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Management of Engineering Projects

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First published 1988

Published by
MACMILLAN EDUCATION LTD
Houndmills, Basingstoke, Hampshire RG21 2XS
and London
Companies and representatives
throughout the world

British Library Cataloguing in Publication Data
Management of engineering projects.

1. Engineering—Management

I. Stone, Richard, 1955

620'.0068'4 TA190

ISBN 978-0-333-40959-6 ISBN 978-1-349-19572-5 (eBook)

DOI 10.1007/978-1-349-19572-5

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Preface

A project is by definition a transient phase that contrasts with the steady state operations more frequently found in industry.

For the successful completion of an engineering project, it is not sufficient to have a sound technical input. Business and project skills are also necessary, and these form the subject of this book. *Management of Engineering Projects* is divided into three parts:

Part I: Principles, Techniques and Management

Part II: Legal Aspects

Part III: Case Studies

The first three chapters constitute Part I, with Chapter 1 providing definitions of the phases in a project (Definition, Justification and Execution) and their associated financial aspects. Chapter 2 covers the project skills of estimation, planning, monitoring and control—an area where the integration of time and financial management is of the highest importance. Project management is discussed in Chapter 3, where the different types of project management structure are explained, along with the way that the structure can change during the project life cycle. The equally important subject of teamwork is also covered.

Part II of *Management of Engineering Projects* is devoted to the legal and related aspects of projects. The legal areas covered are contract law, and health and safety legislation. As greater use has been made of the project approach, so has greater use been made of contractors. For this reason Chapter 4 is devoted to contract types and contract law. Health and safety legislation now has a much greater significance, and despite its importance in all areas of employment, it is often omitted from degree and other courses. Chapter 5 also covers the related subject of engineering risk assessment and control.

The case studies in Part III are of two types: the first two are of a general nature, while the second two consider specific projects. Chapter 6 takes a general look at problems associated with establishing a new facility, and provides checklists to help ensure that a thorough approach is taken; Chapter 7 describes computer projects and some of their particular problems. The case studies in Chapters 8 and 9 illustrate the project techniques described earlier in the book, and they also provide insights into CAD/CAM and the subject of quality.

Discussion questions are placed at the end of each chapter. These can be used in seminars or by individual readers as a check on their understanding of what they have read. Many terms are defined in the text, and these are highlighted by an *italic* typeface. The terms that have been defined in the text are also indicated in the index by a **bold** typeface; this enables the index to be used as a glossary.

In the text no significance should be attached to the use of 'he' or 'his'; the alternatives of 'she' and 'hers' should be taken as implicit alternatives.

This book has been developed from material used in a final year course in the Special Engineering Programme at Brunel University. Some of the material has also been used for a short course on Project Management for engineers, consequently the book is aimed at engineering students and graduates. While the book can be used with students at any level, students who have received some industrial training and management teaching will probably find it easiest to appreciate the material. In order to keep the book to a readable and usable length, some material has only been presented in outline. However, sources of further information are listed in the Bibliography, as well as a list of references.

In the same way that a project is a multi-disciplinary activity, so has been the writing of this book. The Notes on Contributors indicate the backgrounds of the authors, and their contribution is obvious. Less obvious are the contributions from the numerous engineers and industrialists who have been willing to talk to me about projects. I would like to thank all the people who have contributed directly and indirectly to this book. Finally, I must thank Jenny Shaw, Peter Murby and John Winkler of Macmillan Education for their support in this project; special thanks are also due to Dennis Radford who read and commented usefully on the entire manuscript.

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(Author of Chapter 3)

Jonathan Hooker graduated from Loughborough University in Production Engineering and Management in 1979. He did two years of project engineering as described in the case study before becoming an assembly foreman, production control supervisor and finally shift supervisor. He joined Brunel University in 1984. He now works for PA Consulting Group.

(Author of Chapter 9)

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(Author of sections 5.2–5.7)

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(Author of sections 4.3–4.8)

Notation

a_i	output from location i
AD	activity duration
ATE	automatic test equipment
b_j	requirement at location j
BOM	bill of materials
C_{ij}	transport cost from location i to j
CAD/CAM	computer aided design, computer aided manufacture
CNC	computer numerical control
CPA	critical path analysis
DCF	discounted cash flow
DOI	Department of Industry
ECGD	Export Credits Guarantee Department (part of the Department of Trade and Industry)
EEC	European Economic Community
EPROM	erasable programmable read only memory
ESD	earliest start date
FOC	Fire Officers Committee
FPA	Fire Prevention Association
HSC	Health and Safety Commission
HSE	Health and Safety Executive
HSWA	Health and Safety at Work Act
i	interest rate
IRR	internal rate of return
LFD	latest finish date

LPG	liquefied petroleum gas
m	learning constant
MAAPICS	MANufacturing And Production Inventory Control System
n	number of sites, occurrences, years
NPV	net present value
PB	payback
PC	personal computer
PCB	printed circuit board
PERT	programme evaluation and review technique
PFBC	pressurized fluidized-bed combustor
PV(F)	present value (factor)
Q_i	quantity to be transported from existing site i
r	gearing ratio (equity finance/debt finance)
RAM	random access memory
t	time
T_i	transport cost per unit quantity
TC	total cost
TF	total float
TTC	tender to contract (scheme run by the ECGD)
UCTA	Unfair Contract Terms Act
USM	Unlisted Securities Market
VDU	visual display unit
X_{ij}	quantity to be transported from location i to j
<i>Suffices</i>	
e	estimated
m	most likely
n	n th occurrence
o	optimistic
p	pessimistic