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**A Review of Analytical Models, Approaches and Decision Support Tools in Project Monitoring and Control**

Öncü Hazir

**Abstract:**

This article reviews the problems, approaches, and analytical models on project control systems and discusses the possible research extensions. The authors focus on literature in Earned Value Analysis (EVA), optimization tools, and the design of decision support systems (DSS) that will contribute to helping project managers in planning and controlling under uncertain project environments. The review reveals that further research is essential to develop analytical models using EVA metrics to forecast project performance. It also suggests that DSS should be model-driven, function as early warning systems, and should be integrated into commercial project management software.

**Citation:**

A Tool For Managing Projects: An Analytic Parameterization of the S-curve

Denis F. Cioffi

Abstract:

The solution to a differential equation used frequently in ecology is found to reproduce the well-known S-curve seen in various aspects of project management. The solution is modified in a minor way to fit project management boundary conditions. An excellent fit of this theoretical curve to two samples of project cost data shows the utility of the formula. Numerical approximations valid under typical project conditions are utilized to produce an analytic expression that can easily generate classic project management evolution curves under a variety of conditions. The curves are normalized to two basic parameters: the total of the relevant quantity (e.g., project costs) and the duration of the project. The user can choose the steepness of the climb and the point in time at which half the total has been accumulated.

Citation:


A Multivariate Approach for Top-Down Project Control Using Earned Value Management

Jeroen Colin, Annelies Martens, Mario Vanhoucke, and Mathieu Wauters

Abstract:

Project monitoring and the related decision to proceed to corrective action are crucial components of an integrated project management and control decision support system (DSS). Earned value management/earned schedule (EVM/ES) is a project control methodology that is typically applied for top-down project schedule control. However, traditional models do not correctly account for the multivariate nature of the EVM/ES measurement system. The authors propose a multivariate model for EVM/ES, which implements a principal component analysis (PCA) on a simulated schedule control reference. During project progress, the real EVM/ES observations can then be projected onto these principal components. This allows for two new multivariate schedule control metrics (T2 and SPE) to be calculated, which can be dynamically monitored on project control charts. Using a computational experiment, the authors show that these multivariate schedule control metrics lead to performance improvements and practical advantages in comparison with traditional univariate EVM/ES models.

Citation:


The S-Curve Envelope as a Tool for Monitoring and Control of Projects

J. R. San Cristóbal

Abstract:

Monitoring and controlling the progress of projects is always indispensable to a project manager’s mission because it helps to produce updated pictures of how the project is progressing. Even with a target progression derived from a detailed project schedule, the actual progress, under the influence of many factors, may deviate significantly from the target, which requires corrective actions/control. A project monitoring and control system must provide the required information to answer the following questions: What is the difference between the planned and actual work performance? How is the project progressing in terms of completion of activities? How much ahead or behind schedule is the project? What is the efficiency of the time utilized on the project? What is the efficiency of the time utilized on the project? In this article, the concept of S-curve envelope is introduced. This S-curve envelope consists of two curves. The upper curve corresponds to the curve of the earliest times, whereas the lower curve corresponds to the curve of the latest times. This S-curve envelope can be used as an early warning system to determine whether the S-curve from the actual progress data is reasonable or needs
Comparison of Development Test and Evaluation and Overall Program Estimate at Completion

William R. Rosado

Abstract:

Historically, cost growth regression models analyze aggregate, program-level information. Initiatives by Office of Secretary of Defense, Cost Assessment and Program Evaluation (OSD CAPE) require direct, centralized reporting of the complete Work Breakdown Structure (WBS) Earned Value (EV) data. Centralized reporting allows access to unfiltered, unaltered EV data for multiple programs. Using regression, the authors evaluate if WBS element Development Test and Evaluation (DT&E) EV data are related to program estimate at completion (EAC). Identifying a relationship provides evidence validating pertinence and reliability of low-level EV data. Additionally, a relationship between a specific WBS element and program EAC establishes a basis for improved estimate development and prediction capability. The author’s results show a strong relationship between DT&E and program EAC. Although limited by sample size and assumptions regarding DT&E commonality, their findings lead them to conclude that potential improved prediction models can result from using low-level WBS EV data.

Citation:


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