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Empirical Study of Correlation between the Cost Performance Index Stability and the Project Cost Forecast Accuracy in Construction Projects

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Abstract : Earned value management (EVM) has been introduced as an integrated method to combine schedule, budget, and work breakdown structure (WBS). EVM provides various indices to demonstrate project performance including the cost performance index (CPI). CPI is also used to forecast final project cost at completion based on the cost performance during the project execution. Knowing the final project cost during execution can initiate corrective actions, which can enhance project outputs. CPI, however, is not constant during the project, and calculating the final project cost using a variable index is an inaccurate and challenging task for practitioners. Since CPI is based on the cumulative progress values and because of the learning curve effect, CPI variation dampens and stabilizes as project progress. Although various definitions for the CPI stability have been proposed in literature, many scholars have agreed upon the definition that considers a project as stable if the CPI at 20% completion varies less than 0.1 from the final CPI. While 20% completion point is recognized as the stability point for military development projects, construction projects stability have not been studied. In the current study, an empirical study was first conducted using construction project data to determine the stability point for construction projects. Early findings have demonstrated that a majority of construction projects stabilize towards completion (i.e., after 70% completion point). To investigate the effect of CPI stability on cost forecast accuracy, the correlation between CPI stability and project cost at completion forecast accuracy was also investigated. It was determined that as projects progress closer towards completion, variation of the CPI decreases and final project cost forecast accuracy increases. Most projects were found to have 90% accuracy in the final cost forecast at 70% completion point, which is inlined with findings from the CPI stability findings. It can be concluded that early stabilization of the project CPI results in more accurate cost at completion forecasts.

Keywords : cost performance index, earned value management, empirical study, final project cost
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