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Freight Optimization and Development in Missouri: Ports and Waterways Module

by

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16. Abstract

Missouri's ports and waterways have proven to be important to the region's economic growth and significant to the state's role in transporting waterborne freight. The ultimate objectives of this analysis are to provide an inventory of Missouri's public and private port operations and public port needs; discuss baseline commodity flow data for Missouri's waterways; explore regional, national and global trends that Missouri may capture to increase the state's role in freight movements; develop strategies that the state could adopt to accelerate or facilitate freight and logistics development in the state; and create a Waterways Prioritization Process that will assist MoDOT in making justifiable investment decisions that meet the needs of not only Missouri's ports, but the state itself. Missouri's centralized location and access to multimodal connections places the state in a prime position to strengthen its role as a national freight center. With opportunities such as the expanding container-on-barge and biofuel industries, in addition to other trends discussed in the analysis, Missouri's ports have the ability to promote trade and growth on its waterways.

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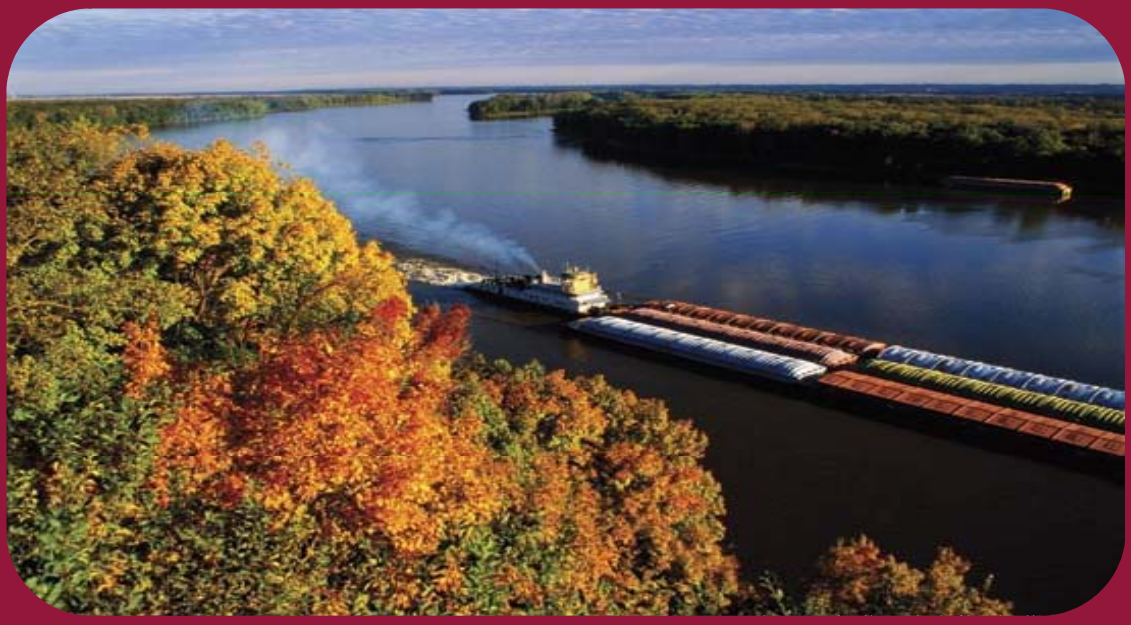

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Executive Summary

Transporting freight has economic importance on both a national and international scale and waterborne freight traffic is projected to grow nationwide. To capture this growth, it is necessary to inventory Missouri's existing waterway operations and infrastructure and determine how Missouri can improve its overall viability and set the stage to strengthen Missouri's role as a national freight center. This report reflects current and projected commodity movements, reviews port infrastructure and resource needs, and discusses strategies that Missouri could adopt to increase the state's role in freight movements. Provided here is a summary of the *Freight Optimization and Development in Missouri: Ports and Waterways Module*.

The state of Missouri borders 488 miles of the Mississippi River, including 361 miles of the Upper Mississippi River and 127 miles of the Lower Mississippi River. Missouri also contains 186 miles of the Missouri River. A total of 14 public ports and over 200 private ports are located along Missouri's waterways. Three of these public ports and more than 50 private ports are on the Missouri River, while 11 public and over 150 private ports are on the Mississippi River. The 14 public Port Authorities currently report service to 36 counties in Missouri as well as to six other states; these Port Authorities occupy roughly 2,000 acres of land.

Missouri's centralized location and access to multiple modes of transportation effectively position the state for increased freight movements and growth on its waterways. Other valuable advantages to encourage waterborne commerce on Missouri's waterways network include: existing land for port expansion, available skilled labor force, favorable business climate and its impact on economic development, presence of Foreign Trade Zones, Enhanced Enterprise Zones, and lack of congestion currently on the waterways.

