

ABSTRAK

PT XYZ merupakan perusahaan yang memiliki *workshop* khusus untuk perawatan dan penanganan perbaikan kulkas sebagai sarana dalam mendukung distribusi produk. Saat ini pengelolaan untuk kebutuhan *sparepart* masih dicatat secara manual sehingga ada potensi stok kurang mencukupi saat terjadi peningkatan kebutuhan. Selain itu, proses prediksi kebutuhan masih dilakukan secara subjektif dengan pendekatan stok minimum. Penelitian ini bertujuan untuk membangun sebuah aplikasi berbasis web yang dapat digunakan untuk pengelolaan data *sparepart*, pencatatan transaksi penerimaan dan penggunaan serta melakukan prediksi kebutuhan *sparepart* berikut dengan rekomendasi pembelian. Aplikasi yang dibangun mengimplementasikan model Algoritma Random Forest Regression untuk melakukan prediksi berdasarkan data historis penggunaan *sparepart* yang telah diolah secara harian dan di agregasi bulanan. Hasil pengujian pada data harian menunjukkan nilai MAE 0.46, RMSE 0.65, MAPE 29.67% dan R-Squared 0.49. Sedangkan untuk model yang telah di agregasi menjadi bulanan diperoleh hasil evaluasi sebesar MAE 0.82, RMSE 1.16, MAPE 18.65%, dan *R-Squared* 0.96. Aplikasi dirancang dan dibangun dengan tahapan analisis kebutuhan, perancangan antarmuka pengguna, pembangunan model, pengembangan aplikasi yang mencakup pengembangan *backend* dan *frontend*, serta perancangan *database*. Pengujian aplikasi dilakukan dengan tiga pendekatan yakni *User Acceptance Testing* dan *Black Box Testing* untuk memastikan seluruh fitur telah berjalan sesuai dengan kebutuhan, serta Pengujian Nonfungsional untuk memastikan aplikasi memiliki kinerja yang baik dan andal. Hasil pengujian *User Acceptance Testing* menunjukkan bahwa aplikasi memperoleh tingkat penerimaan sebesar 90,53% yang termasuk dalam kategori sangat baik. Hasil ini menunjukkan bahwa siapkasi yang dibangun dan dikembangkan dapat membantu proses pengelolaan dan perencanaan kebutuhan *sparepart*.

Kata Kunci : *sparepart*, pengelolaan *sparepart*, perencanaan stok, prediksi, random forest,

ABSTRACT

PT XYZ is a company that operates a workshop specializing in refrigerator maintenance and repair to support its product distribution activities. Currently, spare part management is still carried out manually, which may result in insufficient inventory when demand increases. In addition, spare part demand forecasting is still performed subjectively using a minimum stock approach, leading to less accurate decision-making. This study aims to develop a web-based application for managing spare part data, recording incoming and usage transactions, and predicting spare part demand equipped with a purchase recommendation feature. The developed application implements the Random Forest Regression algorithm to perform predictions based on historical spare part usage data processed on a daily basis and aggregated into monthly data. The experimental results on daily data show a Mean Absolute Error (MAE) of 0.46, a Root Mean Square Error (RMSE) of 0.65, a Mean Absolute Percentage Error (MAPE) of 29.67%, and an R-Squared value of 0.49. Meanwhile, the model evaluated using aggregated monthly data achieved better performance, with an MAE of 0.82, an RMSE of 1.16, a MAPE of 18.65%, and an R-Squared value of 0.96. These results indicate that the model performs more accurately and consistently when applied to aggregated monthly data. The application was designed and developed through several stages, including requirements analysis, user interface design, model development, application development covering both backend and frontend implementation, and database design. Application testing was conducted using three approaches, namely User Acceptance Testing (UAT), Black Box Testing, and Non-Functional Testing. User Acceptance Testing and Black Box Testing were performed to ensure that all application features functioned according to user requirements, while Non-Functional Testing was conducted to verify that the application provides good performance and reliable operation. The results of the User Acceptance Testing indicate that the application achieved a user acceptance level of 90.53%, which is categorized as very good. These findings demonstrate that the developed application can effectively support spare part management and spare part demand planning.

Keywords: *spare part, inventory management, stock planning, demand prediction, Random Forest Regression*