

OPERATIONS MANAGEMENT

MODERN PRACTICES AND ANALYTICS

Gyanesh Kumar Sinha
Soumendra Kumar Patra • Durga Madhab Mahapatra



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Operations Management: Modern Practices and Analytics

This book is dedicated to

My Grandfather, *Late Bhubneshwar Prasad*

and

My Grandmother, *Late Ladli Devi*

My Father, *Late Binod Kumar Sinha*

and

My Mother, *Smt. Tara Sinha*

My Wife, *Smriti Sinha*

– G.K. Sinha

Almighty for divine guidance, My Parents for their unwavering support

My Wife for her constant encouragement,

My Daughters, *Simran* and *Saloni*, for bringing joy into my life.

– S.K. Patra

My Father, *Sh. Prafulla Pattajoshi Mahapatra*

and

My Mother, *Smt. Meenakshi Mahapatra*

– D.M. Mahapatra

Operations Management: Modern Practices and Analytics

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Preface

Operations management has evolved into one of today's most important business disciplines. World-class performance in delivering high-quality, cost-competitive, and sustainable products and services is crucial for survival in today's global and national economies. Operations is an essential part of running any business; in fact, the heart of every organisation. Operations management is the function that turns an organisation's resources (materials, labour) into products and services. It is the operations that make innovations possible – whether it's a new device from Apple, or fast package delivery from Amazon Prime, operations function creates a value proposition for the customers. Operations roles are highly sought-after, in-demand jobs due to globalisation. Operations work helps students build the skills they need for a top executive position. Therefore, our intention in writing this book is to provide a clear presentation of theoretical concepts, coupled with advanced tools, techniques, and applications from the operations management field.

This book places an emphasis in problem-solving and illustrative cases drawn from both manufacturing and service organisations. All these cases require students or readers to thoughtfully apply the concepts and techniques in a broader context. Exhibits in each chapter, presented, help understand the modern business practices through illustrations. Every chapter in the book incorporates features like learning outcomes, concepts on the topic, problem-solving exercises, analytical exercises, exhibits, questions for discussions, experiential learning exercises, and illustrative case studies.

This book has fourteen chapters beginning with the fundamental aspects of production and operations management. The final chapter is on business analytics to make students or readers understand basic tools and techniques of analytics in the management of operations and other related fields. A brief description of each chapter is as follows:

Chapter 1: Operations Management – An Introduction

This chapter introduces production and operations management and its significance, types of production systems, the decision area of the operations manager, roles and responsibilities of the production and operations manager, and trends in production and operations management

Chapter 2: Operations Strategy and Productivity

This chapter focuses on the importance of strategy in an organisation for gaining a competitive advantage, levels of strategy, types of strategy, the linkage between business or corporate strategy and operations strategy, the strategy formulation process, and competitive priorities in operations strategy. It also explains the importance of productivity measures and ways to improve productivity, and challenges

Chapter 3: Product Design, Service Design and Process Selection

This chapter discusses the importance and objectives of product design in today's scenario. The topics include the product development process, factors that affect product design, and modern tools used in product development. It also covers the process design framework, process life cycle, and the product-process matrix, service design and its tools, process analysis for process improvement, and decision-making tools for product or process selection.

Chapter 4: Facility Location

This chapter covers the importance and need for facility location planning, factors affecting location planning both for manufacturing and services, various location planning models and tools, and how to evaluate the facility location alternatives.

Chapter 5: Facility Layout

This chapter explains the need for and importance of facility layout planning, principles of facility layout, factors influencing layout planning, various types of facility layouts, and various tools and techniques for efficient and for efficient and effective layout planning.

Chapter 6: Inventory Management

This chapter focuses on the importance of inventory management in modern business practices, classifications of inventory, inventory-related costs, the relationship among inventory-related costs, economic order quantity, and re-order point, types of inventory control systems, and quantitative models for inventory planning and control.

Chapter 7: Work Study – Procedure and Applications

This chapter introduces the principles of work-study and its importance, basic procedure to carry out work-study, techniques and procedures for method study, and work measurement techniques. It describes the method for calculating the standard time and the normal time, techniques, and procedures of work sampling.

Chapter 8: Aggregate Production and Capacity Planning

This chapter discusses the importance of aggregate planning and strategies, aggregate production and capacity planning, master production scheduling, and material requirement planning. It also explains the types of capacity, the calculation for utilisation and efficiency of production and service processes, and the capacity planning process.

