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Ph.D. DISSERTATION DEFENSE

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Date:	Tuesday, November 25th, 2025
Time/Location:	2:00 pm / https://stevens.zoom.us/j/99916596506
Title:	Estimating the Effort and Cost of Project Management for Complex Systems via a Model-Based Engineering Approach
Chairperson:	Dr. Mo Mansouri, Department of Systems Engineering, School of Engineering & Sciences
Committee Members:	Dr. Roshanak Nilchiani, Department of Systems Engineering, School of Engineering & Sciences Dr. Yasser Morgan, Department of Systems Engineering, School of Engineering & Sciences Dr. Ricardo Valerdi, College of Engineering, University of Arizona Dr. Steve Yang, School of Business

ABSTRACT

The practice of modern project management (PM) has been applied across industries, and its standards, fundamental processes and body knowledge have become matured and abundant across many fields globally. Yet, major PM processes are adapted differently through various projects, organizations, industries, and professional standards. Currently, with little reliable scientific data and a repeatable process in practice, quantitatively understanding, analyzing, and determining accurate PM effort required for system development projects has been a significant, complex challenge, resulting in a common practice of generating PM estimates based on personal experience.

Estimating development effort and cost has been studied in different system modules such as hardware, software, integration, and systems engineering. However, quantification of PM cost and effort has been limitedly explored over the years compared to other system modules. The purpose of this data-driven analysis was to create a systematic, methodological framework through multiple experiments to explore, design, and verify PM estimation results. The objective was to produce an applied parametric cost estimating relationship and PM cost model to fill the current lacuna in the bodies of knowledge of industries and academia.

This study emphasized the attributes of PM documentation, communication, requirements, stakeholders, project site, and coordination, as well as measurements of complexities, human capability, maturity of process, and technological tools to manage projects under development constraints. The research presents a parametric PM cost estimating model containing five size drivers and ten effort multipliers. The constructive project management cost model (COPROJEMO) can assist practitioners in various industries, such as cost estimators, project managers, systems engineering managers, program sponsors, and stakeholders, to rationalize, prognosticate, and make informed decisions.

COPROJEMO offers specialized features that many commercial off-the-shelf cost estimating software tools lack. The results of the study offer direct and immediate benefits to the professional systems cost estimating and engineering communities of practice. Industry practitioners can now have a more robust parametric tool for project planning and decision making, to forecast and prepare project budgets more efficiently and effectively, and produce reliable, defensible cost estimates for projects and system development endeavors.