

PREMIER REFERENCE SOURCE

Fashion Supply Chain Management

Industry and Business Analysis



Tsan-Ming Choi

Fashion Supply Chain Management: Industry and Business Analysis

Tsan-Ming Choi
Hong Kong Polytechnic University, Hong Kong

Senior Editorial Director: Kristin Klinger
Director of Book Publications: Julia Mosemann
Editorial Director: Lindsay Johnston
Acquisitions Editor: Erika Carter
Development Editor: Hannah Abelbeck
Production Editor: Sean Woznicki
Typesetters: Michael Brehm, Keith Glazewski, Jennifer Romanchak, Milan Vracarich, Jr.
Print Coordinator: Jamie Snaveley
Cover Design: Nick Newcomer

Published in the United States of America by
Business Science Reference (an imprint of IGI Global)
701 E. Chocolate Avenue
Hershey PA 17033
Tel: 717-533-8845
Fax: 717-533-8661
E-mail: cust@igi-global.com
Web site: <http://www.igi-global.com>

Copyright © 2012 by IGI Global. All rights reserved. No part of this publication may be reproduced, stored or distributed in any form or by any means, electronic or mechanical, including photocopying, without written permission from the publisher. Product or company names used in this set are for identification purposes only. Inclusion of the names of the products or companies does not indicate a claim of ownership by IGI Global of the trademark or registered trademark.

Library of Congress Cataloging-in-Publication Data

Fashion supply chain management : industry and business analysis / Tsan-Ming Choi, editor.
p. cm.

Includes bibliographical references and index.

Summary: "This book focuses on reporting both quantitative research on FSCM and exploratory studies on emerging supply chain management issues in the fashion industry"--Provided by publisher.

ISBN 978-1-60960-756-2 (hardcover) -- ISBN 978-1-60960-757-9 (ebook) -- ISBN 978-1-60960-758-6 (print & perpetual access) 1. Clothing trade. 2. Business logistics. I. Choi, Tsan-Ming.

HD9940.A2F375 2012

746.9'20687--dc23

2011018606

British Cataloguing in Publication Data

A Cataloguing in Publication record for this book is available from the British Library.

All work contributed to this book is new, previously-unpublished material. The views expressed in this book are those of the authors, but not necessarily of the publisher.

Editorial Advisory Board

Margaret Bruce, *Manchester Business School, UK*
T.C. Edwin Cheng, *Hong Kong Polytechnic University, Hong Kong*
Simone Guercini, *Università degli Studi di Firenze, Italy*
George Hodge, *North Carolina State University, USA*
Byoung-ho Jin, *University of North Carolina at Greensboro, USA*
Stein W Wallace, *Lancaster University, UK*
Houmin Yan, *Chinese University of Hong Kong, Hong Kong*

List of Reviewers

Shubha Bennur, *University of Nebraska, USA.*
Eleonora Bottani, *University of Parma, Italy*
Christy Cagle, *North Carolina State University, USA*
Hau-Ling Chan, *Hong Kong Polytechnic University, Hong Kong*
Jessie Chen-Yu, *Virginia Tech, USA*
Chun-Hung Chiu, *City University of Hong Kong, Hong Kong*
M.C. Chiu, *Hong Kong University of Science and Technology, Hong Kong*
Pui-Sze Chow, *Hong Kong Polytechnic University, Hong Kong*
Jae Eun Chung, *Ohio State University, USA*
Lorynn R. Divita, *Baylor University, USA*
Susana Garrido, *University of Beira Interior, Portugal*
Holly Ho, *Hong Kong Polytechnic University, Hong Kong*
Chi-Leung Hui, *Hong Kong Polytechnic University, Hong Kong*
Kajsa Hulthén, *Chalmers University of Technology, Sweden*
Xi Jiang, *Beijing Jiaotong University, China*
Doris Kincade, *Virginia Tech, USA*
Dimitris Kiritsis, *Université de Technologie de Compiègne, Switzerland*
Ngok Lam, *Hong Kong University of Science and Technology, Hong Kong*
Mingming Leng, *Lingnan University, Hong Kong*
Na Liu, *Hong Kong Polytechnic University, Hong Kong*
Shuk-Ching Liu, *Kwok Hang Holdings Limited, Hong Kong*
Wei-Shuo Lo, *Meiho Institute of Technology, Taiwan*

Jian-Rui Miao, *Beijing Jiaotong University, China*
Thierry Moyaux, *Univ. de Lyon, France*
Erin Parrish, *East Carolina University, USA*
Patsy Perry, *Heriot-Watt University, UK*
Jennie Peterson, *Hong Kong Polytechnic University, Hong Kong*
Hans Sebastian (Seb) Heese, *Indiana University, USA*
Jerry Shen, *University of London, UK*
Jin Su, *Indiana University of Pennsylvania, USA*
Ian Taplin, *Wake Forest University, USA*
Frédéric G. Thiesse, *University Wuerzburg, Germany*
Frank Wiengarten, *University College Dublin, Ireland*
Rachel Yee, *Hong Kong Polytechnic University, Hong Kong*
Tina Yeung, *Sogo (Hong Kong), Hong Kong*
W.K. Yeung, *Hong Kong Polytechnic University, Hong Kong*
Jinhui Zheng, *Hong Kong Polytechnic University, Hong Kong*

