PREMIER REFERENCE SOURCE

Green Finance and Sustainability

Environmentally-Aware Business Models and Technologies

Zongwei Luo

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Environmentally-Aware Business Models and Technologies

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BUSINESS SCIENCE Reference

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Preface

INTRODUCTION

Green, or environmentally friendly, often refers to goods and services considered to inflict minimal or no harm on the environment. The world now is at the point to pursue a low carbon development roadmap that would eventually decouple economic growth from greenhouse gas and other polluting emissions, through technological and business innovations. Worldwide, the supply chain sector is among the top 3 largest carbon emission contributors. Supply chain management undoubtedly shall undertake the burden of facilitating this carbon emission reduction by pursuing a low carbon supply chain management practice. The unanimous global pursuit of a sustainable environment has called for advocating the grand challenge of low carbon supply chain management research for business and technology innovation to pave the foundation for a low carbon economy.

Measurement of carbon emissions is broadly adopted as a proxy for quantifying damage to the environment. Low carbon SCM would play a major role in carbon reduction, thus promoting a long term sustainable economy development and well being. The branding value of low carbon development as well as the sustainable development methods would strengthen comparative advantages of environmentally-aware industries, supporting economic transformation by developing a technology rich, high value added, and service oriented, low carbon economy.

Carbon competitiveness is already considered as the critical benchmark of national economic competition. Therefore, supply chain carbon competitiveness will absolutely redefine an economy's competitive strength.

SUPPLY CHAIN CARBON MANAGEMENT

With growing concern on environmental considerations in supply chain industries, numerous corporations are facing new challenge on carbon management in supply chains. A few of the global companies which provide management services are developing various tools of carbon management. Since carbon management would exert considerable impacts with changes on supply chain activities, effective tools become critical to illustrate and measure the carbon inter-dependencies and inter-impact among activities.

For example, in the supply chain carbon management, it is inevitable to make changes on supply chain activities. Due to these activities having different connections or relationships with each other, some of them would lead to changes to the rest accordingly. In order to measure these changes, it would require tools to model and represent the inter-connection of activities, as well to calculate the impact to the rest

if any activities would change. It is necessary to develop models to represent the inter-connections of supply chain activities and calculate the change impact of carbon intensity caused by carbon management.

CARBON IMPACT MANAGEMENT

In supply chain carbon management, all activities could be considered competitive peers to each other, which mean each of them is wishing to fulfill their own objectives by proposing and insisting their demand for their benefit. Is it possible for each of them to reach the maximal total return at the same time? What is the carbon impact to the whole supply chain?

These questions are frequently asked when those supply chain activities are owned or executed by different interested parties respectively. All of them are pursuing the maximal interest in this carbon constrained economy.

If those activities are run by the same party, then not all activities are necessary to reach their biggest gain. It is natural to have a different priority to enforce the carbon impact to the activities in the supply chains when optimizing the carbon impact or de-carbonizing the whole chains.

With the rapid development of carbon accounting technique, a computable tool for carbon impact analysis to supply chain management is becoming viable, although still with considerable barriers ahead.

ABOUT THIS BOOK

This book is devoted to examining a range of major issues concerning green finance and sustainability to provide perspectives, clustered into five book sections on emerging environmentally aware business models, regulation and standard development, green ICT for sustainability, green finance and carbon market, green manufacturing, logistics and SCM, and regional low carbon development.

Section 1: Business Models, Regulation and Standard for Sustainability

- Chapter 1: *Towards the Transition to a Post-Carbon Society: The Crisis of Existing Business Models?* Sophie Galharret, Laurent Beduneau Wang
- Chapter 2: *Environmental Standardization for Sustainability*, John W. Bagby
- Chapter 3: *Promoting Technological Environmental Innovations: What is the Role of Environmental Regulation?* Jacqueline C.K. Lam and Peter Hills
- Chapter 4: *Quantifying Sustainability: Methodology for and Determinants of an Environmental Sustainability Index*, Kobi Abayomi, Victor de la Pena, Upmanu Lall, Marc Levy

Section 2: Green ICT for Sustainability

- Chapter 5: *Greener Data Centres in the Netherlands*, Theo Thiadens, Marko Dorenbos, Andries Kasper, Anda Counoutte-Potman
- Chapter 6: *Information Technology Resources Virtualization for Sustainable Development*, Malgorzata Pankowska

