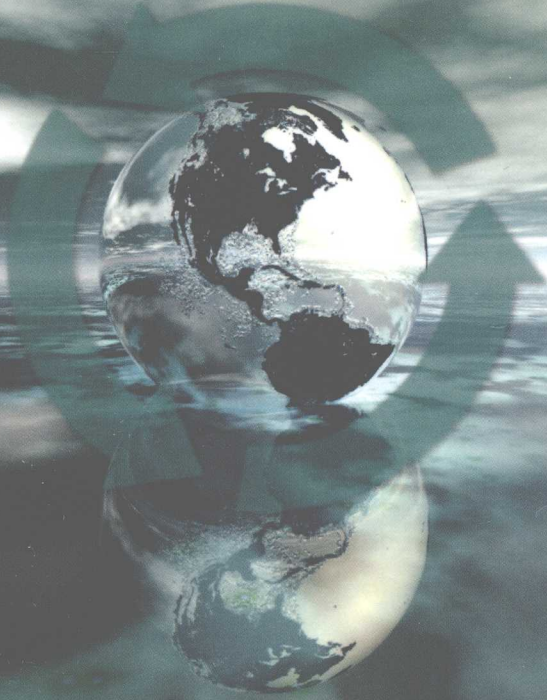


Hsiao-Fan Wang Surendra M. Gupta



GREEN

SUPPLY CHAIN MANAGEMENT

Product Life Cycle Approach

Green Supply Chain Management

Product Life Cycle Approach

Hsiao-Fan Wang, Ph.D.

Surendra M. Gupta, Ph.D.



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Green Supply Chain Management: Product Life Cycle Approach

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Dedicated to our families:

I-Fan and Tao-Fan

Hsiao-Fan Wang

Sharda, Monica, and Neil

Surendra M. Gupta

Preface

Energy and environmental concerns are intricately linked to the supply chains of various goods. Increased public awareness of such concerns is reflected in the contemporary business environment as well as in government legislation. The green supply chain is a new trend in industrial development. Because of various pieces of legislation such as restriction of hazardous substances (RoHS), waste electrical and electronic equipment (WEEE), and eco-design of energy-using products (EuP) announced by the European Union (EU), many industries today need to incorporate environmental factors into their supply chain management. This requires implementation of various techniques to quantify the environmental impact on supply chains, and to identify opportunities for making improvements. This leads to both green engineering and green management of a product.

While global warming has become an urgent issue, educating the general public how to achieve a green environment is essential. In addition, it is not only essential to produce a green product or just manage and control the whole supply chain under the required green guidelines, but it is also obligatory to treat the used materials and products properly. Coping with such complicated and correlated issues such as "4R" (reduce, redesign, remanufacture, and reuse) requires that practitioners utilize more analytical and scientific methodologies. The purpose of this comprehensive text is to address such issues. The book provides a stage-by-stage production methodology within the life cycle of a product to ensure environmental compliance and economical goals. The book also provides coverage for the development of green product information management and retrieval systems to facilitate the understanding and application of green product life cycle assessment and promotion.

This book is designed for senior undergraduate students and graduate students from both engineering and management disciplines. The book contains 12 chapters organized into four parts, viz., Basic Concepts and Background; Green Engineering Technologies; Green

Value Chain Management; and Green Information Management Systems.

This book will be useful to both researchers and practitioners who are interested in a comprehensive overview of a green supply chain as it relates to the life cycle of a green product. In particular, students with an engineering or management background will learn about:

1. the importance of green engineering and management with respect to enterprise competence, environmental protection, product sustainability, and legislation;
2. the resolution and assessment of issues related to a green product using a life cycle approach;
3. the basic concepts of green engineering with manageable solutions;
4. the basic principles of both supply chain and demand chain management; and
5. the elements of designing an information management system.

Finally, it is expected that by utilizing the philosophy, techniques and methodologies covered in this book, we can push forward towards a cleaner planet.

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PART 1

**Basic Concepts
and Background**

CHAPTER 1
Introduction

CHAPTER 2
Mathematical Background