Table of Contents

Foreword	xv
Preface	xvi

Section 1 **Mathematical Modelling Research**

Chapter 1

Fashion Supply Chain Management through Cost and Time Minimization from a Network Perspective	1
<i>Anna Nagurney, University of Massachusetts Amherst, USA</i>	
<i>Min Yu, University of Massachusetts Amherst, USA</i>	

Chapter 2

Trade Promotion Mode Choice and Information Sharing in Fashion Retail Supply Chains.....	21
<i>Hisashi Kurata, University of Tsukuba, Japan</i>	
<i>Xiaohang Yue, University of Wisconsin-Milwaukee, USA</i>	
<i>Layth C. Alwan, University of Wisconsin-Milwaukee, USA</i>	

Chapter 3

Competition and Coordination in a Fashion Supply Chain with Wholesale Pricing Schemes.....	42
<i>Jian Huang, Jiangxi University of Finance and Economics, China</i>	
<i>Mingming Leng, Lingnan University, Hong Kong</i>	
<i>Liping Liang, Lingnan University, Hong Kong</i>	

Chapter 4

Small Manufacturers vs. Large Retailers on RFID Adoption in the Apparel Supply Chain	74
<i>May Tajima, The University of Western Ontario, Canada</i>	

Chapter 5

Optimal Pricing and Inventory Decisions for Fashion Retailers Under Value-At-Risk Objective: Applications and Review	100
<i>Chun-Hung Chiu, City University of Hong Kong, Hong Kong</i>	
<i>Jin-Hui Zheng, The Hong Kong Polytechnic University, Hong Kong</i>	
<i>Tsan-Ming Choi, The Hong Kong Polytechnic University, Hong Kong</i>	

Section 2
Quantitative Empirical Research

Chapter 6

- Quality and Environmental Management Systems in the Fashion Supply Chain 111
Chris K. Y. Lo, Hong Kong Polytechnic University, Hong Kong

Chapter 7

- Strategic Partnerships in the U.S. Textile and Apparel Industry: Exploring Value and Fairness 130
Lorynn R. Divita, Baylor University, USA
Nancy L. Cassill, North Carolina State University, USA
David A. Ludwig, University of Miami, USA

Chapter 8

- Strategic Sourcing and Supplier Selection: A Review of Survey-Based Empirical Research..... 149
Jin Su, Indiana University of Pennsylvania, USA
Vidyaranya B. Gargeya, The University of North Carolina at Greensboro, USA

Chapter 9

- A Three-Level Multiple-Agent Early Warning Mechanism for Preventing Loss of Customers in Fashion Supply Chains 173
Wei-Shuo Lo, Meiho University, Taiwan
Tzung-Pei Hong, National University of Kaohsiung, Taiwan

Chapter 10

- Time-Constrained Fashion Sales Forecasting by Extended Random Vector Functional Link Model..... 185
Yong Yu, Hong Kong Polytechnic University, Hong Kong
Tsan-Ming Choi, Hong Kong Polytechnic University, Hong Kong
Chi-Leung Hui, Hong Kong Polytechnic University, Hong Kong

Section 3
Exploratory Study and Case Research

Chapter 11

- Fast Fashion Business Model: What, Why and How?..... 193
ByoungHo Jin, The University of North Carolina at Greensboro, USA
Hyo Jung (Julie) Chang, The University of North Carolina at Greensboro, USA
Delisia R. Matthews, The University of North Carolina at Greensboro, USA
Megha Gupta, The University of North Carolina at Greensboro, USA

Chapter 12	
“Network Process Re-Engineering” in a Home Textile Network: The Importance of Business Relationships and Actor Bonds	212
<i>Enrico Baraldi, Uppsala University, Sweden</i>	
<i>Giancarlo Nadin, Università Cattolica del Sacro Cuore – Milano, Italy</i>	
Chapter 13	
Matching Manufacturing and Retailing Models in Fashion	235
<i>Simone Guercini, University of Florence, Italy</i>	
Chapter 14	
A Mass Customisation Implementation Model for the Total Design Process of the Fashion System.....	251
<i>Bernice Pan, Seamsystemic Design Research, UK</i>	
Chapter 15	
An Exploratory Study on Product Lifecycle Management in the Fashion Chain: Evidences from the Italian Leather Luxury Industry	270
<i>Romeo Bandinelli, Università degli Studi di Firenze, Italy</i>	
<i>Sergio Terzi, Università degli Studi di Bergamo, Italy</i>	
Chapter 16	
Consumer Perceptions of Online Apparel Customization: An Exploratory Study	286
<i>Hira Cho, California State University-Northridge, USA</i>	
Chapter 17	
RFID Technology in the Fashion Supply Chain: An Exploratory Analysis	303
<i>Susana Garrido Azevedo, University of Beira Interior, Portugal</i>	
<i>Helena Carvalho, Universidade Nova de Lisboa, Portugal</i>	
Chapter 18	
Fashioning a Socially Responsible Garment Supply Chain: A Qualitative Exploration of Corporate Social Responsibility in Sri Lankan Export Garment Manufacturers	327
<i>Patsy Perry, Heriot-Watt University, UK</i>	
<i>Neil Towers, Heriot-Watt University, UK</i>	
Compilation of References	363
About the Contributors	378
Index	386

