

Prediction of project completion time using robust time series regression

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Abstract

This study demonstrates how early project management performance may predict project completion time prior to project execution. Using 109 capital projects and a longitudinal design, we develop a measurement model based on project management performance in the project initiation and planning phases. Subsequent confirmatory factor analysis identifies key determinants in the project initiation and planning phases that affect the durations of completed projects. A time series robust regression forecasting model on the longitudinal data further shows that a combination of 20 metrics from the project management performance measurement model reveals high estimation accuracy and relatively small estimation differences in in-sample and out-of-sample data. Out-of-sample validation demonstrates that the forecasting model provides a reasonably good overall estimation rate of 85.49%. Ultimately, our findings suggest that project management performance in the initiation and planning phases explains an important part of project duration and, more significantly, is a useful predictor of project time performance.

Keywords

Project duration; Forecasting; Prediction; Robust regression; Longitudinal study