Chapter 9: Resource Requirements Planning

This chapter covers the importance of resource requirements planning, its linkage with the business plan, applicability of *MRP-I*, developing an *MRP-I* sheet, applications of *MRP-II*, and *ERP*.

Chapter 10: Maintenance Management

This chapter explains the role of maintenance management in an organisation, various types of maintenance management, their applications, total productive maintenance, and its role.

Chapter 11: Quality Management and Six-Sigma

This chapter discusses the role of quality management in an organization, dimensions of quality for products and services, quality-related costs, statistical quality control, and its significance. It also explains statistical process control, and its techniques, acceptance sampling, total quality management principles and applications, quality standards like *ISO 9000* and *ISO 14000* series of standards, Six Sigma and its application and implementation.

Chapter 12: Project Management

This chapter introduces the fundamentals of the project and its importance in operations management, phases of project management, project organisation, and key decision areas in project management. This chapter explains how the breakdown structure is prepared, and how to draw a project network diagram, tools like the critical path method (*CPM*) and programme evaluation and review technique (*PERT*), critical path, cost-time tradeoff in project crashing, and resource levelling to ensure evenness in resource allocations, and steps involved for managing risks in a project.

Chapter 13: Introduction to Supply Chain and Logistics Management

This chapter covers the fundamentals of logistics supply chain management, and its importance, characteristics, and functions of the supply chain and logistics, supply chain performance metrics, functions of warehousing and material handling, various modes of transportation, and choice of mode selection and reverse logistics.

Chapter 14: Business Analytics

This chapter introduces the fundamentals of business analytics and its importance, tools and techniques of business analytics, data exploration and visualisation, how to classify data, forecasting tools and techniques, application of simulation in business decision making, and the Analytic Hierarchy Process (*AHP*).

We hope that readers, whether they are students studying in college or working professionals, will derive considerable benefits by reading this book. We shall appreciate and acknowledge all comments and suggestions aimed at improving the content of this book.

Gyanesh Kumar Sinha
Soumendra Kumar Patra
Durga Madhab Mahapatra



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And last, but not the least, we would like to express our gratitude to the Almighty without whose benevolence nothing in this world would see the light of the day.

Gyanesh Kumar Sinha
Soumendra Kumar Patra
Durga Madhab Mahapatra

Snapshot of the Book

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Business Environment

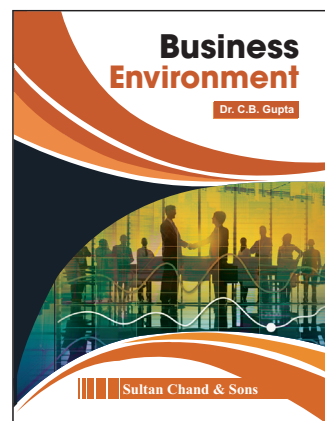
C.B. Gupta

About the Book

The following topics have been added in this new edition :

- Models of Business Conduct
- Green Index
- Impact of Climate Change
- Black Economy
- Biodiversity
- Objective Type Questions

The book is meant for MBA, M.Com, PGDBM, BBA, B.Com. Courses institutes and universities.



Distinctive Features

- Lucid, simple and conversational language.
- Latest policy guidelines and government regulations.
- Full coverage of the latest prescribed syllabi
- Summary at the end of every chapter for quick revision.
 - Tables and diagrams to illustrate the text.
- Chapter outline at the beginning of every chapter to provide overview of the chapter contents.
- Test questions on the pattern of examination question papers.
- Based on the author's teaching and writing experience of 35 years.

Contents

Unit I: An Overview of Business Environment – Introduction to Business Environment • Environmental Analysis • Managing Diversity • Nature and Scope of Business.

Unit II: Political and Legal Environment – The Constitutional Environment • Functions and Roles of the State • Legal Environment.

Unit III: Social and Cultural Environment – Demographic Environment • Culture and Business • Business and Society • Social Responsibilities of Business • Business Ethics and Values • Corporate Governance.

Unit IV: Economic Environment – Economic Systems • Economic Planning • Economic Parameters • Economic Policies.

Unit V: Financial Environment – Indian Financial System • The Reserve Bank of India (RBI) • Commercial Banking • Financial Institutions • Stock Exchange and SEBI.

Unit VI: Natural and Technological Environment – Natural Environment • Technological Environment.