TranSystems conducted a review of commodity flows on the Missouri and Mississippi Rivers in order to provide guidance on market trends that may impact the development of public ports in Missouri. The analysis is derived from MoDOT's 2006 *Missouri Public Port Authorities: Assessment of Importance and Needs Final Report (Assessment)*, and 2007 *Update of Missouri Public Port Authority Assessment (Update),* Waterborne Commerce Statistics for the years 1995 to 2005 obtained from the U.S. Army Corp of Engineers (USACE), brief interviews with a number of public ports in Missouri and TranSystems' knowledge of the regional cargo market based on previous project work.

The commodity flow analysis indicated that commodities such as food and farm products tend to be transported southbound, or "down" the rivers from Kansas City to the mouth of the Mississippi River and from Minneapolis, Minnesota to Baton Rouge, Louisiana on the Mississippi River. The majority of crude materials transported on these waterways are also traveling down river, except in the case of shipments on the Mississippi River from Minneapolis, Minnesota to the mouth of the Missouri River. In this case, the majority of these materials are transported northbound. Additionally, the majority of petroleum and petroleum products are transported northbound on the Mississippi River from Baton Rouge, Louisiana to the mouth of the Ohio River.

The historical review indicates that total port tonnage has grown at a relatively slow rate in recent years. One reason for this is that the expansion of the regional ethanol industry has consumed corn that previously moved out of the region by barge. This trend is expected to continue based on projected growth in ethanol production. However, the ethanol industry is also creating new opportunities for barge transport with increased shipments of ethanol to domestic consumption centers and dry distillers grains with solubles (DDGS) to export markets. Developments in major commodities (e.g., aggregates, sand) are primarily tied to local and regional economic developments and the health of specific economic sectors such as construction activity. Therefore, the availability of local supply (e.g., sand) has an impact on traffic in specific commodity groups (e.g., crude material). There may also be opportunities to move containerized cargo or empty containers if global containerized trade grows strongly over the next decade.

Also discussed are current and future trends that Missouri could capture to strengthen its role as a national freight center. These trends are related to tonnage growth of major commodities on the nation's inland waterway system, the impact of global freight transport on inland waterways, growth of container-on-barge operations, increased biofuel services, identity preserved agriculture, significance of the Jones Act on waterborne commerce, the increasing role of

logistics terminals in the U.S., policy issues regarding navigation of the Missouri River, and lock/dam expansion on the Mississippi River. The following key points highlight these trends:

- Mining crude materials and minerals generates $4.5-$5 billion toward Missouri's economy annually. Missouri's population is estimated to grow 15% over the next 20 years. Given this growth, there will be a continued demand to ship these commodities via barge as it is a cost effective and secure mode of transport.

- In 2004, the reported value of U.S.-international trade by mode was 39.3% water, 26.8% air, 21.4% truck, 4.9% rail and 1.2% pipeline. Clearly, coastal and river ports play an important role in the current modal split for global trade and this is likely to strengthen in the next decade. The use of inland waterways to ship goods further inland is important as many Gulf coast ports are positioned to accept an increased number of containers due to trade growth from China and the expansion of the Panama Canal.

- Global containership capacity has nearly tripled in the last decade and it is estimated to grow another 50% in the next five years. To handle container-on-barge (COB) service, port terminals must have adequate ground storage and equipment to move containers on/off vessels and truck chasses. The lock and dam operation also needs to be reliable for timely shipments.

- U.S. ethanol production reached 4.86 billion gallons in 2006, compared to 1.63 billion gallons in 2000. The U.S. Department of Agriculture (USDA) forecasts an increase in ethanol production over the next five years to more than 11 billion gallons, as a result of the Renewable Fuel Program of the 2005 Energy Policy Act. The smaller biodiesel sector is also projected to expand from annual production of around 250 million gallons in 2006 to 700 million gallons by 2012, then stabilizing at this level. The projected growth of ethanol and other biofuels is expected to have a positive impact on tank barge demand. DDGS, a by-product of ethanol, could also have a positive impact on dry hopper barge demand.

Strategies were also developed to increase Missouri's role in waterborne freight movements and accelerate or facilitate freight and logistics development at Missouri's ports. These strategies considered data and other information gathered on the state's ports and waterways network, including industry trends and input from key stakeholders. The four major categories and subsequent strategies are as follows:

Preserve and enhance Missouri's ports and waterways system to ensure mobility and reliability.

- Complete construction of intermodal connections to maximize investment in established ports, giving priority to ports with incomplete connections like New Madrid and Pemiscot.
- Support the Water Resources Development Act appropriations in Congress to modernize the lock and dam system on the Upper Mississippi River.
- Utilize the proposed Waterways Prioritization Process to determine optimal investments that meet the needs of Missouri's ports.

