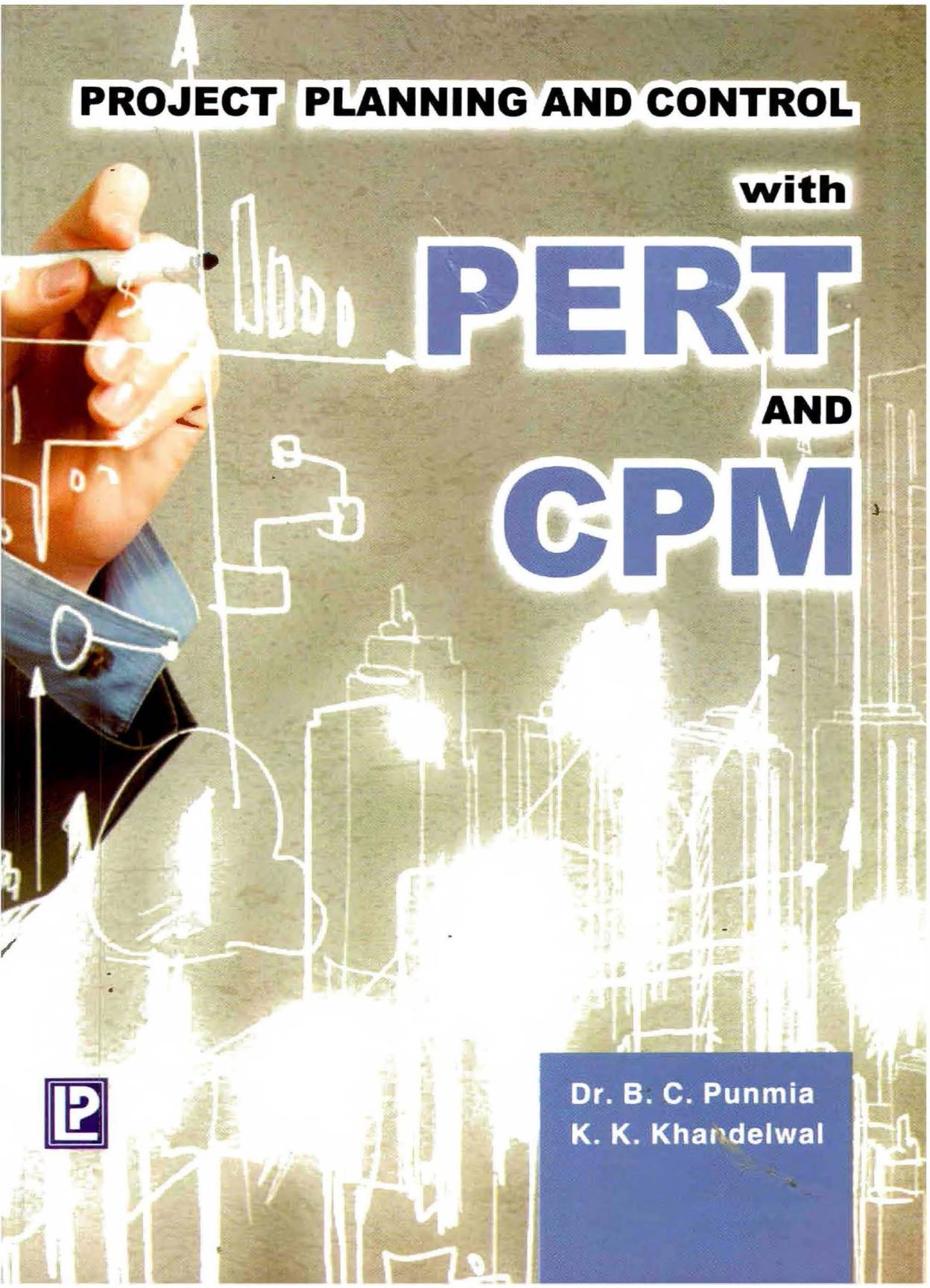
PROJECT PLANNING AND CONTROL with PERT AND CPM



Dr. B. C. Punmia
K. K. Khandelwal

PERT
AND
CPM

PROJECT PLANNING AND CONTROL WITH PERT AND CPM

By

Dr. B.C. PUNMIA

Formerly,
Professor and Head, Deptt. of Civil Engineering &
Dean, Faculty of Engineering
M.B.M. Engineering College,
Jodhpur

and

K.K. KHANDELWAL

B.E. (Hons.), I.A.S.