Section 3: Green Finance and Carbon Market

Section 4: Green Manufacturing, Logistics and SCM

Section 5: Regional Development

- Chapter 25: *A Critical Assessment of Environmental Degeneration and Climate Change: A Multidimensional (Political, Economic, Security) Challenge for China's Future Economic Development and its Global Reputation,* Christian Ploberger
- Chapter 26: *Study on Low-Carbon Economy Model and Method of Chinese Tourism Industry*, Zhang Mu, Luo Jing, Zhang Xiaohong, Tang Lei, Feng Xiao-na, Chen Shan
- Chapter 27: *Government Policies and Private Investments Make for a Bright Cleantech Future in India*, Gavin Duke and Nidhi Tandon
- Chapter 28: *Building a Sustainable Regional Eco System for Green Technologies: Case of Cellulosic Ethanol in Oregon*, Bob Greenlee, Tugrul U Daim

LOOKING FORWARD

At present, low carbon development has been penetrating into various disciplines, becoming pervasive. This low carbon trend has been arousing interests from all kinds of people, including politicians, business professionals, and academic researchers, originating from the environmental movement, towards national strategy and policy worldwide.

However, practice and adoption of low carbon technology in business or industry are not smooth. Low carbon is often associated with terms like more capital expenditure and less operation efficiency. Thus, while low carbon development is an important matter, sustainability now has to move beyond environmental concerns to a holistic view, over emerging business models, low carbon and clean technologies, technology access and finance, and policy and regulations.

I believe this book appears at the right time. I genuinely hope it will bring insights and enlarge your view into this urgent field.

Zongwei Luo

Table of Contents

Section 2
Green ICT for Sustainability

Section 3
Green Finance and Carbon Market

Section 4
Green Manufacturing, Logistics and SCM

Detailed Table of Contents

This chapter reviews and discusses the debate over the effectiveness of environmental regulation in promoting industrial Technological Environmental Innovation (TEI). Using the innovation-friendly regulatory principles adapted from Porter and van der Linde (1995a and 1995b), this chapter demonstrates how properly designed and implemented environmental regulation (TEI promoting regulation) has played a critical role in promoting TEI in the transport industry in California and Hong Kong.

This chapter consider new methods of component extraction and identification for the Environmental Sustainability Index (ESI) – an aggregation of environmental variables created as a measure of overall progress towards environmental sustainability. Principally, the authors propose and illustrate a parametric version of Independent Component Analysis via Copulas (CICA). The CICA procedure yields a more coherent picture of the determinants of environmental sustainability.

Section 2
Green ICT for Sustainability

In this chapter, the current situation regarding green data centres in the Netherlands is mapped. The chapter successively goes through the entire chain of processes that are needed for arriving at greener data centres. The chapter starts with the legislators. It continues with the procurement of IT. It discusses the design of facilities required for a data centre and the ICT provisions as used by this data centre. It looks at the analysis of the degree of sustainability in data centres and the measures that need to be taken as a result of this. And it concludes by describing how ICT equipment could be recycled.

The first part of the chapter includes presentation of benefits resulting from IT (Information Technology) resources virtualization, Grid computing and cloud computing development. The second part

contains a model of IT governance for sustainability. The main important factors included in the model concern IT strategy, business strategy, IT management, business agreements.

Chapter 7

This chapter introduces the Green IT Balanced Scorecard by incorporating an environmental aspect of technology into the scorecard measurement method. The authors conceptualized the Green IT balanced scorecard as "a nomological management tool to systematically align IT strategy with business strategy from an environmental sustainability perspective in order to achieve competitive advantage."

Chapter 8

This chapter conceptualizes three different strategies: tactical green IT strategy, strategic proactive green IT strategy, and sustained green IT strategy, along with theory-based propositions for each of the strategies. The chapter also demonstrates that the Green IT strategy is path-dependent; that is to say, a firm's prior experience and history helps determine its current strategies. This study also involves a discussion of the development of the theory, the proposed model, and some possible future research directions.

Chapter 9

The present chapter explores the use of some of the current state of the art technologies like ICTs including tools like Remote Sensing and GIS as a means for providing sound and efficient decision making across various sectors.

Chapter 10

In this chapter, the architecture and function of a microcontroller, a device for system operation control at micro-level, is briefed. The need for a low power microcontroller towards sustainability and greening is stressed with various examples. The MSP430 Microcontroller, a product from Texas Instruments, is a very low power microcontroller.