

**A Quantitative Analysis of VHMS Payload Meter Parameters and their
Influence on Fuel Ratio and Operational Performance HD785-7 Dump Trucks at
PT. ABC**

By

Yoga Windarto Pratama
22452029

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SWISS GERMAN UNIVERSITY
The Prominence Tower
Jalan Jalur Sutera Barat No. 15, Alam Sutera
Tangerang, Banten 15143 - Indonesia

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STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.



Yoga Windarto Pratama

Student

1 September 2025
Date

Approved by:



Dr. Ir. Maulahikmah Galinium, S.Kom, M.Sc

Thesis Advisor

2 September 2025
Date



Assoc. Prof. Dr. rer. nat. Filiana Santoso.

Thesis Co-Advisor

1 September 2025
Date



Dr. Ir. Maulahikmah Galinium, S.Kom, M.Sc

Dean

2 September 2025
Date

Yoga Windarto Pratama

ABSTRACT

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By

Yoga Windarto Pratama

Dr. Ir. Maulahikmah Galinium, S.Kom, M.Sc, Advisor

Assoc. Prof. Dr. rer. nat. Filiana Santoso, Co-Advisor

SWISS GERMAN UNIVERSITY

A quantitative analysis investigated Vehicle Health Monitoring System (VHMS) payload meter parameters and their influence on fuel ratio and operational performance of HD785-7 dump trucks at PT. ABC. Driven by PT. XYZ need to add customer value amidst declining construction machinery revenue and intense competition, this study addressed fuel consumption, the largest heavy equipment Total Cost of Ownership (TCO) component (55%). PT ABC faced 10% excess fuel consumption and 8% reduced overburden productivity due to VHMS underutilization. Leveraging VHMS data through a systematic framework, the study analyzed correlations and developed a predictive regression model. Key correlation and SHAP value analyses identified empty travel time, idling time, travel speed, loading time, road gradient, and economic mode usage as key fuel ratio influencers. Collaborative interventions yielded significant impacts: a 30.5% decrease in Fuel Ratio (to 0.125 L/ton/km), 23.6% reduction in Idling Time, and 20% decrease in Loading Time. This optimization achieved a ~22% reduction in absolute fuel consumption (75.1 to 58.6 L/h).

Keyword : Quantitative Analysis, Heavy Equipment Optimization, Dump Truck Performance, Fuel Ratio, Modeling, SHAP Value Analysis, Coal Mining



DEDICATION

This thesis is dedicated to my family, My Wife and Children whose unwavering love, support, and encouragement have been the cornerstone of my academic journey.

To my parents, for their sacrifices and for instilling in me the values of perseverance, discipline, and integrity.

To my mentors and academic advisers, I extend my deepest gratitude for your invaluable guidance and belief in my potential.

Finally, I dedicate this work to our country, whose progress and development continue to inspire my pursuit of knowledge and service.



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