ABSTRACT

PT XYZ is a subsidiary of a fertilizer company in Indonesia. PT XYZ operates a warehouse that serves as a temporary storage facility near the final distribution point before the fertilizer is delivered to retailers, ensuring that customer needs are met in a timely manner. Fertilizer demand data from retailers is collected and analyzed to determine the quantity of fertilizer that should be produced. The company conducts demand forecasting to estimate the type and quantity of fertilizer that needs to be manufactured. NPK fertilizer 30-6-8 has the highest demand at 15%.

The presence of forecasting errors indicates a gap between the actual demand and the company's existing forecast. The average error rate for the company's current forecasting is 13%, while the target error rate is set at 9%. This discrepancy highlights a difference between the existing conditions and the company's target. Given the current situation, the company needs a more accurate forecasting method to better align production with market demand and minimize the gap between the forecast and actual demand. The Artificial Neural Network (ANN) method was chosen to forecast demand for NPK fertilizer 30-6-8 because ANN can handle complex, non-linear data patterns and offers flexibility in integrating various types of data and factors that influence fertilizer demand.

The forecasting process involved multiple trials using training and testing data splits of 8:2 and 7:3, as well as one-year and two-year datasets. Six configurations were tested, considering the number of layers, neurons, and maximum epochs. Based on the forecasting results using ANN, the method effectively reduced the gap between actual demand and forecasted demand to 6%. This improvement was achieved by incorporating additional variables such as air temperature, humidity, rainfall, farmer income, fertilizer prices, and farmer profit, which were found to influence fertilizer demand forecasts.

The proposed use of ANN forecasting demonstrated a reduction in the demand gap when using the two-year dataset and the selected configuration of 4 layers, 128 neurons, and 300 epochs, with an 8:2 training-to-testing data split. Improving forecasting accuracy through the use of ANN demand forecasting can help the company make better decisions regarding production quantities, raw material

procurement, and meeting customer demand, thereby enhancing overall business performance.