline railroad abandonment. Following this methodology provides the key information needed to complete most grants, educate the public and policy makers, and make informed policy decisions. However, the methodology presented is not a Benefit-Cost Analysis and does not meet the requirements for the National Environmental Policy Act (NEPA). It is an abbreviated Triple-Bottom Line (TBL) analysis that communities can conduct themselves provided they have economic impact analysis software.

6.2. Analysis Overview

This document provides a step-by-step guide for communities that face the possibility of short rail line abandonment. This step-by-step guide can be used to better understand the overall impact of the shortline company and rail access to the community to aid community leaders to make decisions regarding the shortline. Whether a community is dealing with a closing line or determining the appropriate level of public funds to invest in line maintenance and improvements, this guide can be used to provide valuable information to guide those decisions.

The guide presented in this document analyzes a number of factors such as safety, shipping costs, roadway maintenance, pollution and congestion, business sustainability, benefits to the local communities, support livability, safety, sustainability and economic group in three major components:

a) Economic Impact Analysis
b) Transportation Cost Impact
c) Environmental Review

The results for the three major components of the analysis are calculated either by computer software or simple formulations. Table 6.1 provides a summary of software/formula for each of the three major components and their corresponding outputs/results.

Table 6-1 Three Major Components Calculation Software/Formulation and Their Corresponding Outputs/Results

Analysis Components	Software / Formula	Outputs/Results
Economic Impact Analysis	REMI or other Economic Impact Software	Job impact
	REMI or other Economic Impact Software	GDP impact
	REMI or other Economic Impact Software	Earnings Impact
	REMI or other Economic Impact Software	Personal Consumption Expenditure Price
	REMI or other Economic Impact Software	Population
Transportation Impact	Cost due to Pavement deterioration =Increase in Vehicle Miles Travelled (VMT) x Congestion cost cents per mile	Pavement Cost
	Cost due to Congestion Increase =Increase in VMT x Congestion cost cents per mile	Congestion Cost
	Cost due to Crash Increase =Increase in VMT x Crash cost cents per mile	Crash Cost
	Cost due to Air Pollution Increase =Increase in VMT x Air Pollution cost cents per mile	Air Pollution Cost
	Cost due to Noise Increase =Increase in VMT x Noise cost cents per mile	Noise Cost
Environmental Review	Transportation Fuel= [Ton Pound of Freight * Distance in Miles] / Transportation Mode Fuel Use	Energy Consumption
	U.S Department of Housing and Urban Development Day/Night Noise Level (DNL) calculator	Noise
	Transportation CO2= Ton Pound of Freight * Distance in Miles * Shipping Emission Factors	Air Quality – CO2

The scenario will utilize economic impact analysis software from Regional Economic Models, Inc., (REMI). REMI TranSight Demo V3.5.4 is utilized and similar input procedures should apply to updates of the model. This demonstration software can be downloaded for free from www.remi.com.

Communities interested in preparing a shortline abandonment analysis will need to collect certain primary and secondary data. In order to obtain the output/results presented in the previous Table a number of input/data (Variables) are required for the software/formula. Tables 6.2a, 6.2b, 6.2c, 6.2d and 6.2e present the input/data required for each of the calculations and their possible sources. It should be noted that collecting the correct input data can often be the most challenging and time consuming cost of impact analysis.

Table 6-2 Input Variable and Sources for Economic Impact Analysis

Analysis Components	Variables	Unit of Measure	Data Source		
			Free Secondary Sources	**Paid Secondary Sources**	**Primary Data**
Economic	Employment	Number of Jobs	Railroad Company Website	REMI	Railroad Company
	Increased Shipping Costs	Dollars or Percentage of Overall Production Cost			Shippers survey

Table 6-3 Input Variable and Sources for Environmental – Energy Consumption

Analysis Components	Variables	Unit of Measure	Data Source		
			Free Secondary Sources	**Paid Secondary Sources**	**Primary Data**
Environmental (Energy Consumption)	Amount of Freight	Tons of Pound			Railroad or Shippers
	Freight Travel Distance	Miles			Railroad or Shippers
	Transportation Mode Fuel Use	Train or Truck	Oak Ridge National Laboratory		

Table 6-4 Input Variable and Sources for Transportation Impact

Analysis Components	Variables	Unit of Measure	Data Source		
			Free Secondary Sources	Paid Secondary Sources	Primary Data
Transportation Impact	Track Distance	Miles			Railroad Company
	Annual Rail Carloads	Cars			Railroad Company
	Type of Rail Cars	Cars			Trucking Company
	Payload of Trucks	Tons			Trucking Company
	Marginal Cost of Pavement Maintenance	Cents per VMT	U.SDOT Study		
	Marginal Cost of Congestion	Cents per VMT	U.SDOT Study		
	Marginal Crash Costs	Cents per VMT	U.SDOT Study		
	Marginal Air Pollution Costs	Cents per VMT	U.SDOT Study		
	Marginal Noise Costs	Cents per VMT	U.SDOT Study		

Table 6-5 Input Variable and Sources for Environmental – Air Quality

Analysis Components	Variables	Unit of Measure	Data Source		
			Free Secondary Sources	Paid Secondary Sources	Primary Data
Environmental (Air Quality-considering Carbon Dioxide CO2)	Ton Pound of Freight	Tons of Pound			Railroad and/or Trucking Company
	Freight Travel Distance	Miles			Railroad and/or Trucking Company
	Shipping Emission Factors	CO_2 per Ton-Mile	CarboFund		

Table 6-6 Input Variable and Sources for Environmental – Noise Calculations

Analysis Components	Variables	Unit of Measure	The Data Source		
			Free Secondary Sources	Paid Secondary Sources	Primary Data
Environmental (Noise Calculations)	Train Speed	Miles per Hour			Railroad Company
	Number of Engines per Train	Units			Railroad Company
	Railway Cars per Train	Units			Railroad Company
	Average Train Operations per Day	Units			Railroad or Manufacture
	% of the Train Operations done at Night	Percentage			Railroad or Manufacture
	Train whistles sounded in the community?	Yes or No			Railroad Company
	Is Trackage bolted stick rail or continuous welded rail?	Yes or No			Railroad Company
	Average Truck Speed	Miles per Hour			Trucking Company
	Average Truck Operations per Day	Units			Trucking Company or Manufacture
	% of the Truck Operations over the road done at Night	Percentage			Trucking Company or Manufacture
	Road Gradient Marginal Noise costs	Percentage			Trucking Company or DOT

6.3. Analysis Details

To facilitate the understanding of the step-by-step guide a hypothetical scenario of a shortline railroad in "Rural counties" has been used throughout the explanation. In this hypothetical scenario, the community is faced with the decision of providing funding to a 20 mile shortline railroad company that is at risk of closing down. The community has two major industries (i.e., wood products manufacturers and machinery manufacturers) that rely on the shortline railroad for their shipping, and the railroad company itself employs 10 people. Its annual volume is 9,855 carloads. The community must decide the appropriate level of funding, if any, that should be used to assist the company in its operation. A sample summary of the data/information needed by the community to make the calculations is presented in this guide as shown in Tables 6.3a to 6.3d.

Table 6-7 Primary Data used in EIA Scenario for the Hypothetical Sample

Variable	Source	Value Used
Shortline Employees	Rail Company	10 workers
Increased Cost of Shipping		
Wood Products Manufacturing	Shipper Survey	4% production cost increase
Machinery Manufacturing	Shipper Survey	3% production cost increase
Annual Traffic on Rail Line	Rail Company	9,855 carloads
Railroad Trackage Length	Rail Company	20 miles
Study Area	Community	Rural Counties

Table 6-8 Primary Data used in Transportation Impact Scenario for the Hypothetical Sample

Variable	Source	Value Used
Annual Rail Carloads	Rail Company	9,855 carloads
Types of Rail Cars	Rail Company	50' Standard box cars (100 Ton)
Payload of Trucks	Trucking Company	35 Tons

Table 6-9 Primary Data used in Environmental Assessment (Energy/Air) Scenario for the Hypothetical Sample

Variable	Source	Value Used
Freight Travel Distance	Rail Company	20 miles

Table 6-10 Primary Data used in Environmental Assessment (Noise) Scenario for the Hypothetical Sample

Variable	Source	Value Used
Train Speed	Rail Company	19 mph
Number of Engines per Train	Rail Company	1 Engine
Railway Cars per Train	Rail Company	27 Cars
Average Train Operations per Day	Rail Company	1 Train per Day
% of Train Operations done at Night	Rail Company	0% done at Night
Train whistles sounded in the community?	Rail Company	Yes
Are the tracks bolted or continuous weld?	Rail Company	Yes
Average Truck Speed	Trucking Company	50 mph
Average Truck Operations per Day	Trucking Company	20 Trucks per Day
% of the Truck Operations done at Night	Trucking Company	0% done at Night
Road Gradient Marginal Noise costs	DOT	4%

6.4. Economic Impact Analysis

Economic-impact analysis (EIA) attempts to measure the residual economic activity that takes place as a result of a shortline railroad project (e.g., local or regional employment patterns, wage levels, business activity, and even migration patterns). It is an estimate of how spending associated with a particular project flows through a regional economy. EIAs attempt to forecast how a regional economy is likely to change as a result of an action.

EIAs differ from the Benefit-Cost Analysis (BCA) required on some grants such as TIGER grants (Adams & Marach 2012). BCA attempts to explicitly measure the investment value of a transportation project to the nation and not a particular region. BCAs try to answer whether society will be better off by performing a certain action versus doing nothing. BCAs do not include economic multipliers in the analysis. Many DOTs view economic-impact analysis as a secondary complement to benefit-cost analysis, but communities impacted by a shortline abandonment need to know what the potential economic loss means to them.

6.5. Economic Impact Analysis Software

There are various types of software available for economic impact analysis. Decisions on what software to use depends upon availability, cost, and the technical precision expected from the analysis. The costs range from a few hundred dollars for simple multipliers (e.g., RIMS II input-output multipliers from the U.S. Department of Commerce Bureau of Economic Analysis) to tens of thousands of dollars for a full econometric model of a regional economy such as those by Regional Economic Models, Inc. (REMI). If just one study is needed, it might not make sense for a community to invest in a model themselves. Instead the community might benefit from seeking a consultant, local university or economic development organization to run the analysis using their model.

There are two main types of economic analysis software used for shortline studies. The first category is based on input-output models (e.g., IMPLAN, EMSI) and the second type are econometric models (e.g., REMI, TREDIS). The latter, though more expensive, more accurately estimate how spending associated with a shortline railroad flows through a regional economy.

Input-output analysis is based upon the principle that industries are interdependent. One industry purchases inputs from other industries and households (i.e., labor) then sells outputs to still other industries, households, and government. Additional induced impacts occur when workers involved in direct and indirect activities spend their wages on consumer goods produced or sold in the region and local economy. Therefore, economic activity in one sector impacts other sectors. There are three categories of impacts used in input-output analysis:

- **Direct Economic Impact:** The direct economic impact is the impact created by the business itself, primarily the employment, payroll, and local expenditures.

- **Indirect Economic Impact:** The indirect economic impact refers to additional jobs and payroll created in the surrounding economy as a result of the purchase of inputs by the manufacturer.

- **Induced Economic Impact:** The induced economic impact is the additional impact that results from the employee and populations need to satisfy demand for local goods, goods and services by government expenditure, capital goods, and net exports in the region.

Thus, the total impacts of an increase or decrease in the output of an industry are predicted based on the direct economic impact in a specific industry. Input-output analysis generates estimates of indirect and induced economic impacts, which are commonly referred to as "multiplier effects." An increase in final demand (an additional dollar of output or employee compensation, or one additional job in the sector) results in a total increase in output, income, or employment in the economy equal to its multiplier. That is, multipliers estimate the amount of direct, indirect, and induced effects on income or employment that result from each additional dollar of output, additional job, and additional dollar of employee compensation in a sector.

Modeling economic impacts using I/O model is limited to raw reductions/expansions of specific industry output. This is appropriate for the direct abandonment of a single facility because of the loss of a shortline railroad. The value of sales/employment for that facility is modeled as a reduction in that industry within the I-O model. The model then predicts the indirect and induced impacts resulting from the reduced purchases of inputs and employee spending that had come from the now-abandoned facility.

However, I-O models become less useful for modeling the broader impacts of a shortline abandonment such as an increase in transportation costs. The impacts are often more subtle than a direct decrease in employment or output. Impacts such as supply chain disruptions or potential market losses/opportunities are common outcomes of the loss of a railroad. These effects cannot be modeled using a static I-O model.

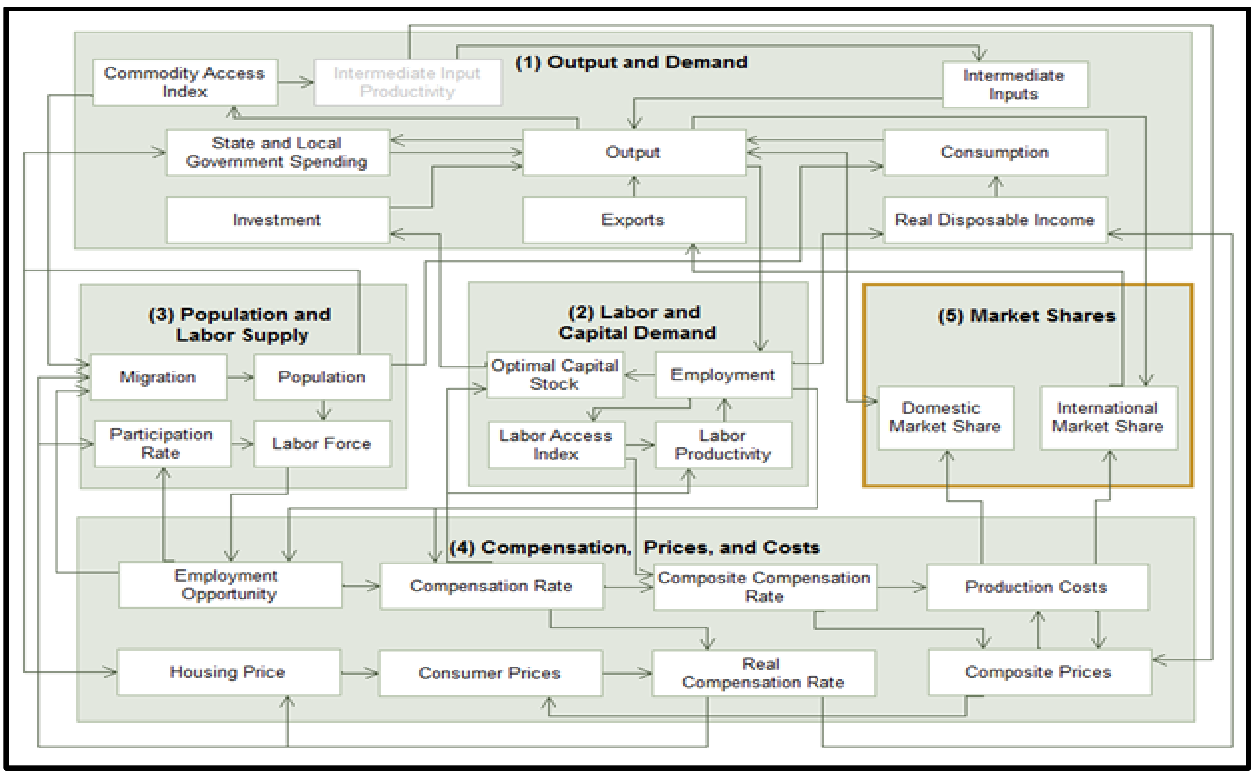


Figure 6-1 REMI Model Linkages (Source: REMI 2007)

Econometric models such as REMI incorporate key aspects of four major modeling approaches used for studies of this type: Input-Output, General Equilibrium, Econometric, and Economic Geography. REMI is sometimes called an "Econometric Model" as the underlying equations and responses are estimated using advanced statistical techniques. The REMI simulation model uses hundreds of equations and thousands of variables to forecast the impact a change has upon an economy of interest. As seen in Figure 6-1, the REMI model contains five "blocks." Each block has its own variables and interactions so that changing any one variable in the model not only affects other variables in its own block, but also variables in other blocks.

