Economic Analysis Framework for Freight Transportation Based on Florida Statewide Multi-Modal Freight Model

Content

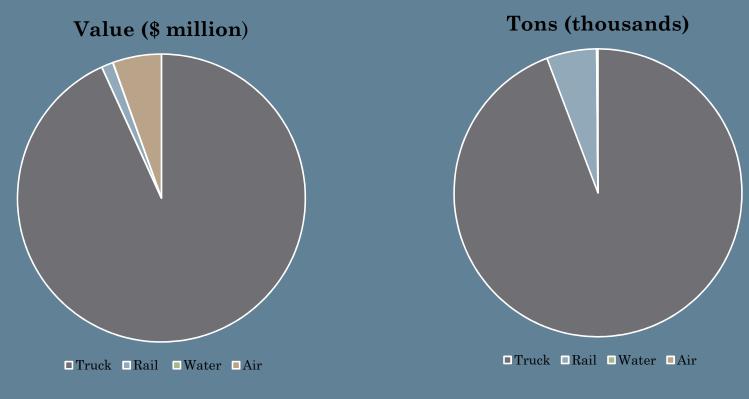
- Freight transportation in Florida regional economy
- Research purposes
- Literature review
- Economic modeling framework
- Analysis kit demonstration

Florida freight flow values and tonnages 2015

Florida	Value (\$ millions)	Tons (thousands)
Inbound Interstate	948	396
Within	1,142	1,452
Outbound Interstate	657	166

Data source: Florida Freight Data 2015

Florida freight flow by mode in 2012



Data source: Commodity flow survey 2012

Sectoral role of freight transportation in Florida economy

Description	Employment	Industry Output
481 Air transportation	40,159.8	\$16,217,447,266
482 Rail Transportation	5,949.3	\$1,991,435,669
483 Water transportation	13,761.3	\$12,354,762,695
484 Truck transportation	92,398.8	\$13,901,708,008

Data: Implan database, 2015



Economic Analysis Framework for Freight Transportation Based on Florida Statewide Multi-Modal Freight Model

1

Literature review

2

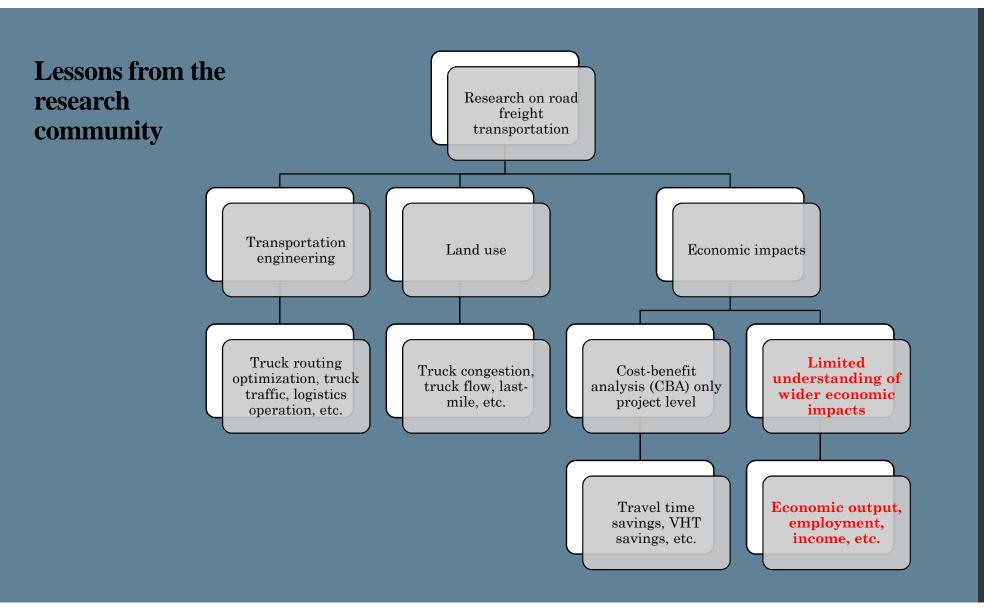
Economic model development

3

Analysis kit development

4

Case studies



Lessons from the practice

Case study 1: Determining Highway Truck-Freight Benefits and Economic Impacts For Washington State Department of Transportation (WSDOT)

- A computable general equilibrium model (CGE) is developed and is integrated with statewide travel demand modeling
 - Truck travel output (truck travel time) from travel demand modeling feeds to the CGE model.
 - Travel time savings (difference between investment scenario and no-investment scenario) considered truck efficiency improvement
 - Efficiency improvement considered truck industry productivity improvement
 - CGE model generates short/long run economic impacts based on productivity improvement

Modeling limits

- A CGE model is a complicated set of equations (hundreds of equation!) and is *a black-box* economic model
- Difficult to calculate
- Not developed as a transferrable tool.

