

## Assessing Project Performance through Work Sampling and Earned Value Analysis

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**Abstract :** The majority of the infrastructure projects are affected by time overrun, resulting in project delays and subsequently cost overruns. Time overrun may vary from a few months to as high as five or more years, placing the project viability at risk. One of the probable reasons noted in the literature for this outcome in projects is due to poor productivity. Researchers contend that productivity in construction has only marginally increased over the years. While studies in the literature have extensively focused on time and cost parameters in projects, there are limited studies that integrate time and cost with productivity to assess project performance. To this end, a study was conducted to understand the project delay factors concerning cost, time and productivity. A case-study approach was adopted to collect rich data from a nuclear power plant project site for two months through observation, interviews and document review. The data were analyzed using three different approaches for a comprehensive understanding. Foremost, a root-cause analysis was performed on the data using Ishikawa's fish-bone diagram technique to identify the various factors impacting the delay concerning time. Based on it, a questionnaire was designed and circulated to concerned executives, including project engineers and contractors to determine the frequency of occurrence of the delay, which was then compiled and presented to the management for a possible solution to mitigate. Second, a productivity analysis was performed on select activities, including rebar bending and concreting through a time-motion study to analyze product performance. Third, data on cost of construction for three years allowed analyzing the cost performance using earned value management technique. All three techniques allowed to systematically and comprehensively identify the key factors that deter project performance and productivity loss in the construction of the nuclear power plant project. The findings showed that improper planning and coordination between multiple trades, concurrent operations, improper workforce and material management, fatigue due to overtime were some of the key factors that led to delays and poor productivity. The findings are expected to act as a stepping stone for further research and have implications for practitioners.

**Keywords :** earned value analysis, time performance, project costs, project delays, construction productivity

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