REMI can perform any analysis that can be done with static models, along with allowing the manipulation of hundreds of ‘policy variables’ such as tax rates, transportation costs, and labor costs. It also provides a number of data sets beyond the input-output Table included in the static model. A couple of the more relevant data sources are trade flows and transportation data.

The most relevant policy variable for this methodology is ‘production costs’, found in block 4 and employment in block 2. Higher transportation costs result in higher production costs. The REMI model allows an analyst to predict the impacts to the overall economy resulting from increased production costs. The impacts can be reported using metrics important to local policy makers and economic developers such as employment, income, and tax revenue.

6.6. The Economic Impact Analysis Process

Now that the software has been selected, the first Phase of the rail line abandonment study will be an assessment of the economic implications of the rail line closure. In short, we will be measuring two key aspects of the line and the ramifications of the potential changes. First, we will look at employment levels of the railroad company itself and truckers that would need to be hired to handle the displaced freight. Second, we will look at the increased cost to the line’s customers in the form of increased shipping costs. While you could use many different models for this analysis, for the purposes of this guide we will be using REMI TranSight v3.5.

To perform this analysis, you will first need to gather two pieces of information. The first is the number of people employed by the shortline. You will likely need to gather this information from the rail line itself if it is not available through readily available secondary sources (e.g., railroad website). By changing the level of employment, the model will also account for the loss of sales. It is important to only use employment to account for the loss of the company so that you avoid double counting the effects.

The second piece of information needed is the increased cost to shippers. This information will be gathered by surveying or interviewing the major users of the rail line. This data could be collected as part of the community’s economic development business visitation and surveying program (IEDC 2006). This cost should be the estimated increase in shipping costs that would occur if all of the line’s customers had to change modes of transportation (i.e., switch to trucking). You can gather this data as a percentage increase or as a monetary increase. Once that information is gathered, the model can be used to estimate the economic impact that would occur if the line were to close. Possible questions to be asked to the companies are shown in Table 6.4.

Table 6-11 Data Collection from Shippers

Interview/Survey Questions for Shippers
Do you use rail for any freight movements?
What potential impact on transportation costs could the abandonment of the rail line have on your company?
What other impacts would there be on your operations if the rail line was abandoned?
Would you potentially lay-off or close the facility if the rail line was abandoned?

Step 1: Define and Create Study Region

The first step is to define and create the study region. When the model is opened, it should look like Figure 6-2 where you create a new Regional Simulation. After opening the new Regional Simulation tab, you should be at a screen like the one in Figure 6-3.

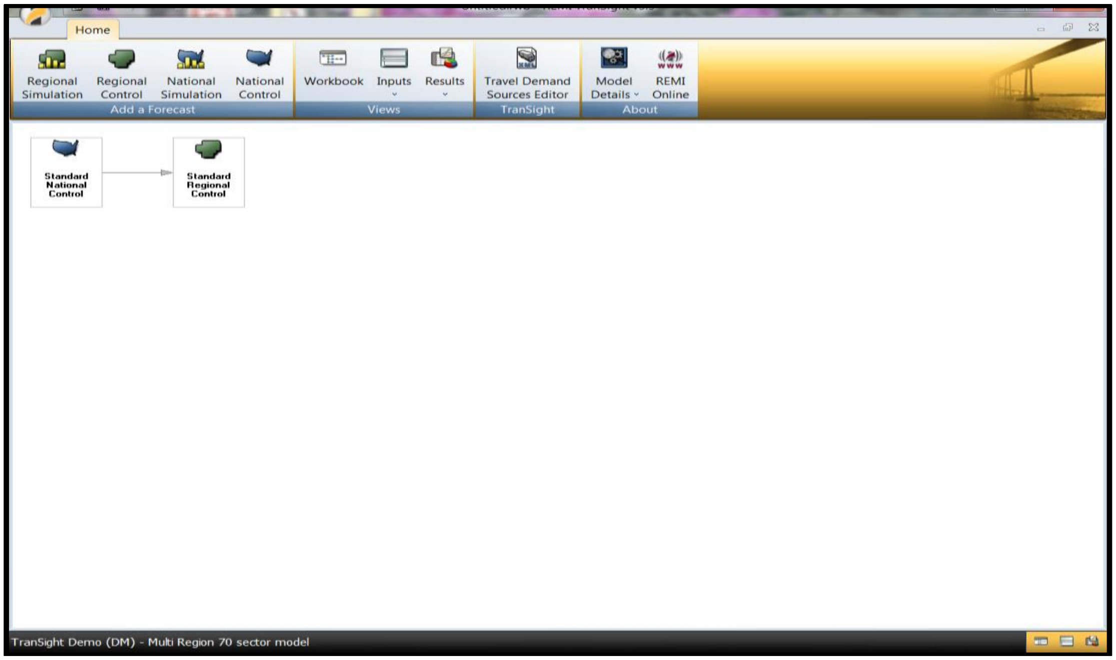


Figure 6-2 Opening Screen of REMI Transight

Defining the study area is one of the fundamental steps in an economic impact analysis. The choice is usually governed by economic, policy, and technology factors. From a purely economic point of view, the study area should be defined as the functional economic area in which the shortline is located. In some instances, however, it may be necessary for policy reasons to define a study area that does not match the railroad's functional economic region, which likely will affect the results of the impact analysis. Another consideration is the geographic regions of the economic software being used. For example, a REMI license might only include the counties in a particular state, but not include the bordering states. This can create problems if the shortline is adjacent to or crosses state lines.

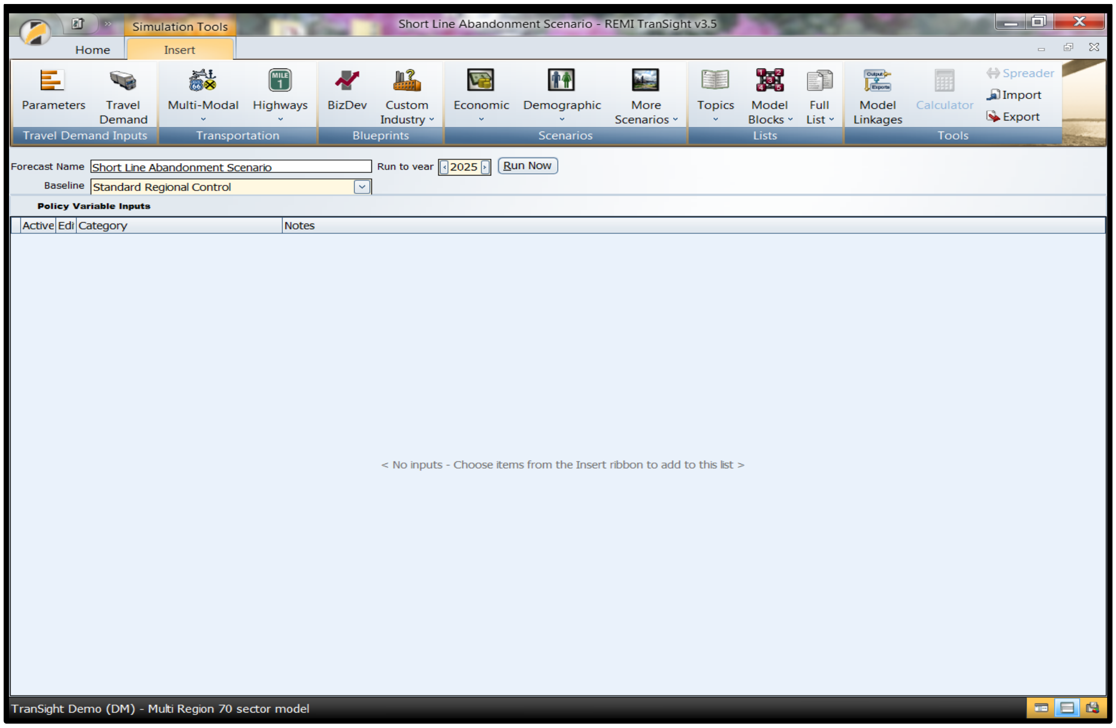


Figure 6-3 Creating a Regional Simulation in REMI Transight

The definition of the area of interest for the study will impact the results. It will determine whether certain economic effects will be internal or external to the area. It is the distinction between the "local" and "non-local" economy. Changes in the geographical boundaries of the region will lead to changes in the multiplier size, because the magnitude of the multiple depends on the industrial structure in the region. It will also determine which shippers need to be surveyed.

Weisbrod and Weisbrod (1997) indicated there are four factors that must be considered when designating the area for impact analysis.

1. The area of jurisdiction for the sponsoring agency. For example, a state department of transportation might want to focus on the impact to the state.

2. The area of direct project influence. For shortlines, this would be the area of current or potential shippers. A rule of thumb is 60 miles.

3. Area seeking distributional impact. Some economic development projects desire to assist economic development in a specific sub-area e.g., an economically distressed area).

4. Interest in external area of consequences. The shortline could be considered in its role within a larger transportation system so this might drive the study area definition.

The review of shortline impact studies for this project found that most studies use a region composed of the counties that the rail line traverses and the state in which the rail line is located. For this example, the region is only Rural Counties.

Step 2: Input Employment Lost from Railroad Company

In the next step we will be creating our first input to the model. At this stage you must decide how many years you want the forecast to extend over. This is a matter of preference, but for the sake of this example we will forecast ten years beginning in 2012-2025. From this screen we will select the drop down menu titled "Economic", followed by the option "Employment and Sales". We will then select the parameters for the change we want to make. We select "Firm Behavior", followed by "Firm Employment". Then we select "Rail Transportation" as the industry. When selecting the region, be sure to include every county where the rail line has employees. You can hold the "control" button to select multiple counties. For the purposes of this example, we will only use Rural Counties. In your simulation, you should select the county in which the railroad company reports its employment. Finally, we select "Units", and then click "Insert Into Editor". You can see an example of this process in Figure 6-4.

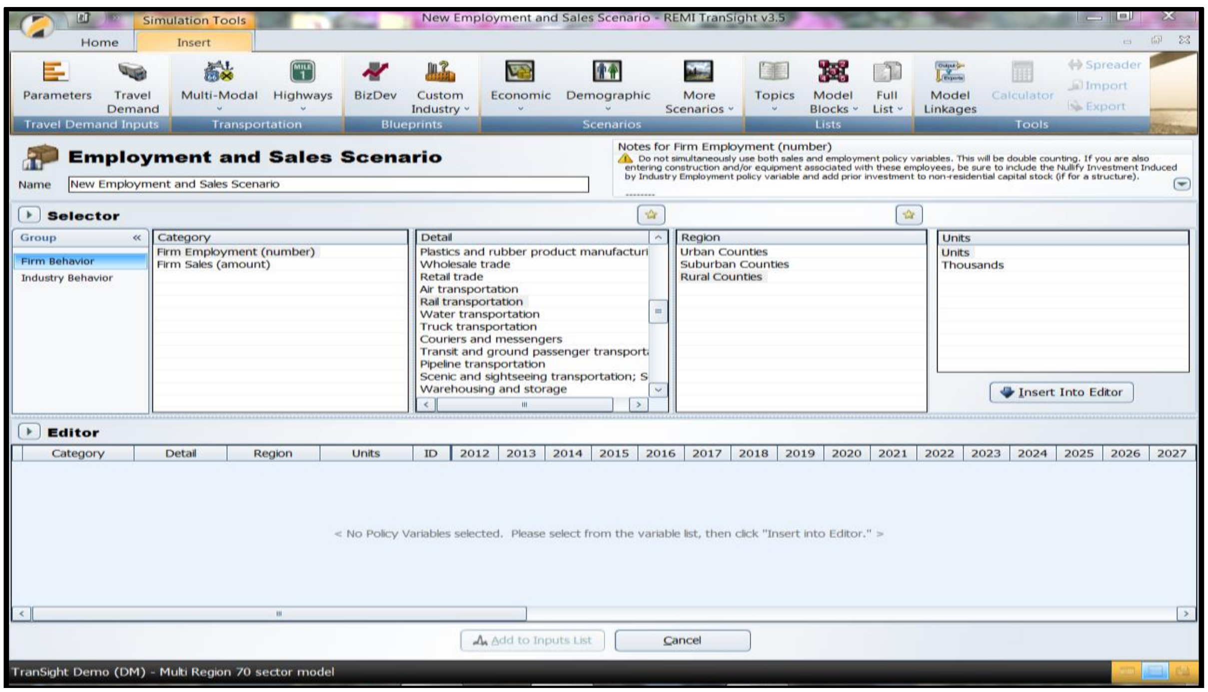


Figure 6-4 Eliminating Shortline Railroad Employees

Once we have inserted this into the editor, we must assign values to each year. Since we want to determine the economic impact of the firm completely shutting down, we assume that Rail Transportation in the region loses every job. For example, if the railroad company employs 10 people, then we will input -10 units of employment for each year of our forecast. It is important to input the change in each year so that the model calculates this as a permanent change in employment. When the changes have been input, we will click the "Add to Inputs List" button. An example can be seen in Figure 6.5.

