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RESEARCH REPORT

Market Opportunity Assessment for the Eastern Shore Short Line Rail in Maryland with a Focus on Potential New Customers

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16. Abstract

This study by the University of Maryland explored the potential of an improved freight rail line to attract new customers. The analysis was based on the 2014 InfoGroup U.S. Business Database and other input data that the National Transportation Center at University of Maryland has acquired. In addition, the research group conducted a survey to collect data from businesses that are not currently short line rail customers, but might be attracted by improved freight rail facilities and services. More specifically, the research team conducted a survey to explore needed facility and service improvements from the potential customers' perspective and to learn about their freight movement needs. Based on these data, a Market Opportunity Analysis (MOA) was performed for the system served by the Maryland & Delaware Railroad Company (MDDE). The results were then used to estimate the potential for attracting new customers to short line rail on Maryland's Eastern Shore. The analysis included a market definition, customer and competitor analysis (trucks), market demand forecast and evaluation of the alternatives. As part of this effort the team evaluated what would happen to businesses in the region if certain improvement scenarios were employed, and quantified the consequent rail activities and changes in demand.

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0. EXECUTIVE SUMMARY

The purpose of this report is to examine the market feasibility of improved short line rail service on Maryland's Eastern Shore, and to explore the potential of an improved short line to attract additional businesses as new customers. The analysis is based on the 2014 US Business file purchased from Infogroup, and on data from businesses that are not currently short line rail customers, but might be attracted by improved freight rail facilities and services. The primary motivation for this project is to identify and estimate additional potential demand for short line rail on the Eastern Shore. The project is also intended to investigate various improvement options and assess their effects on demand for short line rail. This project should help the Maryland Department of Transportation (MDOT) determine whether it is beneficial to financially support and invest further in short rail line infrastructure and service improvements.

For this purpose, the research team conducted a survey to learn about freight movement needs and desired service improvements from potential customers' perspective. Based on this information, a Market Opportunity Analysis (MOA) for the system served by the Maryland & Delaware Railroad Company (MDDE) was performed. The MOA was then used to determine the potential to attract new customers to short line rail on the Eastern Shore. The results from the MOA include a market definition, analysis of customers and competitors (trucks), market demand forecast and evaluation of the alternatives. As part of this effort the team estimated what would happen to businesses in the region under certain improvement scenarios, and quantified the consequent rail activities and changes in demand. The study also surveyed potential new customers about their current transportation needs and interest in using short line rail.

The study found that the businesses contacted primarily ship goods by truck, already have a well-organized logistics chain in place, and in some cases consider intermodality to and from major hubs (i.e. Baltimore). The lack of interest in rail transportation explains, in part, the difficulties in reaching the companies selected and reluctance to respond to the survey. However, a number of companies did show interest in improved rail service. These companies ship large quantities of low value materials and goods over long distances. The analysis of Freight Analysis Framework (FAF) data and projections through 2040 provided valuable information on the commodities that are expected to grow in volumes on the Eastern Shore (i.e. cereals chemicals, fertilizers and agricultural products). Rail is competitive for the transportation of pulp/papers/newspaper and is an option for moving chemicals, fertilizers and agricultural products, although volumes by rail for those commodities are much lower than volumes moved by trucks.

Recommendations for improving the services and for attracting new customers include the provision of last mile delivery and the modification of the short line rail infrastructure to accommodate the widely used 286,000lb. railcars. For future studies the research team suggests accounting for the economic growth of the region and the type of businesses that will be attracted to the area. Information to potential users about the short line rail offered, rates and quotes for different shipment services, and planned investments will make the service more visible and potentially more attractive.

1. INTRODUCTION

1.1. Short Line Rail Industry

Short line rail, often described as Class III rail, is a category of railroads that serves businesses locally by serving as the first or the last-mile moves of the freight logistics chain. This transportation mode is an alternative for trucking, which becomes more attractive for products with relatively low value per ton as the distance from the regional center of distribution increases (MTA Freight Strategic Plan, 2014). Generally, agricultural and mining commodities, construction materials, chemicals and other types of heavy, low-cost raw materials are shipped by rail due to its cost advantage. However, since the short line rails only represent the ends of the freight transport chain, the necessity of using intermodal freight facilities arises. Intermodal transportation is the association of two or more modes in a logistics chain (Reis et al., 2013). The switch between truck/barge/airplane and rail or even among two rail lines has to be done efficiently and effectively in order to provide good service to the shipping customer.

Over the last 30 years, short line rail has emerged as an effective solution to maintain profitable service on rail lines that would likely be abandoned by major rail operators otherwise (Landry et al., 2012). These rail lines have helped communities retain business and enhance economic development by bringing in and shipping out products for local industries. According to Bitzan et al. (2002) and Landry et al. (2012), several advantages can be attributed to short line rail operations, namely the ability to operate at low cost, less strict regulation on labor, and flexible and customized service. Abandoning short line rail operations would result in increased cost of shipping commodities, higher highway maintenance and user costs, and reductions in energy efficiency, local employment, value of properties located in the rail sidings, and economic development opportunities.

This study explores new opportunities for using short line rail on the Eastern Shore of Maryland. According to the Maryland Statewide Freight Plan (2010), by 2035 it is estimated that approximately 64.5 million total tons of freight will be transported by rail in, out, and within the state of Maryland. That represents a 205.2% increase compared to 2006. As of 2006, railroads and waterways captured 14% of the state's freight transportation market. Specifically on the Eastern Shore, the key industries consist of the chemical and agricultural sectors (Delmarva Freight Plan, 2015). Those businesses range from large to small and rely heavily on the transportation infrastructure available. Most of the freight movements are served by trucks, especially for small businesses that serve local markets. A recent market study developed by the Maryland Transit Administration (MTA) discussed the possibilities of investment for state-owned rail lines in Maryland and showed that if some improvements were made, new customers could be attracted to shift from truck to rail (MTA Freight Strategic Plan, 2014).

The trends indicate continuous freight demand increase in Maryland over the next 10-15 years. As the Maryland Statewide Freight Plan shows, steady growth in per capita income through 2030 is expected for all Maryland regions (Maryland Statewide Freight Plan, 2010). This generates high demand for goods and services, especially in densely urbanized areas, and continues to fuel the cycle of commodity flows from suppliers to customers (Delmarva Freight Plan, 2015). Thus, with freight demand on the rise, improvements in short line rail service could absorb part of this demand, and alleviate pressure on congested highways.

1.2. Short Line Rail in Maryland/Delaware

The MTA-owned lines have been operated by the Maryland & Delaware Railroad Company (MDDE) for the last 37 years. MDDE's responsibilities include day-to-day operations such as track inspections, repairs, and reporting safety information/data to the Federal Railroad Administration (FRA). Norfolk Southern (NS) contracts directly with shippers and MDDE; it manages the local aspects of interacting with customers and moving their freight to and from NS lines where they connect to the MTA-owned lines. NS handles the administrative work for MDDE's customers (pricing, billing, etc.). NS also has a division that identifies market trends and works with customers to learn about freight flows, markets, and competition (MTA Freight Strategic Plan, 2014).

The MTA is in the process of developing a Freight Lines Strategic Plan (MTA Freight Strategic Plan, 2014), whose objective is to evaluate recommendations for strategic investments for state-owned rail lines and to promote more efficient and safe movement of freight on the 14-county tri-state area of the Delmarva Peninsula. The MTA study contacted various stakeholders (state and county Agencies, railroad companies, and current and potential rail freight customers) in order to assess the actual and future demand for the rail lines and freight transportation needs. The report provides scenarios for improvement and indications on the importance of these lines to the local and regional economies.