LAXMI PUBLICATIONS (P) LTD

(An ISO 9001:2008 Company)
BENGALURU • CHENNAI • COCHIN • GUWAHATI • HYDERABAD
JALANDHAR • KOLKATA • LUCKNOW • MUMBAI • RANCHI • NEW DELHI
BOSTON (USA) • NAIROBI (KENYA)

PROJECT PLANNING AND CONTROL WITH PERT AND CPM

Printed and bound in India
Typeset at : Goswami Associates, Delhi.
First Edition : Jan. 1982, *Second Edition* : 1985, *Third Edition* : 1987, *Reprint* : 1988, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1999, 2000, *Fourth Edition* : 2002, *Reprint* : 2004, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, *New Edition* : 2016
ISBN : 978-81-318-0962-2

PUBLISHED IN INDIA BY

LAXMI PUBLICATIONS (P) LTD
(An ISO 9001:2008 Company)
113, GOLDEN HOUSE, DARYAGANJ, NEW DELHI-110002, INDIA
Telephone : 91-11-4353 2500, 4353 2501
Fax : 91-11-2325 2572, 4353 2528
www.laxmipublications.com info@laxmipublications.com

Branches

✆ Bengaluru	080-26 75 69 30
✆ Chennai	044-24 34 47 26
✆ Cochin	0484-237 70 04, 405 13 03
✆ Guwahati	0361-254 36 69, 251 38 81
✆ Hyderabad	040-27 55 53 83, 27 55 53 93
✆ Jalandhar	0181-222 12 72
✆ Kolkata	033-22 27 43 84
✆ Lucknow	0522-220 99 16
✆ Mumbai	022-24 93 12 61
✆ Ranchi	0651-220 44 64

C—12720/016/010
Printed at : Ajit Printing Press, Delhi.

Preface to the First Edition

Complex research and development projects can be managed effectively if the project managers have the means to plan and control the schedules and costs of the work required to achieve their technical performance objectives. When the planning of a project is undertaken, a host of questions arise : How should the work be accomplished ? What resources will be needed ? How long will it take ? How much will it cost ? The answers to all these questions can be found by adopting the modern techniques of project management.

It would be difficult to find in the history of management methods any techniques which has received such widespread attention as that accorded to network methods for planning, scheduling and controlling. The network techniques are called by various names such as PERT, CPM, UNETICS, TOPS and SCANS. However, these and other systems have emerged from two major network systems, namely PERT and CPM.

The aim of this book is to present the basic principles of PERT and CPM in such a way that they can be effectively applied to the solution of management problems. Attempt has been made to present the subject-matter which lays emphasis on fundamentals. General statements of important principles, methods and procedures are almost invariably given by practical illustrations. Unsolved problems with answers have also been incorporated at the end of each chapter to enable the student/reader to test his reading at different stages of his studies.

The Authors are thankful to Shri K.L. Sharma for tracing the diagrams, and to Shri Rajendra Kumar Gupta for publishing the book nicely, in such a short time.

B.C. PUNMIA
K.K. KHANDELWAL

Preface to the Fourth Edition

In the Fourth Edition, the book has been revised and updated.

1-7-2002

B.C. PUNMIA
K.K. KHANDELWAL

Contents

1

Project Management

1.1. INTRODUCTION

A project is composed of jobs, activities, functions or tasks that are related one to the other in some manner, and all of these should be completed in order to complete the project. Every project has one specific purpose : it starts at some specific moment and it is finished when its objectives have been fulfilled. For completion of a project, two basic things are required :

(*i*) material resources,

(*ii*) manpower resources.

Many countries, rich in material resources are exceedingly poor in terms of level of production or plan achievement, while there are other countries which have very limited natural resources but have achieved higher level of productivity mainly because of talents, skills, experience and know-how of their people. Availability, quality and use of human resources is a single determinant factor in accomplishing project objectives.

Rapid accumulation of scientific technique in the recent past has not been matched by a corresponding improvement in the sphere of human group relations. In other words, sociology has not kept pace with technology. We are not in a position to utilize fully our technology advancement unless we are also able to advance in social sphere. Here comes the role of *management*. While *technology* deals with *material things, management* deals with both *material things* as well as *human-beings.*

Management increases the productivity through technological innovation taking into account human factors involved in these advances.

Each project, whether big or small has three *objectives* :

(*i*) The project should be completed with a minimum of elapsed time.

(*ii*) It should use available manpower and other resources as sparingly as possible, without delay.

(*iii*) It should be completed with a minimum of capital investment, without delay.

Project management is a highly specialised job, to achieve the above objectives. Project management involves, the following three *phases* :

1. Project *planning*
2. Project *scheduling*
3. Project *controlling*.

Out of the above three phases of project management, the first two phases are accomplished before the actual project starts. The third phase is operative during the execution of the project, and its aim is to recognize the difficulties during the execution and to apply measures to deal with these difficulties.

1.2. PROJECT PLANNING

Planning is the most important phase of project management. Planning involves defining objectives of the project, listing of tasks or jobs that must be performed, determining gross requirements for material, equipment and manpower and preparing estimates of costs and durations for the various jobs or activities to bring about the satisfactory completion of the project.

