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The Impact of Funding Profiles on Budget Success

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Abstract

One of the most valuable assets afforded a program manager is a dependable flow of funding at a rate that allows the team to address the various R&D, engineering, procurement, and production tasks necessary to deliver the product of interest. This flow of funding with respect to time is known as the funding profile. This study compares the timewise funding profiles of a variety of DoD acquisition programs to evidence of their success in delivering the product at its designated budget. Additionally, a method is proposed for establishing a program's funding profile in terms of the program's known risks.

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Keywords: funding; profile; value-at-risk

1. Introduction

Every program has three goals: satisfactory technical performance, on-time product delivery, and adherence to its established budget. This paper seeks to determine the qualitative relationships between program complexity, funding profile stability, and the financial outcome of those programs. Additionally, a proposal is made for increasing the likelihood of funding profile stability by quantitatively analyzing the conditional value-at-risk of a program during its planning and execution phases.

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Dews [1] demonstrated that most of the Department of Defense (DoD) acquisition programs they studied met prescribed technical performance requirements, but only by expending greater funds than were planned and commonly by delivering late to schedule. These failures in meeting two of the three standard measures of program success have been associated with failing to stabilize the programs' technical baseline prior to the Critical Design Review (CDR) [2] and with carrying substantial levels of risk into subsequent phases of acquisition [3].

2. Trends in Budget Adherence

The financial histories of fifteen DoD acquisition programs were reviewed. The data pertaining to those programs was extracted from Selected Acquisition Reports (SAR) and SAR summaries published by the Office of the Secretary of Defense (OSD). By agreement with OSD, specific program names have been replaced with an identifying type of acquisition and serial number, as used in Gideon [4]. The programs included those classified as Command, Control, Communications, Computers, and Intelligence (C4I), fixed wing aircraft (FWA), munitions (Mun), rotary wing aircraft (RWA), space and missile defense (S&MD), and naval ships (Ship). The fifteen selected acquisition programs included nine that remained within their allocated budgets for the first five years following program approval (Milestone B) and six that exceeded their budgets by at least 50% during the same time period. Because the sample population is relatively small, the author has reviewed these programs for any trends that might be present rather than claiming a given statistical value of merit.

Program Average Unit Cost (PAUC) is calculated by dividing the total cost of research, development, testing, and evaluation (RDT&E), procurement, program-specific military construction (e.g., test facilities), and those operations and maintenance costs necessary to acquire the defense system by the total number of fully configured end items [5]. This value is updated each year of program execution. Therefore, after ensuring all costs have been converted to a constant \$FY, $PAUCi/PAUC_0$ can be used as a measure of a program's ability to maintain a constant cost per item purchased. A value of $PAUCi/PAUC_0$ greater than 1.0 is evidence of program cost overrun. The programs selected for this study represent a variety of acquisition challenges and a substantial range in the degree to which they were on budget five years after program approval.

The programs listed in Table 1 were evaluated in three factors: (1) the relative steadiness of each program's funding, (2) the author's assessment of its relative complexity, and (3) its final computed value of P_i/P_0. As noted by Vesterby [6], it is very difficult, if not intrinsically impossible to measure complexity using a single value. The assessment of program complexity was the author's own and reflects only general knowledge of the individual programs rather than any direct mathematical analysis; the values were chosen before research into this matter began to avoid the trap of fitting data to meet a prescribed hypothesis.

For RDT&E funding and Total funding, the planned yearly expenditures (i) for each program were summed for each planning year (j). This created an RDT&E array (\$j) and a Total funding array (\$j) for each acquisition program that could be analyzed for internal consistency. The coefficient of variation for both arrays was used as the measure of timewise funding consistency. Greater variation indicates less stability in funding. When viewed in terms of RDT&E funding, complexity, and PAUC trend, three groups emerge. They are C4I and FWA, Mun and Ship, and RWA and S&MD. Across these three groupings, high complexity appears to be associated with sizeable changes in the RDT&E funding profiles and with their eventual financial performance trends. One conclusion that could be drawn from this relationship is that the challenges presented in the complexity of these programs was either not completely recognized prior to program approval or that the risks associated with the complexity were not adequately managed. Either of these problems can lead to a failure in the program's cost estimate.