Promote the health of existing commodities shipped on the waterway system.

- Leverage involvement in the Industrial Minerals Advisory Council to monitor commodity projections and protect the current and future interests of Missouri's ports.
- Investigate opportunities to serve on councils, associations, or other commodity-focused advocacy groups to support Port interests in all waterway commodities.

Support sound initiatives to capture new commodities and service opportunities for Missouri.

- Support or conduct a feasibility study for a biofuel consolidation and distribution facility initially focusing on ports in Northeast Missouri due to their proximity to production areas.
- Evaluate and consider proposals to support the development of a Logistics Terminal below the Mississippi River's lowest lock and dam and near a large production and consumption area like St. Louis.
- Consider participating in a Public/Private Partnership (P3) to capture new commodities or service options at Missouri ports to take advantage of lower rates on publicly borrowed funds.

Pursue additional funding to implement projects that support freight development.

- Evaluate the economic impact of the ports on the state to provide additional support for funding on an annual basis.
- Pursue a dedicated funding source for waterways rather than relying on yearly appropriations from the General Assembly.
- Work to maintain the ability to use flexible funding mechanisms at ports regardless of its floodplain designation.
- Encourage modal associations by the establishment of a Multimodal Council to promote all modes in Missouri and raise awareness of the need for adequate funding.

Existing models and frameworks used for freight and logistics development were also reviewed. The intent of this research was to understand how best to apply these models to Missouri as a mechanism to select port projects based on how the projects matched with aforementioned strategies. A Waterways Prioritization Process was developed and proposed for Missouri, to provide justification for funding decisions by having a foundation of measures based on these strategies to increase freight movement on Missouri's waterways. Applications provided by the Port Authorities can then be inputted into the Decision-Support Tool, created to have the ability to sort projects by urgency of need and then based on their project "score". The input solicited during the Port Authorities' application process and evaluation of the criteria used in the Decision-Support Tool will yield a prioritized list of projects that can then be evaluated through a dialog with decision-makers to determine the best investments of funds. The Decision-Support Tool, including a description of the initial criteria and weights, is provided in the companion to this report, the *Waterways Prioritization Process Practitioner's Guide*.

In the future, because the Waterways Prioritization Process was developed to parallel MoDOT's Transportation Planning-Planning Framework, roundtable discussions with representatives of multiple modes could take place when prioritizing needs. Multimodal Operations is charged with managing the needs of not only ports and waterways throughout the state but also airports, public transit, and railroad. Sharing the needs of other modes during this process could serve two purposes. First, sharing among the modes could facilitate an overall understanding of the transportation needs across the state and reveal the linkages and relationships among the modal projects. Secondly, recognizing these linkages may assist in future cooperative prioritization dialog among the modes resulting in true transportation investments regardless of the source of the funds to meet the needs of Missouri. Fashioning this Process in a likeness of the Planning Framework lays the foundation for these future "apples to apples" comparisons and considerations.

The opportunities presented here as well as others mentioned in the report lend to Missouri's ability to promote trade and growth on the state's waterways. Additionally, by adopting the strategies proposed in this report and through the Waterways Prioritization Process, ports and waterways partners can engage in a justifiable dialog to consider the best investments to capture freight development and set the stage for Missouri to strengthen its role as a national freight center.

Section 7 – Developing a Waterways Prioritization Process for Missouri

Limitations on funding are a consistent challenge for decision-makers in the public and private sectors. For roadway needs, MoDOT currently operates within the Transportation Planning-Planning Framework. The Planning Framework sets out defined steps, roles of local officials and the public, as well as a process for prioritizing needs and projects. Multimodal Operations desires to refine the mechanism by which they prioritize needs and allocate project funds based on "freight optimization". Rather than develop such a mechanism for all freight modes at once, this report focused on waterway freight. The report includes the development of a process with both cooperative planning and a comparative, software-based evaluation - the Decision-Support Tool. It also aimed to make this process compatible with existing, roadway planning methods. The reality is that the funding sources for roadway and waterways are separate so the process cannot be completely merged. However, coordination with the Planning Framework can open the table for the discussion of Missouri's transportation needs becoming truly multimodal. Roadway and waterway stakeholders can begin communicating the overall goals for Missouri and consider the overlapping needs - addressing port needs with roadway solutions and vice versa.

MoDOT needs a better mechanism to select port projects based on how the projects match with the strategies to develop Missouri as a freight hub. The research team reviewed existing models/frameworks used for freight and logistics development to understand how best to apply these in Missouri. Arkansas's Intermodal Cost Analysis Software and the Federal Highway Administration's Intermodal Transportation and Inventory Cost-State Tool are examples of decision-support models that the research team investigated, in addition to the University of Missouri-Rolla's research on a dynamic approach to multimodal routing decisions.