Detailed Table of Contents

Foreword.....	xv
Preface.....	xvi

Section 1 Mathematical Modelling Research

This section consists of chapters that employ traditional mathematical modelling approach in conducting analytical studies. Both theoretical analysis and application-oriented papers are included.

Chapter 1

Fashion Supply Chain Management through Cost and Time Minimization from a Network Perspective	1
<i>Anna Nagurney, University of Massachusetts Amherst, USA</i>	
<i>Min Yu, University of Massachusetts Amherst, USA</i>	

In order to determine the optimal multiproduct flows associated with the fashion supply chain network activities, Nagurney and Yu consider a multi-criteria decision-making optimization model subject to multimarket demand satisfaction. They provide an equivalent variational inequality formulation and identify the minimal total operational cost and total time consumption. Their model allows decision-maker to achieve the total time minimization objective of the supply chain network for time-sensitive fashion products.

Chapter 2

Trade Promotion Mode Choice and Information Sharing in Fashion Retail Supply Chains.....	21
<i>Hisashi Kurata, University of Tsukuba, Japan</i>	
<i>Xiaohang Yue, University of Wisconsin-Milwaukee, USA</i>	
<i>Layth C. Alwan, University of Wisconsin-Milwaukee, USA</i>	

Supply chain coordination is a core topic in fashion supply chain management. Kurata, Yue, and Alwan explore the role played by incentive alignment contracts such as scan-back trade deal and buyback contract in fashion supply chain models. They analytically derive insights into when a fashion retailer has incentive to accept the scan-back trade deal. They also find that the manufacturer and the entire fashion

supply chain can always benefit from the scan-back trade deal but it is not the case for the retailer. In order to achieve win-win situation in the supply chain upon coordination, a revised policy combining both scan-back trade deal and buyback is proposed.

Chapter 3

Competition and Coordination in a Fashion Supply Chain with Wholesale Pricing Schemes..... 42

Jian Huang, Jiangxi University of Finance and Economics, China

Mingming Leng, Lingnan University, Hong Kong

Liping Liang, Lingnan University, Hong Kong

Competition and coordination are important dimensions in fashion supply chain management. Huang, Leng, and Liang study a two-echelon single-supplier single-retailer multi-period supply chain model. Under a price-discount sharing scheme with the supplier's wholesale price being a linear function of the retail price, they develop a stochastic game and show that a unique Nash equilibrium exists (for each period). They further show that over the infinite horizon the supplier chooses a stationary base stock policy whereas the retailer's equilibrium can be non-stationary. They then derive the condition for achieving supply chain coordination via a wholesale pricing scheme.

Chapter 4

Small Manufacturers vs. Large Retailers on RFID Adoption in the Apparel Supply Chain 74

May Tajima, The University of Western Ontario, Canada

Radio frequency identification (RFID) technology is a very useful tool in fashion supply chain management. In fact, a lot of large scale fashion retailers, such as Marks and Spencer, have been driving RFID adoption. In order to study the impact of the relationship between small manufacturers and large retailers on the small manufacturers' RFID adoption decisions, Tajima develops a two-by-two gaming model and conducts outcome stability analysis. Some interesting results and insights are generated. For instance, it is found that the retailer's opportunistic behaviour is unlikely to occur (due to the strong stability associated with the manufacturer's do-nothing option) and the retailer's pressure tactic is not effective in persuading the small manufacturer to adopt RFID.

Chapter 5

Optimal Pricing and Inventory Decisions for Fashion Retailers Under Value-At-Risk Objective:

Applications and Review 100

Chun-Hung Chiu, City University of Hong Kong, Hong Kong

Jin-Hui Zheng, The Hong Kong Polytechnic University, Hong Kong

Tsan-Ming Choi, The Hong Kong Polytechnic University, Hong Kong

Risk analysis is a timely issue in fashion supply chain management. Inspired by the popularity of the Value-at-Risk (VaR) objective in finance, Chiu, Zheng, and Choi examine and review its application in fashion retail pricing and inventory decision making problems. They first review a formal optimization model for the problem, in which the fashion retailer's goal is to optimize a VaR objective function. After that, they explore the detailed solution schemes and demonstrate the applications of the proposed models via numerical examples. Finally, they investigate the performance of buyback contract and wholesale

pricing contract in enhancing the supply chain's efficiency when the fashion retailer takes a VaR objective. They analytically find some counter-intuitive insights, which include the failure of buyback contract in enhancing the supply chain's efficiency with a VaR retailer.

