Wojciech Piotrowicz
Richard Cuthbertson *Editors*

Supply Chain Design and Management for Emerging Markets

Learning from Countries and Regions

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ISBN 978-3-319-05764-4 ISBN 978-3-319-05765-1 (eBook)
DOI 10.1007/978-3-319-05765-1

Library of Congress Control Number: 2015938449

Springer Cham Heidelberg New York Dordrecht London

Printed on acid-free paper

Springer International Publishing AG Switzerland is part of Springer Science+Business Media (www.springer.com)

I would like to dedicate this book to the memory of two late professors from the Institute of Maritime Transport and Seaborne Trade, Economics Faculty, University of Gdańsk, Poland—Prof. dr hab. Ludwik Kondratowicz and Prof. dr hab. eng. Stanisław Szwankowski, who supported my study at the department and early academic career.
Dr. Wojciech Piotrowicz

Preface

Creation of this book was motivated by our earlier research which was summarised in the highly popular Springer publication *Sustainable Supply Chain Management-Practical Ideas for moving towards best practice* (Cetnikaya et al. 2011). While the earlier book was focused on Europe, in this publication we would like to capture state, issues, barriers and solutions used in supply chains across the globe. Our aim was to gather together experts from various countries and regions; people who are not just visiting the place for a short time, but have a deep understanding and knowledge of the area and the subject—who live, work or come from the particular country and region. We aimed for a collection of papers prepared according to academic standards and at the same time suitable for using as teaching materials. This book is a response to the changing balance in world manufacturing and supply chains, which are moving towards emerging markets. The book provides a unique collection of research articles and case studies focused on emerging markets in ten countries from four continents: Africa, Asia, South America and Central and Eastern Europe. The chapters included in this book reflect the diversity and complexity of the modern international supply chains and different approaches to the supply chain investigation; they are prepared using different methods and methodologies; also the findings are reported in diverse writing styles. Chapters are focused on various supply levels (from regional, via country to individual company level) and on different issues in the supply chain across several industries. Apart from the academic value, which allows for using the findings from each chapter as inspiration for further research, the chapters can be used as study material.

Note for Teachers and Students

Chapters included in this book could be used as classroom materials and for self-study, primarily in the Masters, or late years of Bachelor courses, as well as in dedicated courses for professionals. While the book covers mainly Supply Chain

Management, transport and logistics, it could also support the International Business and Economic Development curriculum. Each chapter has, at the end, a list of questions for discussion and revision. While the questions are chapter-specific, the majority of them could be applied to different chapters in this book. Teachers should also encourage students to use the questions for discussion, and the topics presented in the chapters, to investigate selected regions, countries and industries different from those described in this book. Individual international students could prepare reports based on the regions and countries most familiar for them, then present, discuss, compare and contrast selected issues across the regions according to the questions. The book chapters were up-to-date as at late 2012/early 2013; however, the short/medium term trends overviewed in this book would not be likely to be changed on a yearly basis (except in the most unstable regions of the world). Nevertheless, readers are encouraged to analyse the most recent changes in the socio-economic context and visit sources such as country, regional reports and statistics provided by organisations such as the World Bank, World Economic Forum, United Nations and OECD.

Acknowledgements

We would like to thank all authors for their contribution and patience. Also, many thanks to all the reviewers who helped to improve the chapters in this book as well as all the authors who submitted their original work. Thanks also to Ms. Susan Barrington, the *OXIRM* administrator, for proofreading the chapters in this book.

Oxford, United Kingdom

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Richard Cuthbertson

Reference

Cetinkaya, B., Cuthbertson, R., Ewer, G., Klaas-Wissing, T., Piotrowicz, W., & Tyssen, Ch. (2011). *Sustainable supply chain management: Practical ideas for moving towards best practice*. Springer.

International Statistical Databases

CIA World Fact Book—https://www.cia.gov/library/publications/the-world-factbook/
Eurostat—http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/
OECD—http://stats.oecd.org/
United Nations statistics—http://unstats.un.org/unsd/default.htm

United Nations (UNCTAD)—http://unctad.org/en/Pages/Home.aspx
World Bank—http://data.worldbank.org/
World Bank (Logistics Performance Index)—http://lpi.worldbank.org/
World Economic Forum—http://www.weforum.org/reports

List of Abbreviations

3PL	Third Party Logistics (Provider)
4PL	Fourth Party Logistics (Provider)
ASEAN	Association of Southeast Asian Nation
BOM	Bill of Materials
BRIC	Brazil, Russia, India and China
BRICS	Brazil, Russia, India, China and South Africa
CEO	Chief Executive Officer
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
ESE	Early Supplier Evolvement
EU	European Union
FDI	Foreign Direct Investment
FMCG	Fast Moving Consumer Goods
GDP	Gross Domestic Product
GPS	Global Positioning System
GSCM	Green Supply Chain Management
HACCP	Hazard Analysis and Critical Control Points
HR	Human Resources
HRM	Human Resources Management
ICT	Information and Communication Technology
IMF	International Monetary Fund
IT	Information Technology
JIT	Just-In-Time
LLP	Lead Logistics Provider
LPI	Logistics Performance Index
LSP	Logistics Service Provider
M&A	Mergers and Acquisitions
MENA	Middle East and North Africa
MRP	Manufacturing Resource Planning
OECD	Organisation for Economic Co-operation and Development
OEM	Original Equipment Manufacturer

PO	Purchase Order
PPP	Purchasing Power Parity
RDC	Regional Distribution Centre
RFID	Radio Frequency Identification
SADC	Southern African Development Community
SC	Supply Chain
SCM	Supply Chain Management
SME	Small and Medium Enterprises
SSA	Sub-Saharan Africa
TMS	Transport Management System
UN	United Nations
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business
V4	Visegrád Group
VMI	Vendor Managed Inventory
WMS	Warehouse Management System
WTO	World Trade Organisation
XML	Extensible Markup Language

Contents

Supply Chain Design and Management in Emerging Economies: Identifying Barriers and Critical Success Factors

Wojciech Piotrowicz and Richard Cuthbertson

Abstract This introductory chapter is composed of two parts. In the first section, the major barriers to Supply Chain management are identified and a framework for classifying barriers is proposed. The barriers are derived from a broad literature review. Three sources were analysed in depth: papers focusing on generic Supply Chain barriers (mainly in developed countries), papers focusing on barriers specific to Supply Chains in emerging (developing) markets, and finally the other chapters submitted for this book. The framework developed comprises several layers, from the external environment, via market, Supply Chain and inter-organisational levels, to outputs. Each category of barriers is briefly described. The second part of this chapter provides an overview and guide for the rest of the chapters in this book. The chapters cover topics including development, international trade, supply chain design, risk management, as well as more operational transport and logistics issues. Sectors covered include retail, logistics, food, apparel and automotive. The countries and regions described in the book are: Brazil, Sub-Saharan Africa, Malaysia, China, Indonesia, Russia, Egypt, Nepal and the Czech Republic, providing a broad range of different emerging markets. This chapter summarises the literature focused on Supply Chain Management in emerging markets.

1 Introduction

This book, which is a continuation of earlier work at the EU level (Cetinkaya et al. 2011), aims to capture the issues, barriers and solutions used in supply chains in emerging markets across the globe. This first chapter introduces the main issues covered and discusses the relevant academic literature. The subsequent chapters were prepared by experts from a variety of countries and regions, people who have a deep understanding and knowledge of the area and the subject, people who live or work in the particular country and region. We consider how the findings from the chapters are aligned with already published literature, with the main focus on the

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W. Piotrowicz, R. Cuthbertson (eds.), *Supply Chain Design and Management for Emerging Markets*, DOI 10.1007/978-3-319-05765-1_1

barriers that have to be addressed in order to create efficient and effective supply chains that will benefit both emerging and developed countries.

This chapter is structured as follows: firstly we will explain the main definitions, which is not a straightforward task due to the ambiguity of terms used across the literature. Secondly, we will present the methodology for analysis, and thirdly we will focus on the business in emerging countries and their importance. Then, we will provide an overview of supply chain (SC) barriers, including barriers specific to emerging markets. Based on the analysis, we propose a framework for barrier classification that covers several levels of barriers from the external environment, via market, Supply Chain and inter-organisational levels, to outputs. Each category of barrier is then briefly described. This will be followed by an overview of the individual book chapters. Finally, recommendations for future research and practice are identified.

2 Methodology

This section explains how this chapter was created. Two main groups of sources of information were used: the existing academic literature and the chapters submitted for publication in this book. This allowed us to compare for commonalities and differences in SC barriers identified in various sources. The literature review was performed in 2013. To identify relevant articles, databases such as ProQuest and Science Direct were searched, using the key phrase *supply chain* with a combination of words, including permutations of *emerging*/*developing*/*transitional*, with *markets*/*countries*/*economies*, as well as *BRIC*/*BRICS*, *lessons* and *barriers*. Only peer reviewed, academic papers written in English were considered. The search was limited to titles and abstracts (ProQuest). Identified articles were filtered manually and non-relevant articles were rejected. The references used in the papers were then further reviewed to search for additional relevant literature. Barrier categories and individual barriers were extracted from the papers, and separated according to whether they related to a generic supply chain (SC) or might be particular to an emerging market. Individual barriers were then assigned to the common categories. In parallel, the SC barriers in the book chapters were captured and categorised. This enabled the identification of the most common barrier categories. Creation of the barriers and the framework took place during several cycles of coding, content analysis and comparison with the literature; it was an iterative process where findings reported in the chapters and literature were compared against each other.

3 Defining and Categorising Emerging Economies

In this section, we present some approaches to the ways in which the emerging or developing countries are classified. The group of countries that are defined clearly is the set of the largest and fastest growing markets: the BRIC countries (Brazil, Russia, India and China), or BRICS when South Africa is added. The second group, but without such a clear definition, are the Transitional Economies (or Transition Economies): post-communist countries, which can be divided into Central and Eastern European (CEE) countries and Asian countries. The CEE distinction is based on historical, as well as geographical, characteristics. Within the European Union countries, we can further classify the Visegrad Group (V4) of four countries (Czech Republic, Poland, Slovakia and Hungary). The V4 group along with the Baltic States (Lithuania, Latvia and Estonia), Romania, Bulgaria, Croatia and Slovenia have already joined the European Union. Some of the other classifications, based on geographical, economic and cultural characteristics are as follows. In Asia, we can identify the Association of Southeast Asian Nations (ASEAN), the ten nations which work together on the removal of trade barriers and the improvement of business and cultural relationships. ASEAN is composed of: Indonesia, Malaysia, Philippines, Singapore, Thailand, Brunei Darussalam, Viet Nam, Lao PDR, Myanmar and Cambodia. In Africa, we can identify Sub-Saharan African (SSA) countries (located south from the Sahara desert). The Northern African countries, which lie in the basin of the Mediterranean Sea, are also referred to, together with Middle Eastern countries, as the MENA group (Middle East and Northern Africa); in some cases Turkey is added to the list forming the MENAT group of countries. In the Americas we can identify the Latin American Free Trade Association (LAFTA) and the Mercosur trading block.

The terms "developing" and "emerging" are used synonymously in the literature (Roztocki and Weistroffer 2011), thus the decision was made to include all countries in this book that are not labelled "developed". This is in line with the terms used in previous studies; the following section illustrates how the SC-related literature defines emerging or developing markets.