It is imperative to review and evaluate how any decision-support model can be incorporated into the Multimodal Operations Process. It is also important that the process be flexible enough to prioritize not only the hard, waterways infrastructure projects but programs and policies that may influence the freight and logistics situation. The strategies outlined in Section 6 provide structure to the Waterways Prioritization Process, and can be incorporated in the Decision-Support Tool by applying weights to corresponding data inputs to determine relative importance. Those strategies include both the hard infrastructure priorities as well as those for program and policy implementation.

What are other States Doing?

In the waterways arena, MoDOT has developed relationships with counterparts at other Departments of Transportation that have inland waterway ports. Two states of note are Arkansas and Mississippi.

Arkansas has incorporated tools in their decision-making process to consider the economic impact of a project at a single port or even scenarios considering the impacts of a string of ports. Arkansas State Highway and Transportation Department (SHTD) uses a priority rating system as shown in Table 13. This is an initial step in their funding allocation process. The system categorizes the urgency of the needs presented in a project submittal.

Table 13: Arkansas SHTD Priority Rating System	
Critical	The port structures or equipment are unsafe or could fail.
Immediate	The improvement is required for minimum operations within a 1-2 year timeframe.
Short Term	The project would improve the level of efficiency to serve customers within a 3-5 year timeframe.
Long Term	The project drives future growth and the ability to attract new business.

Source: Arkansas State Highway and Transportation Department.

Arkansas is home to the largest Economic and Development Administration (EDA) research university staff in the country residing at the Institute for Economic Advancement at the University of Arkansas at Little Rock. The Institute developed a Rural Inland Waterways Economic Impact Kit. In simplest terms, this model considers input that includes a scenario of improvements either for a single port or for a string of ports and the model assists in determining the potential economic impacts of those improvements. The Kit's details are reviewed in the next subsection.

Arkansas has been working to incorporate more of a cost benefit analysis for ports projects as they have successfully done for their railroad projects. One challenge for ports and waterways is the need for a reduced planning horizon to do relevant projections in this area. They discovered that five to ten years is the limit to achieve reliable results, unlike roadway projects that are typically evaluated over 20 years. They are considering ways to add to the Kit to calculate baseline from a no build scenario and then compare that to the transportation efficiency benefits for a particular need. In addition to transportation efficiencies of a proposed improvement there is a desire to include the costs of preservation as opposed to delayed maintenance or ultimate replacement/repair and defining those thresholds. All these elements could be incorporated to determine overall transportation benefits of proposed projects to increase the likelihood of the best investment of dollars for the projected return. This process would require not only policies for future development but also adopting policies about maintenance practices.

Mississippi Department of Transportation (MDOT) has a framework structured by the nature of the legislation passed to appropriate the dedicated funding source for ports projects under a multimodal program. The project evaluation mechanism is in the form of an application that is used during the prioritization process phase of their framework to allocate the funds. Figure 14 illustrates Mississippi's most recent version of their application.

Figure 14: Ports Multimodal Application Rating Form, Mississippi Department of Transportation

Name of Applicant: Amount Requested: $

Brief Description of Project: Scored by: _____

PART 1 – THRESHOLD CRITERIA (An answer of "NO" to any of the following will result in the Project being deemed ineligible for funding)		**PART 2 – SCORING**	
THRESHOLD CRITERIA	**YES or NO**	**SCORING CRITERIA**	**SCORE**
The Project is directly related to capital improvements or the rebuilding or rehabilitation of basic infrastructure or purchase of major handling equipment, not for routine maintenance, administrative or operational matters or expenses.		Operational Impact on port • Improve current operational capability of the port? • Provide a new operational capability for the port? • Necessary to keep an existing client of the port? • Necessary to acquire a new client for the port? (30 pts max)	
The Project is directly related to the operation of the port in its role as a water transportation facility.		Economic Impact of the Project • Produce revenue or result in cost savings for the port? • Benefit the economy of the surrounding community? • Provided a thorough cost-benefit analysis of the Project evidencing the net value of the Project to the port and surrounding community? • Create or support jobs, directly or indirectly, at the port or in the local community? (30 pts max)	
The Project is outside the normal operating budget of the port.			
Is the port owned by a public body – State, county, or municipality?		Port Activity Supports the Proposed Project • Support current operations or new operations at the port? (20 pts max)	
A portion of the projected cost of the Project has or will be funded from public or private sources, as a match to the grant sought from the Multi-Modal Transportation Fund.		Funding • Are funds necessary for the Project? • Needed to complete an ongoing project or development? • Be used as matching funds or to leverage other funding? • Are project costs and/or budget reasonable? (20 pts max)	
ELIGIBLE?			
		Total Score	

Mississippi statutes provide that a Ports Committee reviews and approves applications for funding. MDOT only reviews the applications for eligibility while the committee does the approval. The Ports Committee includes one member from the Mississippi Development Authority (MDA), one from MDOT (appointed by their directors), and the port directors of the public ports of Mississippi, or their designees. Currently this Committee comprises three coastal and three inland port directors and the MDOT and MDA representatives have agreed, out of practice, not to vote but to be available to provide input in the process. Some of these practices could be adopted by MoDOT in conjunction with the funding strategy outlined in Section 6.

