Preface

INTRODUCTION

Traditional Supply Chain Management (SCM) aims at movement of goods and services from one end of this chain to the other through different stages so as to improve the efficiency, productivity and profitability of the entire process. As SCM spans across the economic functions of the entire value chain of a product or service, it is vital for a company to join in, form, or coordinate its business related supply chains, forming various kinds of business relationships. Supply chain relationship management, or relationship management in supply chains, increasingly becomes one of the core functions in today’s market place for companies to strive for business competitiveness.

ENTERPRISES IN TRANSITION

Examples always help understanding. Pearl River Delta (PRD), a south region in China, is a region where the world’s largest manufacturing base is located. In PRD, various economic functions of the entire value chain of a product or service are conveniently located together in a close geographical area. The enterprises have established various smoothly running industrial clusters with various business relationships formed.

With the emphasis now on environmental protection and high technology development in China’s trade policy, many of those enterprises, small and medium sized and labor-intensive, have been losing their competitiveness. They are in low-end industries, with low capitalization, in relatively low technological conditions. Transformation, upgrade, and relocation are the only way out for them, which have now become the national encouraged policy, being enforced in China. Hong Kong government is urged to take pro-active role in helping them access financial resources, technology know-how, and market intelligence information.

Now it is a critical moment to innovate technologies and solutions for those enterprises to transform and upgrade while in consistency with China’s new processing trade policy. Market potential and financial resources are the major two concerns for them. On the financial resources side, cross border financing technology and solution innovation is particularly important to improving the financial situations for Hong Kong invested enterprises in PRD and to help them retain the employment in the middle of a current financial tsunami.
On the hard hand, upgrade, transform, and relocation present challenges on the supply chain management for those enterprises. The supply chains would become even longer and more complex with more diverse transportation networks across different and sparse regions. This would put serious threats on enterprises’ products and services market potentials as it hinders the market observation and feedback.

Strong demand is there for market information disclosing and sharing leading to the discovery of market demand and feedback, especially during the transform period. The information often is rather expensive to obtain in the long and complex supply chains, as they tend to span across the economic functions of the entire value chain of a product or service. It is vital for a company to join in, form, or coordinate its business related supply chains, forming close business relationships with business partners. Supply chain relationship management, thus, increasingly becomes one of the core functions in today’s market place for companies to strive for business competitiveness. The supply chain relationship modeling and analysis will lead to informed decision making and better market adaptation capabilities in the fast changing business environment.

**SUPPLY CHAIN RELATIONSHIP MANAGEMENT FOR SUSTAINABLE DEVELOPMENT**

Supply chain relationship management emerges to be a key business capability to help address these challenges in the upgrade, transform and relocation of these enterprises, especially small ones. SCM, spanning across the economic functions of the entire value chain of a product or service, presents challenges and opportunities for relationship management to enhance enterprises’ capability for market adaptation. Traditional SCM, aiming at movement of goods and services from one end of this chain to the other through different stages so as to improve the efficiency, productivity and profitability of the entire process, often widen the distance of an enterprise to the market. Supply chain relationship management, on the other hand, helps narrow the distance for agile market adaptation, studying the business interconnections of how a company can join in, form, or coordinate its business related supply chains by establishing various business relationships with its partners. Supply chain relationship management increasingly becomes one of the core functions in today’s market place for companies to strive for business competitiveness. Supply chain relationship management presents the following characteristics in order to help enterprises’ decision intelligences for dynamic market adaptation:

**ADVANCED ANALYTICS WITH SUPPLY CHAIN MODELS AND FINANCIAL TECHNOLOGIES**

The green and sustainable development trend has been centric in all the hearts in major economies. Sophisticated green analysis for sustainability demands advanced analytics to cope with large data volume dispersed in every corner and to help deal with the risks and identify opportunities in the sustainable economy development. Advanced analytics are essential to high-value decision management towards building a sustainable competitive advantage in the green economy.