Although respondents were often reluctant to share information on their current business operations the study was successful in reporting information relevant for economic analysis and in highlighting specific aspects of freight transportation in the region, business characteristics, and rail use. In summary, it was observed that most businesses were satisfied with MDDE's rail service and the existing facilities, that the choice between rail and truck is primarily driven by cost considerations, and that it is more economical to use rail for long hauls (MTA Freight Strategic Plan, 2014).

The MTA study noted that upgrades were recommended by stakeholders and existing customers in order to increase efficiency. Suggested improvements consisted of providing covered transloading facilities, longer rail spurs to some facilities, and improving business access to the rail line through new transloading sites. Another weakness of short line rail on the Eastern Shore

is the discrepancy between the rail industry standard of 286,000 lbs capacity per railcar versus the 263,000 lbs railcar capacity that is in use. This incompatibility hampers the switch between the Class I and Class III rail lines for long-haul shipments, especially because the unrestricted interchange of freight cars among railroads requires that short lines have the capability to handle larger cars (Bitzan et al. 2002). It was also found that in some parts of the Eastern Shore businesses may be interested in rail access but are unaware that the MTA-owned freight lines are available. Opportunities might arise for MTA and MDDE to partner with local and regional economic development staff to better market rail freight shipping (MTA Freight Strategic Plan, 2014). MDDE currently moves approximately 2,000 carloads of freight per year, but estimates it has the capacity to ship approximately 4,000 carloads per year.

In Chapter 2, studies that have already been conducted on short line rail for different U.S. regions (in Tennessee, Wisconsin, Washington) are introduced and their methods and main results are summarized.

2. RELATED STUDIES ON SHORT LINE RAIL

2.1. Market opportunity analysis for the short line railroad connecting Brownsville and Dyersburg Tennessee

In 2005, the Regional Economic Development Center (REDC) at The University of Memphis was contacted by the City of Brownsville, the Southwest Tennessee Development District (Redding et al. 2005), and the Northwest Tennessee Development District, to explore the feasibility of a short line railroad connecting the city with the port, which could lead to economic development benefits for Brownsville, Haywood County, and surrounding communities. Port development included construction of a rail line from the port to the TennKen Railroad that runs south to Dyersburg. Specifically, the study conducted in Tennessee aimed at examining the market feasibility of building a short line railroad connecting the City of Brownsville with the Northwest Tennessee Regional Port on the Mississippi River. At the time of the study the port was under construction. The project included an adjacent industrial complex with a river terminal, dock and an intermodal facility to include barge to rail, barge to truck, and truck to rail (Northwest Tennessee Regional Port Authority, 2004). Thirty-nine companies within a 150 mile radius were identified as having strong interest in utilizing Cates Landing (Redding et al. 2005). The study adopted the market opportunity analysis (MOA) process as described by Golicic et al. (2003) for evaluating transportation projects. Elements of MOA include an environmental analysis, market definition, customer and competitor analysis, market demand forecasting, and evaluation of the opportunity. Rather than using interviews with potential customers as a basis for customer analysis, the authors used economic data about potential customers and industry groups to analyze their potential for rail use. While sacrificing more concrete data on potential rail customers, the customer analysis format potentially allows for a more comprehensive assessment that includes firm-level logistics flows in multiple industry groups. Other elements of the MOA process were essentially followed. The project estimated the potential activity on the proposed short line railroad, and offered an evaluation of risks and opportunities (Redding et al. 2005).

2.2. Wisconsin Northwoods Freight Rail Market Study

This study was conducted in response to an initiative that came out of Wisconsin's first Governor's Freight Industry Summit in November 2011. It sought to obtain feedback from manufacturers and shippers from around the state on what they considered their "most pressing freight transportation challenges." One of the problems that many participants identified was inadequate rail service in northern Wisconsin (Bonneville et al. 2013). Several segments of a rail line that stretches across northern Wisconsin have had their service discontinued over the last 25 years. The majority of the deactivations occurred after 2001. The reduction in service left many

counties with fewer options for shipping by rail; one county lost its rail access entirely. To address this, the Wisconsin Department of Transportation (WisDOT) proposed a study of the area to begin the process of determining whether this trend could be reversed (Bonneville et al. 2013). A large part of the study was dedicated to a survey of businesses in the region. The objective was to get a sense for what the current level of freight rail use was, and what the potential might be if the network regained its connectivity. WisDOT created a mailing list of businesses in the 10- county study area that might be good candidates for using rail to ship or receive freight. WisDOT mailed to each of the 1,094 businesses on the list a set of two surveys – one for rail users and one for non-rail users – and the recipients were asked to complete the appropriate one. The respondents also had the option of completing the survey online. WisDOT obtained a response rate of about 17%. Interestingly, of the 190 completed surveys WisDOT received, 39 (20%) were from businesses that used rail, and 151 (80%) were from businesses that did not use rail. Information was collected about commodity types, shipping, origins and destinations, reasons for using rail, potential use of out-of-service rail lines, potential increases in rail shipments with improved service, and potential rail shipments from interested businesses (Bonneville et al. 2013).

2.3. Palouse River and Coulee City Railroad: Market Assessment

The study originated from the Washington State Department of Transportation's desire to obtain information on the historical, current and potential future of the market surrounding the Palouse and Coulee City Rail Lines (PCC lines) (Casavant and Jessup, 2006). The main objectives of the study were the evaluation of the current viability of the PCC lines on a private business basis and the changes that created the transported volumes. The study also examined potential changes in the market and industry that would possibly affect the traffic, the revenues and the line's viability in the future, and inventoried public benefits associated with maintenance of the lines. In order to achieve those objectives the authors proposed and conducted a series of interviews to do a market study of the PCC rail line. Information collected included (Casavant and Jessup, 2006):

- Volume of shipments by loads/mode per week and by total shipments
- Current transit time from the PCC facility to the final destinations
- Other modal quality of service characteristics by mode
- Cost and availability of existing and alternative modes or means of shipment
- Business development plans or expectations in the region

The idea was to seek general information on the shippers that have remained on the PCC line, their volumes on the line and the desirability of the PCC line from these shippers' perspectives, as well as information from shippers that preferred to use truck-barge and the associated volumes. Perspectives of special interests (cities, counties, Regional Transportation Planning Organization RTPOs, parks, federal interests, etc.) about maintaining the PCC line were also investigated and the impacts on roadway infrastructure of the remaining shippers after the loss of the PCC line were evaluated. The survey was followed by an evaluation of the economic

feasibility of the PCC short line, the impact of losing the PCC line, and the reactions of shippers and other stakeholders to such an occurrence (Casavant and Jessup, 2006). Results from market assessment of the PCC lines revealed a dynamic but uncertain market with a multitude of competing forces and decision makers/stakeholders having different options. Critical issues identified by the study include the level of maintenance chosen for the line, the timing, magnitude and location of the track rehabilitation, the level of traffic committed and achieved on the three lines, the amount of new economic development, the continued progressive marketing by the facility management, and the energy impacts on operating costs of all modes. The authors concluded that the lack of certainty made consultant evaluations and state policy recommendations necessary but quite sensitive to changes in the inputs used for the analysis (Casavant and Jessup, 2006).