Tools Investigated

University of Missouri-Rolla conducted a critical review of existing technical models and frameworks used for freight and logistics development. They investigated the intended functions of these decision-support tools and their applicability for MoDOT's Decision-Support Tool. Summaries of their findings are provided as follows:

RURAL INLAND WATERWAYS ECONOMIC IMPACT KIT
By Gregory L. Hamilton, David Rasmussen, Xiaogin Zeng
Institute for Economic Advancement, University of Arkansas at Little Rock

The primary objective of this model is to allow users to evaluate the economic impact of existing rural inland waterways ports and terminals. The importance of a port and terminals can be quantified using the Kit. It is designed so that users can follow a step-by-step procedure that focuses on the economic impact of the totality of a port or terminal operation and linkage to the community's industrial structures and transportation systems. It is based on the design of the Maritime Administration Port Economic Impact Kit developed in the 1970s. The kit is designed to run on a PC with a Windows® operating system, and was developed using the Visual Basic programming language. It operates as a stand-alone program so Visual Basic is not required to run the program.

The economic analysis provided by the Kit is extremely complex and requires a significant amount of data collection. For example, users are required to input two types of industry-related data in order to regionalize: 1) employment data by industry are needed to regionalize the industrial sectors of the model and 2) earnings by industry are necessary to regionalize the personal consumption expenditures. The model was last updated in 2000 and is based on a database that contains price indexes for 1987-1997. Price indexes are adjusted from nominal values into 1992 constant dollar amounts. This data requires significant updates. The most interesting characteristic of the model is that it attempts to link the port flows to inland transportation such as rail, truck, or barge. However, the user inputs into these models are very arbitrary.

The Kit could potentially be used to provide input on economic criteria into the Decision-Support Tool; however, this requires significant model revision effort that outweighs the benefits of its inclusion. Another drawback is that it only considers a single criterion and thus has limited ability to assist with developing a decision-support tool for ports and waterways.

INTERMODAL TRANSPORTATION AND INVENTORY COSTING MODEL STATE TOOL
Federal Highway Administration

The Intermodal Transportation and Inventory Costing Model State Tool (ITIC-ST) examines the commodity attributes and transportation characteristics for annual shipments between origination and destination pairs, and then estimates the transportation and inventory costs of alternative freight transportation modes. The model is a more user-friendly update to the U.S. DOT Comprehensive Truck Size and Weight Study. The user can choose a national analysis or limit the analysis to a few states.

The usefulness of the model for prioritized investment and development decisions related to increased freight and logistics development is limited to the impact on truck operations from a relative improvement in rail intermodal operations. The model estimates the impact on vehicle miles traveled for each truck configuration and the transportation and inventory costs. The analogous impact of port operations on truck operations is interesting, and could potentially be useful as an input to the MoDOT tool. ITIC-ST is a deterministic model using truck annual shipment data, truck rate data, and county-to-county mileage estimates. The model includes origin-destination distances grouped into 25-mile increments and market truck rate estimates for approximately 1,500 market origin-destination pairs. The data in these models could be used for newly developed dynamic optimization models.

MULTIMODAL TRANSPORTATION IMPROVEMENT PROGRAM
Mississippi Department of Transportation

The Multimodal Capital Improvement Fund (MCIF) was established in 2002 for the improvement of airports, ports, railroads, and transit systems in the state. The goal is to maximize the impact of the available funds by funding projects that will improve the service, operations, and competitive position of ports within Mississippi and to provide economic benefits to the Mississippi communities in which such ports are located. Projects must be directly related to capital improvements, the rebuilding or rehabilitation of basic infrastructure, the operation of the port in its modal role, and a purpose outside the normal operating budget of the port.

All applications for MCIF funding are rated based on the established scoring criteria, with the final rating score as the average of the individual scores of reviewers. The applications provide a listing of threshold and evaluation criteria and pairs that with the subjective opinion of the reviewing committee. This process most aligns with MoDOT's desire to balance objective measures and criteria with subjective input from MoDOT's Multimodal Operations leadership and the port stakeholders.

