FLEET SIZING USING SIMULATION APPROACH AND PROFITABILITY ANALYSIS ON INVESTMENT OF I-TROLLEY IN HARD DRIVE MANUFACTURER

A THESIS

Submitted in Partial Fulfillment of the Requirement for the Bachelor Degree of Engineering in Industrial Engineering

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IDENTIFICATION PAGE

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I certify that the research entitled "Fleet Sizing using Simulation Approach and Profitability Analysis on Investment of I-Trolley in Hard Drive Manufacturer" in this thesis has not been submitted for any other degree.

I certify that to the best of my knowledge and belief, this thesis which I wrote does not contain the works of parts of the works of other people, except those cited in the quotations and bibliography, as a scientific paper should.

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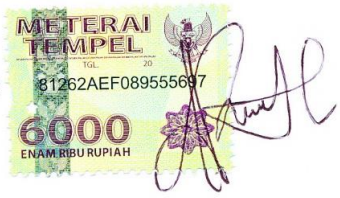
Signature : 

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ABSTRACT

The thesis entitled “Fleet Sizing Using Simulation Approach and Profitability Analysis on Investment of I-Trolley in Hard Drive Manufacturer” began with problem occurred in hard drive manufacturer in determine number of automated material handling used in production floor. The purpose of automated material handling is to replace human power in material handling activity due to efficiency in transportation activity. Hard drive manufacturer decide to use I-Trolley.

Industrial Engineering Department in the project is responsible to determine optimum number of I-Trolley or can be defined as fleet sizing of I-Trolley and operator needed to operate I-Trolley. I-Trolley will implemented in the first floor and there will be two phases of I-Trolley implementation. First phase is implementation of I-Trolley between backend stream (BES) station to Pack 2 station and second phase will be implemented between lift to BES station. I-Trolley route is closed loop and have two stop point for loading and unloading activity. Operator requirement in operating I-Trolley is analyzed using time study. The objectives of this research to have optimum number of I-Trolley based on minimum material waiting time and maximum capacity in production floor.

The conclusion on optimum number of I-Trolley is 14 with phase one and phase two respectively need six and eight. ANOVA analysis shows that there is no significance difference if one I-Trolley added into the scenario. Operator reduced with I-Trolley implementation is 18 employees. Management decide to accept the project when investment is feasible in two years. Payback period and Internal Rate of Return is done and the conclusion is investment feasible in two years. Sensitivity analysis is also done to support decision making due to maintenance cost and operator adjustment cost, in example: operator training cost, are unknown. Decision will not change when maintenance cost is 100 percent of operation cost and operator adjustment cost is 96 percent of initial investment cost.

Keywords: Automated Material Handling, Fleet Sizing, Time Study, Economic Profitability, Simulation, Sensitivity Analysis, Queueing Theory