Summary of literature review

- Economic impacts of freight transportation ignored in both practice and academia
- A lack of modeling frameworks to study freight impacts
- A lack of economic analysis tools for DOTs to aid freight investment decision making
- What economic model best fits for this analysis purposes
- How to integrate economic models with the Florida statewide freight supply-chain demand model (FreightSIM)

The project

1

Literature review

2

Economic model development

3

Analysis kit development

4

Case studies

Regional Input-Output model

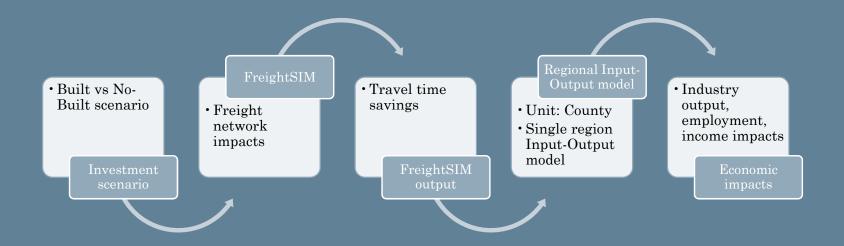
- Sectoral relationship
 - Each sector produces and consumes
 - Interconnected relationship among economic sectors
 - e.g. manufacturing sector purchases raw materials, trade sector relies on transportation and insurance sectors
- Wider economic impacts
 - □ Industry output impact, employment impact, income impact

Standard input-output model (Leontief model)

		Α	ctivity sectors		
	Intermediate demand		Final demand †	Total	
Outputs (j) Inputs (i)	A ₁		An	F _i	Yi
A ₁	<i>y</i> ₁₁	•••	y 1n	F ₁	Y ₁
	:		i	:	
A_n	y_{n1}		y_{nn}	F_n	Y_n
P_i^{\star}	P ₁		P_n	P = F	-,
Y_i	Y ₁		Yn		Y

^(†) F = C (consumption) + I (investment) + G (government expenditures) + X (exports). (*) P_j = payments to production factors or economy's incomes; usually includes wages, profits and imports.

Proposed analysis framework



Economic Analysis Framework for Freight Transportation Based on Florida Statewide Multi-Modal Freight Model

1

Literature review

2

Economic model development

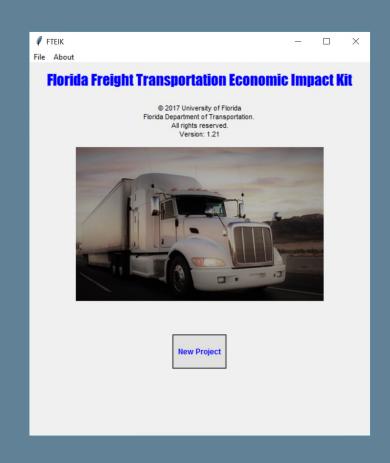
3

Analysis kit development

4

Case studies

- Start window



- About
 - Manual
 - Version



Setting Started:

Once users start the program, the kit will automatically load all the modules in the background.

In the project window, there are two additional functions at current stage. The first function allows users to read the manual for the software and the second function allows user to read the information about the software. These two functions are in the in the About in the Menu bar.

To start a new project, users should click the NEW PROJECT button in the project start window.

Project Information

The Project Information window allows users to describe the project details, analyst names and analysis date. All of the inputs are for project information use and will not affect the economic and FreightSIM results in the module.

Analysis date: This area contains information of the date of the latest economic analysis.

Analyst name: The analyst name entry is for the name of the staff performing the data input and economic analysis.

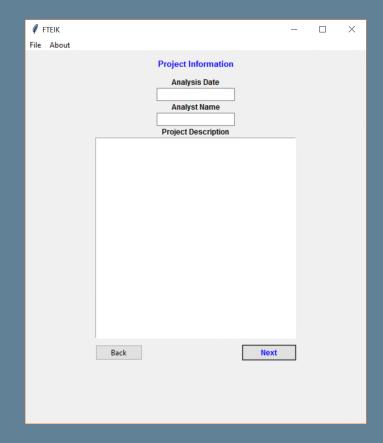
Project Description: The Notes section is for any additional notes on the analysis that may be of some relevance.

After these inputs, user could click Next or Back for further operation. Note that, however, clicking either of these two options will not erase the data that have been entered in the kit. This also applies to the following operations.

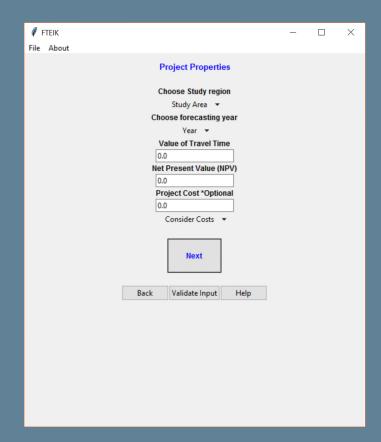
Project Properties

The project information is the key part of the entire economic analysis process. It allows users to customize their own values for converting outputs from FreightSIM and all the inputs from this window are required for further operation. If users are not sure what values to be used,

- Start a new project
 - Project information
 - Analysis date
 - Analyst
 - Project description



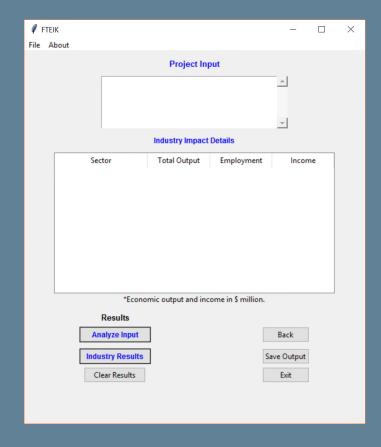
- Project properties
 - Study area
 - Choose forecasting year
 - Value of travel time
 - Net present value
 - Project cost (Optional)
 - Validate input
 - Help



- Scenario input for built and no built scenarios
 - Analyze VHT from FreightSIM output



- Project input
- Industry impact details
 - Analyze input
 - Industry results
 - Save output to txt file.



Current progress

- Update analysis kit
- Case studies using the analysis tool to be provided by the end of November

