ABSTRACT

Demand play an important part in supply chain managemet (SCM) and uncertainty factor is one of thing that can not separated from demand. Replacement market of PT. Goodyear Indonesia, Tbk has sufficient high level of uncertainty, as compared to export market and Original Equipment Manufacturer (OEM). It demand often can not forecast precisely, in period of April 2001-April 2007 fulfilled demand to the number of 1.979.242 and unfulfilled demand for each month is up to 10%. Whereas, demand in a part of supply chain play an important part in early chain, because demand will determine the quantity to produce and distribute for the next chain till the end. One of several method to forecast is Artificial Neural Network (ANN). ANN has more ability as compared to statistic method i.e. the ability to capture nonlinearity pattern, input-output mapping, adaptivity with it learning algorithm.

Issue that arise in facing uncertainty demand is how to forecast future demand of replacement market to assist production planning of Supply Chain department in PT. Goodyear Indonesia, Tbk using ANN.

ANN learning algorithm is using backpropagation with sigmoid as activation function. There are 3 variables for training i.e.: (1) Input and target matrix consist of normalization of distributor demand, (2) Training parameter consist amount of epoch to the number of 100.000, learning rate 0.1, 0.3, 0.5, 0.7, and 1, and 10^{-7} as an error target, (3) Network architecture consist number of neuron in input layer, hidden layer, and output layer. Data as a result of training are MSE, final weight and bias. Furthermore, data of training result is use to simulate test data in order to know learning rate and network architecture that has the best ability in generalization. After simulation, test data is going to denormalization as a mean to calculate Mean Absolute Error (MAE).

Learning rate which is result the smallest MAE is 0.5, whereas network architecture which produce the smallest MAE is with 1 hidden layer and the number of hidden neuron is 30. Learning rate 0.5 and number of hidden neuron is 30 produces MAE value 308.7272, with mean average percentage error 10.64% from 11 test data. Error level as a result of artificial neural network already equal as forecasting method at the present with error level up to 10%. Error level result by artificial neural network in this research is still high caused by the poor network ability to generalize. This poor ability more caused by data that use to describe demand for GT3 type 195/70 R14 GT3 91T TL doesn't have a good pattern within one period in, so the data that put into ANN doesn't have a good pattern. Else, difficulty level is sufficient high because of environment condition for demand of GT3 which influenced by external factor causing uncertain demand oftentimes for each month.

Key words : Forecasting, Artificial Neural Network, Backpropagation, Replacement Market, Goodyear