ANOTHER TOOL: The Analytic Hierarchy Process

The Analytic Hierarchy Process (AHP) was developed by T. Saaty in the 1970s as a multiple-criteria methodology for evaluating alternatives. It is a technique for decision making where there are a limited number of choices (alternatives), but where each has a number of different attributes (criteria). AHP can assist with identifying and weighting selection criteria, analyzing the data collected for the criteria, and expediting the decision-making process. It helps capture both subjective and objective evaluation measures, providing a useful mechanism for checking the consistency of the evaluation measures and suggested alternatives. In many cases, the process can be used to create subgroups of alternatives, such as "High Priority", "Low Priority", and "No Priority". The method allows for formalization of both qualitative and quantitative criteria, and is especially applicable when decisions are being made by a group.

The process works well in practice and is extremely popular among decision-makers in applications such as portfolio selection, transportation planning, manufacturing system design, policy making, and artificial intelligence. The process is based on a series of pairwise comparisons that are checked for internal consistency and then combined. First, alternatives and the significant criteria are identified. Second, each criterion is given a weight either "arbitrarily" or through pairwise comparisons. In the former case, the decision makers specify their preference for each criterion, while, in the latter case, the relative significance of each criterion is obtained by indicating the importance of pairs of criteria. Third, alternatives are compared for *each* criterion. Again, these may be directly input, calculated from available data, or determined via pairwise comparison. Once the data is input, each matrix of preferences is evaluated by using eigenvalues to check the consistency of the responses, which creates a consistency coefficient. Values close to 1 indicate the data is relative comparisons of

alternatives and criteria are consistent. Extreme inconsistency may indicate data collection errors. Finally, a prioritized ranking of alternatives is provided as output.

After a review of these models and tools, and after considering MoDOT's interests and stakeholder suggestions, a combined system of dialog and Decision-Support Tool software were developed. As discussed in this section, the Decision-Support Tool provides a multiple-criterion methodology for evaluating alternatives. When reviewing and evaluating previous models, it was determined that utilization of those models would be computationally complex, involve significant extraneous data and provide non-intuitive user interfaces. The Decision-Support Tool developed for MoDOT, on the other hand, can be incorporated into MoDOT's Transportation Planning-Planning Framework as a less complex and more user-friendly process. The Tool was designed in Microsoft Excel and can be sent via email.

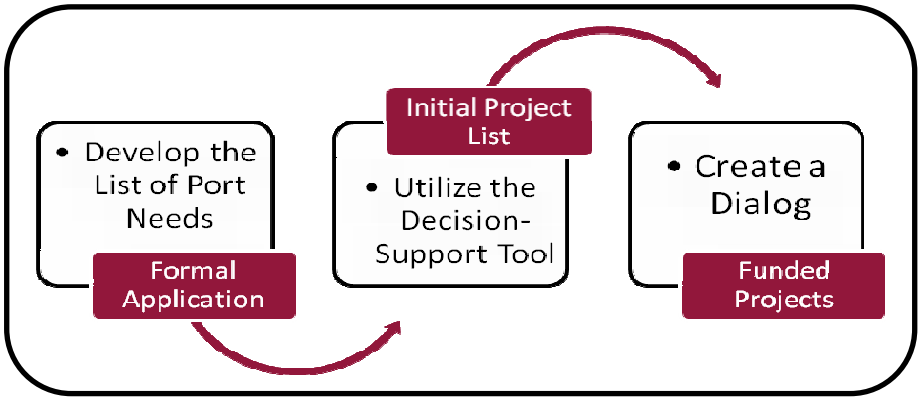
The Decision-Support Tool software evaluates a set of alternatives based on a number of different attributes or criteria, and helps capture both subjective and objective evaluation measures. Input from Missouri's Port Authorities is required to initiate the decision-making process. Ports responses to predetermined questions are used to calculate "scores" for each criterion, which can then be weighted to provide a final ranking mechanism.

The output can be used to assist with prioritization by incorporating a dialog to create subcategories of projects, such as "High Priority", "Low Priority", and "No Priority". In addition, the method allows for formalization of both qualitative and quantitative criteria, which is especially applicable when decisions are being made by a group. This process works well in practice and is extremely popular among decision-makers in a variety of applications due to the visibility provided throughout the entire decision making process, and the consistency of the evaluation measures and suggested alternatives.

A Proposed Waterways Prioritization Process for Missouri

The proposed Waterways Prioritization Process is a natural progression from Multimodal Operations' current process of surveying the Port Authorities to assess the needs and allocating the limited funds. This Process provides justification for the decisions by having a foundation of measures based on the adopted strategies to increase freight movement on Missouri's waterways. The input solicited during the application process and evaluation of the criteria using the Decision-Support Tool yields a prioritized list of projects. This list can then be evaluated through a dialog with decision-makers armed with measurable results to determine the best investments of the funds to meet the needs of Missouri's ports. However, as with MoDOT's Planning Framework for the highways side of the business, the project prioritization process is not a black box that generates a list of Missouri's next waterway projects solely based on objective "scores". Rather, the Waterways Prioritization Process follows steps starting with developing a list of port needs resulting in Port Authorities submitting applications for their top projects. The applied projects are then evaluated by the Decision-Support Tool to create an initial prioritized list. Finally, a subjective dialog is considered before a project is funded. The Process is illustrated in Figure 15.