3. MARKET OPPORTUNITY ANLAYSIS

Woodruf and Gardial (1996) proposed a market opportunity analysis (MOA) framework that helps companies determine the feasibility of entering or expanding operations in particular markets for goods and/or services. There are five steps in the model, involving the analysis of the environment, existing market, customer, competitor, and supplier. The application of this method was chosen since it is in line with the need to get a broad perspective of the market, both from a historical viewpoint and future trends, as well as a more narrow view based on specific companies' abilities. The MOA framework applied here meets these needs by assessing the external market-potential demand, current players in the market, and customers' needs, along with the internal capabilities of the company, to determine the feasibility of pursuing expansion of railroad operations. A graphical representation of this process is shown in Figure 1.

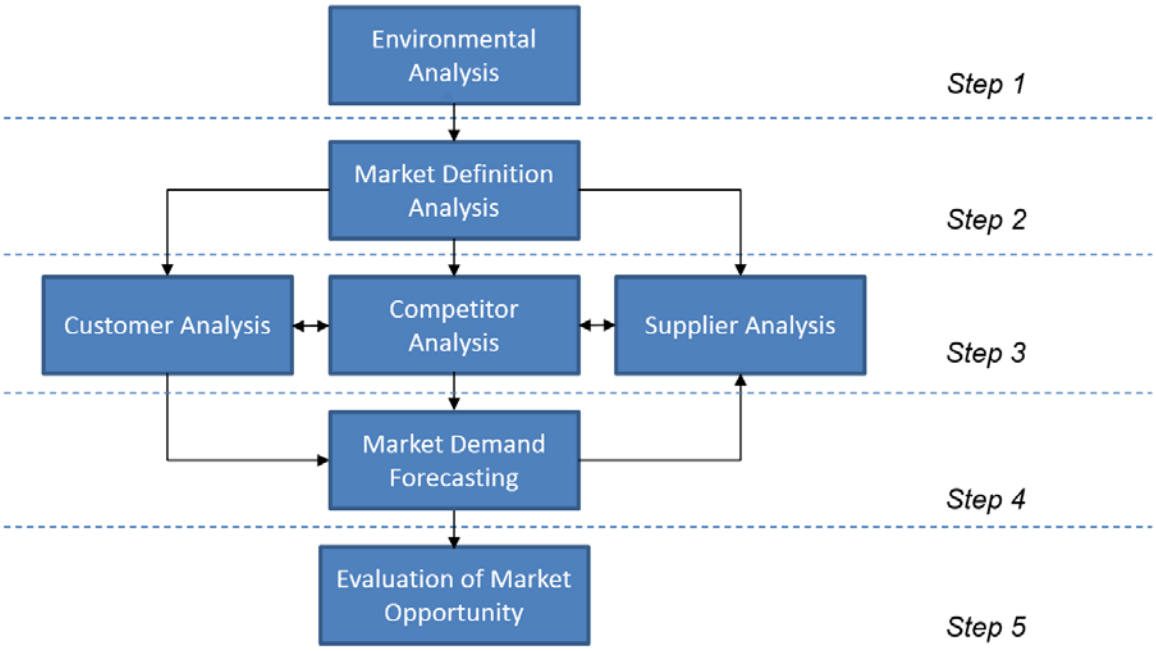

Figure 1 Market Opportunity Analysis Framework (Adapted from Woodruff and Gardial 1996)

3.1. Environmental Analysis

The first step involves analysis of the macro-environment, which includes forces outside the control of the organization that can substantially impact market opportunity. The major forces to be examined include economic, technological, social, political, and regulatory forces (Lehmann

and Winer 2002; Cadotte and Bruce 2003). Firms should recognize susceptibility to changes in macro environmental forces, and position themselves to minimize negative impact and leverage positive impact. Choi (2009) also stresses the importance of this phase.

3.2. Market Definition

The second step is the definition of markets. This task involves identifying the major markets in which the product or service competes, and segmenting the market into a product-market structure. This phase not only establishes boundaries for all subsequent analysis; it is also crucial in understanding the organization of the market and delimiting the segment(s) in, and products/services against, which the firm will compete.

3.3. Customer, Competitor, Supplier Analysis

Following the definition of markets, the MOA process involves collection and analysis of information to determine market opportunities. Collection and analysis of information regarding customers, competitors, and suppliers reveals the size and share of market and historical cost and profit data. It also identifies long-term trends and short-term changes in the market (Lehmann and Winer, 2002). Results from this stage establish the minimum requirements needed to enter the market.

3.4. Market Demand Forecasting

While step 3 involves a historical view of sales and market share, step 4 requires estimating the potential for future demand and the share of demand to be captured by the organization. The information collected in step 3 often comes in both quantitative and qualitative forms. Therefore, demand estimation techniques suited for analyzing both types of data must be adopted. Without a sales forecast, in the short term, operations can only respond retroactively, leading to lost orders, inadequate service and poorly utilized production resources (Fildes, 1994).

3.5. Evaluation of Market Opportunity

The final step in the MOA framework is a two-stage process entailing identification of new opportunities, such as creating new ways or means for satisfying buyer needs that are consistent with core competencies, and matching those opportunities with organizational capabilities. In this stage a SWOT (strengths, weaknesses, opportunities and threats) analysis is recommended to focus on organization’s internal capabilities and its external environment.

4. DATA SOURCES AND ANALYSIS

4.1. Survey

For studying freight movements on the Eastern Shore, the research team designed and conducted a survey asking Eastern Shore companies that did not use rail how they viewed the rail service and what improvements would attract them to it. The full survey, entitled "Eastern Shore Short Line Rail Potential Customers Survey," is included in Appendix A. The survey was conducted between July 10, 2015, and September 29, 2015.

Thirty-seven companies were selected based on their product types and distance from the rail lines. Companies were contacted by phone and were given the option to participate in the survey by phone or email. Overall, 33 companies were contacted through phone interviews, out of which 17 participated in the survey. Nine of these companies completed the survey, and eight indicated why they declined to participate in the study. Table 1 summarizes the results from the nine companies that completed the survey.

Table 1 Survey Results

Company	Material	Reasons for not using rail	Possible improvements	View on rail service
1	Brick and masonry materials	Customer service quality Takes more time to ship via rail Inadequate loading or unloading facilities Less convenient than other transportation modes Service is not offered	1.New connecting rail line or siding 2.An adequate loading or unloading facility 3.intermodal facility within 10 miles of our business	Both good and bad. Good when there is a shortage of trucks; bad because of the time needed to get cars and also possible damage to the material in the cars
2	Milk, grains and hay	4000 tons of our sales is raw milk (unsuitable for rail)	Intermediate intermodal facility or transload	Not applicable for perishable products
3	Fresh mushrooms	Travel time variability Less convenient than other transportation modes Service is not offered	Deal in fresh produce. Time and temperature sensitive.	
4	Building materials	Not familiar with rail service Not interested in changing the current logistic pattern Service is not offered		
5	Lumber, finished furniture			We do have old rail going past our place of operations, which could be restored and used. In

				summary, I am neutral on rail as far as our business is concerned
6	Wood preserving (products)	It needs to be more competitive, it is always cheaper by truck. We work with wood and need more variation in car sizes	Provide last mile delivery	
7	Building Materials	We do not have any rail service	Improvements to connecting rail line An adequate loading or unloading facility Provide last mile delivery Loading and storage area Pickup location or loading sites	
8	Sand & Gravel	We do not have any rail service	Improvements to connecting rail line An adequate loading or unloading facility Provide last mile delivery Loading and storage area Pickup location or loading sites	
9	Fertilizers		Faster and more frequent services. Need to solve issues of congested rail lines.	