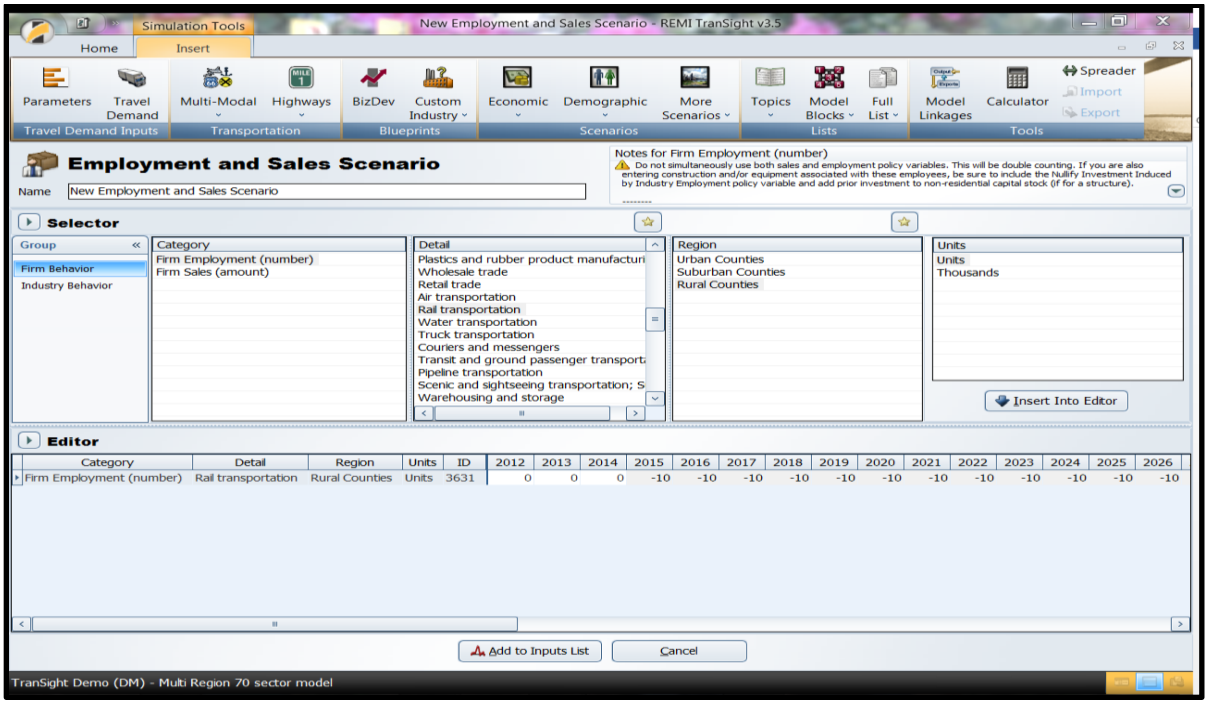


Figure 6-5 Adding Increased Loss of Railroad Workers to Scenario

Step 3: Calculate and Input Job Increase from Trucking Industry

With the elimination of the railroad, shippers will need to move more freight by truck so employment in the trucking industry will increase. This gain in employment needs to be accounted for in the scenario. A rough estimate of this employment gain can be made with the data collected for this scenario.

Formula for Calculating Truck Employment Increase from Switch from Rail to Truck

A rule of thumb is that truckers can drive 500 miles per day, but with round trips this will be less so 250 miles per day is used.

Calculation #1: Annual carloads x Trucks needed to move one rail car of freight = Total annual truck loads

Calculation #2: Total annual truck loads/365 days x (Track Miles or Actual Road Mileage if Available x 2/250 miles per day) = Annual Truck driver Jobs

Scenario Calculation Truck Employment Increase from Switch from Rail to Truck

Assume the 9,855 rail cars have a 100 ton capacity and the trucks that will be replacing the trains have a 35 ton capacity. Table 6 has rail car to truck conversion rates.

Calculation #1: 9,855 (Annual carloads) x 100/35 (Trucks need to move on rail car of freight= 28,157 (Total annual truck loads)

Calculation = 28,157 (Total annual truck loads)/365 days x (20 (Track Miles) x 2/250 miles per day) = 12 Annual Truck Driver Jobs

Based on this calculation, more trucker driver jobs (12) would be created than railroad employees jobs (10) lost. More trucks would be needed in the region to handle the additional 77 truckloads of freight that would need to be hauled each day. Each truck trip would be 40 miles round trip so each trucker could make about 6 trips per day. This addition of employment in the truck transportation needs to be added to the scenario repeating Steps 2 and 3 as shown in Figure 6-6.

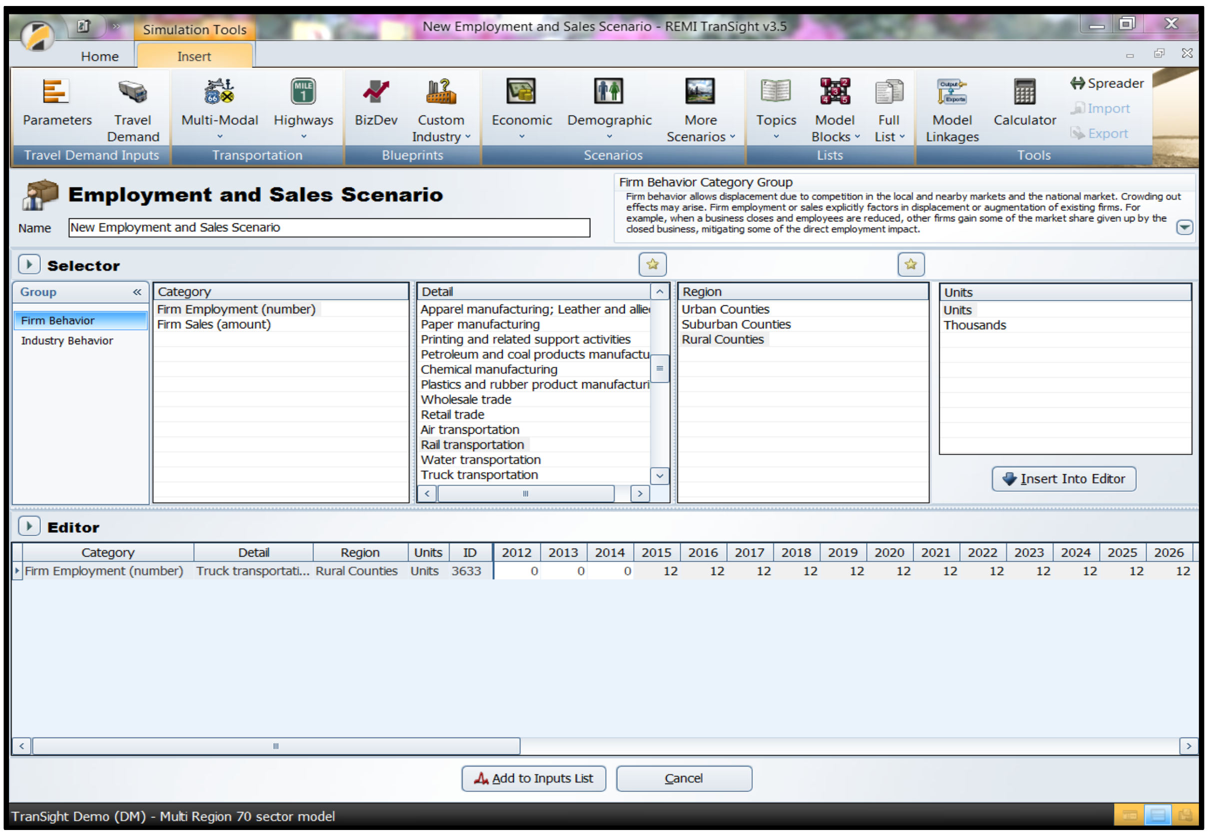


Figure 6-6 Adding Increased Employment of Truck Drivers

<u>Step 4:</u> Input Transportation Cost Increase

The next step is to account for the increased shipping costs. We will follow a very similar path to the one in Step 2. We will click the “Full List” button, followed by the “Economic Variables” option. Scroll through the “Category” column until you find “Production Cost”. The increased shipping costs to the companies that use the rail line will be captured as a portion of the “production cost” variable. There will be two options here: amount and share. If the data you have is a monetary value, then select amount. If the data you have is a percentage increase, select share. It is important to note that this is a percentage increase in the shippers overall production costs, not their shipping costs alone. A 20% increase to a company's shipping costs will not mean a 20% increase in their total production costs. For example, if it the production cost for one widget is $1.00 and $0.10 of that dollar is shipping costs, then a 10% rise in shipping costs ($0.01) is only a 1% increase in overall production costs. When gathering data, be sure to make this distinction.

After selecting "Production Cost", you will need to select all of the industries that ship on the line. Be as detailed as possible in your selection. You can select multiple industries in the same way that you select multiple counties (the control key). Then, in the same way that we input the change in employment, we will input a positive increase to production costs industry by industry. For the purposes of the example, we will estimate a 4% increase in production costs for "Wood Product Manufacturing" and a 3% increase in production costs for "Machinery Manufacturing". Remember to input the change in each year to indicate that it is a permanent increase. When you have done this, select "Add to Inputs List". This can all be seen in Figure 6-7.

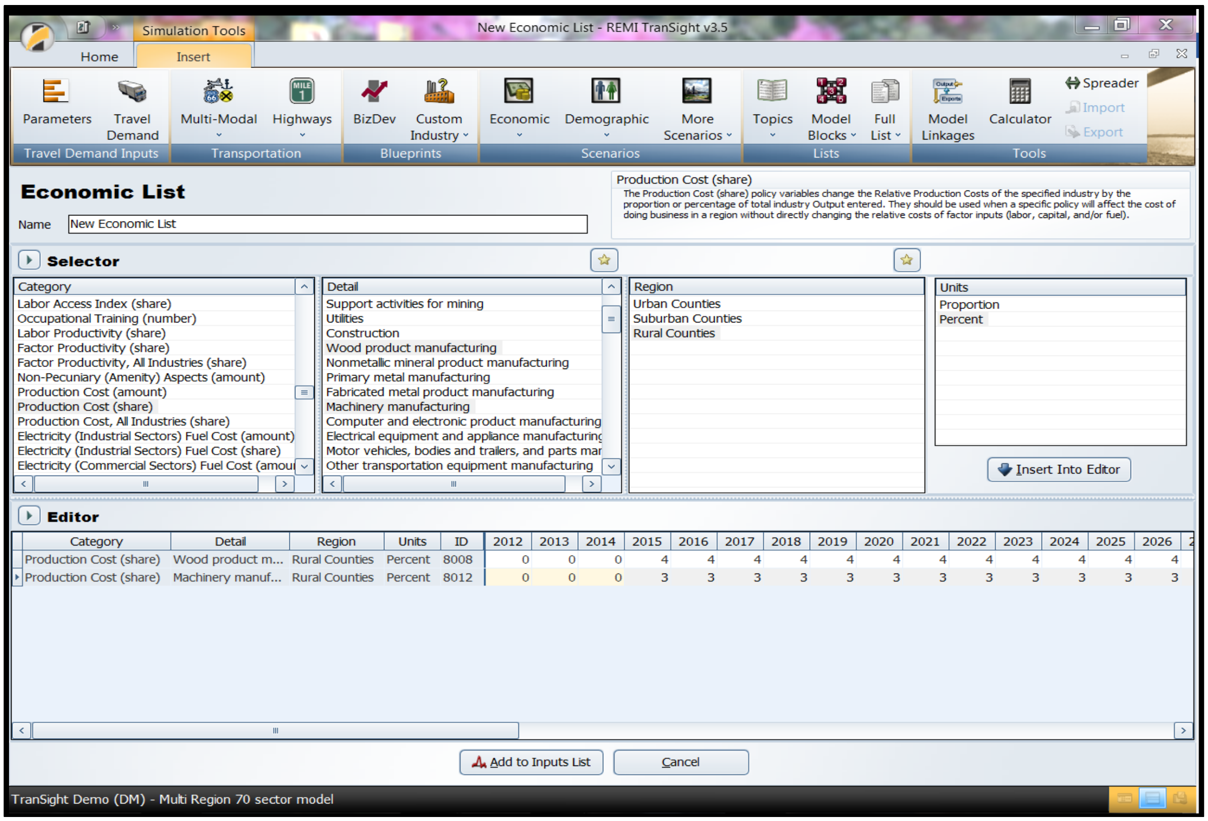


Figure 6-7 Increased Transportation Costs Due to the Switch from Rail to Truck

With all of the information input into the model, the final step is to select the year that you want to forecast to, and run the simulation. For an example of this screen see Figure 6-8.

