ABSTRACT

PT. XYZ is a company operating in the automotive sector, selling premium-class cars in Indonesia. PT. XYZ's car sales are distributed through six dealers spread across major cities in Indonesia such as Jakarta, Bandung, Surabaya, Semarang, Medan, Makassar, Pekanbaru, and Bali. The cars to be sold by PT. XYZ are temporarily stored at a distribution center (DC) as a third party to PT. XYZ.

However, there has been an issue with the inventory of PT. XYZ's complete knocked down (CKD) car units, where there were still 30 aging units over 6 months old at the end of 2023, which did not meet PT. XYZ's target. Several root causes of this problem have been identified, including factors related to methods, environment, and materials. One of the problems lies in the method factor, where PT. XYZ has not yet found an optimal sales forecasting method.

This issue is evidenced by a significant discrepancy and an error rate in forecasting above 25%, leading to continuous arrival of car units and resulting in aging at PT. XYZ's DC. Moreover, the results of PT. XYZ's sales forecasts serve as the basis for ordering the number of lot parts to be built.

This problem can be addressed by formulating a sales forecast that suits PT. XYZ's conditions using the Artificial Neural Network (ANN) method, incorporating actual sales historical data of PT. XYZ from January 2021 to December 2023, inflation rates during the same period, the average exchange rate of US Dollar to Rupiah during that period, the average bank loan interest rates during that period, and the average monthly income of PT. XYZ's customers during the same period.

Given the issues explained earlier, this research focuses on minimizing the forecasting error rate for units aged over 180 days at PT. XYZ. Several parameters used in data processing with the Artificial Neural Network (ANN) method include the number of hidden layers based on empirical formulas, learning rate, momentum, maximum iterations, activation function, and performance function, namely MSE. The design of the Artificial Neural Network (ANN) using these parameters resulted in 150 network combinations according to the specified parameters. From these 150 network combinations, the output and error

calculation of each network will be displayed so that the author can select the best network according to the performance function, which is the one with the smallest MSE, to be proposed as the optimal forecasting method for PT. XYZ.

Out of the 150 networks designed and tested, there is one network with the smallest MSE performance value, specifically the network with parameters of 3 neurons in the hidden layer, a learning rate of 0.1, and a momentum of 0.6. This network combination resulted in an MSE of 537.61 on the test data. Compared to the existing forecasting, the MSE produced in the test data period is 814.143. This indicates that sales forecasting using the Artificial Neural Network (ANN) method can minimize the MSE by a difference of 276.530. Besides MSE, the selected network also yields smaller MAD and MAPE than the existing forecasting method.

Keywords: ***Sales forecasting, aging stock, artificial neural network, automotive industry, premium segment***