COMPARATIVE FORECASTING MODELS AND THE IMPACT ON FINISHED PRODUCT INVENTORY LEVEL WITH FORECASTING ACCURACY AS MEDIATOR IN PT. XYZ.

THESIS

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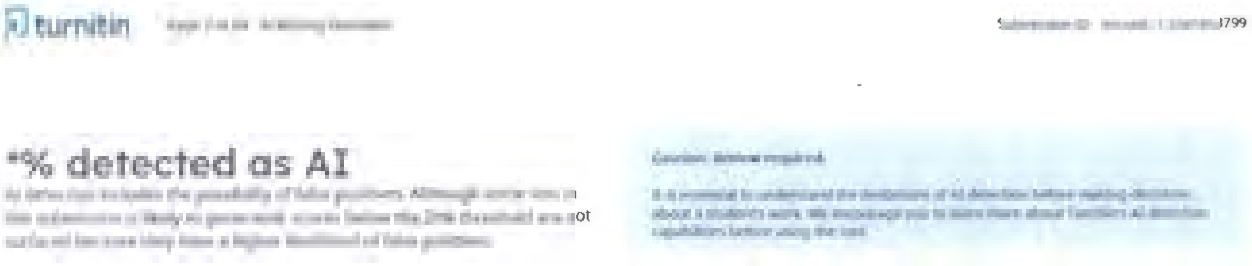

ABSTRACT

Accurate demand forecasting is crucial for efficient production and inventory management in the food sector, where product perishability and variable demand present significant challenges. This study evaluates the forecasting accuracy and operational efficiency of various time series forecasting models, including the Moving Average, Exponential Smoothing, Holt-Winters, ARIMA, and SARIMA models. The primary aim is to investigate how forecasting accuracy influences the connection between these models and completed product inventory management. Data from PT. XYZ, covering a period of 38 months (2021–2024), was utilized to evaluate the models, with performance measured using MAPE, RMSE, and MAE. The empirical findings demonstrate that the Holt-Winters model yields minimal error levels, especially with MAPE and RMSE. Nevertheless, it often underestimates during peak demand periods, resulting in inventory deficiencies. In contrast, the SARIMA model, albeit demonstrating marginally elevated error values, was more adept at identifying seasonal patterns and delivering more precise forecasts during peak demand periods, rendering it the favored option for inventory management. Mediation research indicates that forecasting accuracy strongly mediates the relationship between forecasting models and the management of finished products inventory. The empirical evidence indicates that enhanced forecasting accuracy results in superior inventory management, streamlined production timelines, and diminished operational inefficiencies. This study recommended the implementation of SARIMA instead of Holt-Winters in food manufacturing environments to improve demand forecasting and inventory control, especially during periods of heightened demand.

Key Word: Forecasting Model; Accuracy Forecasting; Operational Efficiency; Inventory Management.

ABSTRAK

Peramalan permintaan yang akurat sangat penting untuk manajemen produksi dan inventaris yang efektif di sektor makanan, di mana kerusakan produk dan permintaan yang bervariasi menjadi hambatan yang signifikan. Penelitian ini mengevaluasi akurasi peramalan dan efisiensi operasional dari berbagai model peramalan deret waktu, termasuk Moving Average, Exponential Smoothing, Holt-Winters, ARIMA, dan SARIMA. Tujuan utama penelitian ini adalah untuk melihat bagaimana akurasi peramalan mempengaruhi hubungan antara model-model ini dan manajemen inventaris produk jadi. Data dari PT. XYZ yang mencakup periode 38 bulan (2021–2024) digunakan untuk mengevaluasi model-model tersebut, dengan kinerja diukur menggunakan MAPE, RMSE, dan MAE. Temuan empiris menunjukkan bahwa model Holt-Winters menghasilkan tingkat kesalahan yang minimal, terutama pada MAPE dan RMSE. Namun, model ini seringkali memberikan hasil yang pesimis selama periode permintaan puncak, yang mengakibatkan kekurangan inventaris. Sebaliknya, model SARIMA, meskipun menunjukkan nilai kesalahan yang sedikit lebih tinggi, lebih mampu mengidentifikasi pola musiman dan memberikan perkiraan yang lebih tepat selama periode permintaan puncak, menjadikannya pilihan yang lebih tepat untuk manajemen inventaris. Penelitian mediasi menunjukkan bahwa akurasi peramalan secara signifikan memediasi hubungan antara model peramalan dan manajemen inventaris produk jadi. Bukti empiris menunjukkan bahwa peningkatan akurasi peramalan menghasilkan manajemen inventaris yang lebih baik, jalur produksi yang lebih efisien, dan pengurangan inefisiensi operasional. Penelitian ini merekomendasikan penerapan model SARIMA daripada Holt-Winters di lingkungan manufaktur makanan untuk meningkatkan peramalan permintaan dan pengendalian inventaris, terutama selama periode permintaan yang tinggi.

Kata Kunci: Model Peramalan; Akurasi Peramalan; Efisiensi Operasional, Manajemen Inventaris.

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LIST OF ABBREVIATIONS

Term	Definition / Explanation
MA	Moving Average
ES	Exponential Smoothing
Dec	Decomposition
ARIMA	Autoregressive Integrated Moving Average
SARIMA	Seasonal ARIMA
MAPE	Mean Absolute Percentage Error
RMSE	Root Mean Square Error
MAE	Mean Absolute Error