The eight other companies provided several reasons why they were uninterested in this study and did not consider rail as a potential shipping mode. These reasons can be summarized as follows:

- Their freight typically demands very short transit times; therefore, they prefer to use trucking for the foreseeable future.
- They do not ship any product out of their location in Maryland. They have very small firms so they have no need for rail service.
- They have their own transportation and do not use rail. Their market is local so they use trucks.
- They provide services to the railroad industry by selling signals and their customer (the rail service provider) uses rail to move (collect and distribute) their product but they do not use rail directly.
- They are not interested in any rail improvement or intermodal facility. They already have some intermodal shipments through Baltimore.
- They have a number of small trucks to handle their own deliveries, but according to them, those deliveries do not count as freight shipments.

The results from the survey indicate that the following industries have an interest in using the rail service:

- Building materials
- Sand and gravel
- Fertilizer

These commodities are mostly low in value, and are thus relatively insensitive to travel time and variation in travel time.

4.2. Infogroup Business Data

The National Transportation Center at the University of Maryland purchased the U.S. historical data from Infogroup and used the data as the primary source for identifying potential rail customers. This data source includes detailed information on businesses across the entire U.S. Data such as location, industry type, contact information, number of employees, and sales volume, are particularly useful for this study.

4.3. Maryland Statewide Transportation Model

The Maryland Statewide Transportation Model (MSTM) is the four-step travel demand model currently used by the Maryland State Highway Administration (SHA) that allows consistent estimates of future development impacts on transportation performance measures. The MSTM is a multi-layer model applicable at the regional, statewide and urban level, providing analytical support in SHA's current decision-making process regarding the implementation of transportation policies and the prioritization of projects throughout the state of Maryland (Maryland State Highway Administration, 2013). In this project, the freight model in MSTM is used to estimate the county-to-county commodity flow on the Eastern Shore. Figure 2 presents the regions for which the commodity flow data were extracted. The freight model includes a long-distance commodity-flow-based freight model of truck trips into, out of, and through the study area. These trips are combined with short distance truck trips generated at the statewide level using a trip generation and trip distribution method.

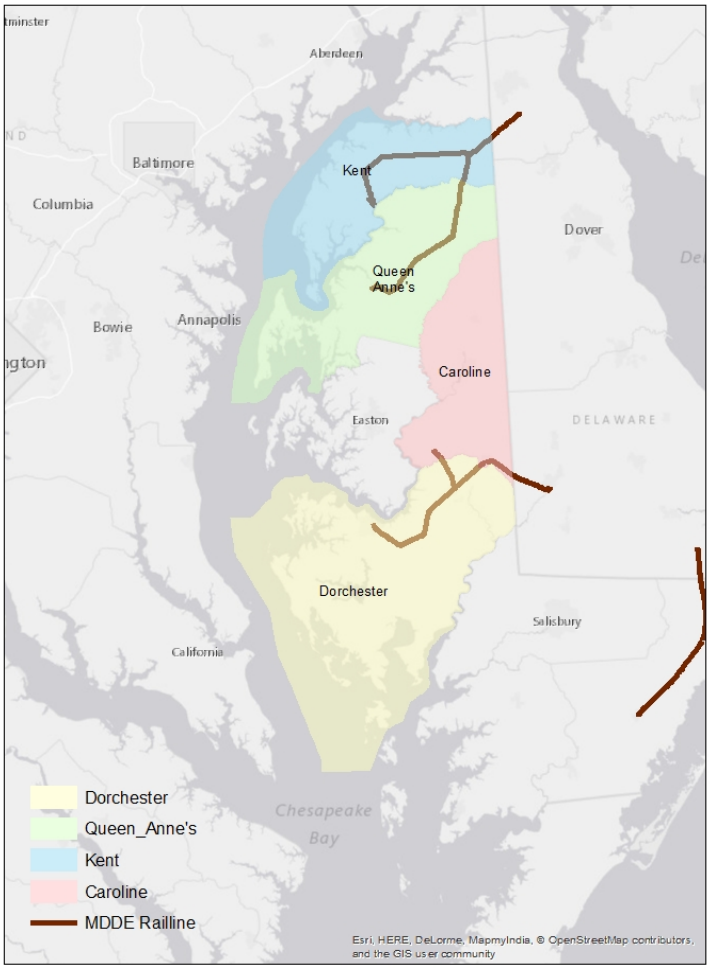

Figure 2 MSTM Commodity Flow Area

4.4. Freight Analysis Framework

For market demand forecasting the research team used the provisional commodity flow data in the Freight Analysis Framework (FAF 2015) provided by the Federal Highway Administration (FHWA). This data file includes tonnage, value, and domestic ton-miles by FAF region of origin and destination, commodity type, and mode with truck and rail for 2007 with forecasts through 2040, and 2012 Provisional Data. Data were extracted for three zones including: (i) Delaware, (ii) Washington DC-Virginia-Maryland, (iii) and the remainder of Maryland, as illustrated in Figure 3.

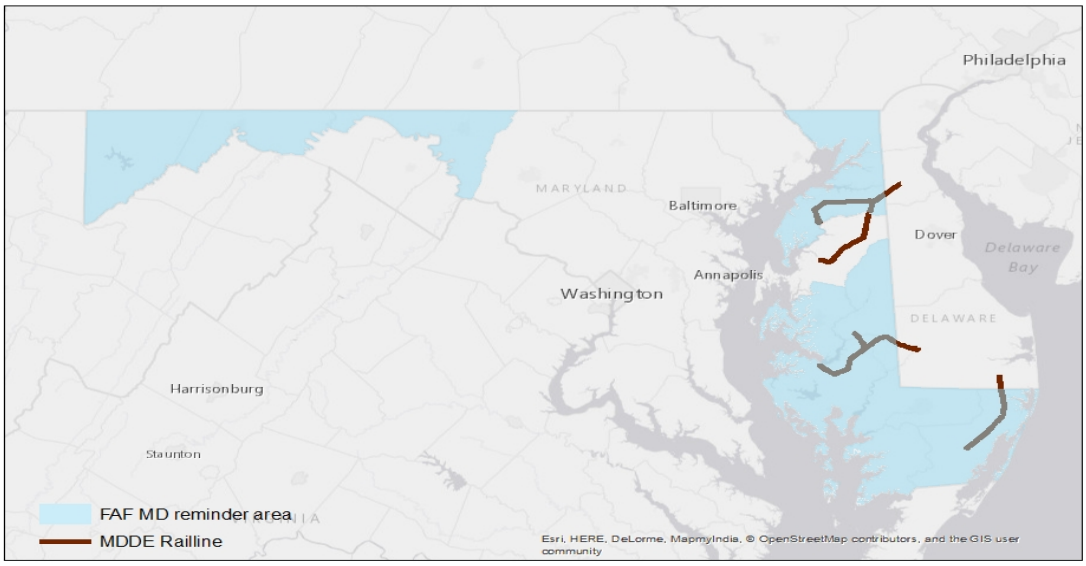

Figure 3 FAF Data Area

5. RESULTS

5.1. Environmental Analysis

Considering that the macroeconomic environment affects opportunities for the rail freight market, the substantial growth in rail volumes in the U.S can be attributed to the following reasons:

- It supports freight shipping mode shift towards intermodal transport;
- It supports the increase in the usage of containerized transport;
- It also contributes to the growth in U.S. auto manufacturing, coupled with streamlined logistics.

