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

Content

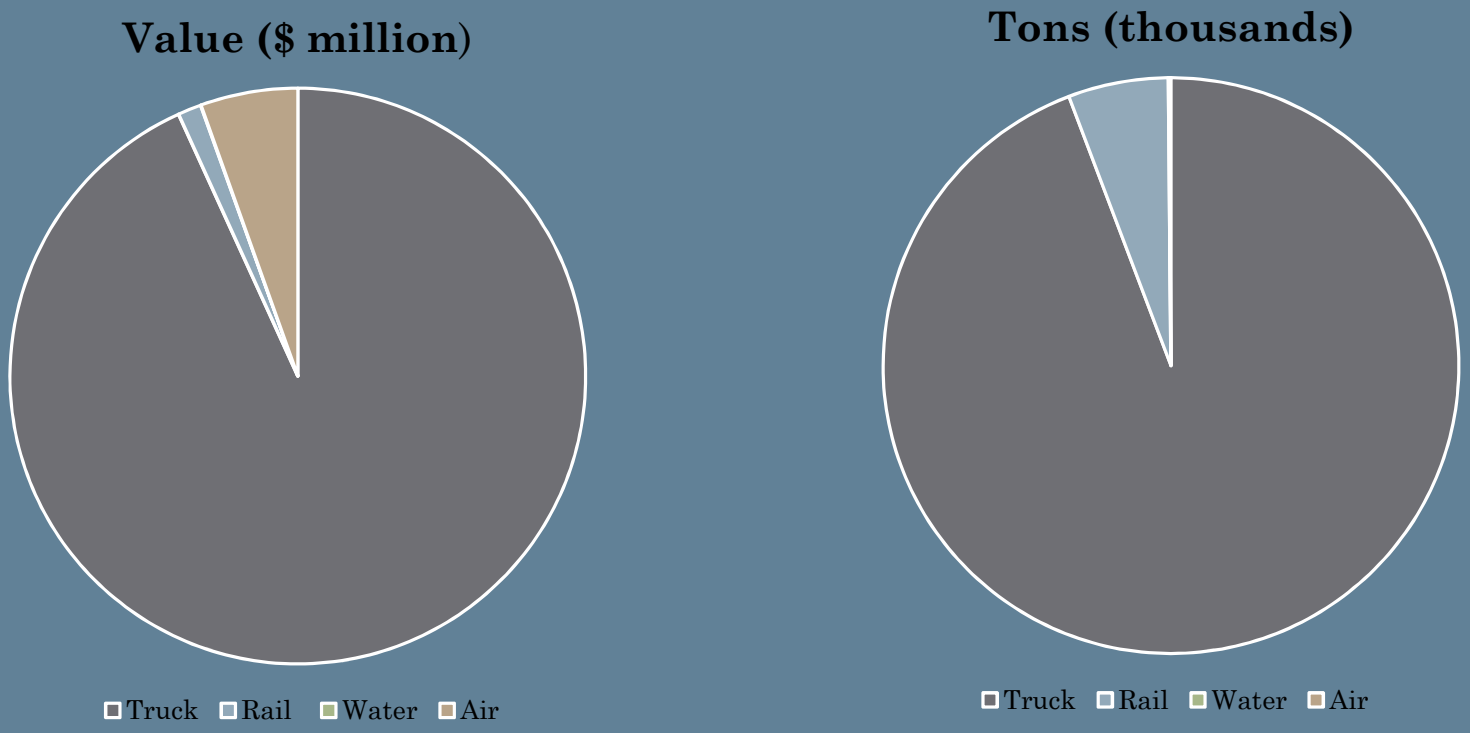
- Freight transportation in Florida regional economy
- Research purposes
- Literature review
- Economic modeling framework
- Analysis kit demonstration

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

- **What does road freight transportation play in urban and regional economic development?**
- **How do we quantify this role with economic modeling?**

