Predicting Overall Equipment Effectiveness (OEE) in pharmaceutical manufacturing using artificial intelligence: A case study of Hikma Pharmaceuticals

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Abstract

This study utilized predictive modeling algorithms to anticipate Overall Equipment Effectiveness (OEE) in pharmaceutical manufacturing using the Hikma Pharmaceuticals dataset as a case study. Production, availability, performance, and quality parameters were analyzed in historical data using machine learning techniques, including Random Forest, Decision Tree, and Linear Regression, implemented in Python. The study demonstrates the effectiveness of these models in accurately predicting OEE through metrics such as Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and R-squared (R^2). The results highlight the superior performance of the Random Forest and Decision Tree models, showcasing their potential to enhance operational efficiency and support continuous improvement initiatives in the pharmaceutical manufacturing industry. This research contributes valuable insights into leveraging predictive analytics for optimizing equipment performance and streamlining production processes..

Keywords: Pharmaceutical Manufacturing, Predictive Modeling, Overall Equipment Effectiveness (OEE), Machine Learning, Random Forest, Decision Tree, Linear Regression, Operational effectiveness, Continuous Improvement.