The American Trucking Association (ATA) indicates that freight tonnage transported by all modes rose by 5.4% from 2009 to 2010. In 2010 the Mid-Atlantic Region accounted for 10.7% of total inbound freight, 12% of manufactured goods, and 9% of other commodities. Inbound and outbound freight consisted of roughly 62% manufactured goods and 37% other commodities.

The FHWA's FAF also shows that the overall freight demand in the U.S between 2000 and 2020 is expected to double. As part of the freight demand growth, the National Cooperative Highway Research Program indicates that there will be a 49% increase in the national railroad shipment between 2000 and 2020, along with a 15% increase in barge ton-miles.

Local economic development strategies will also boost the growth of freight demand. In their efforts to bolster local economies, counties in Maryland and Delaware are offering various incentives and business programs to spur development, employment, and innovation for local industries.

5.2. Market Definition

In order to delineate the potential market, a 25 mile buffer around the short line rails was created based on the geographic location of Eastern Shore rail route and stations; the study area encompasses a diverse group of business from various industry sectors, ranging from smaller local firms to large global companies. 120 companies were selected based on the sale volumes, of which 37 companies were targeted as potential customers based on their lines of business or product types. These included chemical and agricultural industries and a variety of other sectors.

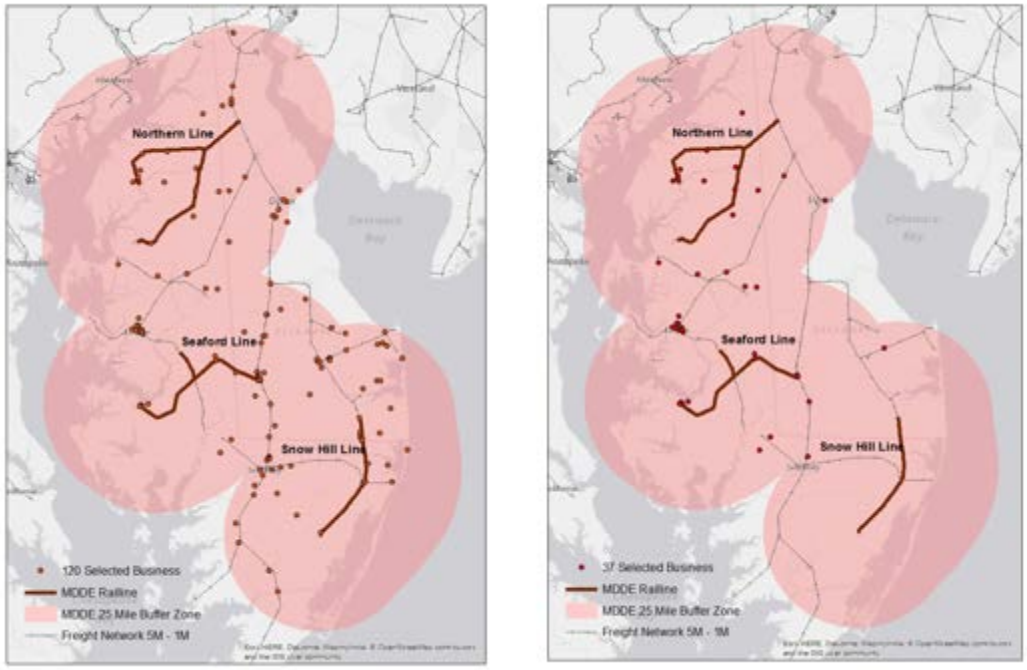

Figure 4 Market Analysis Area

5.3. Market Demand Forecasting

The FAF data include origin and destination (OD) states, shipping modes, commodity types for the truck and rail flows for the years 2007 to 2012, and predicted flows from 2015 to 2040. 2012 FAF commodity flow and 2015 to 2040 predicted flow data for Maryland and Delaware are employed in the prediction. The MDDE Carload Shippers Report and Summary records rail commodity shipment for the Seaford Branch line and the Towson Branch Line, including customer information, commodity types, and total carloads. The carload information of each station is categorized into the four counties which are crossed by MDDE rail lines, namely Caroline, Dorchester, Queen Anne's, and Kent counties. The MSTM freight data records the freight flow data shipped by truck for each Maryland county.

2012 commodity flow data are extracted from the MDDE Carload Shipper Report and the MSTM and are used as the baseline values for prediction. The growth rates of freight flows from 2015 to 2040 are computed using the 2012 FAF commodity flow data in the region of Maryland and Delaware for truck and rail. Figure 5 and Figure 6 show the predictions for rail commodity flows and truck commodity flows.

Figure 5 Rail commodity flow prediction

Figure 6 Truck commodity flow prediction

Based on the results obtained for the rail commodity flows, the research team estimates that in the next 25 years there will be increased flows of paper products, from 28,560 tons to 46,383 tons in Caroline County, and from 706 tons to 1,369 tons in Queen Anne's County. An increase in cereal grains and other agricultural products can also be forecast in Dorchester County from 4,815 tons to 8,486 tons. Basic chemical, fertilizer and cereal grains in Kent County will also increase over the next 25 years. Based on the predicted commodity flow of 2015, comparisons were made between rail and truck for the exiting demand commodity types. Figure 7 shows the detailed results. The rail shipments of cereal, paper products, basic chemicals, and other agriculture products have greater potential for demand development when compared with the same type commodity shipped by truck. Specifically, paper products in Caroline County, coal and petroleum products in Dorchester County, cereal grains in Queen Anne's County, and basic chemicals in Kent County account for large proportions of the rail shipments. The demand prediction charts also show that the demand growth for these commodities is expected to continue.

Figure 7 Truck and rail commodity flow comparison

5.4. Evaluation of Market Opportunity

To calculate the potential rail freight volume from manufacturing, the inbound and outbound tons and railcar loads were estimated for the 37 business establishments selected from the 2014 Infogroup business data. These 37 companies were selected based on their potential for receiving or shipping substantial volumes of goods by rail based on product type, industry patterns and size

of the local firm. Outbound shipments from these manufacturers were estimated through the allocation of national level industry data. Revenue and tons shipped for the 37 companies were estimated by applying data from the Economic Census to local companies, allocating revenues and tons according to each company's number of employees. Tonnage shipped by rail was estimated based on nationwide modal split data (e.g. rail, truck, barge, etc.) from the U.S. Department of Transportation's (USDOT) Commodity Flow Survey. Commodities were classified based on the Standard Classification of Transported Goods (SCTG) coding system for which USDOT provides data on mode of transportation. Rail carloads were then estimated based on commodity weight calculations (Redding et al. 2005). Figure 8 summarizes this process.