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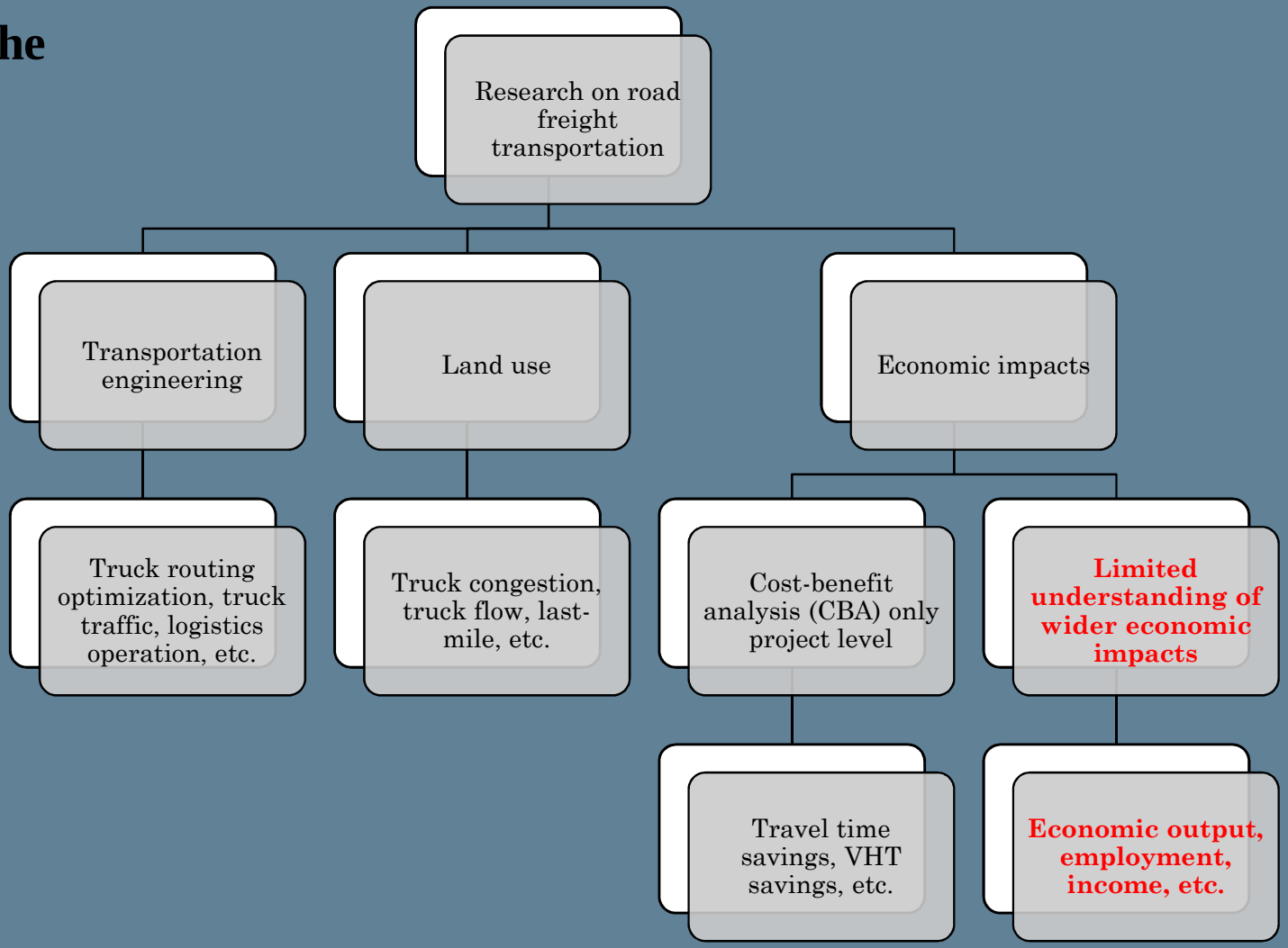
1. **Literature review**
2. **Economic model development**
3. **Analysis kit development**
4. **Case studies**

Lessons from the research community



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
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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

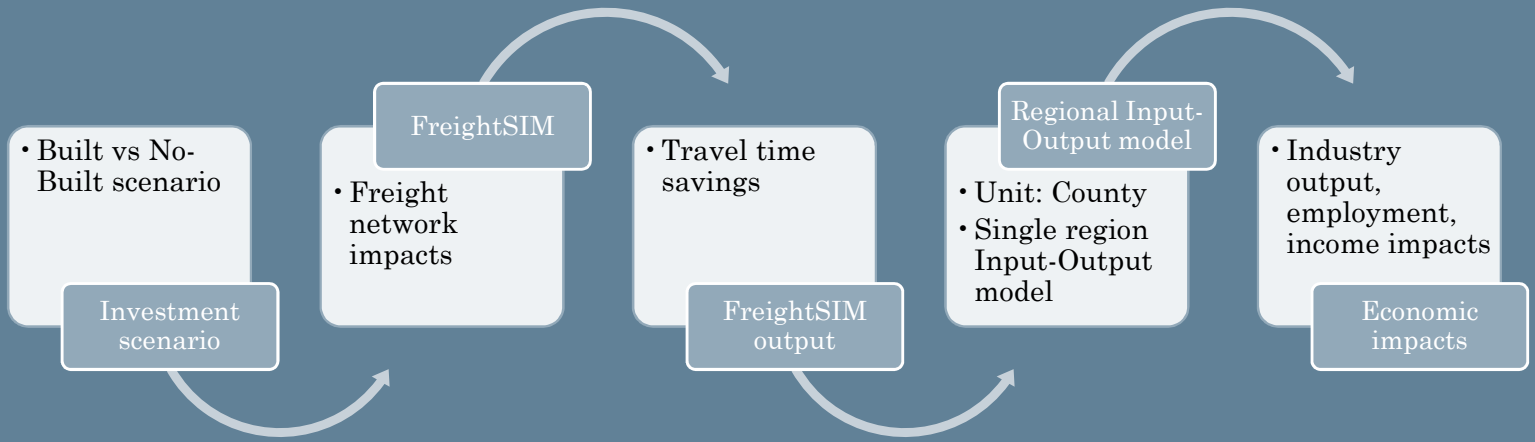
- Wider economic impacts
  - Industry output impact, employment impact, income impact