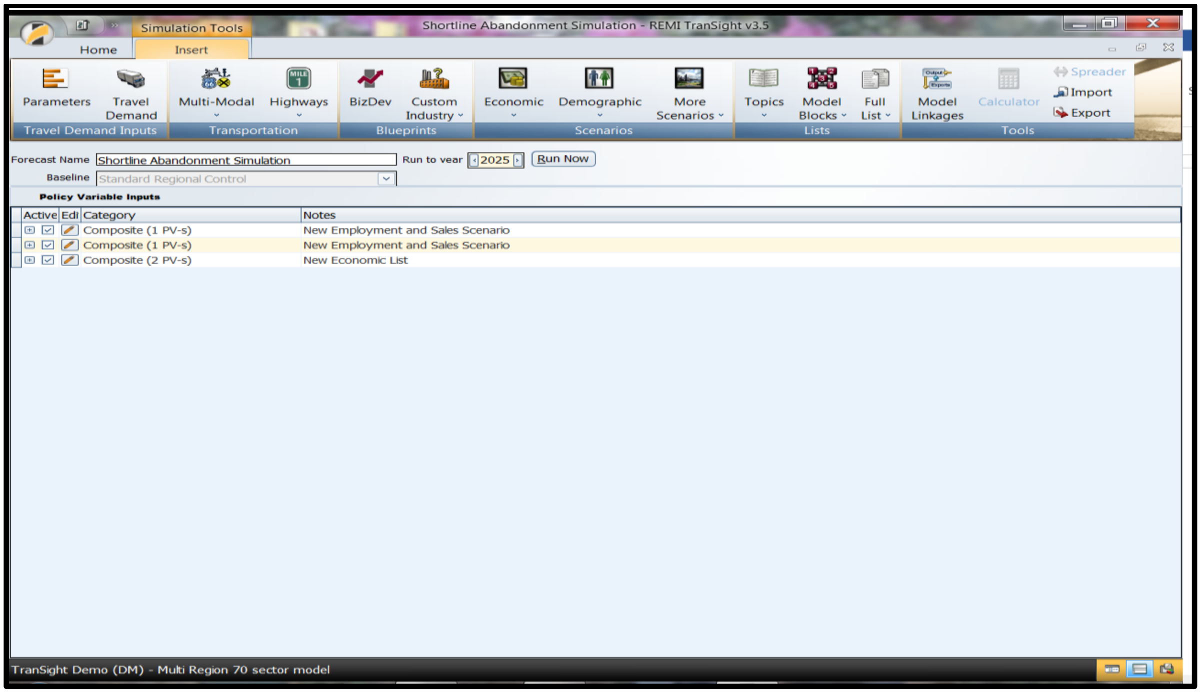


Figure 6-8 Setting the Years to Forecast

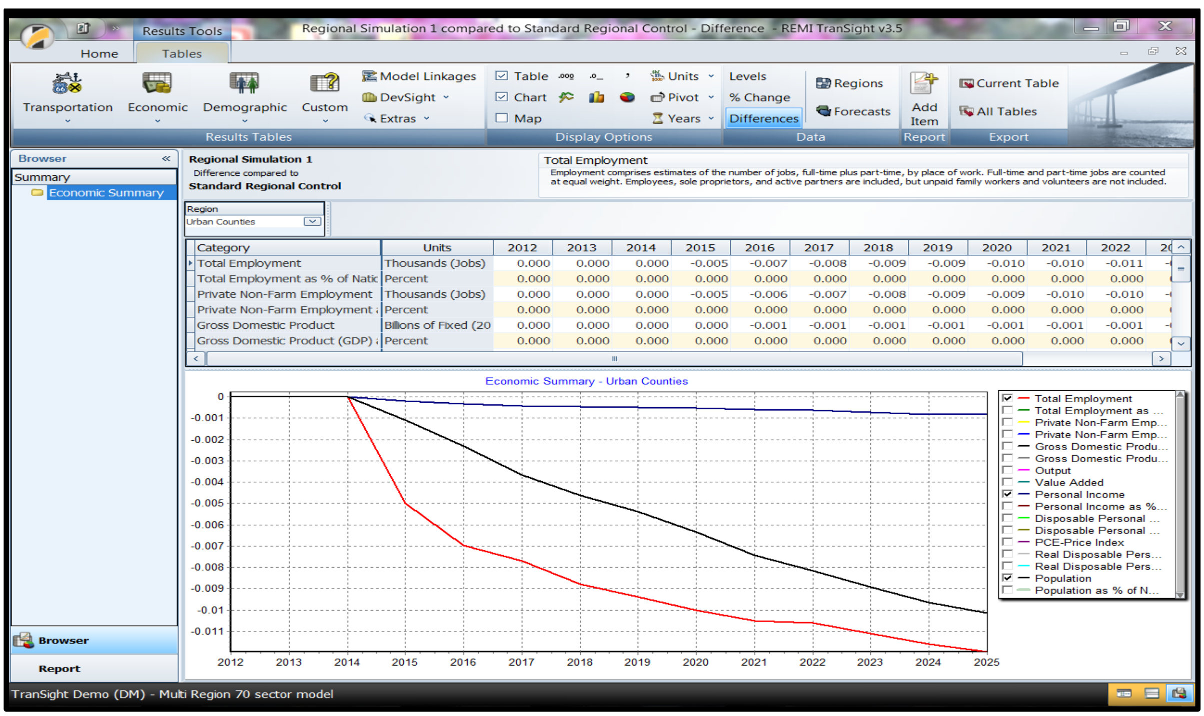


Figure 6-9 Results of Simulation of the Shortline Abandonment

Pushing the "Run Now" scenario button, results in the output shown in Figure 6-9. By 2020, the total loss of employment is 10 despite an increase in truck driving jobs and personal income has decreased by $1m. The output of the model will be the indirect effects of the changes over the specified time period. You can track changes in employment, GDP, annual earnings, population, and many others. Using the software, you can easily create custom reports based off of the information most important to you.

6.7. Transportation Impact

This section calculates the transportation cost increase from shifting the freight from the shortline railroad's trackage to the road and highway system. We will utilize marginal costs for increased truck vehicle miles traveled (VMT) as calculated by the Federal Highway Administration Cost Allocation Study. The cost includes the impact on: Pavement, Congestion, Crash, Air Pollution and Noise.

Step 1: Calculate increase in Vehicle Mile Travel (VMT)

In this step, the community will need to estimate the increase in truck VMT that would occur in the abandonment scenario. To find this number, the community needs to obtain the total mileage of the track that would be abandoned and the total annual number of carloads traveling on the line. Then, the community needs to know the tonnage capacity of the average railcar, and the tonnage capacity of the average truck that would be used to haul the same load.

To aid in the calculation process, Table 6.5 shows the average capacity in the United States of the common eighteen wheelers body types. Table 6.6 shows the typical capacity of different rail car types as well as the conversion from each one of the different rail car types to eighteen wheelers trailer with the proper body type to carry the load.

Table 6-12 Average Payload and Loaded Weight (lbs.) of Common Truck Types (Source: FHWA, 2011)

Body Type	**5-Axle Truck Trailer (18 Wheeler)**	
	Payload	**Loaded**
Platform/Flatbed	30,715	56,900
Van	34,890	60,340
Grain Body	48,970	63,340
Tank Body	47,980	72,390

Upon obtaining the information above, the following formula needs to be used:

$$\text{(Increase in VMT)} =$$

$$\text{(Track Mileage)} \times \text{(Annual Carload)} \times \left(\frac{\text{(Tonnage Capacity of Average Railcar)}}{\text{(Tonnage Capacity of Average Truckload)}}\right)$$

Here is an example for a rail line that operates 20 miles of track, with one train per day hauling 27 cars for a total of 9,855 carloads annually. The average capacity for each car is 100 tons (see Table 6.6), and the average capacity for the substitute trucks is 34.89

tons (see Table 5). The increase in VMT is equal to: $20 \times 9{,}855 \times (\frac{100}{34.89}) = 564{,}918$.

If capacity averages are not available, the assumptions of 100 tons for carloads and 34.89 tons for trucks can be used. It is important to indicate that these assumptions were made in these cases.

Table 6-13 Rail Car Types and Conversations to Different 18 Wheeler Body Types Source: CSX 2010

Rail Car Type	Rail Car Weight Capacity in Tons	Conversion to 18 Wheeler			
		Platform/Flatbed	Van	Grain Body	Tank Body
50' Standard boxcar	70-100	2.27-3.26	2.00-2.87	N/A	N/A
50' Hi-Roof boxcar	100	3.26	2.87	N/A	N/A
60' Standard boxcar	70-100	2.27-3.26	2.00-2.87	N/A	N/A
60' Hi-roof boxcar	100	3.26	2.87	N/A	N/A
86' Auto boxcar	70	2.27	2.00	N/A	N/A
Small Cube covered	70-100	N/A	N/A	1.43-2.04	N/A
Jumbo covered	100-110	N/A	N/A	2.04-2.24	N/A
Open top hopper	110	N/A	N/A	2.24	N/A
52' Gondola	70-100	2.28	N/A	1.43-2.04	N/A
65' Gondola	100-110	3.26	N/A	2.04-2.24	N/A
Tank Car DOT-111	34,500 gal	N/A	N/A	N/A	3
Bi-Level Auto Rack	10-15 vehicles	1.6-2	N/A	N/A	N/A

Step 2: Calculating the Cost of Modal Shift

Now that the increase in VMT has been calculated, the next step is assigning monetary values. Using data from the FHWA Highway Cost Allocation Study, the community can quickly determine the marginal cost incurred by the public due to the line abandonment. Using a methodology previously utilized in similar estimations and the Table 6.7, we can estimate these costs (Cambridge Systematics, Inc., Economic Development Research Group, Inc., & Boston Logistics Group, Inc., 2006). Table 6.7, adapted from a U.S Department of Transportation study, shows marginal costs per mile for a number of factors on rural interstates for two different types of trucks. Generally, the 60 thousand pound, 5-axle estimates will be utilized, however this may vary on a case by case basis.

Table 6-14 2000 Pavement, Congestion, Crash, Air Pollution, and Noise Costs for Illustrative Vehicles Under Specific Conditions
Source: U.SDOT 2000

Vehicle Class/ Highway Class	**Cents per Mile**					
	Pavement	**Congestion**	**Crash**	**Air Pollution**	**Noise**	**Total**
60k lb 5-axle Comb/Rural Interstate	3.3	1.88	0.88	3.85	0.17	10.08
80k lb 5-axle Comb/Rural Interstate	12.7	2.23	0.88	3.85	0.19	19.85

Once the community has determined the total marginal cost for the truck class based on the chart, simply multiply that cost by the increase in VMT. This provides an estimate of the Present Value (PV) of external costs for factors that would not have been captured in the initial Economic Impact Analysis (EIA). For further detail, these costs can be broken down by category.

Returning to the previous example, the community can multiply the 564,918 increase in VMT by 3.3 cents per Mile to obtain pavement cost resulting in pavement cost $18,642. Likewise the community can multiply the VMT by 1.88 cents per mile, 0.88 cents per mile, 3.85 cents per mile, and 0.17 cents per mile (see Table 6.7) to obtain the congestion cost, crash cost, air pollution cost, and noise cost, respectively. This results in $10,620 due to increase in congestion cost; $4,971 due to increase in crash cost, $21,749 in increase in air pollution cost and $9,604 in increase in noise cost. The community could also aggregate all of the individual cost or multiply the VMT by 10.08 cents per mile to obtain the total cost due to these elements. In this example, it results in $56,944 of increased costs for the general public annually.

6.8. Environmental Review

Before proceeding with the environmental review it is important for communities to understand the legal difference between two important terms: “Environmental Assessment (EA)” and “Environmental Impact Statement (EIS).” These studies require professional consulting services and are beyond the scope of this methodology. This proposed methodology is not a substitute for an EA, which is a legal document. Instead the environmental review process presented below provides data useful information that can be used by the community for various purposes.

Environmental Assessment (EA): as described by the National Environmental Policy Act (NEPA) is a concise public document which has the following three defined functions

(NEPA 2014a):

1- Briefly provides sufficient evidence and analysis for determining whether to prepare an EIS or a Finding of No Significant Impact (FONSI);

2- Aids an agency's compliance with NEPA when no EIS is necessary; and

3- Facilitates preparation of an EIS when one is necessary

Environmental Impact Statement (EIS): is a detailed analysis that serves to ensure that the policies and goals defined in NEPA are infused into the ongoing programs and actions of the federal agency. EISs are generally prepared for projects that the proposing agency views as having significant prospective environmental impacts. The EIS should provide a discussion of significant environmental impacts and reasonable alternatives (including a No Action alternative) which would avoid or minimize adverse impacts or enhance the quality of the human environment. (NEPA 2014b).

The U.S Department of Transportation indicated that when the impacts' significance in a transportation project proposal is uncertain, an environmental assessment (EA) should be prepared to assist in making this determination. If it is found that the project will result in a significant impact, the preparation of an environmental impact statement (EIS) should commence immediately (FHWA, 2014).

Rural communities are recommended to follow a similar process as the one indicated the by the U.S DOT and shown in Figure 6-10. The rural community should first prepare an Environmental Assessment (EA). If the EA findings indicate significant impact the rural community should prepare an Environmental Impact Statement. If the EA findings indicate that there is no significant impact the rural community can prepare a "Finding of No Significant Impact."

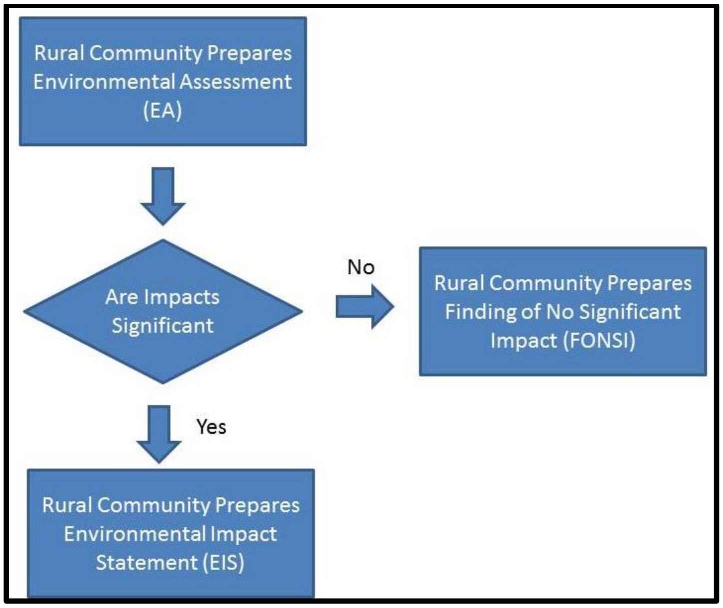


Figure 6-10 Environmental Review Diagram

An Environmental Assessment considers multiple areas as shown in Table 6.8. Each area has multiple factors as shown in Table 6.9.

Table 6-15 Environmental Assessment Areas

Land Development
Socioeconomic
Community Facility and Services
Natural Features
Other Factors

This environmental review will only focus on the italicized areas in Table 9. These are the common areas of public concern. All the factors in the environmental assessment are very important and required; however, the factors that might have the most potential to impact the community decision on a shortline railroad are the ones with underlined and italic text in the Table above (Energy Consumption, Noise, and Air Quality). Therefore, the steps in this guide will concentrate on those factors.

Table 6-16 Environmental Assessment Area with its Factors

Land Development	• Conformance with Comprehensive Plans and Zoning • Compatibility and Urban Impact • Slope	• Erosion • Soil Suitability • Hazards and Nuisances including Site Safety • *Energy Consumption*	• *Noise* • *Air Quality* • Environmental Design
Socioeconomic	• Demographic Character Changes	• Displacement	• Employment and Income Patterns
Community Facilities and Services	• Educational Facilities • Commercial Facilities • Health Care • Social Services • Solid Waste • Waste Water	• Storm Water • Water Supply • Public Safety - Police - Fire - Emergency Medical	• Open Space and Recreation - Open Space - Recreation - Cultural • Transportatio n
Natural Features	• Water Resources • Surface Water	• Unique Natural Features and Agricultural Lands	• Vegetation and Wildlife
Other Factors	• Flood Disaster Protection Act • Coastal Barrier Resources Act	• Airport Runway Clear Zone or Clear Zone Disclosure	• Other Factors

6.9. Energy Consumption

The energy consumption varies significantly among the different mode of transportation. The principal mode of transportation energy consumption is in the form of petroleum and other liquid fossil fuels. Energy consumption is significantly impact by the energy efficiency that can be expressed in different terms as show in Table 6.10.

Table 6-17 Efficiency Measure

Description	Example
Distance per vehicle per unit fuel volume	km/L or miles per gallon
Distance per vehicle per unit fuel mass	km/kg
Volume of fuel (or total energy) consumed per unit distance per vehicle	L/100 km or kW·h/100 km
Volume of fuel (or total energy) consumed per unit distance per passenger	L/(100 passenger·km)
Volume of fuel (or total energy) consumed per unit distance per unit mass of cargo transported	L/100 kg·km or MJ/t·km

The steps provided below focus on determining the amount of fuel required to move the freight.

Step 1: Calculate the train fuel consumption.