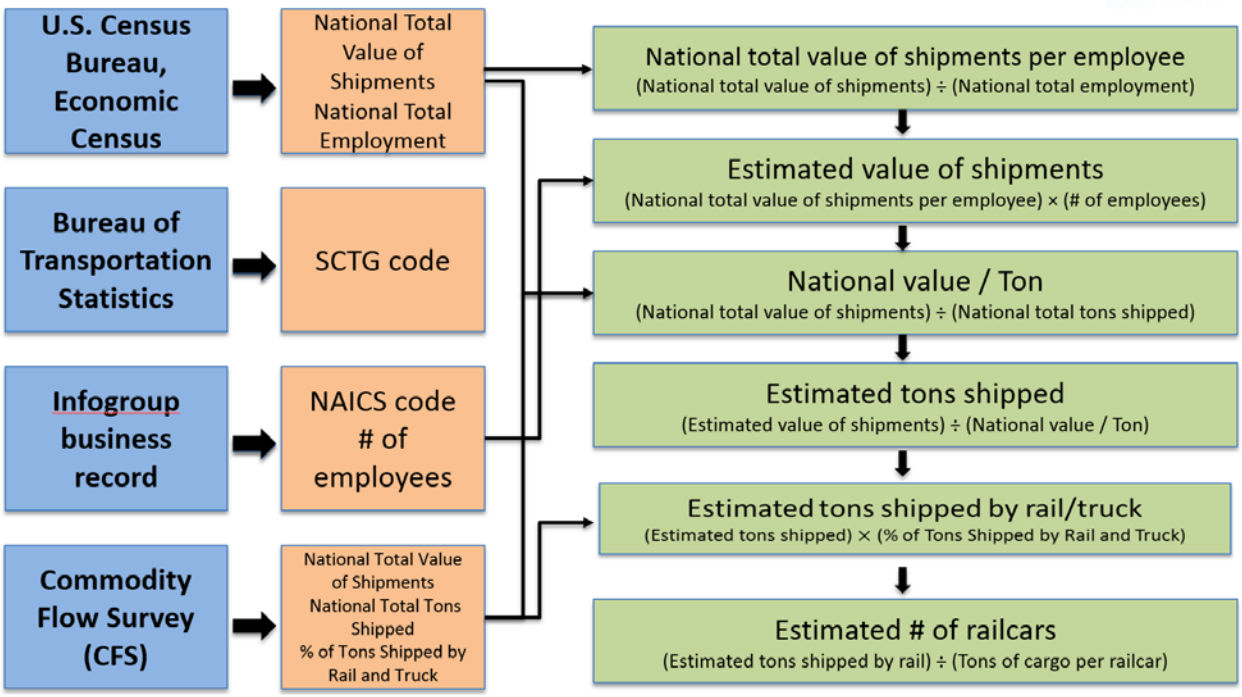

Figure 8 Potential Demand Estimation Framework

Using the above framework and the results from the survey, the research team estimated the potential market (i.e. additional demand due to different facility and service improvements). These results are especially useful for identifying which infrastructure improvements could potentially attract more demand to the rail lines, and which service improvements are more desirable to the potential customers. Figure 9 and Figure 10, respectively, provide the share of businesses indicating which facility and/or service improvement is required in order for them to consider using rail. According to this analysis, "providing the rail service" is the most important factor among those listed in the survey form; it was requested by 22% of the potential market. In fact, most of the respondents showed interest in using the rail lines if they had access to the service. The next significant improvement appears to be providing "last mile delivery" and "loading and unloading facilities". Each will attract 14% of the potential market.

Similarly, for service improvements the most significant item is service frequency, which increases demand by 21%, followed by price and travel time.

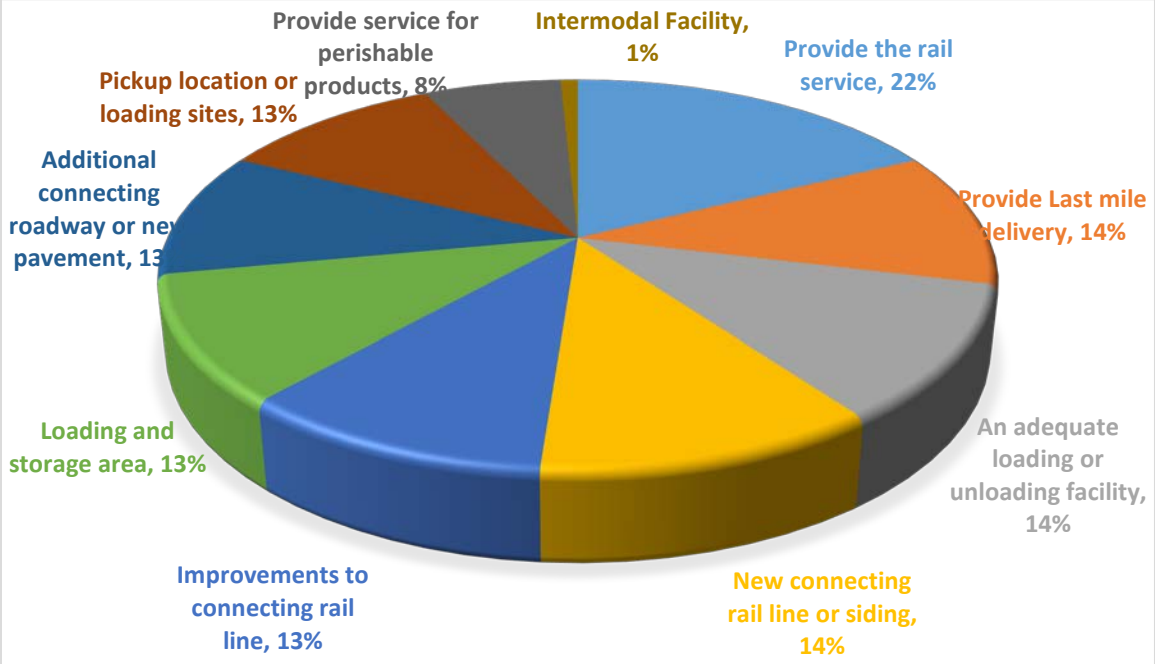

Figure 9 Demand Increase due to Facility Improvements

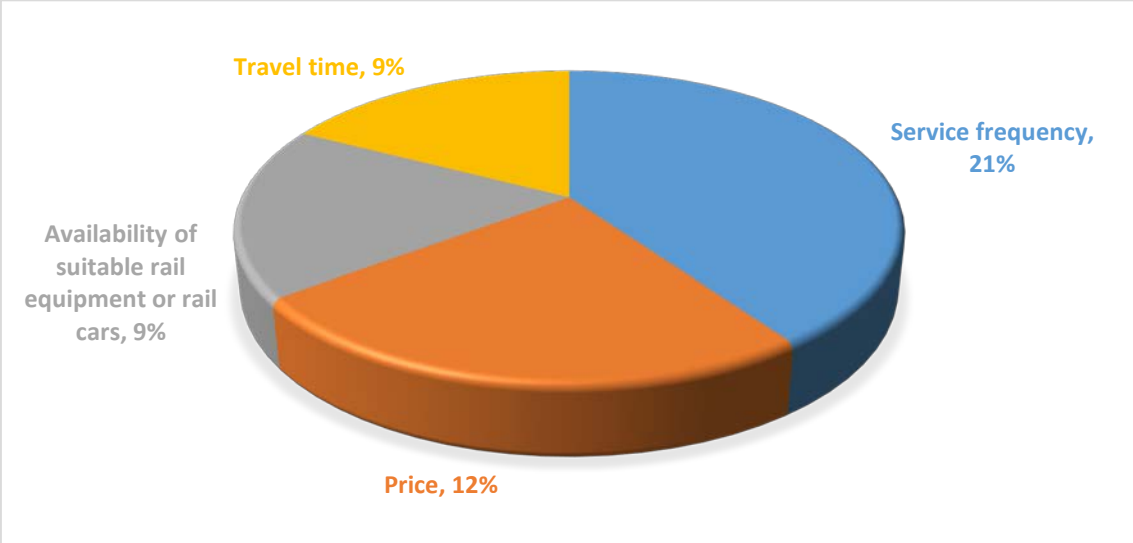

Figure 10 Demand Increase due to Service Improvements

In addition to the above analysis, three hypothetical scenarios were assumed:

I. High Interest Scenario: all 37 companies would choose rail as their shipping mode
II. Medium Interest Scenario: 50% of potential customers would shift to the rail mode.
III. Low Interest Scenario: only 10% of potential customers would choose rail.