Unit VII: Global / International Environment – Globalisation • Foreign Direct Investment • Multinational Corporations • India, WTO and Trading Blocks.

Unit VIII: Industrial and Labour Environment – Public Enterprises and Privatisation • Small Scale and Cottage Industries • Industrial Sickness • Industrial Labour in India.

Organizational Behaviour

L.M. Prasad

About the Book

The book in the present edition has been thoroughly revised and restructured. All the chapters have been re-written not only to incorporate new developments in Organizational Behaviour but also to make the subject-matter more lucid and crisp. Thus, the present edition is vastly improved both in terms of contents and presentation.

Salient Features

- Most comprehensive coverage of subject-matter with latest development.
- Most authentic presentation of the subject-matter.
- Subject-matter presented in simple and lucid style with suitable Figures, Tables and Exhibits.
- Proper blend of theory and practice.
- An opening case of organizational behaviour so that the concerned concepts can be related to practices easily.
- Multiple choice questions, short answer questions, discussion/application questions at the end of each chapter to test the assimilation of subject-matter concerned.
- Awareness Developer at the end of each chapter to enable the reader to assess her/his behavioural pattern.
- Case at the end of each chapter for class-room discussion to sharpen diagnostic and analytical skills of the readers.
- Guidelines for learning through cases at the end of the book to enable the readers to make full use of learning through cases.
- Glossary at the end of the book for bird's eye view.

Thus, the present edition is ideally suited to MBA/PGDM and other relevant courses.

Contents

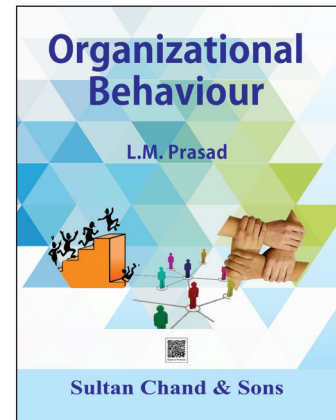
Part I: Conceptual Framework for Organizational Behaviour – Introduction to Organizational Behaviour.

Part II: Foundations of Individual Behaviour – Nature of Human Behaviour • Personality • Perception • Learning • Attitudes and Values • Emotional Intelligence • Motivation: Concepts and Theories • Motivation: Applications • Individual Decision Making.

Part III: Foundations of Group Behaviour – Interpersonal Behaviour • Group Dynamics • Work Teams • Power and Politics • Leadership • Communication • Conflict Management.

Part IV: Organization Systems – Design of Organization Structure • Organizational Culture • Organizational Change and Stress Management.

Appendix 1 • Appendix 2 • Glossary • Index.



Human Resource Management

(Text & Cases)

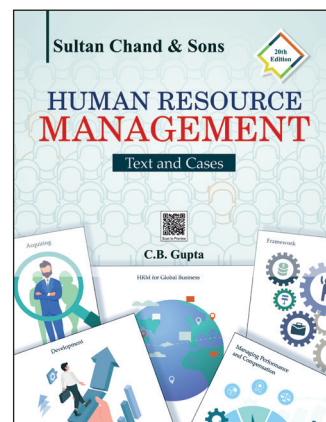
C.B. Gupta

About the Book

This book is an excellent work pertaining to HRM. All the topics are systematically arranged and analytically presented. It adopts a contemporary approach. The major strength of book is that it gives lot of insights about the practicality of the concepts from the Indian perspective.

The summary, test questions and the case studies given at the end of every chapter add lot of value to this book. The bibliography is extensive.

The author has also included various types of end of chapter application exercise to help students begin to apply what they have learned. Human Resource Management text has much to offer and is worth consideration for undergraduate and postgraduate students.



Salient Features

- Systematic arrangement and analytical presentation of the subject matter
- Contemporary approach
- Comprehensive arrangement of topics
- Insights from Indian Industries in the form of boxes
- Provides an in depth understanding of the subject

Contents

Part One: Introduction to Human Resource Management – Nature and Scope of Human Resource Management • Organising the Human Resource Function • Strategic Human Resource Management • Human Resource Policies

Part Two: Acquiring Human Resources – Human Resource Planning • Job Analysis and Job Design • Recruitment and Selection • Placement, Induction and Socialisation

Part Three: Developing Human Resources – Employee Training • Executive Development • Career Planning and Development • Human Resource Development • Employee Empowerment