Figure 15: Waterways Prioritization Process Flow Diagram



Develop the List of Port Needs

As illustrated in MoDOT's *Assessment* and *Update*, the public ports in Missouri have an extensive list of critical, immediate, short- and long-term needs for capital improvements. This list of port needs is the first element in the Process and can be completed through a formal survey each year or could be left to ports who internally consider their needs on an on-going basis.

From their list of needs Port Authorities provide the input for the Decision-Support Tool through an application in the form of a questionnaire for the projects they determine are most important to consider for funding. As part of this report, a general questionnaire was developed and tested. The initial questionnaire is provided in the companion to this report, the *Waterways Prioritization Process Practitioner's Guide.*

The initial questionnaire requests information including the project type and description, estimated project cost, data and projections related to employment, and cargo tonnage as well as other relevant information. This initial step is the Port Authority's first opportunity to consider the ramifications of combining multiple improvements into a single project submittal or presenting them as separate improvements to compete for funds. There are pros and cons to both approaches. Multiple improvements may make a project more competitive in terms of rating higher in the project evaluation criteria; however, this may also make the overall project estimate cost prohibitive and subject it to consideration in outer years for funding.

Multimodal Operations will need to set a schedule for an application submittal period based on funding cycles. It is imperative to give Port Authorities sufficient time to consider their applications due to the information required to fill out the questionnaire. Staff also requires sufficient time to review the initial applications for eligibility and completeness before inputting the projects into the Decision-Support Tool.

Utilize the Decision-Support Tool

The Tool is created to have the ability to sort by urgency of need and then based on the evaluation "scores". The Tool provides a fairly straight-forward way of inputting, evaluating, and comparing project data without being overly technical or complex. It requires less non-applicant provided data input than other tools and provides very intuitive and logical outputs. The project "score"' is of a consistent scale with that of the Planning Framework. This is significant; it enables future inclusion of other modes in that process.

Parallel to MoDOT's Planning Framework, the Decision-Support Tool provides the means for a more objective approach to decision-making and yet these decisions are more complex than just calculable "scores". This process relies on the right people being involved in making decisions and adjusting to the changing factors. There is flexibility incorporated in the design of the Tool to enable MoDOT to change the criteria and the weights to reflect shifts in program goals and objectives. The criteria also define the urgency of the need addressed by the project. The criteria measure the proposed projects' impacts on overall port operations, economics, trucking, rail, waterway, and funding. The Tool also captures some elements of regional considerations that are not scored but just included for informational purposes.

The product of this step in the Process is lists of fundable projects categorized by urgency of the need. These projects are also evaluated based on outcomes anticipated from the completion of the projects and from the investment of the funds. This list will be paired with supplemental information collected from the project applications that were not scored to assist with the subjective dialog in the next step of the Process. The Process is similar to that practiced with the Planning Framework for the roadway projects. The Planning Framework categorizes projects in terms of High, Medium, and Low and it is recommended that Multimodal Operations adopt that same terminology at this phase of the allocation process. There is a direct correlation between these terms and the classification of the urgency of the need as defined for the Port Authorities.

The Decision-Support Tool, including a description of the initial criteria and weights, is provided in the companion to this report, the *Waterways Prioritization Process Practitioner's Guide*.

Create a Dialog

Multimodal Operations, as with the process for roadways, can gather together ports and waterways partners as a selection committee to discuss the list of projects as prioritized by the Tool. This results in a justifiable dialog to consider the best investments to complement the Multimodal strategies to capture freight development and set the stage for Missouri to strengthen its role as a national freight center. This Process step is necessary to balance the measurable outcomes reflected in the evaluation of each individual project for each individual port with a statewide perspective regarding what is the best investment for the overall ports and waterways program throughout Missouri.

The outcome of this step in the Process is the finalized list of funded projects. This step in the Process ensures that all applicants are involved in the selection and buy into the final list of funded projects.

Future Enhancements

The Waterways Prioritization Process parallels MoDOT's Transportation Planning-Planning Framework. This parallel structure enables future roundtable discussions with representatives of multiple modes when prioritizing statewide needs. Multimodal Operations is charged with managing the needs of not only ports and waterways throughout the state but also airports, public transit, and railroad. Sharing the needs of other modes during this process serves two purposes. Sharing among the modes facilitates an overall understanding of the transportation needs across the state and reveals the linkages and relationships among the modal projects. Secondly, recognizing these linkages assists in future cooperative prioritization dialog among the modes resulting in true 'transportation' investments regardless of the source of the funds to meet the needs of Missouri. Fashioning this Process in a likeness of the Planning Framework lays the foundation for these future "apples to apples" comparisons and considerations.

