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PROJECT
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IN MANUFACTURING
AND HIGH
TECHNOLOGY
OPERATIONS

ADEDEJI BODUNDE BADIRU

PROJECT MANAGEMENT IN MANUFACTURING AND HIGH TECHNOLOGY OPERATIONS

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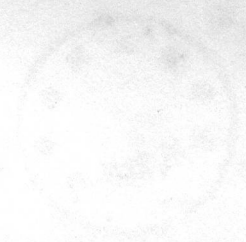
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STATISTICAL QUALITY CONTROL FOR MANUFACTURING MANAGERS

William S. Messina

**PROJECT MANAGEMENT IN MANUFACTURING AND HIGH
TECHNOLOGY OPERATIONS**

Adedeji Bodunde Badiru

PROFESSIONAL LIABILITY OF ARCHITECTS AND ENGINEERS

Harrison Streeter

To My Mother, Rukayat
My Wife, Iswat
My Daughter, Abidemi (Abi)
My Son, Adetokunboh (Ade)

PREFACE

The role that project management plays in our modern environment cannot be overemphasized. Most of the products and services that we now enjoy are the results of project management efforts. Some of those efforts are so subtle that we take them for granted. When a product or service does not meet the acceptable standard, it is probably because of a failure or a shortcoming in the project management function. Companies that consistently deliver quality products and service in a timely fashion succeed mainly because of the efforts they commit to project management.

There is now a proliferation of high technology projects and advanced manufacturing endeavors. Each of these ventures has much at stake in terms of political, economic, and social consequences. With little or no previous experience in managing such projects, the need for successful project management becomes even more critical. The lack of reliable and favorable precedents in managing new technologies has caused many companies to be apprehensive about investing in new capital projects or intensifying ongoing efforts. There is, consequently, an urgent need to reestablish the confidence of society in the management process. Poor management has been pointed out repeatedly as the top problem in many corporations. For companies to succeed, management must be enhanced. In addition to the traditional project management techniques, high technology projects require more innovative approaches. Necessity may be the mother of invention, but need is going to be the father of innovation.

This book addresses the problem of managing high technology and manufacturing projects. Such projects may include space shuttle missions, oil exploration ventures, development of new products, research and development

involving the emerging technology of artificial intelligence, cleanup of nuclear fallouts, tunneling of water passageways (e.g., the English Channel), satellite launching, erection of space stations, and the installation of flexible manufacturing systems. This book is intended primarily as a textbook for first-year graduate courses in business and engineering, as a handbook for technology managers and professionals, and as a reference for researchers and engineers. The book introduces the "triple C principle" for project management. The principle suggests the categorization of the project management function into three focal points of communication, cooperation, and coordination.

Numerous case studies are presented at the end of each chapter. The case studies should serve as guiding models for managerial analysis of project operations in the reader's own environment. The value of case studies in training was demonstrated in August 1987 when Institutional Shareholder Services of Washington, DC offered a \$10,000 challenge to college students to come up with the best management solution to a hypothetical case study of a Fortune 500 multinational company. Similar challenges are inevitable in the future for most of us—either for a prize or for job security. It pays to be prepared. Case studies constitute an important element of such preparation.

Chapter 1 presents an overview of the traditional management concepts. These concepts cover planning, organizing, staffing, directing, controlling, and motivation. Extensions of the basic concepts to specific project management situations are presented in subsequent chapters.

Chapter 2 presents innovative ideas in the management of high technology. Specific topics include technology and society, technology planning, preparations of high tech managers, managing high tech professionals, and information management.

Chapter 3 is a case study of the management and decision-making processes of space shuttle operations. The study calls for an analysis of the management events leading to the space shuttle *Challenger* accident.

Chapter 4 addresses typical management problems in manufacturing projects. Topics covered include managing product complexity, comparison of production management to project management, and the human role in managing computer-integrated manufacturing.

Chapter 5 presents the qualitative aspects of project management. The triple C principle is presented along with a set of project guidelines.

Chapter 6 covers project planning. Topics covered include components of a plan, project feasibility study, proposal preparation, budgeting, learning curve, work breakdown structure, and legal considerations.

Chapter 7 addresses organizational aspects of project management. The topics presented include the manager selection process, staffing, conducting project meetings, the role of women in high tech operations, project communications, and managing international projects.

Chapter 8 is devoted to project scheduling methodologies including PERT, CPM, precedence diagramming, and project presentation graphics.

Chapter 9 presents constrained resource scheduling. Some of the discus-

sions pertain to resource loading, resource leveling, activity prioritizing rules, heuristic performance measures, and project network complexity.

Chapter 10 deals with the final phase in the project management cycle: project monitoring and control. Topics covered include the need for control, schedule control, performance control, cost control, and the project information system.

Chapter 11 discusses the applications of computers in project management. Discussions presented cover software availability and evolution and factors to consider in selecting project management software. The chapter also presents the author's public domain program, STARC, for project network simulation.

Chapter 12 is a case study that addresses the planning process for the installation of a flexible manufacturing system (FMS).

A sequential treatment of the chapter topics is recommended. However, readers may find it necessary to switch the order of coverage to suit specific needs and interests.

ADEDEJI BODUNDE BADIRU

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