Standard input-output model (Leontief model)

Outputs (j) / Inputs (i)	Activity sectors: Intermediate demand			Final demand †	Total
	A_1	…	A_n	F_i	Y_i
A_1	y_{11}	…	y_{1n}	F_1	Y_1
⋮	⋮		⋮	⋮	⋮
A_n	y_{n1}	…	y_{nn}	F_n	Y_n
P_i^*	P_1	…	P_n	$P = F$	
Y_j	Y_1	…	Y_n		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



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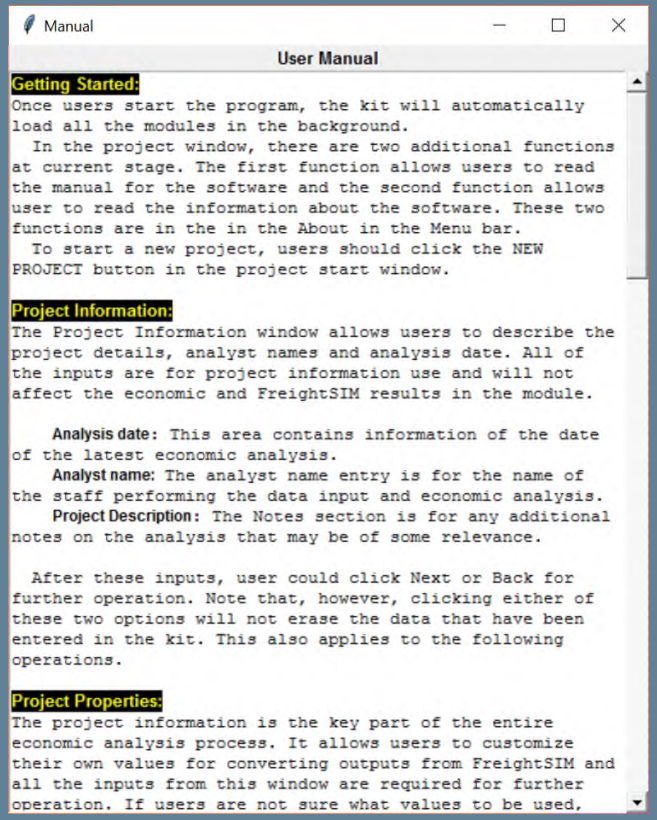
Kit demonstration