4 Emerging or Developing Markets: Some of the Terms and Definitions Applied in the Supply Chain Literature

By looking at selected papers, it is possible to observe that not only the terms developing and emerging but also economies, markets, states, and countries are used synonymously. There is a lack of clear terms and definitions commonly used in management, SC, and development studies. For example, these papers used the following terms for countries or regions:

- Developing country (countries): India, China (Babbar et al. 2008), Brazil, India, China, Mexico (Prasad et al. 2005), India (Prasad and Tata 2010), China (Zhu et al. 2012), China, India, Brazil and Mexico (Park and Min 2013)
- Developing economy (economies): Bangladesh (Islam et al. 2005)
- Developing and transition economies: Estonia, Slovenia, Hungary, Slovakia and Poland (Jindra et al. 2009)
- Emerging countries/states: Eastern Europe, Western Asia (Ganescu et al. 2013)
- Emerging economies: Vietnam, Bangladesh, Pakistan, Haiti, Honduras (Schotter and My 2013), Eastern Europe (Tokman et al. 2007)
- Emerging markets/transitional emerging markets: Russia, Central and Eastern Europe (Lorentz and Ghauri 2010), BRIC and some countries in Asia, Eastern Europe, Latin America, and to a lesser extent Africa: Argentina, Brazil, China, Hungary, Israel, Turkey and Venezuela (Größler et al. 2013)
- Lesser-developed countries (Perry and Towers 2013)

Scavarda et al. (2010) used a definition of Arnold and Quelch (1998) who stated that emerging markets fulfil two criteria: rapid economic development and policies which lead towards a free-market system, while the UNCTAD classification (UNCTAD 2014) is applied by Lorentz and Ghauri (2010). Ehrgott et al. (2011) applied the categorisation of emerging economies from the "Forbes" list which includes 72 countries.

Four groups of countries, based on their economic characteristics, were defined by Prasad and Babbar (2000) who classified them into: industrialised, newly industrialised, transitional and developing. The newly industrialised countries include South Korea and Malaysia, while the transitional group includes former communist bloc countries such as Poland, the Czech Republic and Russia. Transitional countries are characterised by a high level of industrialisation and education, but their political and legal systems are lagging behind developed nations. Prasad and Babbar (2000), looked at income per capita, literacy, infrastructure, convertibility of currencies, competitive environment, level of wages, stability of monetary and fiscal policies in order to classify countries. Roztocki and Weistroffer (2011), although not in the SC context, considered aspects such as: laws and regulations, level of government control, workforce and customer characteristics, management style and economic conditions.

Hence, rather than try to choose one definition of emerging markets, we embraced all and based our definition on excluding the more commonly agreed inversely defined developed markets.

5 Why Emerging Markets?

International trade is nothing new, the Silk Road linked the Roman Empire and Asia, the Amber Road linked the Rome and the Baltic coast, the trade between Asia and Europe and later with the Americas was common in later ages. After the

nineteenth and early twentieth centuries protectionism and the growth of the free trade, supported by developments in transport and communication technologies, allowed a previously unseen level of international trade on a global level; the globalisation era had begun. As western markets became saturated, the new, emerging markets were perceived as a great business opportunity (London and Hart 2004). Western organisations moved towards Asian and Southern American markets. After the fall of communism and through economic transition, the importance and attractiveness of Central and Eastern European countries (such as Poland, Czech Republic, Romania) grew (Lorentz and Ghauri 2010). Together with globalisation and further developments in information technology, the role of logistics and supply chains also changed. Gereffi and Lee (2012) listed three main reasons for the growing importance of global SCs: the emergence of new markets, the leading role of international retailers in setting standards across the SC and their need for cheap sources of private label product, and the post-crisis SC reconfiguration.

6 Business in the Emerging Markets

Just as there are differences between various developed countries, or regions within one country, so we might expect the differences between developed and developing markets to be more visible. These findings are not unexpected, just as there are differences between different industries (Lönngren et al. 2010). While detailed issues will be discussed later in this chapter, here we would like to provide an overview of some major points. Firstly, developing countries contain a high degree of uncertainty (Babbar et al. 2008; Prasad et al. 2005; Prasad and Tata 2010; Lorentz and Ghauri 2010), resulting from economic, political/legal and social/cultural factors (Babbar et al. 2008). These uncertainties, and the risks associated with operations in emerging markets, have the potential to impact the whole of the supply chain (Prasad and Tata 2010). Often emerging markets have less organised economic systems; at the same time there are often problems with the transport infrastructure, a less educated workforce, as well as certain restrictions on capital and material movements (Prasad and Babbar 2000). There are differences in national cultures, which also influence organisations (Pagell et al. 2005). Country level differences could be influenced by local policies and infrastructures (Cagliano et al. 2001). However, despite the risks, emerging markets provide business opportunities (Babbar et al. 2008).

Industrialisation and economic development can also be associated with negative issues, such as the impact on the natural environment (Zhu et al. 2012), as well as problems related to human rights and labour exploitation (Tencati et al. 2010). As was noted by Nolan et al. (2008), increasing industrial consolidation and concentration increases pressure on local producers in terms of cost reduction and quality standards. While SC integration and the importance of labour intensive industries cannot be underestimated, they were still affected by the 2008 crisis (Schotter and My 2013). On the other hand more advanced developing nations that

provided more complex production and services demonstrated more resilience to the 2008 crisis (Alfaro and Chen 2010).

International organisations can enter local markets by creating joint ventures with local partners (Tokman et al. 2007) and through other forms of FDI (Foreign Direct Investment). China is a major place in which to invest, with the majority of investments in the manufacturing sector (Park and Min 2013). While international organisations enter local markets, organisations from the emerging economies also try to explore opportunities for international expansion. As Größler et al. (2013) pointed out, there is a recent shift in the industry-types. While traditionally companies in the emerging markets have been utilising cheap labour and the natural resources available, this is not the case anymore. In 2005, the TOP 500 Fortune companies included organisations from the BRIC countries, which operated in high-value-adding manufacturing sectors (Größler et al. 2013). While some of local organisations are already successful in the international market, most have been trying to improve their performance in the local market. To catch up with the rest of the world, firms in developing countries aim to replicate and implement best-in class solutions (Mefford and Bruun 1998). However, business in developing countries require different strategic approaches (London and Hart 2004) and the direct transfer of "best practices" is usually not possible, and they often need to be adjusted to the local context (Piotrowicz and Cuthberson 2012).

This book should help readers to navigate through the differences between markets, and also emphasise the points and areas that should be taken into consideration when extending supply chains into developing markets.

7 Studies Related to Barriers in Supply Chains

Despite the importance of SC barriers in the creation (or non-creation) of effective and efficient supply chains, research related to this topic is not as common as might be expected (Richey et al. 2009, 2010; Moberg et al. 2003), even though understanding SC barriers and limitations is necessary to improve the supply chain and to transfer SC best practices (Piotrowicz and Cuthberson 2012). Similarly as with the studies of SC barriers, research that covers Supply Chain Management in developing markets (Babbar et al. 2008) and the poorest countries (Gold et al. 2013) is limited. The majority of research related to SC is focused on developed regions, despite the increasing importance of developing countries (Größler et al. 2013).

In the following sections we present papers included in the literature review that focus on SC barriers, challenges and critical success factors.

The first group of papers include those that look at generic SC barriers, i.e. papers not focused on SC in emerging markets (even though some of the papers were based on data collected in India, such as the work by Patil and Kant (2014)). These include papers that cover SC barriers in relation to:

- Agile SCM (Power et al. 2001)
- Collaboration (Ramesh et al. 2010; Fawcett et al. 2010)
- Corporate social responsibility (Faisal 2010)
- Customer enquiry management (Zorzini et al. 2012)
- Customer responsive SC (Storey et al. 2005)
- Environmental practices (Walker et al. 2008)
- ERPII implementation (Koh et al. 2011)
- E-supply chain, web-based integration (Akyuz and Rehan 2009)
- Information integration (Harland et al. 2007)
- Integration (Richey et al. 2010)
- Integration and performance (Richey et al. 2009)
- Knowledge management adoption (Patil and Kant 2014)
- Purchasing and SC sustainability (Giunipero et al. 2012)
- SCM critical success factors (Tummala et al. 2006)
- Strategic management (Fawcett et al. 2008)
- Strategic partnership (Lönngren et al. 2010)
- Transfer of best practices (Piotrowicz and Cuthberson 2012)

7.1 Selected Studies Focused on SC-Related Issues in Emerging Markets

The second group of papers that were identified and analysed for this book include research focused on SC themes in emerging markets or in relation to emerging markets:[1]

- Build-to-order SC (Prasad et al. 2005)
- Cold chain (Joshi et al. 2009; Salin and Nayga 2003)
- Corporate social responsibility in SC (Tencati et al. 2010; Perry and Towers 2013)
- Demand supply networks in Russia (Lorentz and Ghauri 2010)
- Distribution systems (Lorentz and Ghauri 2010)
- Distribution systems (Lorentz and Ghauri 2010)
- E-commerce in manufacturing SME's (Ghobakhloo et al. 2011)
- Food SC in Africa (Gold et al. 2012) and India (Sagheer et al. 2009)
- Green SC practices (Zhu et al. 2012)
- Impact of financial crisis on SC members (Schotter and My 2013)
- IT-enablement (Jharkharia and Shankar 2005)
- Micro-enterprises SC (Prasad and Tata 2010)
- Multimodal transport (Islam et al. 2005)
- Multimodal transport and integration (Islam et al. 2005)
- Network adjustment in food SC (Lorentz et al. 2013)

[1] The list includes work focused on more than just single country (with some exceptions). More country, region oriented studies are listed in the book chapters.

- Organisational and innovation performance (Chong et al. 2011)
- Outsourcing and offshoring (Contractor et al. 2010)
- Outsourcing of complex production (Hameri and Tunkelo 2009)
- Outsourcing strategies (Größler et al. 2013)
- Product variety management (Scavarda et al. 2010)
- Responsible SC (Ganescu et al. 2013)
- SC barriers for foreign subsidiaries (Park and Min 2013)
- SC international joint ventures (Tokman et al. 2007)
- Social sustainability (Ehrgott et al. 2011)
- Sustainable development projects (Diniz and Fabbe-Costes 2007)
- Sustainable SC in the "base of pyramid" countries (Gold et al. 2013)
- Time as a trade barrier (Nordås 2006)
- Transfer of world-class production (Mefford and Bruun 1998)

8 Classifying Supply Chain Barriers in the Literature

For the next step in our work we looked at how authors classified SC barriers in their papers. We identified a lack of consistency in the classification of barriers and a wide variety of approaches to classification were employed. We looked at papers focused on both developed and emerging markets. The classifications are identified in the following section.

SC barriers in the Knowledge Management context (based on the literature review) by Patil and Kant (2014) were separated into s*trategic, organisational, technological, cultural* and *individual*. Harland et al. (2007) distinguished three categories of barriers: *behavioural and cultural, technical, business* and *SC related*.

Internal and *external* categories of barriers were also identified by Walker et al. (2008) as well as Richey et al. (2009, 2010). *Internal* barriers are mainly under the control of the organisation (Richey et al. 2009) and include internal planning failure (lack of effective planning mechanisms) and external monitoring failure (lack of effective monitoring systems). According to Walker et al. (2008) *internal* barriers include subcategories such as: cost concerns, lack of buyer awareness, lack of training and commitment, costs pressure on low prices, and lack of legitimacy. These include unidirectional barriers, where the organisation is focused only on a one-way flow of processes and planning. As a result there is a lack of information sharing, a lack of shared risks and rewards. *Incongruent barriers* include a focus on one focal organisation, without considering and consulting other SC partners. The last category is internalisation, where the company is inwardly focused, instead of focusing on customers and their requirements (Richey et al. 2010).

External barriers include regulations, poor supplier commitment, unwillingness to exchange information, as well as industry-specific barriers (Walker et al. 2008).

A similar categorisation was proposed by Fawcett et al. (2008), who defined *organisational, intra-organisational* and *inter-organisational* barriers, which were

further defined as interfirm rivalry (competition instead of cooperation), and managerial complexity (inability to integrate processes, systems and cultures) as classified by Park and Ungson (2001).

Koh et al. (2011) focused their research on the barriers of ERPII implementation in the SC. Among the barriers they listed were: organisational inertia, cost, lack of business understanding, data accuracy/quality of information, different goals and objectives between SC partners, cultural differences, and the scale of change. Web integration towards an e-supply chain was investigated by Akyuz and Rehan (2009), who identified two groups of challenges: *technological* and *managerial/organisational*.