This calculation can be done using the following formula with the rail fuel use (shown in Figure 6-11):

Transportation Fuel =
[Ton Pound of Freight * Distance in Miles]/[Transportation Mode Fuel Use]

Seven major railroad companies reported the following for 2007:

- 1,770,545,245,000 ton-miles of freight were moved
- 4,062,025,082 gallons of diesel fuel were consumed
- That works out to be almost **436 ton-miles per gallon** (435.88)

Figure 6-11 Rail Fuel Use (Source: Science Buzz 2014)

For example 1 train per day (365 trains per year) with 27 box cars per train with a load of 100 tons per car traveling 20 miles would correspond to 19,710,000 ton-miles. The 19,710,000 ton-miles need to be divided by the rail fuel use of 436 ton-mile per gallon, resulting in 45,206 gallons of fuel in one year.

Step 2: Calculate the truck fuel using the same formula as in the previous step but using the fuel use of trucks as shown in Figure 12.

For example if the same 19,710,000 ton-miles are transported by trucks with a capacity of 34.89 Tons and a fuel efficiency 6.5 ton-miles (See Figure 6-12) it would result in using 3,032,308 gallons of fuel in one year.

Class	Applications	Gross Weight Range (lbs.)	Empty Weight Range (lbs.)	Typical Payload Capacity Max (lbs.)	Typical Fuel Economy Range in 2007 (mpg)	Typical Fuel Consumed (gallons per thousand ton-miles)
1c	Cars *only*	3,200 - 6,000	2,400 - 5,000	250 - 1,000	25-33	69.0
1t	Minivans, Small SUVs, Small Pickups	4,000 - 6,000	3,200 - 4,500	250 - 1,500	20-25	58.8
2a	Large SUVs, Standard Pickups	6,001 - 8,500	4,500 - 6,000	250 - 2,500	20-21	38.5
2b	Large Pickups, Utility Van, Multi-Purpose, Mini-Bus, Step Van	8,501 - 10,000	5,000 - 6,300	3,700	10-15	38.5
3	Utility Van, Multi-Purpose, Mini-Bus, Step Van	10,001 - 14,000	7,650 - 8,750	5,250	8-13	33.3
4	City Delivery, Parcel Delivery, Large Walk-In, Bucket, Landscaping	14,001 - 16,000	7,650 - 8,750	7,250	7-12	23.8
5	City Delivery, Parcel Delivery, Large Walk-In, Bucket, Landscaping	16,001 - 19,500	9,500 - 10,800	8,700	6-12	25.6
6	City Delivery, School Bus, Large Walk-In, Bucket	19,501 - 26,000	11,500 - 14,500	11,500	5-12	20.4
7	City Bus, Furniture, Refrigerated, Refuse, Fuel Tanker, Dump, Tow, Concrete, Fire Engine, Tractor-Trailer	26,001 - 33,000	11,500 - 14,500	18,500	4-8	18.2
8a	Straight Trucks, e.g., Dump, Refuse, Concrete, Furniture, City Bus, Tow, Fire Engine	33,001 - 80,000	20,000 - 34,000	20,000 - 50,000	2.5-6	8.7
8b	Combination Trucks, e.g., Tractor-Trailer: Van, Refrigerated, Bulk Tanker, Flat Bed	33,001 - 80,000	23,500 - 34,000	40,000 - 54,000	4-7.5	6.5

Figure 6-12 Typical Weight and Fuel Use by Truck Class
(Source: Oak Ridge National Laboratory, 2013)

Step 3: Calculate the difference between the "Rail" and "Truck" fuel consumption by subtracting one from the other.

In this particular example, the addition of trucks to the road has a negative effect in the fuel consumption by increasing it by 2,987,101 Gallons per year from 45,206 gallons per year to 3,032,308 gallons per year. However, it is important to notice that these calculations are based on averages and the specific fuel consumption will depend on many localized factors.

6.10. Noise Calculation

Ambient noise level is measured with a sound level meter. It is usually measured in decibels (dB). The decibel (dB) is a logarithmic unit used to express the ratio between two values of a physical quantity, often power or intensity. The number of decibels is ten times the logarithm to base 10 of the ratio of the two power quantities. A decibel is one tenth of a bel, a seldom-used unit named in honor of Alexander Graham Bell (Wikipedia, 2014). Figure 6-13 shows outdoors standards for noise levels.

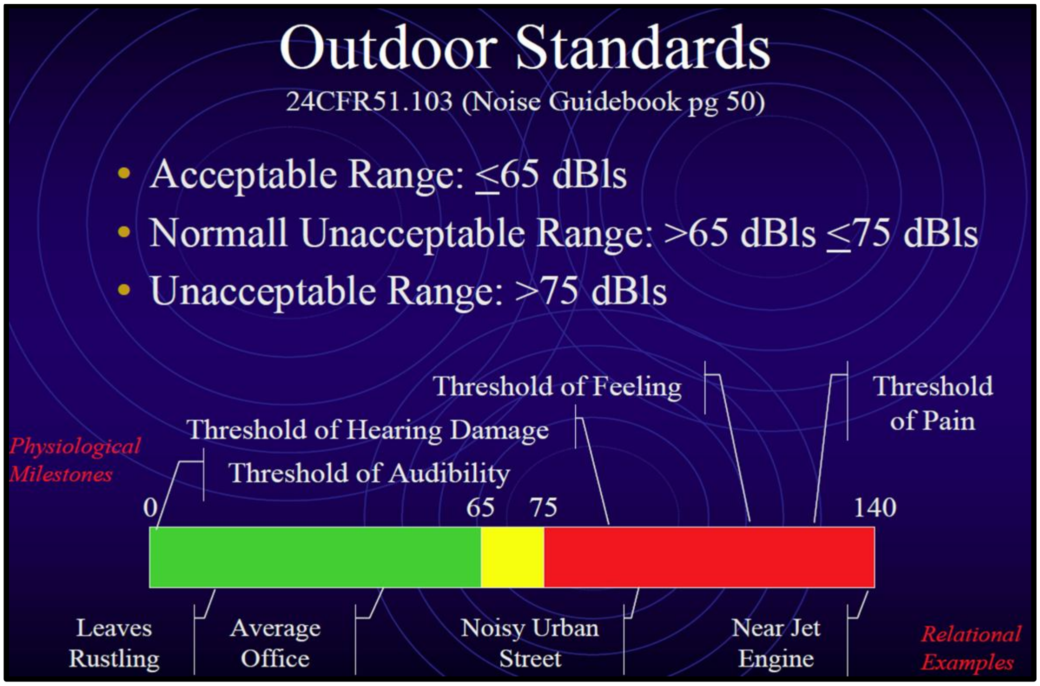


Figure 6-13 Outdoor Noise Standard (HUD n/d)

The decibel is used for a wide variety of measurements in science and engineering, most prominently in acoustics, electronics, and control theory. In electronics, the gains of amplifiers, attenuation of signals, and signal-to-noise ratios are often expressed in decibels. The decibel confers a number of advantages, such as the ability to conveniently represent very large or small numbers, and the ability to carry out multiplication of ratios by simple addition and subtraction. On the other hand, even some professionals find the decibel a confusing and cumbersome metric.

The communities could consider using the U.S Department of Housing and Urban Development Day/Night Noise Level (DNL) calculator located at the URL noted in Step 1 below.

Step 1: Go to the Day/Night Noise Level (DNL) web page located at the following URL (see Figure 6-14):

<http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/environment/dnlcalculatortool>

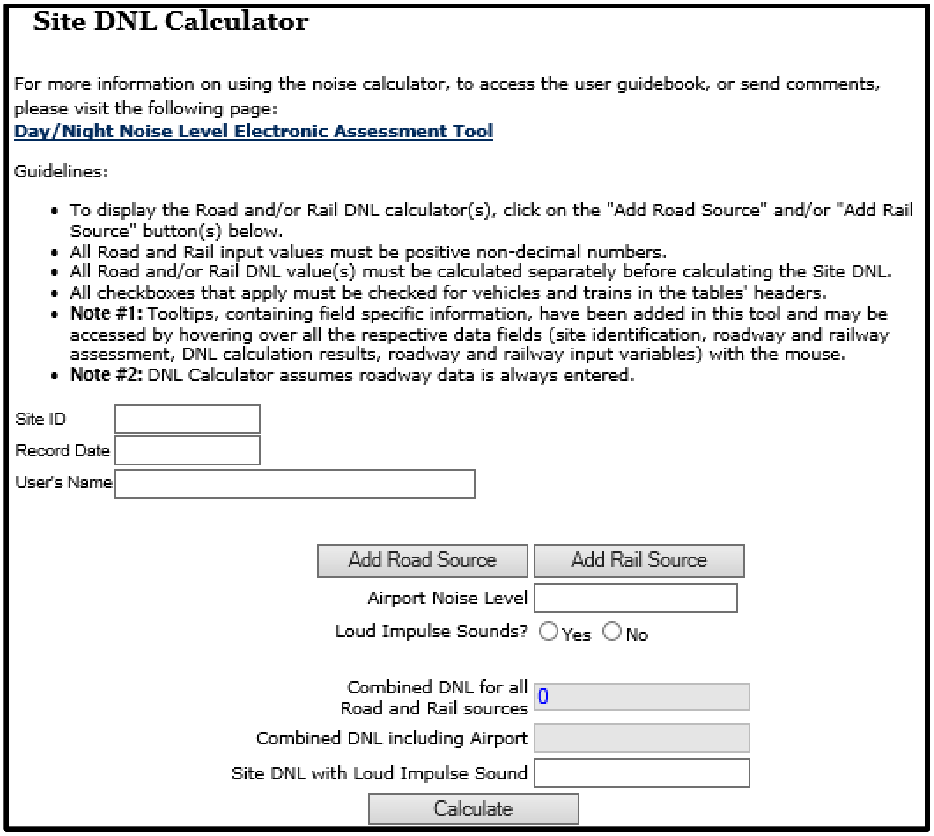


Figure 6-14 Day/Night Noise Level (DNL) Main Page

Step 2: Click on "Add Rail Source" and the system will allow you to add the train information (see Figure 6-15).

Step 3: Input the values to calculate the noise level produced by the train. Figure 6-16 shows an example with a diesel train traveling 100 ft from the noise assessment location at an average speed of 19 miles per hour with one engine per train and 27 cars per train with service daily (since no decimal input is allowed), and with no night travel. This example resulted in 59.5125 db in a 24hr period.

Step 4: Click on "Add Road Source" and the system will allow you to add the truck information (see Figure 6-17).

Step 5: Input the values to calculate the noise level produced by the truck. Figure 6-18 shows an example with heavy trucks traveling 100 ft from the noise assessment location at an average speed of 50 miles per hour. The average daily trips is calculated multiplying the number of box rail cars per day (in this example 27 box rail cars in step 3) times 2.87 (which correspond to the number of trucks needed per each railroad box car, see Table 6) totaling approximately 77 trucks daily with a road gradient of 4%. This example resulted in 58.568 db in a 24hr period.

Step 6: Calculate the difference between the "Rail" and "Truck" service noise by subtracting one from the other. In this particular example, the addition of trucks to the road has a positive effect in the noise level by reducing it 0.995 dB to 58.518 dB from 59.5125 dB. However, it is important to notice that these calculations dependent of the input for example if the option "Railway whistles or horns" would have been selected to "No", the rail scenario would have produced a DNL of 49.8323 dB. Therefore, the additional trucks on the road would have negatively impact the noise level by increasing it 8.6857 dB from 49.8323 dB to 58.518 dB.

Railroad #1 Track Identifier:

Rail # 1		
Train Type	**Electric** ☐	**Diesel** ☐
Effective Distance		
Average Train Speed		
Engines per Train		
Railway cars per Train		
Average Train Operations (ATO)		
Night Fraction of ATO		
Railway whistles or horns?	Yes: ☐ No: ☐	Yes: ☐ No: ☐
Bolted Tracks?	Yes: ☐ No: ☐	Yes: ☐ No: ☐
Train DNL		
Calculate Rail #1 DNL		Reset
	Add Road Source	Add Rail Source
	Airport Noise Level	
	Loud Impulse Sounds?	○ Yes ○ No

Figure 6-15 Rail Input Screen

Rail # 1		
Train Type	**Electric** ☐	**Diesel** ☑
Effective Distance		100
Average Train Speed		19
Engines per Train		1
Railway cars per Train		27
Average Train Operations (ATO)		1
Night Fraction of ATO		0
Railway whistles or horns?	Yes: ☐ No: ☐	Yes: ☑ No: ☐
Bolted Tracks?	Yes: ☐ No: ☐	Yes: ☑ No: ☐
Train DNL		59.5125
Calculate Rail #1 DNL	59.5125	Reset

Figure 6-16 Rail Sample

Road # 1 Name:			
Road #1			
Vehicle Type	**Cars** ☐	**Medium Trucks** ☐	**Heavy Trucks** ☐
Effective Distance			
Distance to Stop Sign			
Average Speed			
Average Daily Trips (ADT)			
Night Fraction of ADT			
Road Gradient (%)			
Vehicle DNL			
Calculate Road #1 DNL		Reset	

Figure 6-17 Truck Input Screen

Road #1			
Vehicle Type	**Cars** ☐	**Medium Trucks** ☐	**Heavy Trucks** ☑
Effective Distance			100
Distance to Stop Sign			100
Average Speed			50
Average Daily Trips (ADT)			77
Night Fraction of ADT			0
Road Gradient (%)			4
Vehicle DNL			58.518
Calculate Road #1 DNL	58.518	Reset	

Figure 6-18 Truck Sample

6.11. Air Quality – CO_2

Air Quality means the state of the air around us. Good air quality refers to clean, clear, unpolluted air. Poor air quality occurs when pollutants reach high enough concentrations to endanger human health and/or the environment. Air pollutants include chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or damage the natural environment into the atmosphere.

EPA's Office of Transportation and Air Quality (OTAQ) has developed the MOtor Vehicle Emission Simulator (MOVES). This new emission modeling system estimates emissions for mobile sources covering a broad range of pollutants and allows multiple scale analysis. MOVES currently estimates emissions from cars, trucks & motorcycles. We plan to add the capability to model non-highway mobile sources in future releases (EPA 2014),

The steps provide below focuses only on the CO2 calculations using the information provided by the Carbon Fund at the following URL:

<http://www.carbonfund.org/how-we-calculate#ShippingCalculator>

<u>Step 1:</u> Calculate the shipping emissions generated by the train.

This calculation can be done using the following formula with the shipping emission factors shown in Figure 19

Transportation CO2 = Ton Pound of Freight * Distance in Miles * Shipping Emission Factors

- Air cargo – 1.527 kg CO_2 per Ton-Mile
- Truck - 0.297 kg CO_2 per Ton-Mile
- Train - 0.0252 kg CO_2 per Ton-Mile
- Sea freight - 0.048 kg CO_2 per Ton-Mile

Figure 6-19 Shipping Emission Factors (Source: CarboFund 2014)

For example 365 trains per year with 27 box cars per train with a load of 100 tons each car traveling 20 miles would result in 19,710,000 Ton-Miles and 496,692 kg CO2 in one year.