Advanced analytics will provide innovative concepts, methods, tools, and application development to drive better decision makings with practical relevance to the green and sustainable economy development.
This book on Advanced Analytics would contain a set of contributions with various focuses on the development of innovative techniques and tools to help clarify/answer some urgent questions in this global trend for sustainable economy development.

The book contains 12 selected chapters with abstract following their titles for your easy reading through. I hope you enjoy your reading.

Chapter 1, *Low Carbon Economy – Finance and Technology Models*, by S. Sureshkukar; The climate change is forcing a low carbon growth model not only for the developed nations but also for the developing countries, and particularly the emerging major emitters belonging to the emerging economies like China and India. New types of policies, partnerships and instruments, which dramatically scale up present climate change efforts, will be needed, if efforts to mitigate climate change and adapt to its effects are to succeed. The focus of this chapter will be on these and related issues pertaining to financial and technological aspects of the challenges confronting us in this context. The methodology used is essentially based on current literature and tacit knowledge arising from related experience along with its explicit accounts.

Chapter 2, *Carbon Markets and Investments: VAM's Case Analysis*, by J. Zambujal-Oliveira, Miguel R. Henrique, and Rui Henriques; In a world where greenhouse gases (GHG) carry a price, organizations can create financial instruments that are tradable on the carbon market by investing in projects that reduce GHG emissions. The purpose of this study is to critically analyze an investment project from EcoSecurities to mitigate the emissions of methane from a coalmine located in China’s Sichuan province. This project generates carbon credits that are later sold to governments and organizations under the Kyoto Protocol. In order to evaluate this investment, we conducted an analysis centered in its net present value, and we take into consideration a set of external variables and the financial and economic situation of EcoSecurities. This study concludes that EcoSecurities project investment, since project’s net present value is positive, it has a relevant impact on EcoSecurities strategy and improves the company’s financial situation as it increases revenues and improves assets using efficiency.

Chapter 3, *Firms’ Banking and Pooling in the EU ETS (2005-2007)*, by Julien Chevallier, Johanna Etner, and Pierre-André Jouvet; This article investigates firms’ banking and pooling behaviors in the context of the EU Emissions Trading Scheme (EU ETS) during Phase I (2005-2007). It provides an overview of the questions raised at the firm-level by the introduction and implementation of the EU trading system in terms of allowances management. More specifically, the article details the banking behavior at the installation level, and the pooling of risks at the group level attached to allowance trading between the parent company and its subsidiaries. Based on case-studies of the most significant patterns in terms of allowances management among firms, the empirical analyses underline the efficiency of the banking instrument as a risk-management tool.

Chapter 4, *Mind the Gap Please! – Contrasting Renewable Energy Investment Strategies between the World Bank and Poor Customers in Developing Countries*, by Sam Wong; This chapter scrutinizes the World Bank’s nine guiding principles for investment strategies on renewable energy in developing countries. Drawing on two World Bank-funded solar lighting projects in Bangladesh and India as examples, it demonstrates a wide gap in investment strategies between the Bank and local people. It suggests that a rigid distinction of renewable and non-renewable options risks restricting poor people to adopt an energy-mix approach to cope with poverty. The economic assumptions of the strategic choice for renewable energy investment pay inadequate attention to the cultural norms that shape people’s preferences for energy sharing. A lack of participation of NGOs and local communities in shaping the Bank’s investment strategies also undermines the effectiveness of its renewable energy policies in the long term.
This chapter suggests that the World Bank re-conceptualises the complex relationships between energy and poverty and seeks a better understanding of local people’s daily energy consumption practices.

Chapter 5, *Alternatives to the Global Financial Sector: Local Complementary Currencies LETS and Time backed Currencies*, by Carl Adams and Simon Mouatt; This chapter explores complementary currencies and exchange systems and how they can provide some stability and competition to the vulnerability of the financial markets. The social economy, or 3rd sector, already plays a significant part in many societies. This is becoming more so as many governments and nations are facing decades of debt inevitably resulting in cut backs in key social and health services. In addition, the existing formal economic activity does not capture, value or support the full range of social and economic interaction within a nation. The chapter examines timebank systems, a particular type of complementary currencies and exchange system, and provides guidance on issues to consider in develop them. One of the finding from the evaluation is that as the number of people in the timebank system increases then more formality is needed to moderate the system and reduce potential for misuse.

