Florida Department of Transportation Research

Florida Index for Transportation: A System of Systems Approach to Understanding the Changing Nature of Transportation

May 2022

Project Number
BDV30-977-28

Project Managers
Jessica VanDenBogaert
FDOT Forecasting and Trends Office

Principal Investigator
Juyeong Choi
Florida State University

Current Situation

For over 100 years, transportation has increased in scale and complexity at all levels, and that trend continues. People and freight move through networks that include public and private transportation and that accommodate and connect pedestrians, bicycles, automobiles, and trucks with planes, trains, and ships. The planning, funding, and management of this system must respond to many external factors, such as population growth, patterns of housing and work, and climate change. Understanding how these factors influence a system this complex requires increasingly sophisticated methods.

Research Objectives

Florida State University researchers explored a novel "system of systems" approach to identify and track external factors as they affect all transportation modes in order to understand the changing behavior of the Florida's emerging multimodal transportation system.

Tens of millions of travelers use this Orlando interchange to access theme parks, airports, cruise ports, as well as local grocery stores.

Project Activities

The researchers developed a detailed view of the state of practice for understanding and using external factors in transportation planning through a comprehensive literature review, an extensive review of existing transportation plans and planning documents, and an online survey and phone interviews with transportation experts. They found that almost all studies focused on only one or two transportation modes, using a very limited set of performance measures. They found that few DOTs evaluated external factors for planning, except for overall travel demand, which was widely used. The survey and interviews added more detail to this pattern. In sum, the researchers were able to assemble a wide variety of external factors relevant to all transportation modes.

To build the system-of-systems (SOS) framework, the transportation system was divided into three levels: seven individual modes; mode type (ground, air, sea); and the state system that links all mode types. All levels and components are parts of networks supported by physical resources, operations that use those resources, stakeholders that benefit from or use the component, and policies that influence the operations. To streamline the vast data available for each level and component without losing key information, the researchers developed a composite index, the Florida Index of Transportation (FIT), to view more clearly the changing relationships between each part of each level of the framework and external factors.

The researchers organized two sessions in which the SOS framework and the FIT were presented to FDOT planners and decision makers. In session one, the researchers explained the SOS and FIT and their development and showed example applications. In session two, the researchers responded to questions from the planners and decision makers.

In the course of the project, the researchers identified many gaps in available data. The framework creates a process for incorporating additional data, performance measures, and external factors as they become available.

Project Benefits

This project creates a potential new tool for transportation planning in the context of a rapidly evolving multimodal transportation system.

For more information, please see www.fdot.gov/research/.