Planning is important because :

(*i*) It provides direction

(*ii*) It provides unifying frame-work

(*iii*) It helps to reveal future opportunities and threats

(*iv*) It provides performance standards.

In the planning phase, *plan* is made and *strategies* are set, taking into consideration the company's *policies, procedures* and *rules*.

Plan

It is a statement of intent, *i.e.*, what is to be done. It is interpreted in terms of what has to be done to resources to achieve the intent. The resources to be used may be : office staff, tradesmen, labour, materials, plant and machinery, space and funds. *Plans* are detailed methods, formulated before hand for doing or making something. Plans simply list the goals (target) and define the means

of achieving them. These listed goals are called *events* and means of achieving these goals are known as operations or *activities* in attaining final target set aside by the plan. The size of the *activities* depends on the nature and scale of project ; however, each activity should be sufficiently well defined, for work on them to proceed without interruption from other tasks. *Activities are those operations of the plan which take time to carry out and on which resources are expended.*

Strategies

Strategy is one important type of plan. It specifies the central concept or purpose of the enterprise as well as the *means* by which it intend to carry that purpose.

Policies, procedures and rules

Policies, procedures and rules differ from each other in degree of specificity. *Policies* usually set broad guide-lines for the enterprise. For example, it might be the policy of a departmental store that if a customer is dissatisfied with any of its sale article, his/her money will be refunded.

Procedure specify how to proceed in some situation. For example, 'before refunding the money of the customer, the salesman should carefully inspect the article to be returned and then obtain approval from the manager for the refund'.

A *rule* is even more specific guide for action. For example, the departmental store may have a rule that 'under no conditions will the money be refunded to the customer if he/she brings the defective article after 15 days of the purchase'.

Thus, plans should be finalised and strategies should be set only after taking into considerations the company's policies, procedures and rules.

Steps in project planning

Following eight steps are generally recognised in the planning process of a project :

1. DEFINE : the objectives of the project in definite words.
2. ESTABLISH : goals and stages intermediate to attain the final target.
3. DEVELOP : forecast and means of achieving goals, *i.e.*, *activities*.

4. EVALUATE : organization's resources—financial, managerial and operational—to carry out activities and to determine what is feasible and what is not.

5. DETERMINE : alternatives—individual courses of action that will allow to accomplish goals.

6. TEST : for consistency with company's policy.

7. CHOOSE : an alternative which is not only consistent with its goals and concept but also one that can be accomplished with the evaluated resources.

8. DECIDE : on a plan.

During the planning phase, the information needed is about all those operations or activities, which have to be carried out before the project is completed, their sequence and their logical inter relationship.

Resources

In running a project, there is a basic need of *resources*. These resources can be classified as under :

(*i*) Material resources (*what*)
(including financial resources)

(*ii*) Equipment resources (*how*)

(*iii*) Space resources (*where*)

(*iv*) Effort or manpower resources (*who*)

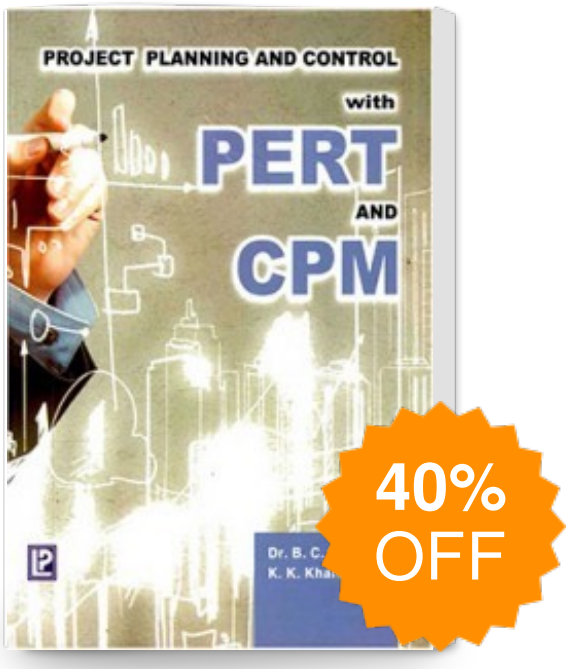
(*v*) Time resources (*when*).

Resources are the starting point of many problems that have to be solved by the manager in the planning phase, before proceeding for scheduling phase of the project.

1.3. SCHEDULING

Scheduling is the allocation of resources. These resources, in conceptual sense, are time and energy, but in practical sense are *time, space, equipment* and *effort* applied to material. More specifically, *scheduling* is the mechanical process of formalising the

Project Planning And Control With PERT And CPM



Publisher : Laxmi Publications ISBN : 9788131806982

Author : B C Punmia And K K Khandelwal

Type the URL : http://www.kopykitab.com/product/10719