Section 2

Quantitative Empirical Research

This section includes chapters that employ empirical data for quantitative analysis. The approaches include data-driven research, survey-based statistical analysis (and its review), intelligent systems, and empirical gaming models.

Chapter 6

Quality and Environmental Management Systems in the Fashion Supply Chain 111
Chris K. Y. Lo, Hong Kong Polytechnic University, Hong Kong

Quality management and environmental challenges are pertinent issues in fashion supply chain management. Lo conducts an empirical study to explore the impacts to fashion and textiles companies (FTCs) brought by quality management systems (QMS) and environmental management systems (EMS). By investigating the adoption of ISO 9000 (a quality management system) and ISO 14000 (an environmental management system) by 284 publicly listed FTCs in the U.S., many important insights are revealed. For example, he shows that the operating cycle time has been shortened by about two weeks (in a five-year period). He also finds that the early adopters of ISO 9000 and high-tech textiles related firms tend to enjoy more supply chain benefits.

Chapter 7

Strategic Partnerships in the U.S. Textile and Apparel Industry: Exploring Value and Fairness 130
Lorynn R. Divita, Baylor University, USA
Nancy L. Cassill, North Carolina State University, USA
David A. Ludwig, University of Miami, USA

Focusing on the U.S. Textile and Apparel industry, Divita, Cassill, and Ludwig explore the value and fairness issues in strategic partnerships. Based on the social exchange, transactional cost analysis, and distributive justice theories, a national quantitative questionnaire and case study research was conducted. They prove that there exists a statistically significant relationship between social value and fairness. Implications for industry and future research directions are discussed.

Chapter 8

Strategic Sourcing and Supplier Selection: A Review of Survey-Based Empirical Research..... 149
Jin Su, Indiana University of Pennsylvania, USA
Vidyaranya B. Gargeya, The University of North Carolina at Greensboro, USA

Strategic sourcing and supplier selection are crucially important in managing fashion supply chains. In the literature, the use of survey-based empirical research is one of the popular research methodologies in

addressing sourcing and supplier selection problems. Motivated by the importance of the topic, Su and Gargeya conduct a review on the current state-of-the art survey-based empirical research on strategic sourcing and supplier selection in fashion. They examine the latest development and trends in the related areas and establish an agenda for future research.

Chapter 9

A Three-Level Multiple-Agent Early Warning Mechanism for Preventing Loss of Customers in Fashion Supply Chains 173

Wei-Shuo Lo, Meiho University, Taiwan

Tzung-Pei Hong, National University of Kaohsiung, Taiwan

The use intelligent systems can enhance the performance of fashion supply chains. Lo and Hong study a three-level e-multi-agent early warning mechanism for preventing loss of customers in fashion supply chains. The system includes three levels, namely data mining, ontology, and decision support. At each level, different agents would execute different tasks in order to achieve integration in the fashion supply chain with less human intervention. The proposed framework also enhances transparent connections among businesses and assists in information sharing, thereby helping to prevent customer loss.

Chapter 10

Time-Constrained Fashion Sales Forecasting by Extended Random Vector Functional Link Model..... 185

Yong Yu, Hong Kong Polytechnic University, Hong Kong

Tsan-Ming Choi, Hong Kong Polytechnic University, Hong Kong

Chi-Leung Hui, Hong Kong Polytechnic University, Hong Kong

Due to the ever-changing features of customer demands, fashion sales forecasting is a challenging problem. Traditionally, in order to yield accurate forecasting result, sophisticated tools, such as artificial neural network (ANN), have been employed. However, the traditional ANN suffers a major drawback because it takes a very long time in order to get the forecasting result. Motivated by this limitation, Yu, Choi, and Hui propose a time-constrained forecasting model (TCFM) for fashion sales forecasting. This TCFM is based on the random vector functional link (RVFL) model. Their real-data driven experiment has shown that the proposed TCFM can produce quality forecasting within the user specified time constraint.

Section 3

Exploratory Study and Case Research

Most scientific research in FSCM is inspired by real cases and industrial exploratory studies. This section presents a number of different studies, including cases, on many timely and emerging issues related to FSCM. It is expected that more future research, including many probable quantitative analyses, will be motivated by these cases and exploratory studies.