Part Four: Managing Performance and Compensation – Performance Appraisal • Job Evaluation • Wage and Salary Administration • Incentive Compensation

Part Five: Maintaining and Retaining Human Resources – Job Changes • Transfers, Promotions and Separations • Absenteeism and Labour Turnover • Employee Health and Safety • Employee Welfare (Employee Benefits) • Social Security • Work Environment • Discipline and Grievance

Part Six: Integrating Human Resource – Industrial Relations and Industrial Disputes • Trade Unions • Collective Bargaining • Workers' Participation in Management • Morale • Job Satisfaction • Human Relations • Quality of Work Life (QWL) • Management of Stress and Burnout

Part Seven: Human Resource Control – Human Resource Records, Research and Audit • Human Resource Accounting and Information System

Part Eight: Emerging Horizons in Human Resource Management – Human Resource Management in Virtual Organisation • International Human Resource Management • Human Resource Management in a Changing Environment

Bibliography • Index

Logistics and Supply Chain Management

Saikumari V. • S. Purushothaman

About the Book

Logistics Management is tailored to meet the requirements of students specializing in Logistics and International Business. The book covers the syllabus of most of the Indian Universities offering Logistics and Supply Chain Management program as well as Operations Elective in MBA programme. The Book unveils with an overview of Logistics Management in an easy to understand manner.

Salient Features

- Exhaustively covers Anna University & Madras University Logistics syllabus of both UG & PG students.
- Content made easy to understand in a student friendly manner.
- Critical Thinking Questions to enhance the out of box thinking of the students.
- Key concepts are presented in a diagrammatic model for better understanding.
- Case Study and Puzzles will help to enhance the understanding level of students.
- Frequently asked University exam questions to facilitate high score in the subject.
- Question Banks with answers to help in getting high score in exams.
- Glossary helps to understand the important key terms used in Logistics and to answer two marks questions.
- Multiple Choice Questions help to recollect the concept and enhance the learning for competitive exams.
- Includes more Logistics & Supply Chain Management topics as per the activities carried out in the Logistics firm.

Contents

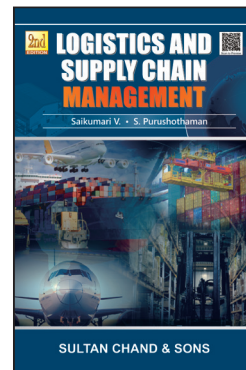
- Introduction to Logistics
- Distribution Channels and Outsourcing Logistics
- Transportation and Packaging
- Logistics Performance Measurement and Costs
- Current Trends in Logistics
- Supply Chain Management Concepts

Question Bank

Case Study

Crossword

University Question Papers.



About the Book

Operations Management: Modern Practices and Analytics presents a broad introduction and applications to the field of operations in a theoretical as well as in a practical manner. This book covers the topics both in-depth and wider perspective through modern concepts, problem-solving, the latest management practices, and illustrative case studies.

Silent Features

- ❑ **Coverage and Scope:** Every chapter begins with learning objectives to familiarize students with the aim and learning outcome of the chapter. Also, the book covers every key aspect, ranging from general to specific, in the field of operations management.
- ❑ **Contemporary Examples:** The book incorporates numerous illustrations from both Indian and global perspectives, blended with classic (past) and current issues faced by operations managers in manufacturing as well as service sectors.
- ❑ **Analytical and Numerical Problems:** Each chapter brings one or two analytical exercises coupled with numerical problems to help students apply a critical thinking approach to problem-solving, and make informed choices based on quantifiable data and insights.
- ❑ **Experiential Learning Exercises:** These exercises are designed to expose students with day to day real challenges around them and attempt to address them through the operations management concept learned in the chapter.
- ❑ **Illustrative Case Studies:** The book features illustrative case studies at the end of each chapter, providing deeper insights and helping students grasp complex concepts more effectively. Cases on Ford, Apple, Amazon, Sonalika Tractor, and Boeing, to name a few, are the major highlights.
- ❑ **Business Analytics:** This book includes a separate chapter on business analytics to make students learn the modern analytical tools for decision-making in the field of operations management using descriptive, predictive, and prescriptive analytics.
- ❑ **Sustainability and Modern Technologies:** This book has put special emphasis on the sustainability and green aspects in various chapters, as well as the application of modern technologies in improving the efficiency, productivity, and quality of outputs.

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