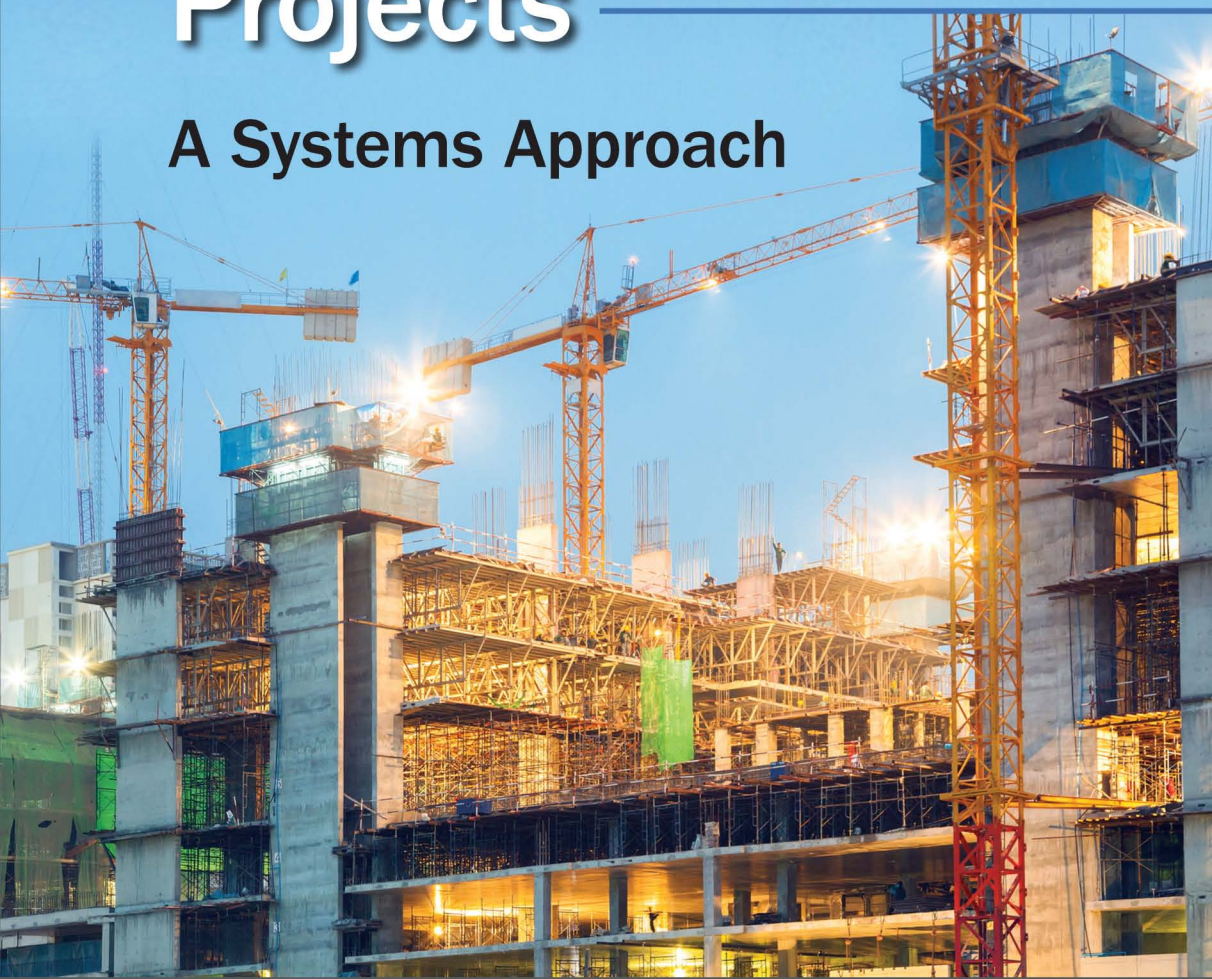
Managing Complex Construction Projects

A Systems Approach



John K. Briesemeister

CPD CERTIFIED
The CPD Certification Service

CRC Press
Taylor & Francis Group
AN AUERBACH BOOK

Best Practices and Advances in Program Management Series

Managing Complex Construction Projects

A Systems Approach

Best Practices and Advances in Program Management Series

Series Editor
Ginger Levin

RECENTLY PUBLISHED TITLES

Managing Complex Construction Projects: A Systems Approach
John K. Briesemeister

Managing Project Competence: The Lemon and the Loop
Rolf Medina

The Human Change Management Body of Knowledge (HCMBOK®), Third Edition
Vicente Goncalves and Carla Campos