Chapter 11

Fast Fashion Business Model: What, Why and How?..... 193

Byoungho Jin, The University of North Carolina at Greensboro, USA

Hyo Jung (Julie) Chang, The University of North Carolina at Greensboro, USA

Delisia R. Matthews, The University of North Carolina at Greensboro, USA

Megha Gupta, The University of North Carolina at Greensboro, USA

In fashion supply chain management, fast fashion is one prominent industrial trend, and it is known that fast fashion retailers are facing two important challenges, namely high demand uncertainty and the strategic consumer behaviours. Motivated by the importance of fast fashion, Jin, Chang, Matthews, and Gupta explore what a fast fashion model is, why a fast fashion business model is becoming prominent in fashion business, and how the fast fashion supply chain is managed. They address these questions by examining the strategies of Zara and H&M, two highly successful fast fashion retailers. Suggestions for non-fast fashion retailers and future research directions are discussed.

Chapter 12

“Network Process Re-Engineering” in a Home Textile Network: The Importance of Business Relationships and Actor Bonds..... 212

Enrico Baraldi, Uppsala University, Sweden

Giancarlo Nadin, Università Cattolica del Sacro Cuore – Milano, Italy

Network process re-engineering (NPR) is an important issue in many textile and clothing companies. Based on a case study on Stella, an Italian home textile manufacturer, Baraldi and Nadin illustrate the challenges of engaging other firms into NPR projects. They explore the importance of the connection between inter-organizational activities that need to be redesigned and coordinated. They suggest that the highly-complex coordination tasks can only be completed if there are strong integrative relationships between the involved parties. Insights on how the pivotal firms of a network can support NPR projects are also discussed.

Chapter 13

Matching Manufacturing and Retailing Models in Fashion 235

Simone Guercini, University of Florence, Italy

In fashion supply chains, interdependencies have long been established with reference to the manufacturer-retailer interactions. In many cases, since fashion retailers aim at reducing the inventory risk from unsold merchandise, markdown, and stockouts, they interact with and rely on the manufacturing suppliers to adopt effective measures to help fulfil orders flexibly and replenish quickly. Guercini examines the implications of these interactions and discusses further developments. One important insight is the probable shifting of channel relationship from a perspective of supply to one of demand.

Chapter 14

A Mass Customisation Implementation Model for the Total Design Process of the Fashion System..... 251

Bernice Pan, Seamsystemic Design Research, UK

Mass customisation (MC) is an industrial trend in fashion retailing. Pan develops a new conceptual model of MC which aligns the activities and interests of the collective fashion supply chain producers. This model takes a consumer-centric approach, and places designers as the instrument for MC. This model aims to enable the prospect for small-to-medium sized fashion companies to implement MC in a more efficient, coordinated, and responsive way. The probable benefits and insights of this new model are discussed.

Chapter 15

An Exploratory Study on Product Lifecycle Management in the Fashion Chain: Evidences from the Italian Leather Luxury Industry 270

Romeo Bandinelli, Università degli Studi di Firenze, Italy

Sergio Terzi, Università degli Studi di Bergamo, Italy

Fashion supply chain management is characterized by an increasing global competition and pressure to improve product quality, and respond quickly to changing customer needs with a shortened product lifecycle. These requirements are increasingly fulfilled by applying the product lifecycle management (PLM) approach. As an exploratory study, Bandinelli and Terzi conduct an analysis on PLM in the Italian leather luxury industry (ILLI) by investigating 20 companies. They identify some differences that exist between ILLI and other more PLM-oriented sectors in several dimensions (such as the adopted information and communication technology). Insights are generated.

Chapter 16

Consumer Perceptions of Online Apparel Customization: An Exploratory Study 286

Hira Cho, California State University-Northridge, USA

Cho identifies a variety of important consumer perceptions of online apparel customization (OAC). As an exploratory study, Cho conducts a survey and the survey-participants need to visit apparel customization websites and customize a pair of jeans before answering the survey questions. The respondents' inputs are analyzed and categorized into eight dimensions representing the major benefits and costs of OAC. Insights regarding why people are willing or unwilling to customize apparel online are generated. Future research directions are discussed.

Chapter 17

RFID Technology in the Fashion Supply Chain: An Exploratory Analysis 303

Susana Garrido Azevedo, University of Beira Interior, Portugal

Helena Carvalho, Universidade Nova de Lisboa, Portugal

Azevedo and Carvalho review the benefits, disadvantages, and barriers associated with the radio frequency identification (RFID) technology in fashion supply chain management. The focal point is on RFID's implementation in fast moving fashion supply chains. A cross-case analysis is also conducted to generate additional insights regarding how RFID technology affects fashion supply chain management.

Chapter 18

Fashioning a Socially Responsible Garment Supply Chain: A Qualitative Exploration of Corporate Social Responsibility in Sri Lankan Export Garment Manufacturers 327

Patsy Perry, Heriot-Watt University, UK

Neil Towers, Heriot-Watt University, UK

Corporate social responsibility (CSR) is a hot topic in fashion supply chain management. Even though there is evidence of a rising consumer demand for low cost fashionable clothing sourced through socially responsible supply chains, the nature of the “high street” fashion industry is not conducive to the implementation of CSR. Motivated by the importance of CSR in fashion supply chain management, Perry and Towers explore obstacles and drivers of CSR implementation in Sri Lankan export garment manufacturers. They propose that in a fashion supply chain, a partnership approach that encourages collaboration on CSR initiatives is more likely to promote supplier engagement with CSR issues than coercive compliance-based mechanisms. Many important insights are generated.