Chapter 6, *Low Carbon Economy and Developing Countries: A Case of Nepalese Forest*, by Raghu Bir Bista; In forest, reduction of emission from deforestation and forest degradation (REDD) is considered as low carbon instrument. Financial Incentive scheme of this new climate change mitigation approach generates query about REDD’s economic implication in developing country. This study is to examine empirically low carbon potential from avoided deforestation in Nepal. The case study is the Kafle community forest of Nepal. We used 10 meter radius circle sample plot for carbon inventory data collection. In addition, we conducted household survey through 48 households for data set collection.

This study finds that community forest contributes 45 percent livelihood income (fire wood, leaf litter, grass, water) to the forest dependent stakeholder’s total income. This labor incentive based on labor contribution in forest management is distributed among the member households. This study further finds huge carbon income potentials. Annually, KCF can earn carbon income Rs. 39,81,196, if KCF enters in REDD. It is 41 times higher than the present mean income Rs 24, 549.55 from the forest product sale. In mixed familiarity about REDD, the study finds only 44 percent households expecting that REDD will be a better livelihood alternative to the poor. 63 percent responds need and use of carbon income for livelihood objectives. From estimation, household stakeholders who have good asset holdings (land and Rlivestock) think that REDD will be not a better livelihood alternative to the poor. However, the household stakeholders who have literacy, different food sufficiency level, land holding (>1), different earning per day, Rsex, per day earning and age think that REDD will be a better alternative. Thus, the poor households expects livelihood role from REDD in Nepal. Therefore, REDD should be more beneficial to the poor household stakeholders and their livelihoods.

Chapter 7, *Transition to Low-Carbon Hydrogen Economy in America: The Role of Transition Management*, by Jacqueline C.K. LAM and Peter HILLS; This chapter describes the process of transition to low-carbon hydrogen economy in America and the role of transition management (TM) in such process. Focussing on the transition process of hydrogen-based energy and transport systems in America, especially California, this study outlines the key characteristics of TM that have been employed in managing the low-carbon transition of hydrogen economy. Several characteristics of TM have been noted in America’s hydrogen transition, including: (a) the complementation of the long-term vision with incremental targets, (b) the integration of top-down and bottom-up planning, (c) system innovations and gradualism, (d) multi-level approach and interconnectedness, and (e) reflexivity by learning and experimenting. These characteristics are instrumental in bringing about the development and initial commercialization of HFCVs and energy infrastructure in America.
Chapter 8, *Operational Hedging Strategies to Overcome Financial Constraints during Clean Technology Start-up and Growth*, by S. Sinan Erzurumlu, Fehmi Tanrisever, Nitin Joglekar; Clean technology startups face multiple sources of uncertainty, and require specialized knowhow and longer periods for revenue growth than their counterparts in other industries. These startups require large investments and have been hit hard during the current credit squeeze. On the other hand, clean technologies create important positive externalities for the economy. Hence, loan guarantees and other incentive schemes are being developed that are conditioned upon operational benchmarks. We offer a framework to establish the extent wherein operational hedging can reduce risk and increase the probability of obtaining financing. We examine a variety of evidence, ranging from production outsourcing to creation of joint ventures, to posit that operational hedging may affect both the marginal cost of capital and the marginal return on investment through mitigating the informational problems in the market. However, operational hedging may not be an effective strategy in all settings: the decision for creation of such hedges ought to weigh the benefits of reduced marginal cost of capital and the opportunity cost of reduced future growth potential against a status quo.

