

DEVELOPMENT OF A STATEWIDE MODEL FOR HEAVY TRUCK FREIGHT MOVEMENT ON EXTERNAL ROAD NETWORKS CONNECTING WITH FLORIDA PORTS (PHASE II)

PROBLEM STATEMENT

Ports are special generators of truck traffic. They therefore play an important part in the planning of the infrastructure of the surrounding areas, particularly in order to accommodate the high percentage of truck traffic generated by the need to move freight in and out of these ports. Any urban planning model must consider this special generator for the application of the model to be precise and the results acceptable. The percentage of trucks usually is a minimum of 5 to 10 percent higher on the roads surrounding the port area, which can be attributed directly to the operations of the port.

In order to accurately identify the number of trucks on the roads entering and leaving the port area, some independent variables must be identified for use as measurement tools. Previous studies of port activity have used as a measure *freight imported and exported* (i.e., units of commodity type). The measurements most commonly used are *tonnage* [tons or short tons (ST)], *barrels* (BBL), *measured board feet* (MBFT < MBF), and *each* (for containers or individual units like automobiles).

After examination of the available vessel data, the independent variables were chosen primarily to be the units of measure for the commodities. The commodities were classified by tons, barrels, or each. The other independent variables were found to be the days of the week. Sample truck counts indicated a difference between weekdays and weekends.

OBJECTIVES

The Artificial Neural Networks (ANN) model was chosen not only because of the dynamic nature and the inherent variability of freight transportation by independent carriers, but because the desired model needed to be flexible with the freight and have the capability to recognize variations in the patterns of the freight movement.

ANN models are more precise than ordinary regression models because of multiple combinations of calculations. Unlike ordinary regression models, ANN models continuously process the sample input data until the desired results are achieved. ANN models are more intelligent because they learn by using sample input data to determine the most appropriate based on consecutive runs completed until satisfactory results are obtained.

FINDINGS AND CONCLUSIONS

The ANN model developed for modeling truck movement into and out of a port provided accurate results at the 95% confidence level. This modeling process has been applied to several ports in the state of Florida, including the Ports of Palm Beach, Everglades, Tampa, and Jacksonville. The computer models developed have the ability to accurately produce truck volumes for the identified port access roads with accuracy ranging from 88% to 95%, depending on the port model. The vessel data provided the necessary input to the model for determining the number of trucks traveling into and out of the ports on a daily basis. This model was used to forecast the increase or decrease in movements around a port using forecasted import and export freight totals at the ports.

Time series analysis was applied to the historical vessel data provided by the port authorities of Palm Beach, Everglades, and Tampa. Forecasting models for each of these ports were developed to predict future values of the vessel data. These predicted records were input into the developed ANN truck trip generation models to produce output values (i.e., estimations of future truck volumes on the access roads to each of the ports). These models subsequently output corresponding truck volumes for years 2001 through 2005. Using 2000 as the base year, researchers forecasted that by the year 2005 the Port of Palm Beach would experience an 86% average increase in daily heavy trucks, the Port of Everglades would experience a 31% average increase in daily heavy trucks, and the Port of Tampa would experience a 3% decrease in average daily truck traffic.

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