Compilation of References 363

About the Contributors 378

Index..... 386

Foreword

It is my great pleasure to write a foreword for the book *Fashion Supply Chain Management: Industry and Business Analysis*. I want to congratulate the editor, Tsan-Ming Choi (Jason), for compiling this impressive volume. Undoubtedly, this book will provide a solid reference on fashion supply chain management research and inspire new research in the area.

The fashion and textiles industry is an ever-green global industry. Without controversy, it is always among the top three most important industries in the world. One characteristic of the fashion and textile industry is its long supply chain, including fibers, yarns, fabrics (both woven and knitted), finishes and coloration, and retailing. Management and coordination of the entire fashion supply chain is critical to the success of companies in the fashion industry. This is especially true under the profound changes in the fashion industry over the past few years. In fact, in addition to the reallocation of the manufacturing activities of the industry to low-cost countries and the higher degree of globalization under fewer trade restrictions, a number of pertinent challenges such as environmental sustainability, fast fashion models, use of advanced Information Technologies, social responsibility, and product innovations and development have emerged. These issues all call for deeper explorations and further research. In particular, industrial-practice-driven quantitative research can provide the much needed insights and measures to address these important issues.

It is therefore gratifying to see Jason focusing his volume on fashion supply chain management with an emphasis on quantitative research and exploratory studies on various timely issues in the fashion industry. The featured articles cover nearly all aspects of the fashion supply chains and offer many innovative solutions and significant findings.

I am sure that this handbook will stimulate new research and industrial analysis on fashion supply chain management and readers will find it a valuable text on this important subject.

Xiao-Ming Tao

Hong Kong Polytechnic University, Hong Kong

Xiao-Ming Tao is Chair Professor and Head of Institute of Textiles and Clothing, The Hong Kong Polytechnic University. She gained her PhD in Textile Physics from University of New South Wales, Australia in 1987. She has published more than 600 scientific publications including over 180 SCI journal papers, 5 research monographs and 14 patents. She has been invited to deliver plenary/keynote presentations in over 60 international conferences. Professor Tao's research work has won her scholarships and prizes from USA, Belgium, Australia, New Zealand, UK, Hong Kong, and China. Currently she is leading several research projects in the area of smart textiles and new yarn manufacturing technology. Professor Tao is the immediate past World President of the Textile Institute International. She is an elected Fellow of American Society of Mechanic Engineers, Royal Society of Arts and Design and the Hong Kong Institution of Textiles and Apparel. Professor Tao is Editor-in-Chief of *Textile Progress* and an editorial board member of several international journals.

Preface

Fashion Supply Chain Management (FSCM) is an important topic in modern fashion business. In addition to the traditional functions of inventory management, transportation management, and facility control, FSCM puts a strong emphasis on the collaboration and partnership among channel members along the fashion supply chain. Obviously, FSCM provides a very strong area for establishing a competitive edge for fashion companies.

Traditionally, most researchers in fashion have been focusing mainly on the “art” side of fashion instead of “science.” There is hence a need to publish a book which comprehensively reports FSCM with more emphasis on scientific research.

This new research handbook focuses on reporting both quantitative research on FSCM and exploratory studies on emerging supply chain management related issues in the fashion industry. Both quantitative and qualitative analyses are included. To be specific, this handbook is organized into several sections outlined as follows:

Section 1 – Mathematical Modelling Research: This section consists of chapters that employ traditional mathematical modelling approach in conducting analytical studies. Both theoretical analysis and application-oriented papers are included. This section includes five chapter papers and they are introduced as follows.

In order to determine the optimal multiproduct flows associated with the fashion supply chain network activities, Nagurney and Yu consider in Chapter 1 a multi-criteria decision-making optimization model subject to multimarket demand satisfaction. They develop an equivalent variational inequality formulation and identify the minimal total operational cost and total time consumption. Their modeling analysis provides insight which allows decision-maker to achieve the total time minimization objective of the supply chain network for fashion products.

Supply chain coordination is a core topic in fashion supply chain management. In Chapter 2, Kurata, Yue, and Alwan explore the role played by incentive alignment contracts such as scan-back trade deal and buyback contract in fashion supply chain models. They analytically derive insights into when a fashion retailer has incentive to accept the scan-back trade deal. They also find that the manufacturer and the entire fashion supply chain can always benefit from the scan-back trade deal but it is not the case for the retailer. In order to achieve win-win situation in the supply chain upon coordination, a revised policy combining both scan-back trade deal and buyback is proposed. Managerial insights are developed.

