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Cost Overruns in Mega Projects: Project Progress Prediction with Probabilistic Methods

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Abstract : Mega projects either in construction, urban development or energy sectors are one of the key drivers that build the foundation of wealth and modern civilizations in regions and nations. Such projects require economic justification and substantial capital investment, often derived from individual and corporate investors as well as governments. Cost overruns and time delays in these mega projects demands a new approach to more accurately predict project costs and establish realistic financial plans. The significance of this paper is that the cost efficiency of megaprojects will improve and decrease cost overruns. This research will assist Project Managers (PMs) to make timely and appropriate decisions about both cost and outcomes of ongoing projects. This research, therefore, examines the oil and gas industry where most mega projects apply the classic methods of Cost Performance Index (CPI) and Schedule Performance Index (SPI) and rely on project data to forecast cost and time. Because these projects are always overrun in cost and time even at the early phase of the project, the probabilistic methods of Monte Carlo Simulation (MCS) and Bayesian Adaptive Forecasting method were used to predict project cost at completion of projects. The current theoretical and mathematical models which forecast the total expected cost and project completion date, during the execution phase of an ongoing project will be evaluated. Earned Value Management (EVM) method is unable to predict cost at completion of a project accurately due to the lack of enough detailed project information especially in the early phase of the project. During the project execution phase, the Bayesian adaptive forecasting method incorporates predictions into the actual performance data from earned value management and revises pre-project cost estimates, making full use of the available information. The outcome of this research is to improve the accuracy of both cost prediction and final duration. This research will provide a warning method to identify when current project performance deviates from planned performance and crates an unacceptable gap between preliminary planning and actual performance. This warning method will support project managers to take corrective actions on time.

Keywords : cost forecasting, earned value management, project control, project management, risk analysis, simulation
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