Fawcett et al. (2010) considered the resisting forces that create barriers for SC collaboration. They are separated into two categories: constituency-based (inconsistent measures, inadequate training, lack of alignment between strategic and operational policies), and social dilemma resistors, related to information sharing, trust and the sharing of risks and rewards (Fawcett et al. 2010). Lorentz et al. (2013) looked at barriers in three main dimensions: *geography, resources and institutions*, as well as at the *operational context*, which included primary and secondary actors (Lorentz et al. 2013). Moberg et al. (2003) listed barriers to effective SC relationships, those included: lack of trust, little understanding and commitment between SC partners, fear of losing control, different goals and objectives among SC partners, inadequate IT systems, short-term focus and involvement in too many different SC chains.

Tummala et al. (2006), when looking at the SCM success factors, investigated the importance of the following set of issues: relationships, ICT, material flows re-engineering, corporate culture and performance measurement, which were separated into strategic and operational levels. Agile SCM success factors were separated into categories such as participative management computer-based technologies, resource management, continuous improvement, supplier relations, just-in-time applications and technology utilisation (Power et al. 2001).

To investigate SC practices in developing countries Prasad and Tata (2010) proposed looking at conditions such as information, uncertainty, market orientation, linkages, socio/cultural factors, political/legal systems and economic conditions (Prasad and Tata 2010). Different classifications included: internal and external factors (Babbar et al. 2008), as well as structure and capabilities (Lorentz and Ghauri 2010). In the offshoring context, Contractor et al. (2010) distinguished issues such as comparative advantage, local market size, cultural distance and institutional environment. Similarly Jensen and Pedersen (2011) classified attributes taken for consideration when offshoring decisions are made, these include: cost levels (wages, infrastructure, tax and regulatory costs), human capital (education and availability), business environment (infrastructure, regulation, industrial context, country risk), and interaction distance (geography, language, culture). According to such criteria Jensen and Pedersen (2011) assigned relevant values for four regions (Western Europe, Central and Eastern Europe, North America and Asia). Park and Min (2013) looked at the ways to reduce barriers to the supply chain, applying the work of Pearson et al. (1998). Those actions included:

familiarity with local business practices, improvements to supplier quality, establishment of the distribution channels, provision of after-sales services, recruitment of logistics personnel and finally relationships with local authorities.

There are also barriers related to the geographical distance between SC partners, which creates a time barrier (Nordås 2006). As a result certain regions are unable to or have difficulty in joining the international supply network, especially when the JIT philosophy is increasingly popular (Nordås 2006).

In addition it is important to mention the Logistics Performance Index (LPI), which considers the following issues: the efficiency of the clearance process, the quality of trade and transport-related infrastructure, the ease of arranging competitively-priced shipments, the competence and quality of logistics services, tracking and tracing ability and the frequency of reaching the expected or scheduled delivery time (Arvis et al. 2007, 2012).

9 Barriers Importance: Views from the Literature

Apart from listing and classifying barriers some authors also looked at the importance and impact of each barrier. Research by Fawcett et al. (2008) determined the top ten barriers to strategic SC, which were in two groups: interfirm rivalry (inadequate information sharing, inconsistent operating goals, lack of willingness to share risks, rewards and information) and managerial complexity (lack of alliance guidelines, poor process appraisal costs, non-aligned measures, organisational boundaries, measurement of SC contribution and customer demand). The strongest single barrier was inadequate or incompatible information systems (Fawcett et al. 2008).

Wong et al. (2012) investigated enablers of SC alignment. An extensive literature review indicated the following areas were critical in SC creation: organisational structure, internal and customer relational behaviours, top management support, information sharing and performance measurement systems (Wong et al. 2012). Research conducted by Chong et al. (2011) indicated that the most important issue is the way in which internal operations are organised; there is a need to improve internal integration, before focusing on SC improvement (Chong et al. 2011). In India, in the cold SC context, the key barrier was the lack of proper infrastructure (Joshi et al. 2009). Similarly Giunipero et al. (2012) determined barriers for sustainable SC and concluded that the top barriers include the need for investment, from both buyers and suppliers as well as economic uncertainty. Medium level barriers identified during the research were short versus long term goals, a lack of standards and regulations, additional burdens on suppliers, little lack of managerial support and lack of resources on the suppliers side (Giunipero et al. 2012).

Research by Tummala et al. (2006), in a developed country context, determined SC success factors, which included: cross functional integration, senior and middle management commitment, cross-functional and participative management, good

communication and employee involvement, with barriers such as lack of resources, ICT, training and alignment across the organisation. Ramesh et al. (2010) concluded that the key issue in the context of the Indian apparel industry was lack of SC understanding, together with a lack of collaborative and strategic SC planning, and top management commitment.

10 Classifying Supply Chain Barriers

In the following section the detailed Supply Chain barriers were extracted from the papers and chapters (see Annex) and are grouped into several levels according to their characteristics (Fig. 1). The levels include:

- **Macro level environment**
  - Environmental (geographical barriers)
  - Risks, security and stability
  - Political and regulatory barriers
- **Market level environment**
  - Transport and logistics infrastructure
  - Supply Chain structure
  - Market structure
- **Supply Chain level**
  - Communication, information sharing and technology
  - Costs, resources and capabilities
  - Human Resources, training and awareness
- **Industry specific barriers**
- **Inter-organisational level**
  - Measurement-related barriers
  - Strategic Supply Chain planning barriers
  - Relationships and commitment
- **Outputs**
  - Productivity
  - Quality
  - Implementation

The levels of the barriers also reflect the potential influence of a single company, or set of companies, being able to remove them. While companies are able to remove or reduce barriers at the lower level (inter-organisational, supply chain), changes at the top level (market, environment) can only realistically be made by, or in cooperation with, the public sector and international organisations.

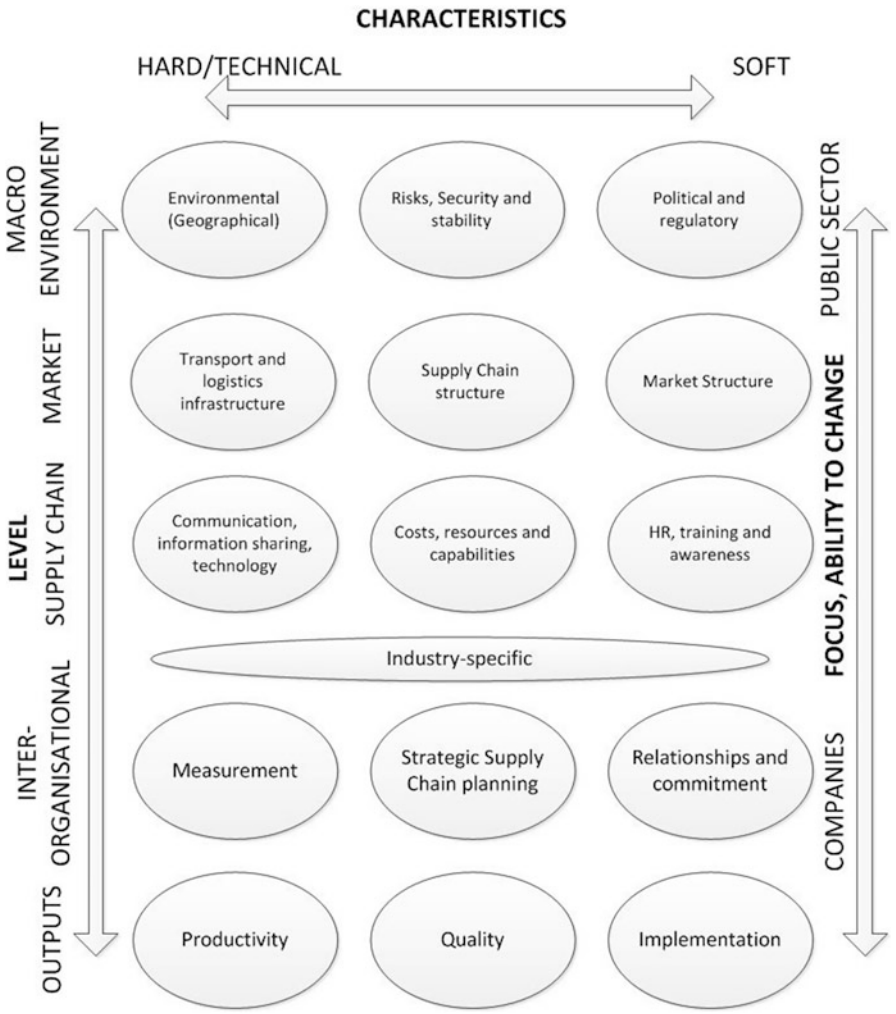

Fig. 1 Supply chain barriers—levels and characteristics (based on the literature and book chapters, see Annex)

In addition the barriers can be separated according to their characteristics, from hard, relatively easy to identify and quantify (such as geography, measurement, productivity, IT), to soft, intangible and harder to quantify barriers (such as human resources, policies, relationships). However, we are aware that boundaries between such categories are blurred.

The sections below briefly overview each category of barriers, based on the list included in the Annex (see Annex for sources of each barrier).

10.1 The Macro-level Environment

The Macro-level environment consists of three sub groups of barriers which are impossible to change, or hard to change in a short time frame (years). Three groups include barriers such as:

Environmental (Geographical Barriers) geographical features and constraints, such as access to sea or availability of inland waterways, mountains, islands etc. which influence the transport network; distances within a country and to the large markets; weather conditions, the location of the population, which influence the time and costs of transport—such barriers are easy to identify, but are mostly impossible to change; a supply chain should be designed to reduce them. Geographic issues exist in all countries; however, emerging countries are located further from the major world markets, with some regions having unfavourable climates. At the same time developed countries manage to design their transport networks to reduce the geographical impact; nevertheless, some negative issues are still visible (such as congestion in sea ports). Adaptation to the environment often needs high investment in transport-related infrastructure.

Risks, Security and Stability this is a major issue, especially visible in some emerging markets, but not listed as a barrier within developed markets—of course instability in emerging markets influences supply chains in developed countries. It is important to stress that not all emerging markets are prone to security and instability problems (for example some of the transitional economies from Central and Eastern Europe entered the EU, which increased political stability). In some emerging countries, issues such as economic and political instability, social unrest and conflict strongly and negatively influence goods transportation, information flows and exchange rates, as well as infrastructure and overall development. The main issue is a lack of stability, turbulence and high variability which influence the ability for mid and long term planning and create a need for risk management and contingency planning. International players have the option to enter such a market or not, however local organisations have to adjust their operations to mitigate negative impacts. Apart from the large global corporations, smaller and local organisations have little influence on barrier removal and should incorporate issues into strategic and operational management.

Political and Regulatory Barriers In developed markets there is a lack of certain standards at operational level (IT, transport) which can be perceived as a barrier; however, in emerging markets barriers are at the national, regional levels and determine organisational strategy and supply chain design. Barriers include the institutional environment, weak institutions, government policies, trade regulations and law enforcement. Corruption and protectionism could also be major issues, as well as a lack of legislation, transparency and sudden changes in policies. The majority of barriers come under the responsibility of the public sector; companies have to comply with them, or avoid involvement (corruption). Barriers could be removed by the actions of a single country, bilateral and regional agreement. The

supply chain design and operation is easier in a regulated, but stable environment compared to a turbulent market.

10.2 Market Level Environment

This level includes barriers at the country or regional level, including "hard" issues such as transport and logistics infrastructure, as well as softer aspects related to the market and supply chain structure (supply and demand side).

Transport and Logistics Infrastructure while in a developed market there are some local infrastructure shortages, the real problems are in emerging markets. Infrastructure covers roads, railway, seaports, inland waterways, but also logistics infrastructure, such as warehouses. There are problems not only with lack of infrastructure, but also its quality, lack of compatibility, problems in crossing urban areas as well as an unbalanced modal split which favours the road option in land transportation. A fragmented distribution system together with a lack of infrastructure is a major problem; however this can be overcome when the macro-level environment is stable and favours infrastructure investments, by the public and/or private sector.