Creating a Greater Whole: A Project Manager's Guide to Becoming a Leader
Susan G. Schwartz

Project Management beyond Waterfall and Agile
Mounir Ajam

Realizing Strategy through Projects: The Executive's Guide
Carl Marnewick

PMI-PBA® Exam Practice Test and Study Guide
Brian Williamson

Earned Benefit Program Management: Aligning, Realizing, and Sustaining Strategy
Crispin Piney

The Entrepreneurial Project Manager
Chris Cook

Leading and Motivating Global Teams: Integrating Offshore Centers and the Head Office
Vimal Kumar Khanna

Project and Program Turnaround
Thomas Pavelko

Project Portfolio Management in Theory and Practice: Thirty Case Studies from around the World
Jamal Moustafaev

Managing Complex Construction Projects

A Systems Approach

John K. Briesemeister

CRC Press
Taylor & Francis Group
Boca Raton London New York

CRC Press is an imprint of the
Taylor & Francis Group, an **informa** business
AN AUERBACH BOOK

CRC Press
Taylor & Francis Group
6000 Broken Sound Parkway NW, Suite 300
Boca Raton, FL 33487-2742

Printed on acid-free paper

International Standard Book Number-13: 978-1-4987-8311-8 (Hardback)

Dedication

This book is dedicated to all of the men and women working in the construction industry throughout the world in various positions who, through their knowledge and sweat, are building dreams "one day at a time."

Contents

Foreword

The Construction Industry is known for many programs and projects being behind schedule or over budget or experiencing both of these issues given the complexity of the work to be done. John Briesemeister, winner of the 2016 David S. Barrie award from the Project Management Institute, has managed construction projects on various sites around the world and continues to work in this industry. These projects are known for their challenges and complexity as many are in remote areas of the world. His expertise in avoiding cost and schedule issues is extraordinary…He has combined his on-site experience, along with the knowledge gained by his third Master's degree in Project Management and a previous Master's degree in Industrial Engineering, to develop the field-based Construction Management approach discussed in this book…He has used this approach on various large, complex construction projects around the world…This book is a "must-read" for anyone working in the construction field or considering it. It also is one that anyone interested in this topic will find interesting and useful…I hope you enjoy reading it and learning from it as much as I did.

— Dr. Ginger Levin, PMP, PgMP, OPM3

Preface

In this toolbox or book, as some would call it, the reader will find three systems that, used together, can be used to effectively manage the complex construction of large, complex projects. Each of these systems should be viewed as a tool that was designed with over twenty years of formal education and forged in the fires of more than thirty years in the field of onsite construction.

If a person is tired of welding piping in the trenches or bolting up steel structures, there is the Work Management System that will help him or her move out of that trench or off of that structure into a career as a labor superintendent, which could potentially lead this person to managing his or her own construction company someday.

If a person would like to know more about developing a Quality Management program for the construction work onsite, or move from a quality inspector into being a QA/QC Manager, there is the Quality Management System.

Finally, if a person wants to move from college into the exciting field of construction management, with all of its unique challenges, and work with some amazing people, there is the Project Management System that will start him or her on this journey. If this same person wants to see the big picture and effectively paint that big picture, then he or she should learn all three systems in this book and how these systems, when combined, can transform an empty piece of land into a bright new future for millions of people.

Acknowledgments

I would like to thank Professor Ginger Levin, who inspired me to write this book and worked with me on its development.

I would also like to thank John Wyzalek (Taylor & Francis Group) for providing this opportunity and for his support in the publishing of this book.