In each one of these hypothetical scenarios the following improvements were assumed. In other words, these improvements would result in attracting 100%, 50%, 10% of the potential market. Scenarios II and III include only some of the improvements listed for Scenario I.

a) Scenario I: High Interest Scenario:
   - Provide rail service – Appropriate railcars would be made available to customers at convenient times and would be hauled without undue delays.
   - Provide last mile delivery – In such cases trucks would be used to transport freight between the nearest short rail dock and the customer's facility.
   - Loading or unloading facility – Such facilities would be provided at or near the customers's locations
   - New connecting rail line - Branch lines would be extended to reach the facilities of customers who generate substantial amounts of shipments.
   - New sidings – These allow maneuvers that drop off cars from the middle of a train and rearrange railcars in other ways within trains.
   - Improvements to connecting rail line – Improvements in bridges and track structures may be designed to allow standard 286,000 lb railcars to operate on the Eastern Shore rail lines, for compatibility with much of the U.S. rail network. Improvements in control systems may improve rail line speed, safety and capacity. It should be noted that capacity is not yet a limiting factor on MDDE short rail lines. As traffic increases, additional locomotives may also be needed.
   - Loading equipment – Specialized loading equipment, such as cranes and forklift trucks can improve the speed, efficiency and cost at which freight is loaded on railcars, unloaded from them, and transshipped to trucks.
   - Storage facilities – Warehouses or open-air storage allows buffer space for transshipment of freight between railcars and trucks without requiring perfect synchronization of rail and truck schedules.
   - Additional connecting roadway or new pavement to loading sites – These would enable heavy trucks to reach rail sidings or storage facilities near the customers' locations.
   - Service for perishable products – Appropriate (e.g. refrigerated) railcars and storage facilities at loading sites would be provided.
   - Intermodal facility – Space and loading equipment would be provided to shift truck trailers and containers between railcars and road vehicles.
b) Scenario II : Medium Interest Scenario
   - Provide last mile delivery
   - Provide rail service
   - Loading or unloading facility
c) Scenario III: Low Interest Scenario
   - Provide last mile delivery

In Scenarios II and III the industry types that are more likely to use rail were selected (i.e. industries that mostly deal with large quantities of low value products such as building materials, fertilizers, sand and gravel). The following graph compares the market demand changes under each hypothetical scenario.

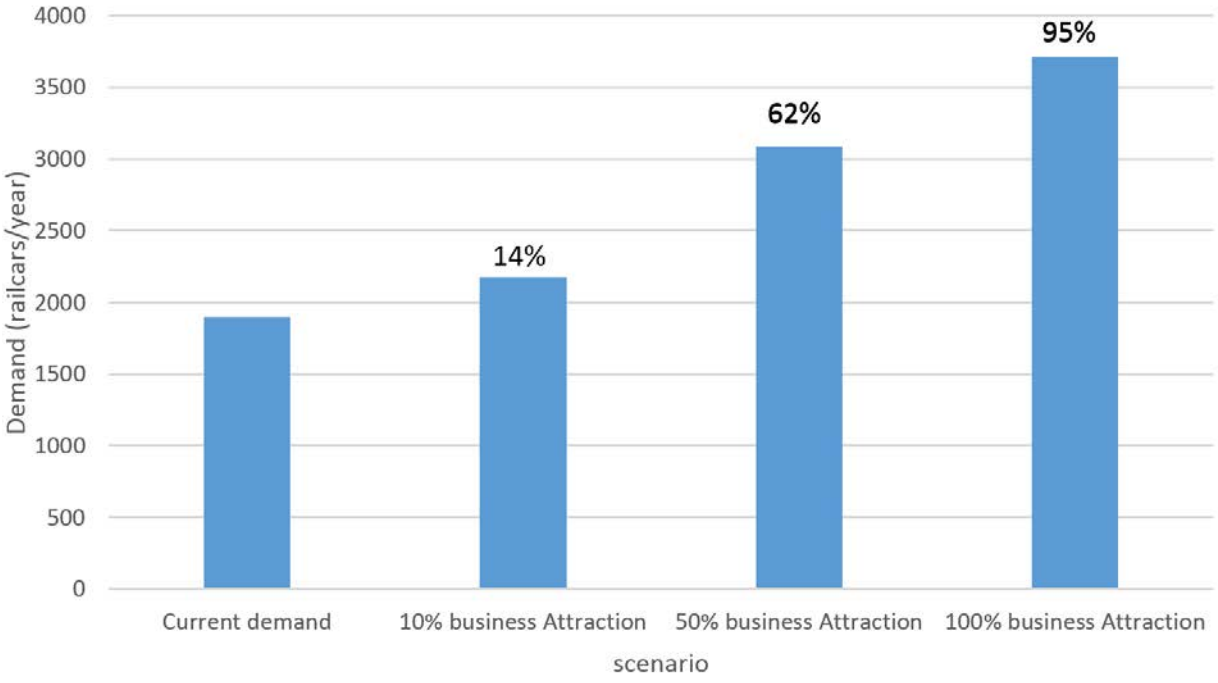

Figure 11 Market Demand Changes under Three Hypothetical Scenarios

6. CONCLUSIONS/ RECOMMENDATIONS

6.1. Project summary

- A market opportunity analysis for the Maryland Eastern Shore short line rail was conducted. The project aimed at studying new business opportunities for the rail sector, and in particular at identifying companies that are potentially interested in using rail freight transportation services, the type and the quantity of new shipments, and the infrastructure and service improvements required to attract new demand.
- For this purpose several databases have been acquired or collected. The businesses in the study area have been identified using the Infogroup data that contain historical information, location, contact and size of the companies. About 120 businesses were initially selected based on a buffer of 25 miles around the short line rail; of those, 37 were chosen by MDOT for successive analyses.
- The commodity flow data from the Freight Analysis Framework (FAF) provided by the Federal Highway Administration (FHWA) were extracted for the Delaware, Washington DC, Virginia, and Maryland. Data include information on tonnage, value, and domestic ton-miles by FAF region of origin and destination, commodity type, and mode with truck and rail. The data are available from 2007 and forecasts are made through 2040.
- A survey was designed and submitted to the selected 37 companies; the survey was administrated by email and telephone. All the companies in the list have been reached; five companies responded to the complete survey, four completed the short survey; eight stated why they were uninterested in the survey and in rail transportation, seven were apparently out of business, and thirteen never answered despite multiple attempts to contact them by telephone or mail.
- A comprehensive market opportunity analysis was conducted and based on all the information collected for this project. The methodology is based on existing literature but has been adapted to take into account data availability and specific requests from MDOT.

6.2. Project findings

The main results from both data collection and MOA can be summarized into the following findings:

- The companies that responded to the surveys stated that rail transportation is, in general, less convenient than trucks; it takes more time, it is unreliable, it is not convenient for perishable material (i.e. mushrooms, milk, fresh poultry), and loading and unloading facilities are not adequate. These companies usually have their own trucks, already have a well-organized logistics chain in place, and in some cases consider inter-modality from and to major hubs

(i.e. Baltimore). The lack of interest in rail transportation explains in part the difficulties in reaching the companies selected and their reluctance to respond to the survey.