Competition and coordination are important dimensions in fashion supply chain management. Huang, Leng, and Liang study in Chapter 3 a two-echelon single-supplier single-retailer multi-period supply chain model. Under a price-discount sharing scheme with the supplier’s wholesale price being a linear function of the retail price, they develop a stochastic game and show that a unique Nash equilibrium ex-

ists (for each period). They further show that over the infinite horizon, the supplier chooses a stationary base stock policy whereas the retailer's equilibrium can be non-stationary. Afterwards, they derive the condition for achieving supply chain coordination via a wholesale pricing scheme. Analytical insights are derived.

Radio frequency identification (RFID) technology is a very useful tool in fashion supply chain management. In fact, a lot of large scale fashion retailers, such as Marks and Spencer, have been driving RFID adoption. In order to study the impact of the relationship between small manufacturers and large retailers on the small manufacturers' RFID adoption decisions, Tajima develops in Chapter 4 a two-by-two gaming model and conducts outcome stability analysis. Some interesting results and insights are generated. For instance, it is found that the retailer's opportunistic behaviour is unlikely to occur (due to the strong stability associated with the manufacturer's do-nothing option) and the retailer's pressure tactic is not effective in persuading the small manufacturer to adopt RFID.

Risk analysis is timely issue in fashion supply chain management. Inspired by the popularity of the Value-at-Risk (VaR) objective in finance, Chiu, Zheng, and Choi examine and review its application in fashion retail pricing and inventory decision making problems in Chapter 5. They first review a formal optimization model for the problem, in which the fashion retailer's goal is to optimize an VaR objective function. After that, they explore the detailed solution schemes and demonstrate the applications of the proposed models via numerical examples. Finally, they investigate the performance of buyback contract and wholesale pricing contract in enhancing the supply chain's efficiency when the fashion retailer takes an VaR objective. They analytically find some counter-intuitive insights which include the failure of buyback contract in enhancing the supply chain's efficiency with an VaR retailer.

Section 2 – Quantitative Empirical Research: This section includes papers that employ empirical data for quantitative analysis. The approaches include data-driven research and survey-based statistical analysis (and its review). There are five chapter papers in this section, and they are briefly described below.

Quality management and environmental challenges are pertinent issues in fashion supply chain management. In Chapter 6, Lo conducts an empirical study to explore the impacts to fashion and textiles companies (FTCs) brought by quality management systems and environmental management systems. By investigating the adoption of ISO 9000 (a quality management system) and ISO 14000 (an environmental management system) by 284 publicly listed FTCs in the U.S., many important insights are revealed. For example, he shows that the operating cycle time has been shortened by about two weeks (in a five-year period). He also finds that the early adopters of ISO 9000 and high-tech textiles related firms tend to enjoy more supply chain benefits.

Focusing on the U.S. Textile and Apparel industry, Divita, Cassill, and Ludwig explore the value and fairness issues in strategic partnerships in Chapter 7. Based on the social exchange, transactional cost analysis, and distributive justice theories, a national quantitative questionnaire and case study research was conducted. They prove that there exists a statistically significant relationship between social value and fairness. Implications for industry and future research directions are discussed.

Strategic sourcing and supplier selection are crucially important in managing fashion supply chains. In the literature, the use of survey-based empirical research is one of the popular research methodologies in addressing sourcing and supplier selection problems. Motivated by the importance of the topic, Su and Gargeya conduct a review in Chapter 8 on the current state-of-the art survey-based empirical research on strategic sourcing and supplier selection in fashion. They examine the latest development and trends in the related areas and establish an agenda for future research.

The use intelligent systems can enhance the performance of fashion supply chains. Lo and Hong study in Chapter 9 a three-level e-multi-agent early warning mechanism for preventing loss of customers in fashion supply chains. The system includes three levels, namely data mining, ontology, and decision support. At each level, different agents would execute different tasks in order to achieve integration in the fashion supply chain with less human intervention. The proposed framework also enhances transparent connections among businesses and assists in information sharing, thereby helping to prevent customer loss.

Due to the ever-changing features of customer demands, fashion sales forecasting is a challenging problem. Traditionally, in order to yield accurate forecasting result, sophisticated tools, such as artificial neural net-work (ANN), have been employed. However, the traditional ANN suffers a major drawback because it takes a very long time in order to get the forecasting result. Motivated by this limitation, Yu, Choi, and Hui propose a time-constrained forecasting model (TCFM) for fashion sales forecasting in Chapter 10. This TCFM is based on the random vector functional link (RVFL) model. Their real-data driven experiment has shown that the proposed TCFM can produce quality forecasting within the user specified time constraint.

Section 3 – Exploratory Study and Case Research: Most scientific research in fashion supply chain management is inspired by real cases and industrial exploratory studies. This section presents a number of different studies, including cases, on many timely and emerging issues related to fashion supply chain management. It is expected that more future research, including many probable quantitative analyses, will be motivated by these cases and exploratory studies. To be specific, this section includes eight chapters and they are stated in the following.