In addition, I would like to thank Theron R. Shreve, Director, and Marje Pollack, copy editor and typesetter (DerryField Publishing Services)—who worked tirelessly and with great precision—for their collaboration and dedication in the production of this book.

I also give thanks to the Lord above, who gave me the knowledge and wisdom that made this endeavor possible.

About the Author

The author, who is a Vietnam Veteran and a licensed Project Management Professional since 2007, began his construction experience as a Site Senior Mechanical Engineer on a large nuclear construction project upon graduation from the University of Minnesota in June 1981.

He has continued working in the power industry as an Engineer, Construction Manager, Site Manager, and Project Manager since the mid-1980s, and he expanded his academic education to include an MBA in 1994, a Master's degree in Industrial Engineering (MSIE) in 2003, and a Master's degree in Project Management (MSPM) in 2015.

This author has successfully worked in the field on various large, complex construction projects for the past thirty years and last year, 2016, was awarded the 2016 Donald S. Barrie Award in Construction Management at the PMI® Global Congress 2016—North America in San Diego, California, from the Project Management Institute Educational Foundation (PMIEF) for a paper he wrote and submitted, which was titled, "Construction Execution Plan Alignment for Successful Construction Projects."

Chapter 1

Introduction

1.1 Introduction

If we take the standard multi-story apartment building and add another four buildings, a substation for the electric power needs, solar heating on all of the roofs, a sports complex for the inhabitants that includes a swimming pool, and, finally, a special water filtration plant for this complex, then most Program, Project, and Construction Managers would agree this is now a complex project.

To inexperienced Program, Project, or Construction Managers, a complex project seems to be a labyrinth with many hidden dangers and is difficult to manage. It is the intent of this book to provide best practices and insight for Program, Project, or Construction Managers so they can not only identity these hidden dangers but also effectively manage the construction process to either mitigate or eliminate these risks. The approach that will be presented in this book is based upon three systems, as shown in Figure 1-1.

These three systems are as follows:

1. Project Management System
2. Work Management System
3. Quality Management System

The interface areas shown in Figure 1-1 are also important and must be effectively managed because of the interdependencies among these three systems. The problem with complex programs and projects is that many Construction, Program, or Project Managers are only equipped with a knowledge of project management, which is only one of the systems.

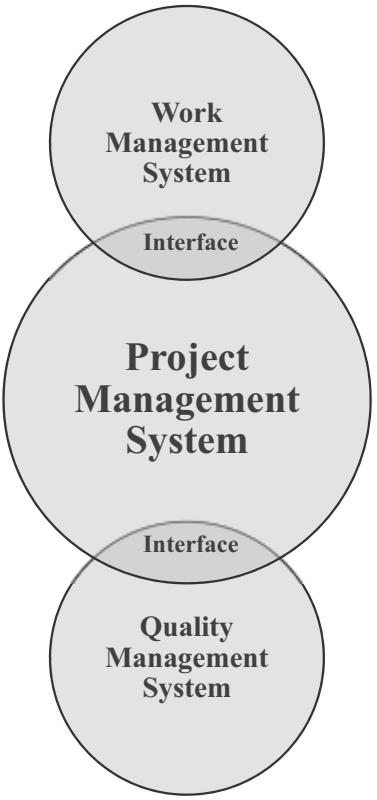


Figure 1-1 Construction Three-System Relationship Diagram

A system for construction is a collection of many processes effectively working together for the production of a specific product or deliverable, which is usually defined in the program or project's contract. This system has a series of specific inputs and outputs, which are what the customer expects from the company or companies performing the work. This will be the approach that will be taken in this book so that the Construction, Program, or Project Manager managing the construction work can use a checklist when he or she first arrives onsite. This checklist will comprise the inputs and outputs for each system that will be clarified and discussed within this book.

In order for this concept to be clear, we will briefly look at a similar project that most people are familiar with—the education of a child. This project primarily consists of two systems, as shown in Figure 1-2.

The information for this project, along with the inputs and outputs for each system, are shown in Table 1-1.