Supply Chain Structure barriers exist also in developed markets, however they are more visible in emerging countries. These include a fragmented supply chain, a narrow supply base, the structure and nature of local companies (size, number of suppliers and intermediaries, level of internationalisation), the level of integration and industrialisation, and the type of major products. The SC structure determines entry barriers, product time to market, ability to meet price, quality and delivery times. Increased integration and concentration does create problems for small companies in emerging markets, which are unable to join the global supply chain due to their size and lack of resources. On the other hand high concentrations allow us to explore economies of scale. Supply chain structure can be influenced by both commercial and public organisations.

Market Structure this set of barriers is related to the local market on which the supply chain operates and is focused more on the demand side. Barriers include the size and structure of the local market, local competition, customers, their buying power and disposable income. Issues such as poverty and sustainable regional development also play an important role, as parts of the country could be left behind or even excluded from development. The strong local market sustains local companies, creating the opportunity to grow an organisation on a local scale, before becoming engaged in international trade. A large population with a disposable income also attracts international companies that are seeking new customers. Problems with local markets were more often listed in the context of emerging countries (see Annex).

10.3 Supply Chain Level

At the Supply Chain level we again identified three interrelated groups of barriers, which focused on the way in which the supply chain is designed and supported by: IT, the resources available and finally human factors—such as training and awareness. In this group of barriers also we move from harder IT/tech-related issues, to softer HR focused problems.

Communication, Information Sharing and Technology surprisingly communication and information sharing problems were more often listed in the context of developed countries. This could be explained by the fact that IT is used to optimise processes, while in some of the emerging markets the problem is how to design and run the processes; optimisation is the next step. In some emerging countries (again here we cannot generalise) there were issues of access to IT infrastructure, its quality, and wider problems with technology delivered by providers from developed countries. While the technology is able to reduce some of the barriers, its lack of quality constrains further development. Both public and private sectors are able to work on barrier removal.

Costs, Resources and Capabilities this group, as well as resources, also includes capabilities, since a lack of resources results in an inability to acquire or generate the capabilities necessary to create and run a supply chain. While companies from across the world list problems with resources, in emerging countries this is an important issue, since companies need to spend resources on issues which are normally supported by the public sector, to some extent (such as education and training). Lack of technological and managerial capabilities and high costs are negatively influencing companies' emerging markets.

Human Resources, Training and Awareness problems are listed in both emerging and developed countries. However, the scale of the problem is different in each group of countries. While in the developed markets there is lack of specific skills, or awareness of the most recent issues and trends, in emerging countries there could be a shortage of basic skills and knowledge. Lack of knowledge, especially related to logistics, SC, recognition of potential benefits, together with short comings in the skilled workforce was listed as a problem across emerging countries. This is also linked with the fact that education is unable to keep up with the latest developments.

Relationships and Commitment a set of soft barriers related to cultural differences, business culture and trust between partners. This is common in all regions, but as the cultural distance between partners grows the importance of such factors is increasing. Language issues also play an important role here. In emerging markets, where formal institutions are weak, personal contacts often replace formal agreements. Also the relative power of large international corporations and cost pressures are listed as important issues among emerging market suppliers.

Industry Specific Barriers these are common across the globe; there are issues specific to the industry and type of product (such as agriculture) or transport mode (such as sea transportation).

10.4 Inter-organisational Level

The set of barriers which influence the ability of a company to cooperate directly with up- and down-steam SC partners, mainly at the strategic, and to some extent, operational levels.

Measurement-Related Barriers such barriers were listed mainly in the developed countries, as generic SC problems. The literature (Annex) indicated issues such as a lack of common and aligned metrics, as well as measurement difficulties. Rarely were such problems listed in the emerging country context. This could be explained by the fact that measurement is used to improve the performance of stable and already existing processes, while in some emerging markets the problem is to create and run processes; inefficiencies are visible, thus there is no need to invest in a performance measurement system. However, such a hypothesis needs further investigation.

Strategic Supply Chain Planning barriers related to the ability to create a SC vision and align strategy and operations around the vision, as well as short-term focus. Barriers are listed for all types of countries, more commonly as generic SC barriers. A lack of long term planning is listed as a common issue, but we should note that in the unstable macro-environment, as in some emerging markets, long-term planning is hard or even impossible and managers need to improvise, responding to rapid changes and developing alternative strategies.

10.5 Outputs

Outputs include issues related to inefficiencies, quality and implementation. They are symptoms, not causes, which were listed earlier in the chapter. While we can see problems with productivity, quality and implementation in all countries and companies, they are much more serious and easily visible in emerging markets. In developed countries organisations focus on further improvements in productivity, eliminating inefficiencies, as well as on improving and maintaining various aspects of quality. In the emerging markets there are problems in achieving a level of quality comparable to that in developed markets.

Productivity in the context of developed markets the main focus is on productivity benefits and improvements—how to improve productivity further (efficiency, resource utilisation). In emerging markets, problems with productivity are visible

and easily identified. These include low productivity, in the private and public sector, high costs at various stages of the SC, low performance, border crossing problems and congestion, among others (see Annex).

Quality similarly as in the productivity section, developed countries are focused on further quality improvements, discussing benefits and the way forward. In the emerging markets context it could be difficult to achieve control and maintain even basic level of quality. Quality problems are caused by suppliers, quality of raw materials and parts, labour and errors in information entry and processing. Quality problems contribute to low productivity, increasing various costs.

Implementation-Related Barriers there are problems at the operational level, common everywhere. These include resistance to change, problems with standards, internal operations, and inflexible organisations. The issues are strongly linked with barriers at the strategic level and are influenced by higher level barriers (market, supply chain and external environment).

11 Links Between Barriers

The categories of barriers (Fig. 1) are interlinked and cover issues from the macro-level, which cannot be influenced by most companies, to the local, organisational level. The macro-level problems could be addressed, in practice, mainly or even only by the public sector—governments and international organisations. Supply chain members have to adapt to the external environment while international players can select the option of not entering or withdrawing from the market as the political, social and economic situation deteriorates. Problems at all levels influence each other, in some cases creating reinforcing loops which lead to failure, or after removal or reduction of the key barriers, to success. However, interrelations between barriers should be defined more precisely in future research. In the list of barriers we included outputs, issues which are the result of problems at different, higher levels. This is in line with papers which have looked at the interactions between barriers, facilitators and outcomes/performance (i.e. Richey et al. 2009, 2010; Fawcett et al. 2008; Zorzini et al. 2012). Outputs are the most visible effects, caused by problems at the environmental/market/SC/inter-organisational levels.

12 Chapters in This Book

This section overviews the chapters included in the book (Table 1). The chapters are from Africa, Asia, Eastern/Central Europe and Southern America. The level of analysis ranges from the solutions used by a country/region up to those used by a single company. The chapters present the current state of supply chain development, or specific solutions created in response to a particular environment in which

Table 1 Chapters overview

Author	Region/country	Main sector	Level of analysis	Main focus
Pires (2014)	Brazil	Cross-sector (manufacturing, agriculture)	Country/sector	Current state of SC development
Parker and Luiz (2014)	South/Sub-Saharan Africa	Retail	Region/sector/company	Retail development
Kassim and Abu Bakar (2014)	Malaysia	Public sector	Country	Trade facilitation
Xu et al. (2014)	China	Manufacturing	Sector/company	Risk and uncertainty
Febransyah and Simangunsong (2014)	Indonesia	Agriculture	Country/sector	SC competitiveness
Pieriegud (2014)	Russia	Retail (FMCG) distribution	Sector/company	Retail and distribution
Kuhn (2014)	Egypt	Automotive	Supply chain/company	Quality in logistics
Deveci et al. (2014)	Turkey	Automotive	Supply chain/company	Design of logistics
Awni et al. (2014)	Egypt	Apparel	Company	Strategy and operations
Bhattarai (2014)	Nepal	Agriculture	Company	Strategy and operations
Klapalová and Škapa (2014)	Czech Republic	Logistics	Supply chain/company	Return logistics

organisations operate. The majority of chapters focus on the private sector, with the exception of work from Malaysia. Each chapter identifies certain barriers specific to the country/region/issue and demonstrates how such barriers were, or could be, removed or mitigated.

12.1 Chapters Overview

The state of supply chain management in Brazil is overviewed by Pires (2014). The socio-economic conditions, barriers and prospects are presented. Issues such as the political situation, economy, transport and telecommunications infrastructure, taxation and workforce and their influence on supply chain design are analysed. Successful practices from the automotive, airspace, trade and food sectors are used as illustrations of the detailed solutions used in Brazil. The solutions used to reduce supply chain barriers include SC reconfiguration, supplier base reduction, early supplier involvement, outsourcing and cross-docking.

Retail design and development in Sub-Saharan Africa (SSA) is overviewed by Parker and Luiz (2014) and illustrated by the case study of Game stores, the South African company which expanded into different African markets (with operations in 11 African countries by 2010). The chapter presents the challenges associated with operations in an unstable environment and the responses applied by the company, the role of SC planning and flexibility when operating in a turbulent environment was stressed.

The paper by Kassim and Abu Bakar (2014) presents an initiative taken by the Malaysian government to reduce barriers in international trade. The authors describe an ICT solution—the *Malaysian National Single Window*—which improves trans-border transactions and reduces supply chain costs. The paper not only presents the system, its implementation and functions, but also overviews the drivers which motivated the government to focus on ICT-based facilitation, as well as the associated challenges, actions and initiatives. The goals of implementation balance the need for process improvement, cost reduction and improvement in border control and security maintenance.

The work of Xu et al. (2014) focuses on supply chain uncertainty in the Chinese manufacturing context. The chapter, based on two case studies and supported by modelling, presents four models which consider various uncertainty factors. The findings present how issues grouped into the three main categories of uncertainties—quality, lead time and delay—influence the information and physical flows in the supply chain.

Supply chain competitiveness in the food industry is analysed in the Indonesian context by Febransyah and Simangunsong (2014). Applying the Analytic Hierarchy Process (AHP) and Analytic Network Process (ANP), the authors look at the factors which influence the major industry in Indonesia—agriculture, which includes both production and distribution. The findings suggest that infrastructure is the major influencer, followed by differentiation, costs and sustainability. The chapter also includes two mini case studies from the sector.

Retail and Fast Moving Consumer Goods (FMCG) supply chains in Russia are presented by Pieriegud (2014). The retail sector, and its development, is overviewed. The challenges of doing business in Russia are listed. An example of successful market operations and supply chain design is illustrated by the case study of ALIDI—a company founded in 1992 which has become a leading transport and distribution provider in Russia.

Kuhn (2014) investigates the automotive supply chain flows between Germany and Egypt. The chapter focuses on the quality, quality improvement, six sigma and issues which cause quality problems at various stages of the transport process between Europe and Egypt. The chapter overviews the solution developed by Mercedes-Benz passenger car plant in Egypt which allows mitigating quality issues in the Egyptian context as well as risks sustaining cargo flows.

Intermodal transport links between Turkey and the EU are investigated in the automotive sector by Deveci et al. (2014). The supply chain links Ford's Otosan factories located in Turkey with 450 suppliers across Europe. The chapter presents automotive manufacturing in Turkey, as well as the detailed design of an integrated

transport solution which utilises various modes of transport: road, rail and water. Technical solutions as well as transport, storage and consolidation processes are overviewed; challenges and their solutions are also listed. The importance of supply chain planning and coordination, utilisation and integration of the transport infrastructure and the role of ICT are stressed.

Awni et al. (2014) present a case study from the textile sector. They investigate operations and supply chain strategies in Egyptian luxury menswear. The chapter, apart from the historical development of the company, gives a detailed account of how the North African producer supplies the US and European markets. The research indicates the importance of core competences and strategies such as focused operations, and vertical integration, which are applied in the organisation. Roles of training, ICT, HR management and knowledge management are indicated as solutions to reduce SC barriers. In addition the chapter demonstrates how the company addressed issues related to political instability, financial risks, delivery problems and social unrest.