In fashion supply chain management, fast fashion is one prominent industrial trend, and it is known that fast fashion retailers are facing two important challenges, namely high demand uncertainty and the strategic consumer behaviours. Motivated by the importance of fast fashion, Jin, Chang, Matthews, and Gupta explore in Chapter 11 what a fast fashion model is, why a fast fashion business model is becoming prominent in fashion business, and how the fast fashion supply chain is managed. They address these questions by examining the strategies of Zara and H&M, two highly successful fast fashion retailers. Suggestions for non-fast fashion retailers and future research directions are discussed.

Network process re-engineering (NPR) is an important issue in many textile and clothing companies. Based on a case study on Stella, an Italian home textile manufacturer, Baraldi and Nadin illustrate the challenges of engaging other firms into NPR projects in Chapter 12. They explore the importance of the connection between inter-organizational activities that need to be redesigned and coordinated. They suggest that the highly-complex coordination tasks can only be completed if there are strong integrative relationships between the involved parties. Insights on how the pivotal firms of a network can support NPR projects are also discussed.

In fashion supply chains, interdependencies have long been established with reference to the manufacturer-retailer interactions. In many cases, since fashion retailers aim at reducing the inventory risk from unsold merchandise, markdown, and stockouts, they interact with and rely on the manufacturing suppliers to adopt effective measures to help fulfil orders flexibly and replenish quickly. In Chapter 13, Guercini examines the implications of these interactions and discusses further developments. One important insight is the probable shifting of channel relationship from a perspective of supply to one of demand.

Mass customisation (MC) is an industrial trend in fashion retailing. In Chapter 14, Pan develops a new conceptual model of MC that aligns the activities and interests of the collective fashion supply chain producers. This model takes a consumer-centric approach, and places designers as the instrument for MC. This model aims to enable the prospect for small-to-medium sized fashion companies to imple-

ment MC in a more efficient, coordinated, and responsive way. The probable benefits and insights of this new model are discussed.

Fashion supply chain management is characterized by an increasing global competition and pressure to improve product quality, and respond quickly to changing customer needs with a shortened product lifecycle. These requirements are increasingly fulfilled by applying the product lifecycle management (PLM) approach. As an exploratory study, Bandinelli and Terzi conduct an analysis in chapter 15 on PLM in the Italian leather luxury industry (ILLI) by investigating 20 companies. They identify some differences that exist between ILLI and other more PLM-oriented sectors in several dimensions (such as the adopted information and communication technology). Insights are generated.

In Chapter 16, Cho identifies a variety of important consumer perceptions of online apparel customization (OAC). As an exploratory study, Cho conducted a survey and the survey-participants needed to visit apparel customization websites and customize a pair of jeans before answering the survey questions. The respondents' inputs were analyzed and categorized into eight dimensions representing the major benefits and costs of OAC. Insights regarding why people are willing or unwilling to customize apparel online are generated. Future research directions are discussed.

Azevedo and Carvalho review in Chapter 17 the benefits, disadvantages, and barriers associated with the radio frequency identification (RFID) technology in fashion supply chain management. The focal point is on RFID's implementation in fast moving fashion supply chains. A cross-case analysis is also conducted to generate additional insights regarding how RFID technology affects fashion supply chain management.

Corporate social responsibility (CSR) is a hot topic in fashion supply chain management. Even though there is evidence of a rising consumer demand for low cost fashionable clothing sourced through socially responsible supply chains, the nature of the "high street" fashion industry is not conducive to the implementation of CSR. Motivated by the importance of CSR in fashion supply chain management, Perry and Towers explore in Chapter 18 obstacles and drivers of CSR implementation in Sri Lankan export garment manufacturers. They propose that in a fashion supply chain, a partnership approach that encourages collaboration on CSR initiatives is more likely to promote supplier engagement with CSR issues than coercive compliance-based mechanisms. Many important insights are generated.

I am pleased to see that this handbook contains new analytical and empirical results with valuable insights, which will help both the academicians and the practitioners to understand more about the latest development and solution schemes in FSCM. In particular, this handbook positions itself as a pioneering text that reports many important research results in quantitative FSCM. As a result, researchers and practitioners who are interested in FSCM should find this book a valuable reference.

I would like to take this opportunity to thank Professor Xiao-Ming Tao for writing the foreword of this handbook and her kind support for this book project. I must thank all editorial advisory board members, Hannah Abelbeck and Christine Buffon from IGI Global, and my editorial assistant Pui-Sze Chow for their help along the course of carrying out this project. I am indebted to all the authors who have contributed their works to this handbook. I am also grateful to all reviewers who reviewed the submitted manuscripts and provided me with constructive comments and recommendations. I also acknowledge the funding support from The Hong Kong Polytechnic University under the Dean's Reserve Funding Scheme.

Tsan-Ming Choi
Hong Kong Polytechnic University, Hong Kong
November 30, 2010