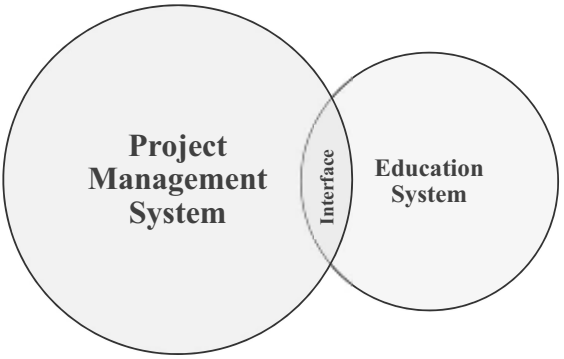


Figure 1-2 Education of a Child Two-System Relationship Diagram

If we examine Table 1-1, we see that both systems have the same output and require both time and money, which is one of their interface areas. The interface area shows that in order for the parent to monitor the progress of this project,

Table 1-1 System Analysis for the Education of a Child Project

Name of Project	**Education of a Child**		
Duration	**12 Years**		
Budget*	**$148, 812 ($12,401 per year* for 12 Years)**		
System	**Inputs**	**Outputs**	**Remarks**
Project Management	Child	Educated Child	
	Capital		
	Time		
	Nutrition		
	Training		
Education	Capital	Educated Children	
	Qualified and Certified Teachers		
	Training Materials		
	Buildings (Schools)		
	Transportation		
	Time		
	Children		

* 2011–2012 figures provided by the National Center for Education Statistics (http://nces.ed.gov/fastfacts/display.asp?id=66).

he or she needs to have progress reports, which are supplied by the Education System at specified intervals. If the progress of the project does not achieve the desired output within 12 years, then the parent or Project Manager may increase the training provided, which will incur additional cost for the project.

It may surprise some parents that they have been practicing project management, but this simplistic example clearly shows how educating one's child has its own degree of complexity, from a project perspective.

This book is written to provide a "nuts and bolts" approach for the Program, Project, or Construction Manager once he or she arrives onsite at a complex project. How many of us have either experienced or observed the following at the construction site?

- Contractor personnel are working in areas that are not on the critical path.
- In a meeting with the contractors, the term "baseline" is considered to have more to do with baseball than with schedules.
- The main contractor's Site Project Manager tells you that there is no "baseline schedule," but he or she knows that the project is on track.
- Contractor personnel are walking off the project due to pay issues with their current employer.

This list can go on indefinitely, but all of this points to very serious signs of trouble for the project. The system approach in this book can fix this, if applied early—at the first signs of trouble or during the project initiation phase. The topics we will follow in this book are the following:

Chapter 2 – Project Management System, Part I
Chapter 3 – Project Management System, Part II
Chapter 4 – Project Management System, Part III
Chapter 5 – Work Management System
Chapter 6 – Quality System
Chapter 7 – Bringing It All Together
Chapter 8 – Lessons Learned from the Field

In Chapters 2 through 6, the three systems will be defined, analyzed in detail, and developed so that the reader will not only understand each system but will also be able to apply each of them effectively in the field.

In Chapter 7, we will take the complex project briefly discussed at the beginning of Chapter 1—Introduction and walk the reader through the process of applying each system to effectively manage this complex project and make it a success for both the EPC Company and the Owner.

In Chapter 8, the author will provide many valuable "lessons learned" for the reader, which are based upon the author's more than thirty years of working on various construction sites around the world. These "lessons learned" will not only provide valuable information to the reader for future projects, but they will also make the reader more effective as a Program, Project, or Construction Manager when managing a complex project onsite.

This book will also open up a new world of construction terminology and words for the reader, such as "Approved for Construction (AFC)," "Field Action Requests," "Site Survey," etc., which can be found at the end of this book in the Glossary section. This Glossary includes a brief description of each term to facilitate a full understanding not only of the word or term but also how it applies to the construction process and which systems it applies to.

1.2 Concluding Remarks

Since the Project Management System is very large and has its start at the time of project initiation, it will be discussed in detail in the next three chapters. These three sections are designed to bring the reader from the time of project initiation through the project planning phase and into the project execution phase, which is why the Project Management System is the backbone of the complete process of managing large, complex construction projects.