The development of the Nepalese company, the Valley Group, and strategies pursued under conflict conditions were analysed by Bhattarai (2014). The case study presents the growth of the company from small poultry meat trader to local market leader which operates an extended poultry supply chain. Problems and barriers, as well as solutions developed in the specific socio-economic context are described. The solutions include the creation of the supply network, training for suppliers (farmers), quality improvements, a focus on long term relationships and cooperation as well as collective planning and goal setting.

Reverse logistics were investigated in the Czech context by Klapalová and Škapa (2014) who looked at attitudes of local managers to this issue, as well as listing the drivers and barriers to reverse flow management. The paper is illustrated by three mini-case studies. The findings indicate that perceived low importance and lack of a systematic approach and knowledge about reverse logistics are listed as the top internal barriers. External barriers include problems with suppliers and customers as well as financial constraints. Cost reduction and the aim to improve customer satisfaction and service are the driving interests in reverse flow management. To reduce the barriers, the authors recommend incorporation of reverse flow management to strategic planning, to the creation of performance monitoring as well as the provision of training related to this topic.

13 Conclusions and Recommendations for Practice

This introductory chapter presents barriers to SC development, with a focus on emerging markets. The barriers from the literature and book chapters were classified according to their level and characteristics. International organisations which operate in emerging markets should understand the environment in which they are going to operate and design the supply chain accordingly. Operations in a turbulent environment require a flexible SC and elastic planning, which includes risk

management. The differences between developed and emerging markets should be analysed and addressed. While it is hard to influence the environment and markets, companies are able to plan and design a supply chain and internal operations, mitigating the barriers related to ICT, communication, information sharing, relationships, capabilities, training and awareness.

Based on the chapters and literature there are also some recommendations and guidelines for practitioners who are going to operate in emerging markets:

- Do not assume that all emerging markets are the same, they are not, even though there are commonalities across different groups of countries
- You need to understand the local social, economic and political context and monitor it constantly
- Learn about the history, society and tradition of the country
- Look at the whole region, such as countries across the border, they can influence your target country
- Don't expect trade and transport infrastructure at the level of developed countries
- Operations should be adjusted to fit the local context
- Running day to day operations is not as easy as in the developed world
- Long term planning might not work in an unstable environment
- In an unstable economic environment risk mitigation strategies should be in place
- Think about the exit strategy, if the environment becomes unstable
- Be ready to deal with bureaucracy and delays
- Building personal trust and informal relations is important in the absence of strong institutions
- Define policies concerning how to deal with corruption and unethical (from a Western point of view) behaviour
- Finding the right people to do the job could be a challenging task, as they have to possess professional skills as well as they need to understand local context
- Training is important in both emerged and emerging countries, however lack of skills and knowledge could be more visible in developing markets, be ready to provide additional support in this area.

14 Recommendations for Future Research

Research focusing on the SC in emerging markets is still behind that in Western Europe and North America (Bhattarai 2014; Qi et al. 2009), which opens opportunities for researchers. However, there are problems concerning the ability of researchers from emerging markets to design and execute research which will be published in top ranked journals and available internationally. Limited research focused on certain countries, together with a low number of researchers, influence SC-related education (Bhattarai 2014). When studying SC barriers, it was possible

to observe limited application of the relevant theories (such as contingency theory) which could be used to analyse the Supply Chain in emerging markets (see Defee et al. (2010) for analysis of theories applied in SC research). There are also opportunities to study SC barriers in emerging countries applying concepts from strategic management such as external environment analysis using PESTEL—Political Social Environmental Economic Technological Legal (Johnson et al. 2008) or PEST—Political Economic Social and Technological frameworks, industry and business unit analysis (Pitkethly 2006), or environmental analysis (Grant 2010). Work from the international management field also could be incorporated into SC studies. There are opportunities for studies to focus on certain countries, regions and industries, as well as comparative work that looks at the similarities and differences between them. In this chapter barriers are listed in the proposed framework (Fig. 1). The framework and its construct should be tested in various contexts and individual barriers in each category defined. It will be important to investigate relationships between the barriers, which will help to establish strategies for barrier removal, including cooperation between the public and private sectors. It is clear that as economic activity moves from developed to emerging markets, the research should indicate this; however we can observe that academia is unable even to follow this shift, still keeping a focus on Western Europe and North America. We believe that this book will be an important step in changing this status quo.

Questions for Review and Discussion

1. What criteria could be applied in order to classify countries into developed/developing categories? Discuss based on examples of countries.
2. Discuss similarities and differences between different regions and continents, according to various criteria listed in the chapter.
3. How we can classify supply chain barriers? Discuss the barriers in relation to a selected region or country.
4. Discuss the role of the public sector in removing SC barriers.
5. What we should consider when analysing the macro-level environment?
6. Which barriers are easiest to remove and why? Discuss from the view of the public and private sectors.
7. Discuss SC barriers in developed and emerging countries: which of them are similar and which are different?
8. Select one barrier category from the framework (Fig. 1): how does it influence supply chain design, strategy and operations?
9. How do shortages in transport and ICT infrastructure influence supply chain flows (cargo, information and financial)? Discuss based on a selected country or region.

Annex

SC barriers—generic Based on the literature	SC barriers in developing markets—specific Based on the literature	SC barriers based on the book chapters
Macro level environment		
Environmental (geographical) barriers		
Geographical distance (Zorzini et al. 2012; Piotrowicz and Cuthberson 2012) Raw materials availability (Piotrowicz and Cuthberson 2012) Access to sea and inland waterways (Piotrowicz and Cuthberson 2012)	Geographical constraints (Salin and Nayga 2003) Natural barriers (rivers) (Islam et al. 2005) Distance (Babbar et al. 2008; Lorentz et al. 2013) Distance and time of transport (Nordås 2006)	Geographical features—landlocked, mountains (Bhattarai 2014), large number of islands (Febransyah and Simangunsong 2014), long distances (Pieriegud 2014), distance to major markets (Pires 2014) Long commuting distance for workers (Awni et al. 2014) Bad weather (Parker and Luiz 2014)
Risks, security and stability		
Security concerns (Harland et al. 2007) Low data and information security (Patil and Kant 2014)	Fear of SC breakdown (Jharkharia and Shankar 2005) Higher interest rates (Prasad et al. 2005) Fluctuation of exchange rates (Babbar et al. 2008) Political conflicts and wars (Babbar et al. 2008) Threats of IT security (Jharkharia and Shankar 2005; Piotrowicz and Cuthberson 2012)	Financial, economic and political risks (region) (Deveci et al. 2014) Risks (Kuhn 2014), business risks (Pieriegud 2014), financial risks (Awni et al. 2014), theft (Pires 2014) and crime (Bhattarai 2014) Uncertainty (Pieriegud 2014; Xu et al. 2014; Parker and Luiz 2014; Kassim and Abu Bakar 2014) and low predictability (Kassim and Abu Bakar 2014; Parker and Luiz 2014) High variability and turbulence (Parker and Luiz 2014) Political instability (Bhattarai 2014; Deveci et al. 2014) and conflicts (Parker and Luiz 2014) Social conflicts (Febransyah and Simangunsong 2014; Bhattarai 2014), labour strikes (Awni et al. 2014; Bhattarai 2014) and insurgency (Bhattarai 2014). Security (Bhattarai 2014; Kassim and Abu Bakar 2014; Awni et al. 2014; Pires 2014) Privacy issues (Kassim and Abu Bakar 2014 Irregular supply and disruption (Bhattarai 2014) Utilities disruption (Bhattarai 2014), power-cuts (Kuhn 2014) and fuel shortages (Awni et al. 2014) Prices (Bhattarai 2014) and currency rates fluctuations (Awni et al. 2014)

(continued)

Annex (continued)

SC barriers—generic Based on the literature	SC barriers in developing markets—specific Based on the literature	SC barriers based on the book chapters
Political and regulatory barriers		
Lack of regulations and standards (Faisal 2010; Giunipero et al. 2012; Walker et al. 2008) Degree of regulations (Piotrowicz and Cuthberson 2012) Lack of transparency (access to information) (Piotrowicz and Cuthberson 2012) National policy (Piotrowicz and Cuthberson 2012) Legislation (Piotrowicz and Cuthberson 2012)	Government policies (Gold et al. 2012; Islam et al. 2005) and regulations (Joshi et al. 2009) Local policies (Ganescu et al. 2013) Lack of transparency (tax, policies) (Park and Min 2013) Policy shifts and rule changes (Park and Min 2013) Trade regulations (Lorentz et al. 2013; Islam et al. 2005) Bureaucracy (Park and Min 2013; Islam et al. 2005) Corruption and bribery (Islam et al. 2005; Babbar et al. 2008)	Trade barriers (Kuhn 2014) and quotas (Awni et al. 2014) Institutional environment (Xu et al. 2014) Protectionism (Pieriegud 2014) Bureaucracy (Pieriegud 2014; Bhattarai 2014; Pires 2014; Febransyah and Simangunsong 2014; Parker and Luiz 2014; Deveci et al. 2014) Regulatory problems (Bhattarai 2014; Xu et al. 2014; Parker and Luiz 2014) Poor copyrights, intellectual property protection (Bhattarai 2014) Corruption (Parker and Luiz 2014; Pieriegud 2014; Bhattarai 2014) Institutional weakness and poor law enforcement (Parker and Luiz 2014; Pieriegud 2014; Bhattarai 2014) Government regulations (Klapalová and Škapa 2014) Inefficient public local government (Klapalová and Škapa 2014) Administrative barriers (Parker and Luiz 2014) Legislation and policy (Klapalová and Škapa 2014) Taxation systems (complex, lack of integrated planning across different levels) (Pires 2014) Lack of legislation (Deveci et al. 2014), complex legislation (Pieriegud 2014) Lack of transparency (Pieriegud 2014; Kassim and Abu Bakar 2014) Transport permits shortages (Deveci et al. 2014) Need for alignment between partners (government, organisations) (Kassim and Abu Bakar 2014)

Market level environment		
Transport and logistics infrastructure		
	Lengthy distribution channels (Lorentz and Ghauri 2010) Distribution problems (Salin and Nayga 2003) Lack of access to distribution network (Prasad and Tata 2010) Poor transport infrastructure (Babbar et al. 2008; Lorentz and Ghauri 2010) Quality of infrastructure (Ganescu et al. 2013; Prasad et al. 2005; Joshi et al. 2009; Lorentz et al. 2013) Fragmented freight transport system (Islam et al. 2005) Insufficient infrastructure (Islam et al. 2005) and distribution systems (Lorentz and Ghauri 2010) Incompatible transport infrastructure (Islam et al. 2005)	Poor infrastructure (roads, ports, rail) (Parker and Luiz 2014) Transport infrastructure (Pieriegud 2014; Febransyah and Simangunsong 2014; Bhattarai 2014) Logistical infrastructure (Deveci et al. 2014) Low quality of road infrastructure (Pieriegud 2014) Infrastructure (transport)—shortages in certain areas, unbalanced modal split, lack of bypasses, problems to cross large urban areas by rail, underutilised alternative modes (water) (Pires 2014) Road infrastructure (Klapalová and Škapa 2014) Insufficient transport capacity (Deveci et al. 2014; Xu et al. 2014) Unbalanced modal split (roads) (Deveci et al. 2014; Parker and Luiz 2014) Shortage of warehousing facilities (Pieriegud 2014)
Supply chain structure		
Organisational boundaries (Fawcett et al. 2008) SC complexity (Perry and Towers 2013) Involvement in too many different SC chains (Moberg et al. 2003) Number of suppliers (Zorzini et al. 2012) Company size (Harland et al. 2007)	Fragmented (Lorentz et al. 2013) and narrow supply base (Prasad and Tata 2010) Number of intermediaries (Lorentz and Ghauri 2010; Joshi et al. 2009) Problems in entering the supply chain (Scavarda et al. 2010) High entry barriers for new suppliers (Palpacuer et al. 2005) Lack of established supplier base (Babbar et al. 2008) Lack of diversified economic base (Schotter and My 2013) Lack of industrial linkages (Prasad and Tata 2010) Low level of SC integration (Jharkharia and Shankar 2005) Low number of foreign operators (Islam et al. 2005) High number of small trucking companies (Islam et al. 2005)	Market structure (Parker and Luiz 2014) Industrial nature (Xu et al. 2014) Complexity of international trade (Kassim and Abu Bakar 2014) Large number of suppliers (Febransyah and Simangunsong 2014) Entry barriers (Klapalová and Škapa 2014; Febransyah and Simangunsong 2014) Products commoditization(food) (Febransyah and Simangunsong 2014) Short product life-cycle (Febransyah and Simangunsong 2014) SC is not as advanced as manufacturing (Xu et al. 2014) Time to market (Kassim and Abu Bakar 2014) Small suppliers are unable to meet quality, delivery and price (Bhattarai 2014) Environmental sustainability (need to comply) (Pires 2014)

