

ABSTRACT

The uncertainty between product demand and the supply of raw materials is a major issue in a company, and it is noted that several global giants in various industry sectors have ultimately gone bankrupt due to this problem. Uncertainty in consumer demand affects the fluctuations in the need for raw material supply. Having too much raw material stock leads to long-term accumulation, potentially causing damage to goods. On the other hand, a shortage of raw materials results in the company's inability to meet market demand and leads to increased costs due to understocking. Therefore, optimizing the management of raw material inventory becomes crucial for the company to achieve maximum profitability. Similar issues can also occur in Small and Medium-sized Enterprises (SMEs), and sometimes the impact can be even more significant than in large companies. This is exemplified by UD. An-Nur, a rice mill with a medium-sized scale. The company faces challenges in inventory control due to demand fluctuations, making it difficult to plan inventory control effectively. To address this issue, a predictive analysis of raw material requirements is conducted using the Holt-Winters Exponential Smoothing forecasting method. In this research, historical data of rice demand from January 2020 to June 2023 is used to analyze patterns, trends, and demand fluctuations. The Holt-Winters Exponential Smoothing method is chosen because it is suitable for companies with data patterns exhibiting trends and seasonality, such as UD. An-Nur. In performing the forecast, optimal parameter determination and initial values for level, trend, and seasonal components are first established. The calculated values are then used to forecast future raw material requirements, specifically for July 2023 to August 2024. The results of the rice demand forecast using Holt-Winter Exponential Smoothing for the next 12 periods, from July 2023 to June 2024, yield raw material requirements based on the total demand for rice, amounting to 54,889 kg or 54.89 tons. The forecasting results indicate that the Holt-Winters Exponential Smoothing method with $\alpha = 0.1$, $\beta = 0.1$, $\mu = 0.6$ yields an average percent error of 8%, indicating an accuracy rate of approximately 92%. This level of accuracy is higher compared to comparative models such as Single Exponential Smoothing (58%) and Double Exponential Smoothing (57%). Additionally, measuring the consistency and stability of forecasting results using

the Moving Range Chart reveals that no forecast error data exceeds the upper control limit (UCL) or lower control limit (LCL) in the MRC. This demonstrates that fluctuations in forecast errors are within acceptable control limits. Thus, these findings provide confidence that the forecasting model used can deliver accurate and relevant results for predicting raw material needs at UD. An-Nur.

Keywords: Raw Material Inventory Control, Demand Forecasting, Holt-Winter's Exponential Smoothing, MAPE.