- Start window

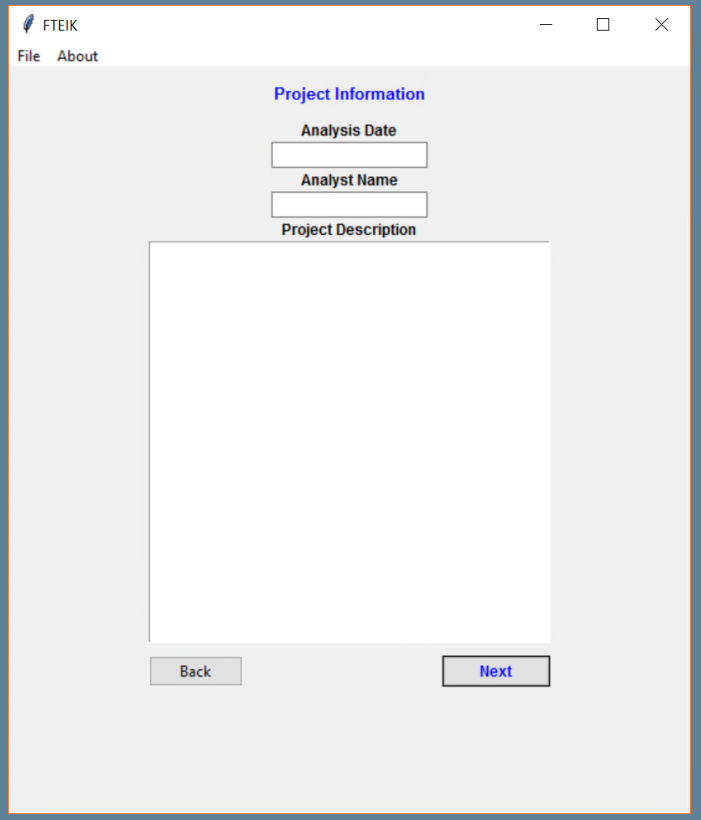
Kit demonstration

- About
  - Manual
  - Version



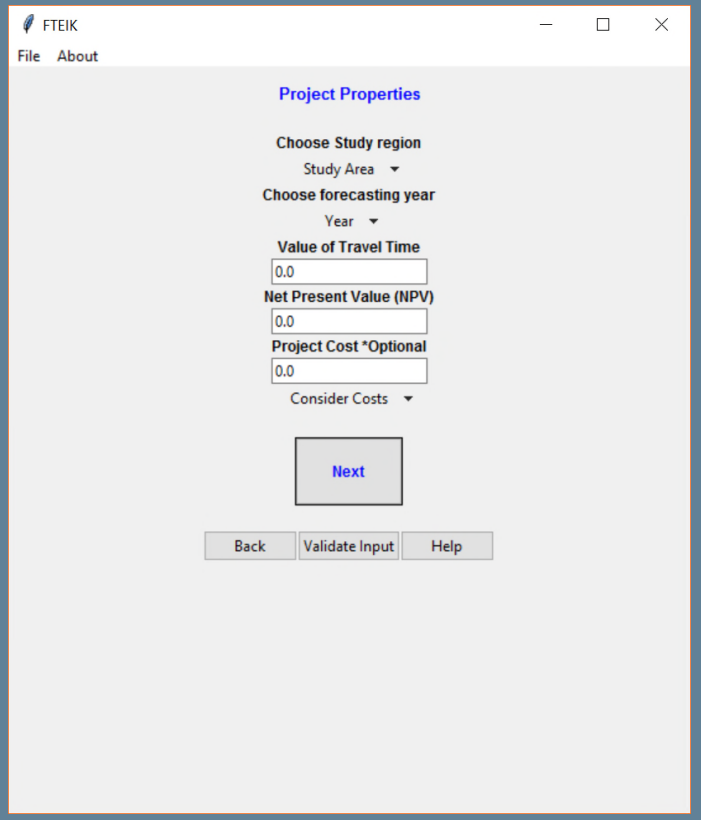
Kit demonstration

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



Kit demonstration

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

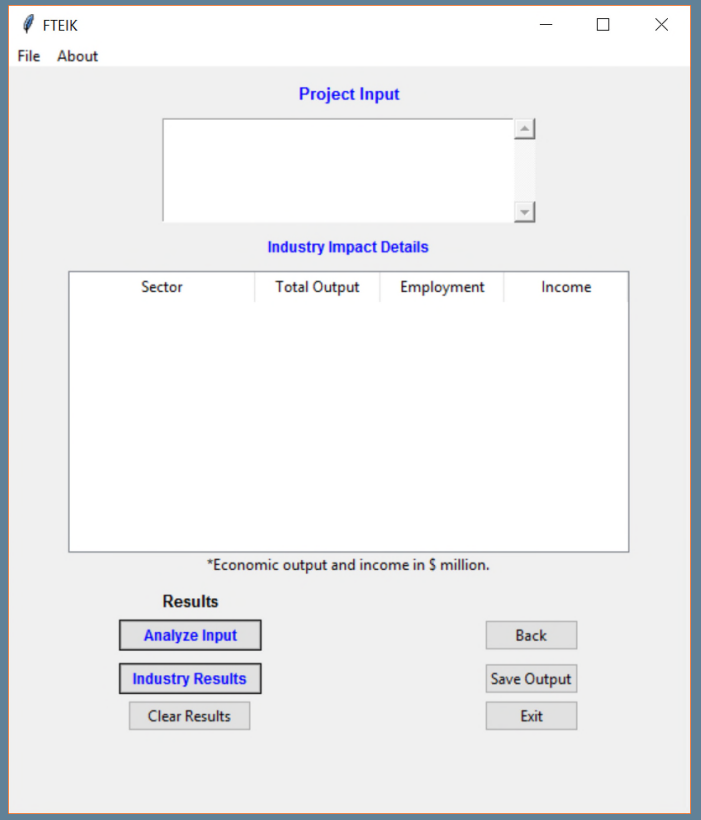


Kit demonstration

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

Kit demonstration

- 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

Thank you