(continued)

Annex (continued)

SC barriers—generic Based on the literature	SC barriers in developing markets—specific Based on the literature	SC barriers based on the book chapters
Market structure		
Customer preferences (Giunipero et al. 2012; Harland et al. 2007) Lack of public media interest (Faisal 2010)	Lack of large domestic market (Schotter and My 2013) Local competition (Ganescu et al. 2013) Customer ignorance towards quality (Joshi et al. 2009) Lack of competition (Islam et al. 2005)	Market structure (Parker and Luiz 2014) Income inequality (Deveci et al. 2014) Low local buying power (Bhattarai 2014) Low available disposable income (Pieriegud 2014) Poverty (price sensitive local customers) (Awni et al. 2014) Imbalanced development (Kuhn 2014; Deveci et al. 2014) and regional development (Pieriegud 2014) Low customer satisfaction (Xu et al. 2014) Unbalanced cargo flows (Deveci et al. 2014)
Supply chain level		
Communication, information sharing and technology		
Inadequate IT systems (Moberg et al. 2003; Richey et al. 2009) and information sharing (Ramesh et al. 2010; Richey et al. 2010; Fawcett et al. 2008) Legacy systems (Akyuz and Rehan 2009) Communication problems (Zorzini et al. 2012) Lack of willingness to share information (Fawcett et al. 2008; Walker et al. 2008) Lack of information (Harland et al. 2007) Disparity in technological capabilities (Ramesh et al. 2010), lack of technological capabilities (Giunipero et al. 2012) Lack of communication and knowledge flows (Patil and Kant 2014) Lack of infrastructure and technical assistance from suppliers (Patil and Kant 2014) Incompatible IT (Akyuz and Rehan 2009) Need for sophisticated IT infrastructure (Akyuz and Rehan 2009) Insufficient technical resources (Akyuz and Rehan 2009)	Technological barriers (Gold et al. 2012) Poor IT infrastructure (Jharkharia and Shankar 2005) Lack of access to modern technology (Gold et al. 2012) Technical constraints (Salin and Nayga 2003) Low diffusion of Information Technology (Lorentz et al. 2013) Lack of technology (Babbar et al. 2008; Prasad and Tata 2010) and Information Technology (Islam et al. 2005; Chong et al. 2011) and production technologies (Schotter and My 2013) Information sharing (Chong et al. 2011) Inadequate IT, low EDI usage (Islam et al. 2005)	Infrastructure (telecommunication)—internet access (Pires 2014) Information infrastructure (Febransyah and Simangunsong 2014) IT infrastructure (network) availability (Kassim and Abu Bakar 2014) Reliance on foreign technology suppliers (Bhattarai 2014) Outdated technology (Kuhn 2014) Legacy systems (Kassim and Abu Bakar 2014)

Inefficient IT support (Lönngren et al. 2010; Tummala et al. 2006)		
Costs, resources and capabilities		
Lack of resources (Giunipero et al. 2012; Fawcett et al. 2008; Richey et al. 2010) Need for high initial investments (Giunipero et al. 2012) Financial constraints (Faisal 2010) Costs (Walker et al. 2008; Koh et al. 2011; Harland et al. 2007)	Disparity between SC partners capabilities (Jharkharia and Shankar 2005) Lack of capabilities (Schotter and My 2013) Lack of technological (Jindra et al. 2009; Größler et al. 2013; Prasad and Tata 2010) and managerial capabilities (Größler et al. 2013; Lorentz and Ghauri 2010) Costs of supplier certification (Park and Min 2013) Costs of local employee training (Park and Min 2013) Costs such as certifications, audit and technical updates (Tencati et al. 2010) Costs of training and education (Tencati et al. 2010) Lack of resources (Schotter and My 2013) Lack of funds (Jharkharia and Shankar 2005) Lack of capital (Prasad et al. 2005)	Costs of greening the business (Febransyah and Simangunsong 2014) Transport costs (Febransyah and Simangunsong 2014; Pires 2014) Costs of CSR initiatives (Febransyah and Simangunsong 2014) Manufacturing costs (Febransyah and Simangunsong 2014) Training costs (due to high turnover) (Awni et al. 2014) Lack of resources (Bhattarai 2014) Lack of financial resources (Klapalová and Škapa 2014)

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Annex (continued)

SC barriers—generic Based on the literature	SC barriers in developing markets—specific Based on the literature	SC barriers based on the book chapters
HR, training and awareness		
Lack of training (Ramesh et al. 2010; Fawcett et al. 2008; Walker et al. 2008; Piotrowicz and Cuthberson 2012; Tummala et al. 2006) Lack of SC understanding (Ramesh et al. 2010; Patil and Kant 2014) and SC competences (Lönngren et al. 2010) Lack of knowledge and expertise (Harland et al. 2007) Lack of buyer awareness (Walker et al. 2008) Lack of awareness (Faisal 2010; Park and Min 2013) Needs and benefits are not understood (Harland et al. 2007) Lack of customer concerns (SCR) (Faisal 2010) Lack of concerns about reputation (Faisal 2010) Low familiarity with technology (Harland et al. 2007) Level of education (Piotrowicz and Cuthberson 2012) IT-related training (Akyuz and Rehan 2009) Human resources (Akyuz and Rehan 2009)	Lack of knowledge (Islam et al. 2005), SC (Diniz and Fabbe-Costes 2007) and managerial knowledge (Diniz and Fabbe-Costes 2007) Lack of professional skills (Joshi et al. 2009) Lower skills level (Scavarda et al. 2010), training (Chong et al. 2011, (Islam et al. 2005) and employee training (Ganescu et al. 2013) Poor SC understanding (Diniz and Fabbe-Costes 2007) and low comprehension of SC concepts (Lorentz and Ghauri 2010) Lack of awareness about IT use (Joshi et al. 2009; Jharkharia and Shankar 2005) Lack of recognition of potential benefits (Diniz and Fabbe-Costes 2007; Islam et al. 2005) Level of buyer sophistication (Ganescu et al. 2013) High labour turnover (Park and Min 2013)	Lack/limited skills and knowledge (Klapalová and Škapa 2014; Bhattarai 2014) Education level (Kassim and Abu Bakar 2014), Insufficient logistics education (Deveci et al. 2014) Inadequate training of managers and workers (Awni et al. 2014) Owners/managers are not familiar with new management concepts (Awni et al. 2014) Logistics is perceived as cost not source of competitive advantage (Klapalová and Škapa 2014) Poor motivation and problem solving skills (Deveci et al. 2014) Skills level (Kuhn 2014), shortcomings of educated and skilled workforce (Pires 2014) Education is not keeping pace with latest developments (Kuhn 2014; Klapalová and Škapa 2014) Lack of knowledge among managers (Klapalová and Škapa 2014) Lack of knowledge, skills and commitment in SME's (Kassim and Abu Bakar 2014) Attitude to acknowledge shortage of knowledge (Awni et al. 2014) Lack of awareness about potential benefits (Klapalová and Škapa 2014) High labour turnover (Awni et al. 2014) Absenteeism (Awni et al. 2014)

Industry specific barriers		
Perry and Towers (2013), Harland et al. (2007), Walker et al. (2008)	Gold et al. (2012), Salin and Nayga (2003), Joshi et al. (2009), Islam et al. (2005)	Nature of the product (Klapalová and Škapa 2014)
Inter-organisational level		
Measurement-related barriers		
Lack of metrics (Faisal 2010) and benchmarking standards (Faisal 2010) Difficulty in determining individual impact of each SC member (Richey et al. 2009) Difficulties in measuring costs (Fawcett et al. 2008, 2010) and SC contribution (Fawcett et al. 2008) Non-aligned (Fawcett et al. 2008, 2010; Richey et al. 2009) inconsistent and inadequate performance metrics (Ramesh et al. 2010; Richey et al. 2010; Fawcett et al. 2010) Problems in measuring customer demand (Fawcett et al. 2008) and requirements (Richey et al. 2009)	Costs of creation of the monitoring system (Tencati et al. 2010)	Value and benefits are hard to capture (Klapalová and Škapa 2014)
Strategic SC planning barriers		
Lack of SC vision (Ramesh et al. 2010) Lack of strategic planning (Ramesh et al. 2010; Richey et al. 2010; Faisal 2010; Patil and Kant 2014) Lack of common goals and objectives (Richey et al. 2010; Koh et al. 2011; Moberg et al. 2003; Akyuz and Rehan 2009) Lack of top management commitment/support (Ramesh et al. 2010; Giunipero et al. 2012; Fawcett et al. 2010; Faisal 2010; Tummala et al. 2006) Short-term focus (Moberg et al. 2003) Inconsistent operating goals (Fawcett et al. 2008) Misalignment short vs. long term goals (Giunipero et al. 2012) Lack of alignment between strategic and operational policies (Fawcett et al. 2010) Lack of clear alliance guidelines (Fawcett et al. 2008) Lack of consensus at CEO level (Giunipero et al. 2012)	Lack of communication and collaboration (Gold et al. 2012; Lorentz and Ghauri 2010) Inadequate communication (Diniz and Fabbe-Costes 2007) Improper collaboration and planning (Joshi et al. 2009) Lack of common goals (Diniz and Fabbe-Costes 2007) Lack of top level commitment (Joshi et al. 2009)	Lack of coordination (Deveci et al. 2014) Lack of long term planning (Kuhn 2014) Need to improvise (Parker and Luiz 2014) Lack of systematic approach to management (Klapalová and Škapa 2014)

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Annex (continued)

