A Comparison of Traditional and Neural Networks Forecasting Techniques for Container Throughput at Bangkok Port

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Abstract

Containerization is one of the important factors for Thailand's economics. However, forecasts of container throughput growth and development of Bangkok Port, the significant port of Thailand, have been scant and the findings are divergence. Moreover, the existing literature emphasizes only two forecasting methods, namely time series and regression analysis. The aim of this paper is to explore Multilayer Perceptron (MLP) and Linear Regression for predicting future container throughput at Bangkok Port. Factors affecting cargo throughput at Bangkok Port were identified and then collected from Bank of Thailand, Office of the National Economic and Social Development Board, World Bank, Ministry of Interior, and Energy Policy and Planning Office. These factors were entered into MLP and Linear Regression forecasting models that generated a projection of cargo throughput. Subsequently, the results were measured by root mean squared error (RMSE) and mean absolute error (MAE). Based on the results, this research provides the best application of forecasting technique which is Neural Network – Multilayer Perceptron technique for predicting container throughput at Bangkok Port.

Key words: Forecasting, Neural Networks, Multilayer Perceptron (MLP), Linear Regression, Container throughput

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I. Introduction

Today container transport is an important transportation system in the rapid growth of international trade, especially in the country dominating both of importing and exporting like Thailand. Nearly 90% of cargo moves by containerization system. The economic expansion increases the volumes of containers at Bangkok Port and the growth of this container throughput is one of the most important determinants of the large investment for container terminal. Therefore, the forecasting accuracy of the future throughput is crucial to both of private sectors and government offices for planning and managing their future development.

In 1994, Japan International Cooperation Agency (JICA)[1] applied both trend of cargo volumes and relation of economic indices as population and Gross Domestic Product (GDP). Nevertheless, JICA's work has the limitation in presenting inadequate factors that would affect the forecasting accuracy of container throughput volume.

Nowadays, Bangkok Port Authority applies linear regression method and time series to forecast the number of containers in Bangkok Port. The factors are adopted following as: GDP, exchange rate and world GDP.[2] The weakness of this approach is the non-consideration of the regression on the relationship between the volumes of containers and the important macroeconomic variables such as interest rate and inflation rate.

Many researchers have been interested in the relationship between factors of economics and the volumes of import and export. Greenaway and Nam[3] analyzed the various indicators of industrialization and macroeconomic. Ram[4] used a regression model to analyze the relationship between the exports and economic growth. Their study has confirmed the strong relationship of the export performance and the economic growth. The other research is written by Ahaugar et al. They defined the macroeconomic variables for forecasting such as Growth rate of industrial production, inflation rate, interest rate, exchange rate, rate of return on stock public, unemployment rate, oil price,

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1) JICA (1994), pp.199-202.
2) Port Authority of Thailand (2010), pp.28-29.
3) D.Greenway and C.H.Nam (1988), pp.419-435.
4) R.Ram (1985), pp.415-425.