UNIVERSITI TEKNOLOGI MARA

PREDICTIVE ANALYTICS OF OVERTIME (OT) REQUIREMENTS BASED ON OUTBOUND ORDER VOLUME AT FM GLOBAL LOGISTICS (M) SDN BHD

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ABSTRACT

The rapid development of data-driven decision-making has enhanced the significance of predictive analytics and business intelligence for operational planning and cost control in the warehouse. Nevertheless, FM Global Logistics (M) Sdn. Bhd. has several problems, such as the failure to precisely predict carton workload, challenges in estimating overtime (OT) workload, and the inability to see the cost impact in the operations of changing outbound volumes. To address these challenges, this study applied the CRISP-DM framework using historical warehouse data from 2024 to 2025. Predictive analytics and regression techniques were employed to estimate outbound carton volumes based on operational and temporal attributes. Five machine learning models were developed and evaluated, namely Random Forest, Gradient Boosted Trees, Multiple Linear Regression, Support Vector Regression, and Decision Tree. Multiple Linear Regression achieved the best performance with an RMSE of 517.983 cartons, an MAE of 386.678, and an R^2 of 97.30%. The predicted carton volumes were translated into overtime requirement decisions, overtime hours, and overtime costs according to the company-defined operational rules. An interactive Power BI dashboard was developed to visualize historical trends, predictive results, and what-if scenarios for warehouse decision support. The dashboard was evaluated by three domain experts based on usefulness, ease of use, and interpretability, and the feedback confirmed its practicality for outbound warehouse planning. Overall, this study demonstrates that predictive analytics and business intelligence can be used as an effective decision support tool to optimize workforce planning and overtime cost management in warehouses.