Section 8 – Summary and Conclusions

The preceding analysis provides the following information:

- An inventory of Missouri's public and private port operations and public port needs
- Baseline commodity flow data calculated for Missouri's waterways
- Regional, national and global trends that Missouri may capture to increase the state's role in freight movements
- Strategies that Missouri could adopt to accelerate or facilitate freight and logistics development in the state
- A Waterways Prioritization Process that will assist MoDOT in making justifiable investment decisions that meet the needs of not only Missouri's ports, but the state itself

Missouri's ports and waterways prove to be important to the region's economic growth and significant to the state's role in the transport of waterborne freight. Although relatively slow tonnage growth has been reported at Missouri's 14 public ports in recent years, there are opportunities moving forward that offer potential for the state. For instance, Missouri is a key producer of construction sand and gravel. The local supply of such commodities has a direct impact on waterway traffic. Therefore, it is important to monitor that supply and demand in order to determine where Missouri's ports should focus their efforts. Likewise, future principal changes regarding traffic on Missouri's waterways are anticipated to be in the agricultural sector due to the growth of ethanol production in the Midwest. As biofuel production requires a significant amount of corn and soybeans, there may be less grain transported on Missouri's waterways. However, the projected growth in exports of DDGS and biofuel transport are expected to positively impact traffic on the state's waterways network. Containerized trade and the development of logistics terminals that can offer COB service is another opportunity that Missouri may wish to capture, as capacity constraints can be found at many coastal ports.

This report proposes strategies to help grow trade on Missouri's ports and waterways and to balance existing customers' needs with new markets. These strategies can ensure that Missouri stays on the pulse of the transportation and logistics industry to assist in making Missouri a national freight center. These strategies are listed below:

Preserve and enhance Missouri's ports and waterways system to ensure mobility and reliability.

- Complete construction of intermodal connections to maximize investment in established ports, giving priority to ports with incomplete connections like New Madrid and Pemiscot.
- Support the Water Resources Development Act appropriations in Congress to modernize the lock and dam system on the Upper Mississippi River.
- Utilize the proposed Waterways Prioritization Process to determine optimal investments that meet the needs of Missouri's ports.

Promote the health of existing commodities shipped on the waterway system.

- Leverage involvement in the Industrial Minerals Advisory Council to monitor commodity projections and protect the current and future interests of Missouri's ports.
- Investigate opportunities to serve on councils, associations, or other commodity-focused advocacy groups to support Port interests in all waterway commodities.

Support sound initiatives to capture new commodities and service options to expand traffic on Missouri's waterways.

- Support or conduct a feasibility study for a biofuel consolidation and distribution facility initially focusing on ports in Northeast Missouri due to their proximity to production areas.
- Evaluate and consider proposals to support the development of a Logistics Terminal below the Mississippi River's lowest lock and dam and near large production and consumption areas like St. Louis.

- Consider participating in a Public/Private Partnership (P3) to capture new commodities or service options at Missouri ports by taking advantage of lower rates on publicly borrowed funds.

Pursue additional funding to implement projects that support freight development.

- Evaluate the current and projected economic impact of the ports on the state to provide additional support for funding on an annual basis.
- Pursue a dedicated funding source for waterways rather than relying on yearly appropriations from the General Assembly.
- Work to maintain the ability to use flexible funding mechanisms at ports regardless of its floodplain designation.
- Encourage modal associations by establishing a Multimodal Council to promote all modes in Missouri and raise awareness of the need for adequate funding.

The proposed Waterways Prioritization Process assesses the needs of Missouri's ports and helps to allocate the limited funds. The intent of the Process is to provide justification for project selection by having a foundation of measures based on the adopted strategies in Section 6. As a component of the Waterways Prioritization Process, the Decision-Support Tool is designed to yield a list of prioritized projects based on criteria evaluated from input solicited from the Port Authorities' applications. This list of projects, categorized by urgency of need and evaluated based on outcomes anticipated from the completion of the projects, can arm decision-makers with measurable results to determine the best investments of funds to meet the needs of Missouri's ports.

Missouri's centralized location and access to multimodal connections places the state in a prime position to strengthen its role as a national freight center. As the Mississippi River moves 170 million tons of freight each year through Missouri, the barge industry continues to grow with concentration on the east side of the state along the Mississippi River. With these opportunities, along with many others discussed in this report, Missouri's ports have the ability to promote trade and growth for the state.