

ABSTRACT

The construction of the Ciharuman Suspension Bridge, which connects Pangandaran and Tasikmalaya Regencies, experienced a 16-calendar-day delay due to high rainfall intensity. The delay resulted in an increase in the project's indirect costs. This study aims to identify activities on the critical path and analyze changes in project duration and cost to determine the optimal acceleration combination using the Time Cost Trade-Off (TCTO) method and Microsoft Excel Solver. The acceleration analysis focuses on adding overtime working hours while considering the decrease in labor productivity due to fatigue.

The analysis began by identifying activities on the critical path using Microsoft Project. Acceleration simulations were conducted using overtime scenarios ranging from 1 to 4 hours per day. Optimization was performed using the Evolutionary algorithm in Microsoft Excel Solver, with the objective function of minimizing the total project duration while considering constraints on overtime hours and Cost Slope in relation to the daily indirect cost.

The results show that 7 work items are on the critical path, with a normal duration of 72 working days or 76 calendar days, including 4 public holidays during Eid al-Fitr, and a total normal project cost of IDR 942,813,899.00. The optimization results produced an overtime combination of 1 hour for Earth Excavation, 3 hours for Reinforcement Work, and 1 hour for K.250 Concrete Foundation Work. This combination resulted in a total duration of 67 working days or 71 calendar days, representing a reduction of 5 working days or a time efficiency of 6.58%. Although overtime increased the direct cost, the reduction in indirect costs resulting from the shorter calendar duration reduced the total project cost by IDR 566,455.00, from IDR 942,813,899.00 to IDR 942,247,444.00.

Keywords: *Suspension Bridge, Time Cost Trade-Off, Crashing, Fatigue Factor, Excel Solver.*