<u>Step 2:</u> Calculate the shipping emissions generated by truck transportation using the same formula and shipping emission factors shown above.

For example the same 19,710,000 ton-miles transported in trucks would result in 5,852,870 kg CO2 in one year.

<u>Step 3:</u> Calculate the difference between the “Rail” and “Truck” CO2 emission by subtracting one from the other.

In this particular example, the addition of trucks to the road has a negative effect in the CO2 emission by increasing the CO2 emission 5,357,178 Kg per year from 496,692 Kg CO2 per year to 5,853,870 Kg CO2 per year.

However, it is important to notice that these calculations only focus on CO2 and there many other chemicals, particulate matter or biological materials that could be affected by the different modes of transportation.

6.12. Environmental Impact from Hazardous Material

In addition to the normal environmental impact of freight movement, one special category is the environmental impact in the event of accidents involving the transportation of Hazardous Materials (HAZMAT). According to the EPA about 12 million tons of hazardous waste are transported each year for treatment, storage, or disposal (EPA, 2014). The Federal Motor Carrier Safety Administration's Office of Information Management indicates that for the years 1991 to 2000 transportation of flammable liquids accounted for almost half of all fatal truck crashes involving hazmat, also for the years of 1980 to 1990, in average 225 large trucks carrying hazardous materials were involved in fatal crashes and during the same period 6,000 large trucks carrying hazmat where involved in non-fatal crashes annually (Hunt 2014). The federal railroad administration indicates that for all hazardous materials, for the years 1994 to 2005, hazardous materials released in highway accidents resulted in a total of 116 fatalities while in the same period hazardous materials released in railroad accidents resulted in a total of 14 fatalities (U.SDOT, 2014). Further the Hazmat accident rates have been declining as shown in Figure 6-20.

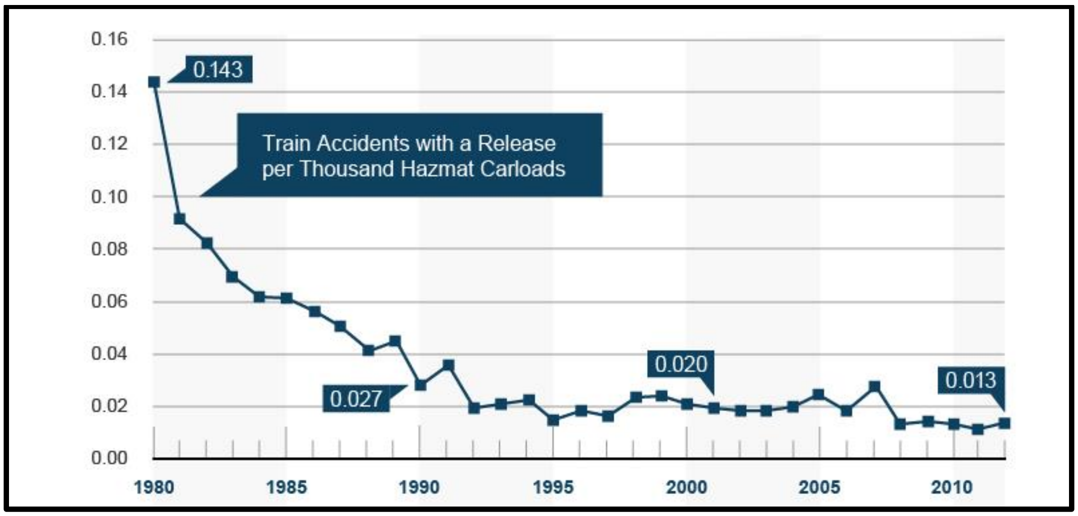


Figure 6-20 Hazmat Accident Rate from 1980 till 2010 (Source: AAR 2014)

The movement of Hazmat is regulated by several federal agencies such as the Department of Transportation (DOT), the Occupational Safety and Health Administration (OSHA) the Environmental Protection Agency (EPA).

Trucks regulations for Hazmat transportation can be found at the Federal Motor Carrier Safety Administration web page at the following URL:

<http://www.fmcsa.dot.gov/regulations/title49/section/385.1>

Rails regulations for Hazmat transportation can be found at the Federal Railroad Administration web page at the following URL:

<http://www.fmcsa.dot.gov/regulations/title49/section/385.1>

A report on environmental health and public safety, and social impacts associated with transportation accidents involving hazardous substances can be found at:

<http://unix.eng.ua.edu/~rpitt/Publications/BooksandReports/transportation%20accidents%20involving%20hazardous%20materials.PDF>

7. SUMMARY, RECOMMENDATIONS AND FUTURE RESEARCH

For the purposes of this study, researchers were tasked to collect and assess data provided by the main stakeholders of the shortline industry environment. The survey took place in the CFIRE region and shortline railroads operating within the region, their customers and state DOTs were contacted and asked to participate in a questionnaire based survey.

The shortline railroads that participated were in their majority commercially oriented and employed full-time personnel approximately in a 97.5% rate, with an average of 27 employees per company. They most likely own their own equipment and in certain cases they lease necessary equipment from other companies. In similar manner, most of the companies perform ‘’in house” equipment maintenance, while occasionally some of them outsource maintenance to third parties or do both. No safe assumption can be made on whether these companies were profitable in the past years (in a surveyed time domain between 2003 through 2013), due to lack of data, but most probably the trend of their representatives’ replies shows profitable behavior in the period under survey. They serve an average of 14 customers per company and most of them operate 7 days a week and or are flexible to operate during weekends in order to meet customers’ needs. The railroad length that most companies utilize is on average 71.5 miles with a minimum mileage of 8 up to 180 miles. Approximately 33% of the surveyed companies can serve 286,000 lbs. cars throughout their network, while 25% of the rest can partially serve 286,000 lbs. cars as well.

The infrastructure being utilized is in good/fair condition with only exception rail bridges. Most of the companies have developed a CIP, but the vast majority was unwilling to reveal it for survey purposes. Shortline companies’ representatives consider that the most important infrastructure improvements relate with bridge and rail tracks upgrades but also point out the necessity for more space or other space utilization enhancing solutions, if available (especially those shortlines that are landlocked from other companies). According to their representatives these upgrades can make the shortlines more attractive, when compared with competitive modes (mostly trucks and barges in some cases), to existing or prospect customers as they could provide them with faster and more reliable service. Also, shortlines have competitive advantages against their main competitor (trucks), when market demands low cost transport of heavy, bulky freight. Thus, the aforementioned infrastructure improvements supported by the fact that the shortlines participating in this survey are connected with Class I railroads could, substantially, lead in attraction of more new enterprises in their “sphere of influence” with beneficial results for both the shortlines and the local community.

In order to overcome operational challenges and according to the shortline representatives’ opinion the State and or Federal policies should focus on the shortline market as a whole giving incentives and funding for both the shortline companies (for maintenance and improvement projects) but also their customers (in order to be motivated in investing in rural - shortline served areas). Furthermore, they request a less confusing and more stable (in terms of frequent changes) regulation system that allows them to operate in a sustainable manner.

On the customer side, and even though the participants' number is small in order to make any safe assumptions, the responses given can be useful for stakeholders and policy makers as well. The companies that participated in this survey are all shortline customers and they cooperate with Class III railroads in order to ship /receive products/raw materials and the transported volume varies according to company size and seasonal characteristics from 3 carloads per month up to 110 carloads per week. In all facilities there is direct (on-site) rail access and the most common reason for using Class III railroads for moving their products is the low-cost of transport followed by the texture of the goods that are moved (heavy or bulky materials). Their main alternative in moving their goods or receiving raw materials are trucks, which provide faster shipping/receiving times, but more expensive when compared with shortlines. They are well aware of the freight market, as relevant cost analyses are regularly being performed, but the switch from the mode under study to its main competitor (trucks) is most often if not always based on need for faster delivery times where the cost is less important. The most important factor for sustaining or increasing the cooperation with the shortlines according to them is time consistency of delivery times (both for shipping and receiving). Also, additional land purchase (when the companies are not landlocked) needed to add more rail lines, would be the second factor followed by the necessary handling/loading equipment. It can be said that the key phrase for the shortline customers is “delivery time consistency”. Thus, reliability in terms of delivery time and care to minimize damages/losses for their transported goods as well as contemporary tracking – information technologies would seem to be enough to make the shortlines competitive in the freight market and provide a sustainable environment for both customers and Class III railroads.

Out of the four state DOTs contacted only one accepted to participate and provide information for the study. Approximately 20 employees are responsible to support and or regulate railroads and there is no State Railroad Commissioner position in this specific state. The total length of rail tracks in this state is 2542 miles out of which 898 are owned and operated by ten shortlines dedicated to freight transportation, seven of which are private companies. The condition of railroad network is controlled by state inspections and the state provides improvements/maintenance funding to the shortlines in the form of Multi-Modal Funds. The amount of this funding was $1,200,000 per year for the years 2007 and after. This funding was most frequently requested for rail truck rehabilitation and cross-ties replacement followed by ballast replacement. Less frequently, shortlines requested funding for rail expansions, surface improvements, bridge rehabilitation or other improvements.

Taking under consideration the significance of shortlines for the viability of rural economies as well as the total public benefit from their operation publicly sponsored programs should be established in order not only to promote the shortline sustainable operation but also to support all industries that need reliable cost effective freight rail transportation. State rehabilitation grants, loans or combinations of grants and loans can provide the basis for a sustainable shortline environment. Tax incentives could also lead to an improving direction towards a better, safer and more competitive shortline railroad business environment. Future research should focus on the linkage between access to rail service and economic competitiveness as well as livability of rural communities. As studies in other states have shown, shortline operations are economically supporting some of the poorest areas within a state. Thus, investment strategies and policy issues as well as community initiatives that will support attraction and retention of rail access and thus job creation in rural areas, should be proposed. Further, recommendations could be developed that can be used by government agencies and other stakeholders to evaluate and plan programs, policies and investments to attract and retain rail access to Class I railways.

Finally, a step-by-step guide for communities that face the possibility of short rail line abandonment provides information on the data that needs to be collected and how to run the numbers for a basic economic, transportation, and environmental forecast of the loss of the railroad. The results can be used by communities as a means to communicate what the loss of the railroad will mean for the region. It provides some of the basic numbers needed for the policy process.

The results of the scenario in this exercise show that the loss of the railroad will have a negative impact on the community (See Table 6-11). Because of the nature of the scenario with just a 20 mile rail line and two shippers, the results are not dramatic. The scenario did not include the loss of businesses (other than the railroad) or the ramifications of the decreased ability to attract new industry. In an actual analysis all the potential positive and negative consequences of rail line abandonment need to be considered.

Table 7-1 Efficiency Measure

Analysis Components	Outputs/Results	Scenario Results
Economic Impact Analysis	Job impact	Loss of 10 jobs
	GDP impact	Loss of $1m
	Earnings Impact	Loss of $1m
	Personal Consumption Expenditure Price	Loss of $1m
	Population	6 less people
Transportation Impact	Pavement Cost	$18,642
	Congestion Cost	$10,620
	Crash Cost	$4,971
	Air Pollution Cost	$21,749
	Noise Cost	$9,604
Environmental Review	Energy Consumption	3,032,308 gallons
	Noise	59.5125 db
	Air Quality – CO_2	5,357,178 Kg per year

8. REFERENCES

1. AAR (2014) “Hazardous Materials Transportation”, Association of American Railroads, Retrieve June 2014 from https://www.aar.org/safety/Pages/Hazardous-Materials-Transportation.aspx
2. Adams, T., & Marach, B. (2012). Benefit-Cost Analysis Preparation Guidelines for TIGER Grant Applications. National Center for Freight and Infrastructure Research and Education, Madison, WI.
3. Alabama Department of Transportation. (December 2008). 2008 Alabama Rail Plan. Retrieved from http://www.southernhsr.org/PDFs/rail-plan_ala-2008.pdf
4. Allen W, Sussman M, and Miller D. (2002) Regional and short line railroads in the United States. Transportation Quarterly 56:77-113.
5. American Association of State Highway and Transportation Officials (AASHTO) (2013) Standing Committee on Rail State Initiatives. URL http://rail.transportation.org/Pages/rail_success.aspx
6. American Association of State Highway and Transportation Officials (AASHTO) (2013) Standing Committee on Rail State Initiatives Retrieved from on July 24, 2013 from: http://rail.transportation.org/Pages/rail_success.aspx
7. American Short Line and Regional Railroad Association (ASLRRA) (2011). *Short Line and Regional Railroad Facts and Figures*. (7 edn). ASLRRA, Washington, DC
8. American Short Line and Regional Railroad Association (ASLRRA) (2011). *Short Line and Regional Railroad Facts and Figures*. (7 edn). ASLRRA, Washington, DC
9. “An Overview of Transportation Infrastructure and Services in the Northern Great Plains Region: Executive Summary.” May, 2000.
10. Association of American Railroads (2013) *Freight Railroads in Mississippi*. The Association of American Railroads, Washington, DC Available electronically at: http://www.tomorrowsrailroads.org/stlouis.pdf
11. Babcock M, Russell E, Prater M, Morrill J (1993) State short line railroads and the rural economy. In *Report No. K-TRAN: KSU-93-2*. Midwest Transportation Center, Ames, IA
12. Babcock, M, Sanderson J (2006) Should shortline railroads upgrade their systems to handle heavy axle load cars? *Transportation Research Part E: Logistics and Transportation Review* 42:149-166
13. Babcock, Michael W and Marvin Prater. "Determinants of Profitability of Grain Dependent Short Line Railroads." *Transportation Research Part E: Logistics and Transportation Review* 34, no. 3 (1998): 187-200.
14. Babcock, Michael W., and James L. Bunch. "Energy Use and Pollutant Emissions Impacts of Shortline Railroad Abandonment." *Research in Transportation Economics* 20, no. 0 (2007): 225-257.
15. Baldwin, F (2001) Short line railroads: Local lifelines for business. *Appalachia Magazine*. May-August: 14
16. Batson, J, Bearer M, Norton J (1997) *Maintaining local rail freight service*. U.S. Department of Agriculture, Agricultural Marketing Service, Washington, DC

