BEST PRACTICES IN GREEN SUPPLY CHAIN MANAGEMENT

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BEST PRACTICES IN GREEN SUPPLY CHAIN MANAGEMENT: A DEVELOPING COUNTRY PERSPECTIVE

BY

SADIA SAMAR ALI
King Abdulaziz University, Saudi Arabia
New Delhi Institute of Management, India

RAJBIR KAUR
India

JOSE ANTONIO MARMOLEJO SAUCEDO
Panamerican University, Mexico

United Kingdom – North America – Japan – India – Malaysia – China

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List of Abbreviations

AHP	Analytical Hierarchy Process
ANOVA	Analysis of Variance
ANP	Analytical Network Process
BD	Benders Decomposition
BSP	Benders Subproblem
CAGR	Compound Annual Growth Rate
CB-SEM	Covariance-Based Structural Equation Modelling
CC	Collection Centers
CDC	Central Distribution Centers
CENACE	National Center for Energy Control
CER	Certified Emission Reduction
CFA	Confirmative Factor Analysis
CFE	Federal Electricity Commission
CO_2	Carbon Dioxide
DEMATEL	Decision-Making Trial and Evaluation Laboratory
DS	Disposal Site
EEP	External Energy Producers
EMS	Environmental Management System
EPC	Electric Power Supply Chains
FAHP	Fuzzy Analytical Hierarchy Process
FDI	Foreign Direct Investment
GHG	Greenhouse Gas
GL	Green Logistics
GP	Green Procurement
GSCM	Green Supply Chain Management
GTMA	Graph Theoretic and Matrix Approach
ISM	Interpretive Structural Modelling

JIT	Just in Time
LB	Lower Bound
LED	Light Emitting Diode
LP	Linear Programming
MIP	Mixed-Integer Programming
MP	Master Problem
MSME	Micro, Small, Medium Enterprises
NCR	National Capital Region
NGO	Nongovernment Organization
NOIDA	New Okhla Industrial Development Area
PLS-SEM	Partial Least Squares Structural Equation Modeling
RC	Recycling Center
RDC	Regional Distribution Centers
RL	Reverse Logistics
RMP	Remanufacturing Plant
RPC	Reprocessing Center
SAP-LAP	Situation Actor Process–Learning Action Performance
SCM	Supply Chain Management
SCND	Supply Chain Network Design
SD	Sustainable Development
SDG	Sustainable Development Goal
SEN	National Electricity System
SSCM	Sustainable Supply Chain Management
TBL	Triple Bottom Line
TCIL	Tire Corporation of India Limited
UB	Upper Bound
UNDESA	United Nations Decade of Education for Sustainable Development
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNGC	United Nations Global Compact
UNHABITAT	United Nations Human Settlement Program
WCED	World Commission on Environment and Development

Preface

Developing countries are looking for alternate paths to sustainability as the problems faced by them are region, social, and culture specific. They look forward to relevant and affordable ideas emerging from developed nations for inspiration and other developing nations who are facing similar challenges on economic, social, and climatic fronts. They are contriving methods and ways to compensate growth with economic utilization of resources, implementation of energy-efficient technologies for progressive reduction of carbon intensities for sustainable development. But a bigger question worth asking is: is this development sustainable in a real sense? It is an accepted fact that the paradigm of sustainable development is primarily focused on environmental and economic development, and the agenda of social development needs to be reconsidered. The dilemma faced by a majority of nations is profit versus conservation, and since it is a debatable issue, we have examined some antecedents of the concepts of sustainable development and narrowed down key points from the debate which are worth pondering over for their validity, suitability, and accountability toward the issues and challenges of sustainability. The sustainable development definition given by the *Brundtland Report* and its related controversies and shortcomings and further additions to the concepts are also discussed for comprehension and interest of our readers. The areas left uncovered in the initial definition of sustainable development – place and people – have provided us the motivation for directing our effort toward human issues in sustainable development with a focus on place aspect developing countries. The role played by the United Nations, the programs initiated by them, and the work done by various academicians, societies, and global or international bodies have been highlighted for understanding the complexities and challenges related to sustainability. The exponential growth and evolution of a supply chain is described by uncovering multiple theories and reviews proposed by academicians and global researchers. The book also covers the issues associated with green supply chains and sustainable supply chains by first outlining their fundamental differences and then discussing their contribution toward the agendas of sustainable development, with comprehensive details about the practices, pressures, and major drivers. The major drivers of green chains are internal, external, and regulatory, and the main drivers of sustainable supply chains are similar to green chains with the inclusion of social drivers. The popular practices for greening the supply chain and for sustainable supply chains are also discussed in detail. The book proceeds with a holistic and inclusive discussion on the methods of measurement of sustainability: quantitative mode as an objective

