

**FORMULATION OF BUSINESS INTELLIGENCE BASED ON MACHINE
LEARNING AND LEAN CONSTRUCTION FOR PROJECT CONTROL
AT PT ROYAL PROJECT MANAGEMENT**

SKRIPSI



Submitted By:

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JAWA TIMUR**

2026

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**Diajukan Untuk Memenuhi Sebagian Persyaratan
Dalam Memperoleh Gelar Sarjana Manajemen**



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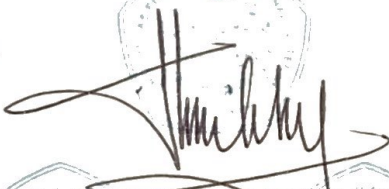
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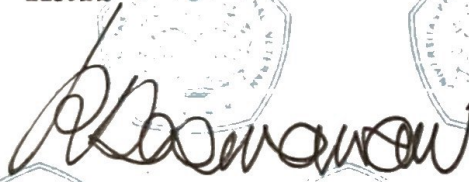
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FOREWORD

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Author

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**Formulation Of Machine Learning-Based Business Intelligence
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At Pt Royal Project Management**

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ABSTRACT

Construction project control is generally still reactive in nature, causing schedule deviations and cost overruns to often be detected only after delays and budget escalations have occurred. This study aims to formulate a business intelligence framework for weekly project control, develop an XGBoost predictive model as an early warning system, and propose corrective action recommendations based on lean construction principles. A quantitative approach was employed in a Type-45 housing project managed by PT Royal Project Management, utilizing weekly data consisting of project schedules, cost budgets (RAB), WBS-based physical progress, and actual expenditures. Data processing was conducted through earned value management, S-curve analysis, time-based splitting, and walk-forward validation. The results indicate that the integration of Planned Value (PV), Earned Value (EV), and Actual Cost (AC) into the BI dashboard produced consistent performance indicators. Furthermore, the XGBoost model demonstrated superior performance compared to the baseline model, achieving MAPE values of 3.81% for EV prediction and 1.16% for AC prediction. The predictive outputs were subsequently converted into risk status categories, normal, alert, and critical, and linked to lean-based SOPs to accelerate managerial response.

Keyword: *business intelligence; earned value management; lean construction; machine learning; manajemen proyek*