17. Betak, J, Theofanis, S, Boile M. (2009) *Short line rail: Its role in intermodalism and distribution* (No. RAIL-RU4474). Center for Advanced Infrastructure & Transportation, Civil & Environmental Engineering, Rutgers, NJ
18. Betak, John F. *Short Line Rail: Its Role in Intermodalism and Distribution*. RAIL-RU4474 vols. Rutgers, The State University. 2009.
19. Bitzan, J, VanWechel T, Benson D, Vachal K (2003) *The importance of short line railroads to rural and agricultural America*. Upper Great Plains Transportation Institute, North Dakota State University
20. Blanchard, R., (2006), The value-added shortline railroad. *Midwest Association of Rail Shippers*. Ithasca, IL.
21. Borchardt, John, (2012) Shortline Railroads Help Keep Economic Growth On Track Area Development (Fall) Retrieved from: http://www.areadevelopment.com/logisticsInfrastructure/Fall2012/shortlines-serving-industrial-customers-grows-2662511.shtml
22. California Shortline Railroad Association (2009) *California shortline railroad association*. URL: http://www.cslra.org/index.php
23. Cambridge Systematics, Inc., Economic Development Research Group, Inc., & Boston Logistics Group, Inc., (2006). Guide to Quantifying the Economic Impacts of Federal Investments in Large-Scale Freight Transportation Projects. Prepared for U.S Department of Transportation, Washington DC.
24. Carey, Bill. "Clock Ticks on LCV 'Truce'." Traffic World (May 8, 2006): 23.
25. Conant, M. "Railroad Bankruptcies And Mergers From Chicago West 1975-2001: Financial Analysis And Regulatory Critique." Research in Transportation Economics Vol.7 (2004).
26. Congressional Budget Office, "Freight Rail Transportation: Long-Term Issues". Washington, DC. 2006.
27. "Construction and Forecast of Freight Traffic Data for the Wisconsin State Rail Plan." Reebie Associates. February, 2002.
28. "Corridors 2020: Review and Update." Wisconsin Translinks. June, 1994.
29. Cox, Wendell. "How America's Freight Railroads Can Relieve Traffic Congestion in St. Louis." Wendell Cox Consultancy. 2005.
30. CSX (2010) "Railroad Equipment" Retrieved May 2014 from http://www.csx.com/index.cfm/customers/equipment/railroad-equipment/
31. Dorin, Patrick. The Canadian National Railway's Story. Burbank: Superior Publishing, 1975.
32. Due, J, Leever, S, Noyes, T (2002) The experience with new small and regional railroads, 1997-2001. *Transportation journal* 42:5-19
33. Due, John F., Suzanne D. Leever, and Thomas Noyes. "The Experience with New Small and Regional Railroads, 1997-2001." Transportation Journal 42.1 (2002): 5-19.
34. EPA (2014), "MOVES - Motor Vehicle Emission Simulator" Retrieved May 2014 from http://www.epa.gov/otaq/models/moves/index.htm
35. EPA (2014), "Resource Conservation and Recovery Act (RCRA) – Fact Flash)" Retrieve June 2014 from http://www.epa.gov/superfund/students/clas_act/haz-ed/ff_06.htm

36. Evers, Phillip T., Donald V. Harper, and Paul M. Needham. "The Determinants of Shipper Perceptions of Modes." Transportation Journal (1996): 13-25.
37. Federal Railroad Administration (2012). Railroad Rehabilitation & Improvement Financing (RRIF): Program Overview. Retrieved December 10, 2012 from http://www.fra.dot.gov/Page/P0128
38. Federal Railroad Administration (2013) Grants & Loans. URL: https://www.fra.dot.gov/Page/P0021
39. Feser, E, Cassidy, G (1996) Rethinking state rail policy: The benefits of rail preservation include more than jobs. *Policy Studies Journal* 24:57-73
40. FHWA (2011), "Comprehensive Truck Size and Weight (CTS&W) Study" Retrieved May 2014 from http://www.fhwa.dot.gov/reports/tswstudy/Vol2-Chapter3.pdf
41. FHWA (2014), "NEPA Documentation" Retrieved May 2014 from http://www.environment.fhwa.dot.gov/projdev/docuea.asp
42. Fischer, Philip Anthony John D. Bitzan and Denver Tolliver. "Analysis of Economies of Size and Density for Short Line Railroads." Masters, North Dakota State University, 2000.
43. "Five-Year Strategic Plan for Railroad Research, Development, and Demonstrations." Federal Railroad Administration, U.S. Department of Transportation. March, 2002.
44. "Freight Movement Study." Metropolitan Interstate Committee, a joint venture of the Arrowhead Regional Development Commission and Northwest Regional Planning Commission. March, 1997.
45. "Freight Transportation: Strategies Needed to Address Planning and Financing Limitations." U.S. General Accounting Office. GAO-04-165. December, 2003.
46. Gallagher, John. "Incentives But Shippers Say Their Patience is Overtaxed." Traffic World (May 8, 2006): 10-11.
47. Gillis, Chris. "Building DCs – Wal-Mart Style". American Shipper (April, 2006).
48. Gordon, Randall C. "Changing dynamics of U.S. rail system explored at NGFA symposium." NGFA Rail Transportation Symposium Special Report. May 18, 2000.
49. "Growing Wisconsin's Economy." Wisconsin Department of Transportation. July, 2002.
50. Harrison, E. Hunter. How We Work and Why: Running a Precision Railroad. Montreal: CN Railroad Company, 2005.
51. HUNT, J (2014), "Transportation of Hazardous Materials (Hazmat) Insurance", Retrieved June 2014 from http://insurancecompanyreviews.about.com/od/Latest_Insurance_Industry_News/a/Transportation-Of-Hazardous-Materials-hazmat-Insurance.htm
52. HUD (n/d), "Noise Assessment Training" Retrieved May 2014 from http://portal.hud.gov/hudportal/documents/huddoc?id=DOC_14222.pdf
53. Illinois Department of Transportation. (December 2012). Illinois State Rail Plan. Retrieved from http://www.dot.il.gov/ilrailplan/pdf/Illinois%20State%20Rail%20Plan_Report_Final_Dec-2012.pdf
54. Indiana Department of Transportation (2011). Indiana State Rail Plan.

55. Johnson J, McClure D, Schneider K, Wood D (2004) Shortline railroad managers discuss their industry. *Transportation* 31:97-123
56. International Economic Development Council (2006), Business Retention and Expansion. IEDC, Washington, DC.
57. Keeler, Theodore E. "Railroad Costs, Returns to Scale, and Excess Capacity." *The Review of Economics and Statistics* 56, no. 2 (1974): 201-08.
58. Kirk, R., et. al (2012) Surface Transportation Funding and Programs Under MAP-21: Moving Ahead for Progress in the 21st Century Act (P.L. 113-141) Retrieved on November 26, 2012 from http://www.crs.gov/Products/R/PDF/R42762.pdf
59. Michigan Department of Transportation (2011). Michigan State Rail Plan.
60. Minnesota Department of Transportation (2010). Minnesota Comprehensive Statewide Freight and Passenger Rail Plan.
61. Mississippi Department of Transportation. (June 2011). Mississippi State Rail Plan. Retrieved from http://sp.gomdot.com/Intermodal%20Planning/Freight,%20Rails,%20Ports%20and%20Waterways/Documents/Mississippi%20State%20Rail%20Plan.pdf
62. Mississippi Development Authority (2010). “Freight Rail Program (RAIL).” Retrieved from http://www.mississippi.org/helping-our-communities/infrastructure-grants-and-loans/freight-rail-program-rail.html
63. Mississippi Development Authority (2010). “Mississippi Rail Grant Program (RAIL).” Retrieved from http://www.mississippi.org/index.php?id=10188
64. NEPA (2014a) “Environmental Assessments & Environmental Impact Statements” Retrieved May 2014 from http://www.epa.gov/reg3esd1/nepa/eis.htm
65. NEPA (2014b) “Environmental Assessments & Environmental Impact Statements” Retrieved May 2014 from http://www.epa.gov/reg3esd1/nepa/eis.htm
66. Ohio Department of Transportation (2010). Ohio Statewide Rail Plan.
67. Oak Ridge National Laboratory (2013), “2013 Vehicles Technologies Market Report” Retrieved May 2014 from http://cta.ornl.gov/vtmarketreport/pdf/chapter3_heavy_trucks.pdf
68. Ohio Rail Development Commission, Ohio Department of Transportation (February 2013). “Freight Rail Planning and Projects”. Retrieved from http://www.dot.state.oh.us/Divisions/Rail/Programs/freight/Pages/default.aspx
69. Ohio Rail Development Commission, Ohio Department of Transportation (February 2013). “Public Private Partnerships with Shortline Railroads”. Retrieved from http://www.dot.state.oh.us/groups/tft/Appendix%20C/Economic%20Development%20subcommittee/WCallisonShortLineRRs.pdf
70. Plant J (2002) Railroad policy and intermodalism. *Policy Choices after Deregulation. Review of Policy Research* 19:13-24
71. Prater, Marvin, and Michael W. Babcock. "Grain-Dependent Short Line Railroad Profitability: An Operating Cash Flow Approach." *Transportation Journal (American Society of Transportation & Logistics Inc)* 38, no. 2 (1998): 18-31.
72. Regional Economic Models, Inc. (2007) “Model Documentation,” Retrieved May 2014 from www.remi.com/.../Policy_Insight_9-5_Model_Documentation.pdf
73. Science Buzz (2014) “Freight Trains Miles Per Gallon” Retrieved May 2014 from http://www.sciencebuzz.org/blog/freight-train-miles-gallon

74. Sternberg M, Banks C (2006) Short line railroads in economic development. *Economic Development Journal* 5:16-23
75. Stewart, R. D., R. C. Williams, J. P. Bausano, and A. M. Pagano. "Rail to Truck Modal Shift: Impact of Increased Freight Traffic on Pavement Maintenance Costs." Midwest Regional University Transportation Center, University of Wisconsin--Madison, 2008.
76. Stich B, Miller C (2008) Using the Advocacy Coalition Framework to Understand Freight Transportation Policy Change. *Public Works Management & Policy* 13 (1):63-74.
77. Stich B, Miller C (2012) A new public philosophy for a new railroad era: Applying the Blacksburg Manifesto to contemporary transportation issues. *Administration Theory &* Praxis. 34:603-623
78. Tennessee Department of Transportation. (2003). Tennessee Rail Plan. Retrieved from http://www.tdot.state.tn.us/publictrans/railplan/index.htm
79. United States Department of Transportation. “TIGER Grants.” dot.gov. October 12, 2012. http://www.dot.gov/tiger
80. United States Department of Transportation. “Transportation Investment Generating Economic Recovery (TIGER) Grants.” dot.gov. February 17, 2010. http://www.dot.gov/sites/dot.dev/files/docs/Tiger_I_Awards.pdf
81. United States Department of Transportation (2014), “Hazardous Materials Transportation”, U.S Department of Transportation Federal Railroad Administration, Retrieve Jun 2014 from https://www.fra.dot.gov/Page/P0151
82. Warner J, Terra M (2005) *Assessment of Texas short line railroads*. Texas Transportation Institute, College Station, TX
83. Weisbrod, G., & Weisbrod, B. (1997). Assessing the Economic Impact of Transportation Projects. Economic Development Research Group, Boston, MA.
84. White, R. (2011). *Railroaded: the transcontinentals and the making of modern America*. WW Norton & Company.
85. Wikipedia (2014), “Decibel” Retrieved June 2014 from http://en.wikipedia.org/w/index.php?title=Decibel&oldid=611906833
86. Winston, Clifford. *The Success of the Staggers Rail Act of 1980*. AEI-Brookings Joint Center for Regulatory Studies, 2005.
87. Wisconsin Department of Transportation (2010). Wisconsin Rail Plan 2030.

9. APPENDIX

9.1. Shortline companies sample questionnaire

SHORTLINE DATA FORM

Survey for CFIRE Tier 1 UTC – RI -7 Rural Rail Expansion Research Project

Please note: All information will be kept confidential and data will be aggregated so that individual companies cannot be identified in any publication.

I. Shortline Railroad Information: Date: ___/___/______

1. Shortline Name: ____
   Physical Address: ____

2. Company Representative: ____
   Position: ____
   Contact Information: ____
   Email: ____
   Phone: ____
   Web URL ____

3. What is the Business Structure of the Shortline?
   - ❑ **For-Profit**
   - ❑ **Non-Profit**
   - ❑ **Government**
   - ❑ **Other** ______________________________

4. What is the number of employees working for the Shortline?
   Full Time: #____________ **Part Time: #**__________ **Contracted Labor: #**__________

5. Is the Locomotive equipment used on the Shortline:
   - ❑ **Leased**
   - ❑ **Purchased**

6. Is the Rail/Locomotive equipment maintenance done on the Shortline:
   - ❑ **In-house**
   - ❑ **Outsourced**

7. What is the Shortline's revenue for last 10 years?

Year	Revenue (in $)
2003	
2004	
2005	
2006	
2007	
2008	
2009	
2010	
2011	
2012	

8. Please indicate which years the Shortline was profitable in: (check all that apply)

- ❑ 2000
- ❑ 2010
- ❑ 2005
- ❑ 2013

9. Does the Shortline have other sources of financial support? Please explain.

____

____

10. How many clients does the Shortline serve?

____

11. What number of clients' shifts are served?

____

12. What days does the Shortline operate? (circle all that apply)

S M T W R F S

13. What is the annual line maintenance costs for 2011?

$ ____

14. What is the annual equipment maintenance costs for 2011?

$ ____

II. Rail Infrastructure:

15. What is the current length of railroad track? ____________miles

16. Are your lines equipped to hand 286,000 lb rail cars?

    ❑ No

    ❑ Yes

17. Please rate the condition of the Shortline Infrastructure components below:

	Good	Fair	Poor	Other (Please Explain)	Comments
Rail Bed					
Rail Ties					
Rail Line					
Rail Bridges					
Rail Cars					
Intersection Signals					

18. Have you developed a Capital Improvement Plan for the Shortline Railroad?

    ❑ No (Skip to Q-21)

    ❑ Yes (Ask Q-20)

19. If you have a Capital Improvement Plan, can we obtain a copy of the Plan?

    ❑ No

    ❑ Yes

20. What infrastructure improvements are needed today?

    ____

21. What infrastructure improvements are needed in the next 5 years?

22. In terms of rail replacement, please identify level of need for each infrastructure component.

	Absolutely Critical	Very Important	Important	Somewhat Important	Not At All Important	Comments
Rail Bed						
Rail Ties						
Rail Line						
Rail Bridges						
Rail Cars						
Intersection Signals						

23. What are the expected benefits from these possible infrastructure improvements?

24. Do you anticipate significant increase in traffic levels therefore creating increased revenue after these infrastructure improvements are completed?

- ❑ **No**
- ❑ **Yes**

25. What types of new customers could you serve with infrastructure improvements?

26. Are any of your customers utilizing Congestion Mitigation and Air Quality (CMAQ) proposals or tax incentives for rail sidings?