Chapter 9, *Warehouse Financing Risk Analysis and Measurement with Case Study in Carbon Trading*, by Ying Yin, Zongwei Luo; Warehouse financing has been emerged as one of the most effective financing approaches for small and medium-sized enterprises (SME). Its basic working mechanism is to transfer the company’s assets to collaterals which are more acceptable by the bank. As a logistics service provider, the 3rd Party Logistics (3PL) coordinates and controls the whole financing process. With the professional 3PL’s help, it is easier for SMEs to get loan from the bank. In the meantime, the 3PL’s profit margin has also been increased by providing financing service in addition to their traditional logistics based functions. This chapter explains the basic working mechanism of warehouse financing, applies SCOR reference model to identify financing activities and the risks caused by them. Then this paper synthesizes four relevant risk analysis / management frameworks from previous literatures, and proposes a new risk framework and evaluation measures aimed specifically for warehouse financing. Finally, a case of carbon trading in China is studied using the previous framework.

Chapter 10, *Modeling Closed Loop Supply Chain Systems*, by Roberto Poles; In the past, many companies were concerned with managing activities primarily along the traditional supply chain to optimize operational processes and thereby economic benefits, without considering new economic or environmental opportunities in relation to the reverse supply chain and the use of used or reclaimed products. In contrast, companies are now showing increased interest in reverse logistics and closed loop supply chains (CLSCs) and their economic benefits and environmental impacts. In this chapter, our focus is the study of remanufacturing activity, which is one of the main recovery methods applied to closed loop supply chains. Specifically, we investigate and evaluate strategies for effective management of inventory control and production planning of a remanufacturing system. To pursue this objective, we model a production and inventory system for remanufacturing using the System Dynamics (SD) simulation modeling approach. Our primary interest is in the returns process of such a system. Case studies will be referred to in this chapter to support some of the findings and to further validate the developed model.

Chapter 11, *Bike Transportation System Design*, by Avninder Gill; The main objective of this chapter is to address the facility design and location issues in a public bike transportation system. The major decisions in introducing a public bike transportation system include determining the number of bike facilities and their locations. The present chapter considers a case study from city of Vancouver bike transportation system to demonstrate the importance of these decisions through a real world application. The city intends to decide the number and location of bike terminals. Addressing these two decisions is
the main focus of the present chapter and the chapter employs linear programming and center of gravity approaches to arrive at the solutions. The chapter also provides a basic introduction to bike facilities and discusses the sustainability benefits of bike transportation mode.

Chapter 12, Data Center Technology Roadmap, by Tugrul Daim, Timothy R. Anderson, Mukundan Thirumalai, Ganesh Subramanian, Nitin Katarya, Dhanabal Krishnaswamy, and Neelu Singh; Datacenters have been in existence all over the world for the past several decades. In today’s dynamic world, especially with most of the businesses being heavily dependent on Information Technology, interconnecting various systems within the organization and the outside world is a mandatory requirement for the success of any business. Datacenters all around the world perform this role to some level of satisfaction. Since datacenters started to play a significant factor in any organization’s success, companies realize the value of having a datacenter oriented strategy as one of the strategic initiatives for the success of their organization. Despite the agreement that the value of having such an initiative for datacenters is important, there is a lack of clarity in terms of the technical know-how involved in datacenters. Our objective here in this study is to fill that gap in the Industry. We wanted to portray the different facets of datacenters in terms of how can they be classified, what are the underlying technologies, what are the current challenges faced by the industry and where the industry is headed in the next 10 years. We illustrate the evolution of the datacenter industry in the last decade and how it is going to continue in the next 10 years graphically in the form of a Technology Roadmap. We based our research on going through existing industry literature, analyze challenges and develop a technology roadmap for data center industry with emphasis on energy efficiency and cost reduction. The wide audience for this roadmap would include IT professionals, datacenter managers, company strategists, the Government as well as environmentalists. Our intention is to present the audience with a single-stop snap shot of the data center industry on how the industry has evolved over the time and where it is heading in the future. We present our findings based on analyzing the data obtained from literature research and expert knowledge. The key research areas of our study were challenges, market trends, technological innovation, energy efficiency, cost reduction and government involvement.

In this report, we take you through the general roadmap architecture starting with market drivers, products, technology and its components followed by our recommendations and inference from the study.

Zongwei Luo
University of Hong Kong, China