SC barriers—generic Based on the literature	SC barriers in developing markets—specific Based on the literature	SC barriers based on the book chapters
Lack of guidance for SC management (Richey et al. 2010) Lack of roles and responsibilities (Patil and Kant 2014). Lack of proper structure (Patil and Kant 2014).		
Relationships and commitment-related barriers		
Trust (Ramesh et al. 2010; Fawcett et al. 2008; Moberg et al. 2003; Lönngren et al. 2010; Koh et al. 2011) Fear of losing control (Moberg et al. 2003) Cultural differences between SC members (Fawcett et al. 2010; Koh et al. 2011; Zorzini et al. 2012) Languages (Zorzini et al. 2012) Little understanding and commitment between SC partners (Moberg et al. 2003) Unwillingness to share risk and reward (Ramesh et al. 2010; Richey et al. 2009, 2010; Fawcett et al. 2008, 2010) Reluctance of partners (Faisal 2010) Cost-based relationships (Faisal 2010) Pressure on costs and prices (Perry and Towers 2013; Walker et al. 2008) Additional burden on suppliers (Giunipero et al. 2012) De-centralised responsibilities (Lönngren et al. 2010) Lack of commitment (Walker et al. 2008) Different corporate cultures and managerial approaches (Akyuz and Rehan 2009) Opportunistic behaviour (Patil and Kant 2014).	Culture (Tencati et al. 2010) Business culture (Lorentz et al. 2013) Low local cultural awareness (Park and Min 2013) Level of customer orientation (Ganescu et al. 2013; Lorentz and Ghauri 2010) Lack of customer orientation (Gold et al. 2012) Strategic supplier partnership (Chong et al. 2011) Customer relationship (Chong et al. 2011) Lack of reliability among SC partners (Gold et al. 2012) Lack of trust (Jharkharia and Shankar 2005; Islam et al. 2005) Power distribution (Perry and Towers 2013) Buying practices (retailers) (Perry and Towers 2013) Low private-public cooperation (Islam et al. 2005) Low commitment (Islam et al. 2005)	Cultural differences (Awni et al. 2014; Parker and Luiz 2014; Kuhn 2014) Business culture (Xu et al. 2014) Relationships based on personal trust and informal agreements (Pieriegud 2014) Inadequate logistics culture (Pieriegud 2014) Language barriers (Awni et al. 2014) Social structure (Bhattarai 2014) Work with trusted suppliers only (Bhattarai 2014) Business ethics (Bhattarai 2014; Febransyah and Simangunsong 2014) Family-based businesses are not open to insiders (Bhattarai 2014) Pressure from customers, suppliers (Klapalová and Škapa 2014) Unbalanced power of strong foreign buyers (Febransyah and Simangunsong 2014) Costs pressure from buyers (Febransyah and Simangunsong 2014) Stakeholder engagement (Kassim and Abu Bakar 2014)

Outputs		
Productivity		
Note: here most papers were focused on benefits Resource efficiency {Richey, 2010 #1465} Productivity (Richey et al. 2009; Zorzini et al. 2012) Cost competitiveness (Fawcett et al. 2008) Better asset management (Fawcett et al. 2008) Operational efficiency (Koh et al. 2011) Efficiency (Lönngren et al. 2010; Tummala et al. 2006)	Inefficient cross-border procedures (Islam et al. 2005) Insufficient logistics services (Lorentz and Ghauri 2010; Islam et al. 2005) Border controls (Babbar et al. 2008; Islam et al. 2005) Low labour productivity (Park and Min 2013) Inefficient port operations (Islam et al. 2005)	Inefficient: processes (Bhattarai 2014), internal logistics (Pieriegud 2014), national transport and logistics systems (Pieriegud 2014) Low operational performance (Xu et al. 2014) Low productivity (Xu et al. 2014; Awni et al. 2014) Low production and trade efficiency (Pieriegud 2014) High logistics costs (Pieriegud 2014) Congestion (Deveci et al. 2014; Xu et al. 2014; Pires 2014; Pieriegud 2014), delays and queues (Parker and Luiz 2014; Deveci et al. 2014) High transport costs (Parker and Luiz 2014) Poor port performance (Parker and Luiz 2014) Transaction/trade costs (Kassim and Abu Bakar 2014; Parker and Luiz 2014) Costs (Xu et al. 2014; Parker and Luiz 2014) High indirect costs and losses (Parker and Luiz 2014) Paper-based documentation (Kassim and Abu Bakar 2014) Redundant tasks (control, data entry) (Kassim and Abu Bakar 2014) Costs of customs processes (Febransyah and Simangunsong 2014) Customs clearance problems (Kuhn 2014; Deveci et al. 2014; Parker and Luiz 2014)

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Annex (continued)

SC barriers—generic Based on the literature	SC barriers in developing markets—specific Based on the literature	SC barriers based on the book chapters
Quality		
Note: here most papers were focused on benefits Product quality (Fawcett et al. 2010; Richey et al. 2009) Customer satisfaction (benefit) (Fawcett et al. 2010) Service quality (Richey et al. 2010) On-time delivery (Richey et al. 2009) Quality (Fawcett et al. 2008; Walker et al. 2008)	Lack of safety and quality measures (Joshi et al. 2009) Inability to meet quality standards by local suppliers (Lorentz et al. 2013) Low availability of high quality of raw materials (Lorentz et al. 2013) Poor quality parts (Park and Min 2013) Lower quality levels (Prasad et al. 2005) Low quality standards (Harland et al. 2007) Quality of local suppliers (Ganescu et al. 2013) Not many high quality suppliers (Lorentz and Ghauri 2010) Inconsistent material delivery (Park and Min 2013) Lack of qualified suppliers (Park and Min 2013)	Problems in maintaining quality standards (Bhattarai 2014) Inaccurate order quality (Xu et al. 2014) Unfilled orders (Xu et al. 2014) Quality problems (Kuhn 2014) Labour and product quality (Xu et al. 2014) Defective products (Xu et al. 2014) Inadequate supervision (Awni et al. 2014) Problems in controlling costs and delivery times (Deveci et al. 2014) Errors in paper-based documentation (Kassim and Abu Bakar 2014) Maintenance problems (transport, machinery) (Parker and Luiz 2014; Kuhn 2014; Deveci et al. 2014) Quality of customs processes (Febransyah and Simangunsong 2014) Information delay (Xu et al. 2014)
Implementation-related barriers		
Resistance to change (Fawcett et al. 2008; Akyuz and Rehan 2009) Problems in changing current practices (Giunipero et al. 2012) Lack of employee empowerment (Fawcett et al. 2008) Lack of enforcement mechanisms (Faisal 2010) Inflexible organisational systems and processes (Fawcett et al. 2008) Organisational boundaries prevent integration (Richey et al. 2010) Lack of legitimacy (Walker et al. 2008)	Internal operations (Chong et al. 2011) Lack of standardisation (Joshi et al. 2009; Islam et al. 2005) Improper tracing (Joshi et al. 2009) Resistance to change (Jharkharia and Shankar 2005)	Process integration, between public and private sectors (Kassim and Abu Bakar 2014) Documents standardisation (Kassim and Abu Bakar 2014) Complex and multiple documentation (Deveci et al. 2014) Compliance (Kassim and Abu Bakar 2014) Data complexity and need for integration (Kassim and Abu Bakar 2014) Integration problems (Xu et al. 2014)

References

Akyuz, G. A., & Rehan, M. (2009). Requirements for forming an 'e-supply chain'. *International Journal of Production Research, 47*, 3265–3287.

Alfaro, L., & Chen, M. X. (2010). *Surviving the global financial crisis: Foreign direct investment and establishment performance*. Harvard Business School BGIE Unit Working Paper.

Arnold, D. J., & Quelch, J. A. (1998). New strategies in emerging markets. *Sloan Management Review, 40*, 7–20.

Arvis, J.-F., Mustra, M. A., Ojala, L., Shepherd, B., & Saslavsky, D. (2012). *Connecting to compete 2012: Trade logistics in the global economy*. Washington, DC: World Bank.

Arvis, J.-F., Mustra, M. A., Panzer, J., Ojala, L., & Naula, T. (2007). *Connecting to compete: Trade logistics in the global economy*. Washington, DC: World Bank. http://www.worldbank.org/lpi.

Awni, A. H., Abdul Aziz, M. S., & Awad, M. (2014). Arafa holding supply chain design and operations for luxury men's wear made in Egypt. In W. Piotrowicz & R. Cuthberson (Eds.), *Supply chain design and management for emerging markets: Learning from nations and regions*. Springer.

Babbar, S., Addae, H., Gosen, J., & Prasad, S. (2008). Organizational factors affecting supply chains in developing countries. *International Journal of Commerce & Management, 18*, 234–251.

Bhattarai, R. K. (2014). Supply chain development under conflict conditions – case of Nepal. In W. Piotrowicz & R. Cuthberson (Eds.), *Supply chain design and management for emerging markets: Learning from nations and regions*. Springer.

Cagliano, R., Blackmon, K., & Voss, C. (2001). Small firms under MICROSCOPE: International differences in production/operations management practices and performance. *Integrated Manufacturing Systems, 12*, 469–482.

Cetinkaya, B., Cuthbertson, R., Ewer, G., Klaas-Wissing, T., Piotrowicz, W., & Tyssen, C. (2011). *Sustainable supply chain management: Practical ideas for moving towards best practice*. Heidelberg: Springer.

Chong, A. Y., Chan, F. T., Ooi, K.-B., & Sim, J.-J. (2011). Can Malaysian firms improve organizational/innovation performance via SCM? *Industrial Management & Data Systems, 111*, 410–431.

Contractor, F. J., Kumar, V., Kundu, S. K., & Pedersen, T. (2010). Reconceptualizing the firm in a world of outsourcing and offshoring: The organizational and geographical relocation of high-value company functions. *Journal of Management Studies, 47*, 1417–1433.

Defee, C. C., Williams, B., Randall, W. S., & Thomas, R. (2010). An inventory of theory in logistics and SCM research. *The International Journal of Logistics Management, 21*, 404–489.

Deveci, A. D., Şakar, G. D., Işiktaş, R., & Tuna, O. (2014). Intermodal transport-based supply chain developments in Turkish automotive industry. In W. Piotrowicz & R. Cuthberson (Eds.), *Supply chain design and management for emerging markets: Learning from nations and regions*. Springer.

Diniz, J. D., & Fabbe-Costes, N. (2007). Supply chain management and supply chain orientation: Key factors for sustainable development projects in developing countries? *International Journal of Logistics Research and Applications, 10*, 235–250.

Ehrgott, M., Reimann, F., Kaufmann, L., & Carter, C. R. (2011). Social sustainability in selecting emerging economy suppliers. *Journal of Business Ethics, 98*, 99–119.

Faisal, M. (2010). Analysing the barriers to corporate social responsibility in supply chains: An interpretive structural modelling approach. *International Journal of Logistics Research and Applications, 13*, 179–195.

Fawcett, S. E., Magnan, G. M., & Fawcett, A. M. (2010). Mitigating resisting forces to achieve the collaboration-enabled supply chain. *Benchmarking: An International Journal, 17*, 269–293.

Fawcett, S. E., Magnan, G. M., & Mccarter, M. W. (2008). Benefits, barriers, and bridges to effective supply chain management. *Supply Chain Management, 13*, 35–48.

Febransyah, A., & Simangunsong, E. (2014). Supply chain competitiveness in food industry: An Indonesian case. In W. Piotrowicz & R. Cuthberson (Eds.), *Supply chain design and management for emerging markets: Learning from nations and regions*. Springer.

Ganescu, M. C., Asandei, M., Gangone, A., & Chirilă, C. (2013). Performance determinants for responsible supply chain management in the European emerging countries. *The Amfiteatru Economic Journal, 15*, 154–169.

Gereffi, G., & Lee, J. (2012). Why the world suddenly cares about global supply chains. *Journal of Supply Chain Management, 48*, 24–32.

Ghobakhloo, M., Arias-Aranda, D., & Benitez-Amado, J. (2011). Adoption of e-commerce applications in SMEs. *Industrial Management + Data Systems, 111*, 1238–1269.

Giunipero, L. C., Hooker, R. E., & Denslow, D. (2012). Purchasing and supply management sustainability: Drivers and barriers. *Journal of Purchasing and Supply Management, 18*, 258–269.

Gold, S., Hahn, R., & Seuring, S. (2013). Sustainable supply chain management in "Base of the Pyramid" food projects—a path to triple bottom line approaches for multinationals? *International Business Review, 22*, 784–799.

Gold, S., Seuring, S., & Jeff, A. N. N. (2012). Barriers of food supply chains in Africa – a Delphi study. *International Journal of Agricultural Resources, Governance and Ecology, 9*, 228–246.

Grant, R. M. (2010). *Contemporary strategy analysis* (7th ed.). Chichester: Wiley.

Größler, A., Laugen, B. T., Arkader, R., & Fleury, A. (2013). Differences in outsourcing strategies between firms in emerging and in developed markets. *International Journal of Operations & Production Management, 33*, 296–321.

Hameri, A.-P., & Tunkelo, T. (2009). Captive outsourcing – a way to move complex products to emerging markets. *Strategic Outsourcing: An International Journal, 2*, 54–67.