❑ No ❑ Yes ❑ Not Applicable

III. Rail Connections:

27. List up to 5 types of goods transported via the Shortline Railroad

1.__________________________________

2.__________________________________

3.__________________________________

4.__________________________________

5.__________________________________

28. How many railroads does this Shortline rail connect with? ____________

29. How many cars are switched per day/week/month with each of these other lines? (check one column per rail line)

Railroad Connection	Name of Rail Line Owner	More than one carload a week	Less than one carload a week	More than one carload per month	Less than one carload per month	Never
1	BNSF					
2	UP					
3	CSX					
4	NFS					
5	KS					
6	CN					
7	CP					
8	Other:					
9	Other:					
10	Other:					

30. Please share input regarding your relationship with Class I railroads?

____

____

31. What unique capabilities does this railroad have? (e.g. loading, storage, etc.)

____

____

32. What transport alternatives exist for your customers? (check all that apply)

- ❑ Rail ❑ Truck ❑ Water ❑ Pipeline ❑ Air ❑ Other

33. What impact does the use of your railroad have on lowering your clients' production costs? (select all that apply)

- ❑ Transportation cost for inbound materials
- ❑ Transportation cost for outbound materials
- ❑ Other costs: ___________

34. Can the freight shipped on your railroad be transported by truck?

- ❑ No (If No, Skip to Q-37)
- ❑ Yes (If Yes, Go to Q-36)

35. If Yes to Q-34, approximately how many road miles are displaced?

- ❑ Less than 5 miles
- ❑ 6-25 miles
- ❑ 26-50 miles
- ❑ 51 (+) miles

36. Do you think there is potential for company expansions because of your rail line? Please explain.

____

____

37. Do you think there is potential to attract new companies to the area because of your rail line? Please explain.

____

____

38. Are there significant operational challenges faced by the Shortline railroad regularly? If yes, what?

____

____

39. Are there state or local policies/barriers inhibiting the success of the Shortline? If yes, what?

40. If new economic incentives were created to assist your railroad, what will most help you?

41. Would you be willing to disclose economic impact information concerning the Shortline railroad?

❑ No ❑ Yes

The next four questions are State-specific. Mark N/A for each question if not applicable to your railroad.

42. Did you request any funding from a state DOT Shortline Assistance Program in the years below? Indicate funds received also.

	Funds Requested								Funds Received							
	< $50k	$50k-$100k	$100k-$150k	$150k-$200k	$200k-$300k	$300k-$400k	$400k-$450k	>$450k	< $50k	$50k-$100k	$100k-$150k	$150k-$200k	$200k-$300k	$300k-$400k	$400k-$450k	>$450k
2003																
2004																
2005																
2006																
2007																
2008																
2009																
2010																
2011																
2012																

43. If received funding from a state DOT Shortline Assistance Program – indicate how the funds were used? (Estimated Dollars)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Replacement of cross- ties										
Rehabilitation of Rail										
New Rail(System Expansion)										
Maintenance of Rolling Stock										
Purchase of new cars										
Bridge Rehabilitation										
Replacement of ballast										
Surface Improvements										
Other										

44. Please indicate any increase in productivity since receiving funds from state DOT Shortline Assistance program. (Include increases in revenue, accrual of new business, increase in customers, etc)

Year	Less than 10%	10% to 20%	20% to 30%	More than 30%
2003				
2004				
2005				
2006				
2007				
2008				
2009				
2010				
2011				
2012				

45. In the last ten years, what amount of economic benefit (job creation, serving new business) that are a result of state DOT Shortline Assistance Program?

Year	Job Creation			New Business		
	Significant	Medium	Insignificant	Significant	Medium	Insignificant
2003						
2004						
2005						
2006						
2007						
2008						
2009						
2010						
2011						
2012						

9.2. Shortline customers sample questionnaire

Survey for CFIRE Rural Rail Expansion Research Project

Affected Industries (Customers) **- Users of Rail Transportation**
Please note: All information will be kept confidential and data will be aggregated so that individual companies cannot be identified in any publication.

I. Company Information: Date: ___/___/______

1. Company: ____
   Address: ____

2. Company Representative: ____
   Position: ____
   Contact Information: ____
   Email: ____
   Phone: ____

3. What is estimated total sales for your company's plant(s) location within the state for 2012?
   $_______________

4. What primary products do you produce and what are their shipping dimensions? (e.g., dimensional lumber (board feet), chips (Cubic feet), pulp (cubic and mass)
   ____
   ____

5. What raw materials or semi-finished products do you use? (e.g., round wood, chips, pulpwood)
   ____
   ____

II. Rail Usage:

6. Did you use rail in the past and have stopped using rail?
   ❑ No

❑ **Yes** (if yes please check appropriate boxes below as to why you quit)

Rationale for stopping the use of rail - please check all that apply

- ❑ Poor frequency of service to loading facility
- ❑ Cost
- ❑ Damage
- ❑ Shipping time
- ❑ Reliability of service to end customer
- ❑ Customer service from railroad(s) to you
- ❑ Other: Please describe ______________________________

____

Where was the facility located?
City__________________________________ State ______________________________
City __________________________________ State _______________________________

7. Do you currently use rail for any freight movements?

❑ **No** (If No - Skip down to Question #_18_ of section II)

❑ **Yes** (if yes please answer questions below

Where is the facility located?
City__________________________________ State ______________________________
City__________________________________ State ______________________________

Rational for using rail – please check all that apply

- ❑ Customer service from railroad(s) to you
- ❑ Cost
- ❑ Type of cargo shipped is best suited to rail shipment
- ❑ Reliability
- ❑ Damage reduction
- ❑ Improved Shipping time
- ❑ Greener supply chain
- ❑ Other - Please describe ______________________________

____

8. Do you have direct rail access (i.e., on-site) from your facility?

❑ **No** ❑ **Yes**

Where is the facility located?
City__________________________________ State ______________________________

9. If you are using non-intermodal rail transport but don't have direct access, how many miles are you located from the railway site(s)? _______________ one way miles

10. Do you think the ramp or spur you are using is very busy and affecting the time it takes to process your shipments?

❑ **No** ❑ **Yes**

11. Do you use a rail served intermodal terminal?

❑ **No** ❑ **Yes** Distance to terminal one way ____________miles

12. List the Class I Railroad Line(s) your company freight is shipped on within the state:

Class 1 Railroad	More than one carload a week	Less than one carload a week	More than one carload a month	Less than one carload a month	Never
BNSF					
UP					
CSX					
NFS					
KS					
CN					
CP					

13. If your company is utilizing a shortline to move freight – what is the distance the freight is hauled to the ramp or spur? _________________

14. If utilizing a shortline – what is the name of the shortline and who owns it?

____

15. Volume of business (in car loads, tons, or dollars) that your company ships/receives by rail

Year	Volume
2000	
2005	
2010	
2011	

2012	

16. List up to 5 types of goods transported via rail by your company
    1.______________________________________
    2.______________________________________
    3.______________________________________
    4.______________________________________
    5.______________________________________

17. Did your company use any CMAQ proposals or tax incentives for rail sidings at your facility?

    ❑ **No** ❑ **Yes**

III. Increasing rail transportation

18. On average, how long in days does it take for a shipment to go from your door to your customer's door?
    - By Rail __________ days
    - By Truck ________ days
19. On average, how long in days does it takes for a shipment by to go from your supplier's door to yours?
    - By Rail __________ days
    - By Truck ________ days

20. Would you be willing to increase your rail usage if a new rail spur or other improved rail access was more convenient to your location?"
    ❑ **No** ❑ **Yes**

21. When have you done a total cost analysis to determine if a modal shift (truck to rail) would reduce costs, increase reliability or in any way provide a better supply chain?
    ❑ **Never** ❑ **Annual** ❑ **Every 2-3 years** ❑ **Every 3-5 years**

22. What would be necessary for your company to increase its use of rail transportation for receiving raw materials or semi-finished products? **(Explain below)**

    ____

23. What would be necessary for your company to increase its use of rail transportation for shipping goods? **(Explain below)**

Transportation's impact on your Supply Chain:

24. Do you believe transportation costs are a major competitive issue for your industry domestically?

❑ **No** ❑ **Yes**

25. Do you believe transportation costs are a major competitive issue for your industry internationally?

❑ **No** ❑ **Yes**

26. Please rate the importance of the following transportation factors applicable to all modes using the Likert Scale where 1 = not important up to 5 = critical.

Factor	Not Importance 1	2	3	4	Critical 5
vehicle characteristics – type of railcar, size of truck, etc.					
Cost					
Geographic coverage					
Just in time delivery					
Loss or damage rate					
Real time information availability					
Reliability					
Your final customer satisfaction					
Timely delivery					
Payment terms					
Fuel, demurrage and other accessorial charges					
A cooperative attitude by carrier to your SC needs					

Environmental impact (a green supply chain)					
Other:________ **(List)**					

Public Private Interaction

27. What improvements or initiatives for transportation can be made by local government officials in the short-term and the long-term that could increase your competitiveness in domestic/international markets?

28. What improvements or initiatives for transportation can be made by state government officials in the short- and long-term that could increase your competitiveness in domestic/international markets?

29. What improvements or initiatives for transportation can be made by federal government officials in the short- and long-term that could increase your competitiveness in domestic/international markets?

30. What improvements or initiatives for transportation can be made by private transportation companies in the short- and long-term that could increase your competitiveness in domestic/international markets?

31. Is there anything else about your transportation needs and its impact on your competitiveness that we missed and you would like to share with us? **(Explain below)**

9.3. DOT sample questionnaire

STATE DOT SHORTLINE RAILROAD SURVEY FORM

Survey for CFIRE Tier 1 UTC – RI -7 Rural Rail Expansion Research Project

Date: ___ /___ /______

I. General State DOT Information- State of _______________________

1. Name of agency/bureau within your state DOT that has the primary duty of supporting or regulating railroads.
    a. Please attach an organizational chart if available or the weblink to such a chart.
    ____

2. Total number of state employees whose primary duties are to support and or regulate railroads?
    a. ____

3. DOT Representative: ____
    i. Position: ____

4. Contact Information: ____
    i. Email: ____
    ii. Phone: ____

5. Does your state also have a state rail commissioner? ❑ Yes ❑ No

6. Contact Information: ____
    i. Email: ____
    ii. Phone: ____

II. Shortline RR infrastructure:
Please note that for our survey purposes a shortline railroad is any railroad except one of the seven class 1 railroads (ie. BNSF, UP, CP, CN, CSX, NFS, KS)

1. What is the current total length of rail lines statewide? __________________ miles

2. How many total miles were abandoned in 2010 ____________, 2013,___________ 2012 _________

3. How many total miles were taken out of service 2010 ____________, 2013,___________ 2012 _________

4. How many total new miles were built in 2010 ____________, 2013,___________ 2012 _________

5. What is the current total length of short-line rail statewide? __________________ miles

6. How many miles were taken over by shortlines in 2010 ____________, 2013,___________ 2012 _________

7. How many total shortline miles were abandoned in 2010 ____________, 2013,___________ 2012 _________

8. How many total shortline miles were taken out of service 2010 ____________, 2013,___________ 2012 _________

9. How many total new shortline miles were built in 2010 ____________, 2013,___________ 2012 _________

10. Who owns these lines and what service do they provide?

	Name of Railroad	Rail car reporting mark	Ownership (Private/Public)	Does this Shortline carry freight (Y or N)	Does this Shortline carry passengers (Y or N)
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

11. Categorize the state's major shortlines by carloads per mile of track. Are these lines equipped to handle 286,000 lb rail cars?

	Carloads Per Mile of Track			
Name or marks of Shortline	<40	40-200	> 200	286,000 lb Cars?
				Y / N
				Y / N
				Y / N
				Y / N
				Y / N
				Y / N
				Y / N

12. Do you rely on information about the condition of shortline railroads within your state by: check all that apply.
    - ❑ Federal (FRRA) annual reports
    - ❑ Shortline railroad annual reports to the state DOT
    - ❑ State inspections

13. Please rate the condition of the Shortline Infrastructure components below:

	Good	Fair	Poor	Other (Please Explain)	Comments
Rail Bed					
Rail Ties					
Rail Line					
Rail Bridges					
Rail Cars					
Intersection Signals					

What class 1 railroads operate in your state?

	Name of Rail Line Owner	Which shortlines connect to this Class 1 railroad (Rail marks are fine)
1	BNSF	
2	UP	
3	CSX	
4	NFS	
5	KS	
6	CN	
7	CP	

III. Shortline RR Revenue and Customer Base

1. Total Revenue generated annually by Shortlines within State

2008 ___________________________________

2009 ___________________________________

2010 ___________________________________

2011 ___________________________________

2012 ____________________________________

2. Major Industries Served by Shortline RR in your state:

____

____

____

3. List the Top 5 types of goods transported via Shortlines within your state:

1.______________________________________

2.______________________________________

3.______________________________________

4.______________________________________

5.______________________________________

4. Statewide volume of business (by tonnage) for all Shortline Railroads :

Year	Volume in tons
2000	
2005	
2010	
2011	
2012	

IV. State Support for Railroads

1. Provide a list of all state support for Shortlines within State:

Type of Incentive	Annual amount in 2012	Name of incentive	weblink
Grants			
Loans			
Property tax incentive			
Income tax incentive			
Planning			

2. Does the state own or maintain any of these railroad's rail beds and or track?

❑ Yes (please fill out below) ❑ No

RR name or reporting marks	Rail bed length in miles	State funds expended in 2012	Track length in miles	State funds expended in 2012

3. Does your state own any rolling stock such as scale cars? ❑ Yes (please fill out below) ❑ No
   a. Total number: ____________________________________

4. Which of the following groups does your state DOT work with to promote rail usage:

Group	Always	Frequently	Infrequently	Never
Metropolitan Planning agencies				
State Economic Development agencies				
Chambers of Commerce				

5. Are companies in your state using CMAQ proposals or tax incentives for rail sidings?

❑ Yes ❑ No

6. How much State funding was requested by shortlines in the following years?

Year	Funding Requested in dollars	Funding appropriated
2001		
2002		
2003		
2004		
2005		
2006		
2007		
2008		
2009		
2010		
2011		
2012		

7. What were the funds (from above) requested for: please check all that apply?

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Replacement of cross- ties												
Rehabilitation of Rail												
New Rail(System Expansion)												
Maintenance of Rolling Stock												
Purchase of new cars												
Bridge Rehabilitation												
Replacement of ballast												
Surface Improvements												
Other												

V. Commentary on Shortline Rail Service in your state.

1. What could the existing shortline railroads do in your state to promote economic development?

____

____

____

2. What infrastructure improvements are needed today for short-line railroad system in your state?

____

____

____

3. What infrastructure improvements will be needed in the next 5 years for the short-line railroad system in your state?

____

____

____

4. Are there unusual operational challenges faced by shortlines regularly? If so, what?

____

____

5. Are there any state or local policies/barriers inhibiting the overall success of shortlines?

____

____

6. What potential impact on production costs (i.e., lower transportation costs for inputs, lower transportation costs for finished goods) could a new rail line have for companies in the region?

____

____

____

7. Is there potential to displace trucks and road distance if a new shortline rail line is established?

____

____

____

8. Do you think there is potential for company expansions if a new shortline rail line is established? Please explain

____

____

____

9. Do you think there is potential to attract new companies to the area if a new shortline rail line is established?

____

____

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