measurement relying on statistical, mathematical, or numerical analysis or primary data collected through a medium of polls, surveys, questionnaires, etc.; qualitative mode that is subjective in nature and focuses on images, transcripts, and words. Comprehensive discussions and research work done in multivariate analysis and its relevance to the context of supply chain, identifying its related problems and offering solutions for emission reduction adds to the richness of the book. Using statistical methods researchers have attempted to quantify the relationship among variables of supply chains to predict the likely outcomes in the form of a comprehensive research study based on combined qualitative and quantitative assessment of green supply chain practices adopted by the Indian manufacturing sector. The study applies the regression techniques to help in calculation of coefficient for each independent variable of the supply chain to estimate the effect of each predictor on independent variables. Regression further provides insights to the researchers by calculating statistical significance and quantifying relationships between predictors and outcomes, which helps them in making practical and viable decisions concerning supply chain efficiencies. The book provides insights into the complex problem and sustainable approaches of electricity generation in developing nations like Mexico for practitioners and business managers. Outlining a connection between inventory levels of fuels in thermal plants and their transport medium, a study is presented using Delphi techniques for charting policies for carbon reduction. For keeping the interest of readers alive we took the liberty of including interesting case studies from Indian organizations, covering varied fields of sustainable HRM practices, reverse logistics, and emission control measures from the tire industry. Among the existing theories and concepts the one which excites us is the application of Optimization and Operations Research for designing and controlling complex systems, solving hard problems of efficiently allocating scarce resources using incomplete information, and developing sustainable strategies to master situations of conflict and co-operation in a scientific manner. The final chapter covers Mixed Integer Linear Programming and *Mobile6* software methodology and Benders Decomposition to counter the demand uncertainty in the supply chain in the Mexican context.

Relevance of the Study

The study of Environmental Management and Sustainability has experienced a gradient shift from a niche area to mainstream way of thinking and education. It has evolved from philanthropic discourses on Save Earth or Save the Planet to a broader discipline providing insights into the aspects of environment studies, social sciences, business and technology to a wider range of participants including students, economists, environmentalists, world leaders, and the community at large. Since the modern world is struggling with issues of environmental sustainability, "sustainability" education concentrates on core skills and capabilities which are suitable for handling environmental complexities through innovation in technology and science, social and political norms. Sustainability has its roots in politics, economics, philosophy, social sciences, but it also covers a broader theoretical spectrum of civic engineering and technology, so its education and applications are pertinent to many fields like civic planning, environmental

consultancy, agriculture, corporate strategies, health care, and many more related fields. The book covers the sustainability and sustainable development concepts from multiple viewpoints and offers comprehensive qualitative and quantitative research focuses which can offer insights to a variety of readers, including students, academicians, supply chain managers, social groups, and researchers. Rising cost of manufacturing, shrinking resources of manufacturing bases, coupled with the problem of shortened life cycle has pressurized supply chains to find alternate routes, and green supply chains have started to play their part well. The book is also a good read from a green supply managerial perspective since elaborate discussion about the practices and drivers of green supply chains have been covered.

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