- A number of companies showed interest in improved rail services on the Eastern Shore. These companies ship large quantities of low value materials and goods over long distances (i.e. sand, construction materials and lumber). Some of these companies were willing to load or unload the material/goods from rail cars.
- There was a general perception that rail service is not available on the Eastern Shore; a significant number of businesses stated that they would consider rail service if it was offered. The use of rail is conditioned on the competitiveness of the pricing, improved loading and unloading facilities, more frequent service, and the provision of last mile delivery.
- The analysis of FAF data and the projections through 2040 for the four counties on the Eastern Shore have identified the commodities that are expected to grow in volumes. Cereals represent the dominant commodity in Queen Anne's County and will grow significantly over the period examined; chemicals also show a positive trend and are mainly located in Kent County; fertilizers and agricultural products are present in all the four counties and have stable or slightly growing profiles trends. Companies operating in these sectors should be targeted as new potential users of short line rail.
- The modal share analysis on FAF data attests that truck is the prevailing mode for freight transportation on the Eastern Shore. Rail is competitive for the transportation of pulp/papers/newspaper and it is considered for moving chemicals, fertilizers and agricultural products although volumes by rail are much lower than volumes moved by trucks for those commodities.
- Based on the results of the survey and the MOA, three scenarios were tested and the demand for rail was estimated. It was estimated that a 14% increase in rail demand would be generated by the scenario providing last mile delivery and considered by about 10% of the 37 businesses interviewed. Higher demand for rail transportation on the Eastern Shore can be generated by providing additional services and major infrastructure facilities, as listed for Scenario I on page 22.

6.3. Recommendations

The research findings suggest that MDOT may consider the following improvements/actions on the short-line rail if funding is available and if there are no other projects with higher return on investments.

- Provide improved last mile delivery, especially for businesses that transport large quantity of low value materials, or those that transport chemicals, fertilizers and agricultural products. While MDOT may help provide the needed transfer facilities and equipment at the rail terminals, the operation of trucks providing last mile deliveries and pick-ups should be left to the customers, the rail operator, or commercial third-party providers.

- To improve compatibility and transfers with Class I railroads, MDOT could estimate the cost of modifying the short line rail infrastructure on the Eastern Shore to accommodate the widely used 286,000 lbs railcars.
- Major infrastructural investments like thouse identified for Scenario I on page 22, would probably be required to shift a significant market share from trucks to rail. This might be justified by the need to reduce congestion caused by trucks on major highway corridors in Maryland.
- As indicated in the Scenario 1 list, line capacity is not currently a limiting factor for short line rail service on the Eastern Shore. However, if demand grows significantly, additional and/or more powerful locomotives and improvements in the control system will be needed to increase capacity.
- In order to maximize the return of each project, planning for the short line should also take into account the economic growth of the region and the type of businesses that will be attracted in the area. This could be done in coordination with the Maryland Department of Commerce and county economic development planners. The MOA procedure developed in this project can be used also for this further analysis.
- Inform potential users about the services offered by the short line rail on the Eastern Shore; rates and quotes for different shipment services should be readily provided by a designated marketing office whose contact information is widely advertised. The functions of this marketing office may be conducted by the private sector operator of short line rail services. This office may initially employ just one marketing specialist. Rather than rely solely on "broadcast" types of advertising, it should be ready to work individually with each of the fairly limited number of potential clients for rail services, and negotiate with them facility and equipment improvements, other investments, services, quality guarantees and prices. The MDOT may provide guidelines on what financial and other types of assistance it can provide, depending on the commitments made by the potential clients and short line rail operator. When public-partnerships are considered, MDOT should be directly involved in the negotiations.

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8. APPENDIX A

This survey is a part of a study on improving freight transportation service in the Delmarva Peninsula. It is conducted by the University of Maryland and sponsored by the Maryland Department of Transportation. The

information collected from individual firms will be carefully safeguarded and only reported in aggregated form.

1. Please specify the products or materials that are shipped by your organization:

Inbound Freight:

Outbound Freight:

2. Does the total volume of your inbound and outbound freight exceed 50 ton/month?

- Yes
- No

If your answer to Question 2 is "No", then please go to Question 16.

3. In which location, if any, are your business facilities located? (*Please write "None" if there are no facilities).*

Facility 1:

Facility 2:

Facility 3:

Other facilities:

4. In tons, or other industry standards (such as cubic feet), what was the approximate volume of products or raw materials for *inbound freight* in 2014?

Facility 1:

Facility 2:

Facility 3:

Other facilities:

5. In tons, or other industry standards (such as cubic feet), what was the approximate volume of products or raw materials for *outbound freight* in 2014?

Facility 1:

Facility 2:

Facility 3:

Other facilities:

6. Approximately what percentage change in annual freight shipments do you expect for the next 15 years?

7. Approximately what percentage of your freight shipment is transported to or from the Delmarva Peninsula by the following transportation modes?

	Inbound Freight	Outbound Freight
Truck:		
Rail:		
Truck + Rail:		
Water (ship, barge):		
Other		

Other (please specify)

8. Please estimate the average distance in miles travelled by your freight:

Inbound Freight:

Outbound Freight:

9. Who chooses the transportation mode for your *inbound freight*?

- Corporate Manager
- Suppliers
- Customers
- Other (please specify)

10. Who chooses the transportation mode for your *outbound freight*?

- Corporate Manager
- Supplier
- Customers
- Other (please specify)

11. Please check all the reasons why you don't use rail.

- [ ] Service is not offered
- [ ] Not enough freight volume
- [ ] Our freight is not suitable for rail transport
- [ ] Not familiar with rail service
- [ ] More expensive than other transportation modes
- [ ] Less convenient than other transportation modes
- [ ] Too far from our facility
- [ ] Inadequate loading or unloading facilities
- [ ]
- [ ] Not interested in changing the current logistic pattern
- [ ] Takes more time to ship via rail
- [ ] Travel time variability
- [ ] Customer service quality
- [ ] Other (please specify)
- [ ]

12. What (if any) transportation facility improvements would you need in order to use rail transportation? Please tell us the ideal location of these potential improvements.

Improvements to connecting rail line

An adequate loading or unloading facility

New connecting rail line or siding

Loading and storage area

Additional connecting roadway or new pavement

Pickup location or loading sites

Nothing, just need service

Other

13. What (if any) transportation service improvements would you need in order to use rail transportation? Please describe how those improvements could better assist you.

Price

Service frequency

Availability of suitable rail equipment or rail cars

Responsiveness

Other

14. An "intermodal facility" is a place where goods may be transferred from one freight transportation mode to another, such as between a truck and a rail car. Please select the type of intermodal facility of interest to you.

○ **Direct intermodal facility:** when a truck trailer shipping container is loaded directly on to (or unloaded from) a rail car. The contents of the truck trailer or shipping container are not unloaded during the transfer.

○ **Intermediate intermodal facility or transload:** when the contents of a truck trailer or rail car are unloaded from one type of carrier and then reloaded on another. The unloaded cargo may be stored at the site before being picked up by the other carrier.

○ Both

○ None

If you are interested, where do you think it should be locate for your convenience?

15. Briefly explain how your industry views the rail service. Please indicate pros and cons.

16. Do you have any additional comments?

17. Please provide contact information for yourself or another appropriate person in your organization:

Name

Email address

Phone number

If you have questions about the survey or this study, please contact:

Dr. Cinzia Cirillo	or	**Dr. Paul Schonfeld**
(301)-405-6864		(301)-405-1954
ccirllo@umd.du		pschon@umd.edu

Thank you very much. Your help is greatly appreciated