Harland, C. M., Caldwell, N. D., Powell, P., & Zheng, J. (2007). Barriers to supply chain information integration: SMEs adrift of eLands. *Journal of Operations Management, 25*, 1234–1254.

Islam, D. M. Z., Dinwoodie, J., & Roe, M. (2005). Towards supply chain integration through multimodal transport in developing economies: The case of Bangladesh. *Maritime Economics & Logistics, 7*, 382–399.

Jensen, P. D. Ø., & Pedersen, T. (2011). The economic geography of offshoring: The fit between activities and local context. *Journal of Management Studies, 48*, 352–372.

Jharkharia, S., & Shankar, R. (2005). IT-enablement of supply chains: Understanding the barriers. *Journal of Enterprise Information Management, 18*, 11–27.

Jindra, B., Giroud, A., & Scott-Kennel, J. (2009). Subsidiary roles, vertical linkages and economic development: Lessons from transition economies. *Journal of World Business, 44*, 167–179.

Johnson, G., Scholes, K., & Whittington, R. (2008). *Exploring corporate strategy: Text & cases* (8th ed.). Harlow: FT Prentice Hall.

Joshi, R., Banwet, D. K., & Shankar, R. (2009). Indian cold chain: Modeling the inhibitors. *British Food Journal, 111*, 1260–1283.

Kassim, E. S., & Abu Bakar, F. (2014). Malaysian government transformation towards effective supply chain management: The case of IT-based facilitation. In W. Piotrowicz & R. Cuthberson (Eds.), *Supply chain design and management for emerging markets: Learning from nations and regions*. Springer.

Klapalová, A., & Škapa, R. (2014). Companie's approach to reverse flows management: The case of the Czech Republic. In W. Piotrowicz & R. Cuthberson (Eds.), *Supply chain design and management for emerging markets: Learning from nations and regions*. Springer.

Koh, S. C. L., Gunasekaran, A., & Goodman, T. (2011). Drivers, barriers and critical success factors for ERPII implementation in supply chains: A critical analysis. *The Journal of Strategic Information Systems, 20*, 385–402.

Kuhn, J. (2014). Maintaining logistics quality in supply chains to developing countries: The case of automotive parts supplies to Egypt. In W. Piotrowicz & R. Cuthberson (Eds.), *Supply chain design and management for emerging markets: Learning from nations and regions*. Springer.

London, T., & Hart, S. L. (2004). Reinventing strategies for emerging markets: Beyond the transnational model. *Journal of International Business Studies, 35*, 350–370.

Lönngren, H.-M., Rosenkranz, C., & Kolbe, H. (2010). Aggregated construction supply chains: Success factors in implementation of strategic partnerships. *Supply Chain Management: An International Journal, 15*, 404–411.

Lorentz, H., & Ghauri, P. N. (2010). Demand supply network opportunity development processes in emerging markets: Positioning for strategy realization in Russia. *Industrial Marketing Management, 39*, 240–251.

Lorentz, H., Kittipanya-Ngam, P., & Singh Srai, J. (2013). Emerging market characteristics and supply network adjustments in internationalising food supply chains. *International Journal of Production Economics, 145*, 220–232.

Mefford, R. N., & Bruun, P. (1998). Transferring world class production to developing countries: A strategic model. *International Journal of Production Economics, 56*, 433–450.

Moberg, C. R., Speh, T. W., & Freese, T. L. (2003). SCM: Making the vision a reality. *Supply Chain Management Review, 7*, 34–39.

Nolan, P., Zhang, J., & Liu, C. (2008). The global business revolution, the cascade effect, and the challenge for firms from developing countries. *Cambridge Journal of Economics, 32*, 29–48.

Nordås, H. (2006). Time as a trade barrier: Implications for low-income countries. *OECD Economic Studies, 42*, 137–168.

Pagell, M., Katz, J. P., & Sheu, C. (2005). The importance of national culture in operations management research. *International Journal of Operations & Production Management, 25*, 371–394.

Palpacuer, F., Gibbon, P., & Thomsen, L. (2005). New challenges for developing country suppliers in global clothing chains: A comparative European perspective. *World Development, 33*, 409–430.

Park, B.-I., & Min, H. (2013). Global supply chain barriers of foreign subsidiaries: The case of Korean expatriate manufacturers in China. *International Journal of Services and Operations Management, 14*, 67–78.

Park, S. H., & Ungson, G. R. (2001). Interfirm rivalry and managerial complexity: A conceptual framework of alliance failure. *Organization Science, 12*, 37–53.

Parker, H., & Luiz, J. M. (2014). Designing supply chains into Africa: A South African retailer's experience. In W. Piotrowicz & R. Cuthberson (Eds.), *Supply chain design and management for emerging markets: Learning from nations and regions.* Springer.

Patil, S. K., & Kant, R. (2014). A fuzzy AHP-TOPSIS framework for ranking the solutions of knowledge management adoption in supply chain to overcome its barriers. *Expert Systems with Applications, 41*, 679–693.

Pearson, J. N., Carter, J. R., & Peng, L. (1998). Alliances, logistics barriers, and strategic actions in the People's Republic of China. *Journal of Supply Chain Management, 34*, 27–36.

Perry, P., & Towers, N. (2013). Conceptual framework development. CSR implementation in fashion supply chains. *International Journal of Physical Distribution & Logistics Management, 43*, 478–501.

Pieriegud, J., (2014). Designing FMCG & retail supply chains in Russia. In W. Piotrowicz & R. Cuthberson (Eds.), *Supply chain design and management for emerging markets: Learning from nations and regions*. Springer.

Piotrowicz, W., & Cuthberson, R. (2012). A structured approach for assessing sustainable best practices in supply chains. In P. Golinska & M. Hajdul (Eds.), *Sustainable transport: New trends and business practices*. Heidelberg: Springer.

Pires, S. R. I. (2014). The current state of supply chain management in Brazil. In W. Piotrowicz & R. Cuthberson (Eds.), *Supply chain design and management for emerging markets: Learning from nations and regions*. Springer.

Pitkethly, R. (2006). Analysing the environment. In D. O. Faulkner & A. Campbell (Eds.), *The Oxford handbook of strategy: A strategy overview and competitive strategy* (Vol. 1, pp. 231–266). Oxford: Oxford University Press.

Power, D. J., Sohal, A. S., & Rahman, S.-U. (2001). Critical success factors in agile supply chain management – an empirical study. *International Journal of Physical Distribution & Logistics Management, 31*, 247–265.

Prasad, S., & Babbar, S. (2000). International operations management research. Discipline Note. *Journal of Operations Management, 18*, 209–247.

Prasad, S., & Tata, J. (2010). Micro-enterprise supply chain management in developing countries. *Journal of Advances in Management Research, 7*, 8–31.

Prasad, S., Tata, J., & Madan, M. (2005). Build to order supply chains in developed and developing countries. *Journal of Operations Management, 23*, 551–568.

Qi, Y., Boyer, K. K., & Zhao, X. (2009). Supply chain strategy, product characteristics, and performance impact: Evidence from Chinese manufacturers. *Decision Sciences, 40*, 667–695.

Ramesh, A., Banwet, D. K., & Shankar, R. (2010). Modeling the barriers of supply chain collaboration. *Journal of Modelling in Management, 5*, 176–193.

Richey, R. G., Jr., Chen, H., Upreti, R., Fawcett, S. E., & Adams, F. G. (2009). The moderating role of barriers on the relationship between drivers to supply chain integration and firm performance. *International Journal of Physical Distribution & Logistics Management, 39*, 826–840.

Richey, R. G., Jr., Roath, A. S., Whipple, J. M., & Fawcett, S. E. (2010). Exploring a governance theory of supply chain management: Barriers and facilitators to integration. *Journal of Business Logistics, 31*, 237–256.

Roztocki, N., & Weistroffer, H. R. (2011). Information technology success factors and models in developing and emerging economies. *Information Technology for Development, 17*, 163–167.

Sagheer, S., Yadav, S. S., & Deshmukh, S. G. (2009). Developing a conceptual framework for assessing competitiveness of India's agrifood chain. *International Journal of Emerging Markets, 4*, 137–159.

Salin, V., & Nayga, R. M., Jr. (2003). A cold chain network for food exports to developing countries. *International Journal of Physical Distribution & Logistics Management, 33*, 918–933.

Scavarda, L. F., Reichhart, A., Hamacher, S., & Holweg, M. (2010). Managing product variety in emerging markets. *International Journal of Operations & Production Management, 30*, 205–224.

Schotter, A., & My, H. D. T. (2013). The effects of the global financial crisis on supply chain members in non-BRIC emerging markets. *Thunderbird International Business Review, 55*, 609.

Storey, J., Emberson, C., & Reade, D. (2005). The barriers to customer responsive supply chain management. *International Journal of Operations & Production Management, 25*, 242–260.

Tencati, A., Russo, A., & Quaglia, V. (2010). Sustainability along the global supply chain: The case of Vietnam. *Social Responsibility Journal, 6*, 91–107.

Tokman, M., Richey, R. G., Marino, L. D., & Weaver, K. M. (2007). Exploration, exploitation and satisfaction in supply chain portfolio strategy. *Journal of Business Logistics, 28*, 25–56.

Tummala, V. R., Phillips, C. L., & Johnson, M. (2006). Assessing supply chain management success factors: A case study. *Supply Chain Management: An International Journal, 11*, 179–192.

UNCTAD. (2014). *Methodology and classification* [Online]. United Nations Conference on Trade and Development (UNCTAD). Accessed March 5, 2014, from http://unctadstat.unctad.org/UnctadStatMetadata/Classifications/Methodology&Classifications.html#DISTRIBUTION_OF_DEVELOPING_ECONOMIES_BY

Walker, H., Di Sisto, L., & Mcbain, D. (2008). Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sectors. *Journal of Purchasing and Supply Management, 14*, 69–85.

Wong, C., Skipworth, H., Godsell, J., & Nemile, A. (2012). Towards a theory of supply chain alignment enablers: A systematic literature review. *Supply Chain Management, 17*, 419–437.

Xu, W., Song, D. P., & Roe, M. (2014). Modelling Chinese manufacturer oriented domestic and international supply chains with uncertainties. In W. Piotrowicz & R. Cuthberson (Eds.), *Supply chain design and management for emerging markets: Learning from nations and regions*. Springer.

Zhu, Q., Tian, Y., & Sarkis, J. (2012). Diffusion of selected green supply chain management practices: An assessment of Chinese enterprises. *Production Planning & Control, 23*, 837.

Zorzini, M., Stevenson, M., & Hendry, L. C. (2012). Customer enquiry management in global supply chains: A comparative multi-case study analysis. *European Management Journal, 30*, 121–140.

The Current State of Supply Chain Management in Brazil

Sílvio R.I. Pires

Abstract Over the last few decades, the concept of Supply Chain Management (SCM), whose main goal of achieving simultaneous cost reduction throughout the supply chain and a perceived increase in value of the product/service, has emerged worldwide as one of the most promising areas of business management. The main objective of this chapter is to present to the international audience a broad panorama of the current situation of SCM in Brazil, such that the reader can increase his/her knowledge concerning some key issues that characterize and/or influence it. Both positive and negative issues are described and analysed from a macro perspective. Additionally, this chapter highlights some cases of successful implementation of SCM practices in Brazil. Due to the scope and contemporaneous nature of the theme, the research design uses an exploratory approach with reference to some case studies. Most data reported in the text were obtained as part of a broader ongoing research project on the identification and analysis of best SCM practices currently implemented in Brazil. Additionally, a framework was developed with the aim of illustrating the logic of the development of the chapter. The text points out that Brazil contains many positive aspects for successful SCM, but some negative issues still remain to be addressed, so that the country can manage its supply chains more effectively, and most of these negative issues are the responsibility of government.

1 Introduction

The industrialisation process in Brazil took place during the twentieth century, mainly with the establishment of the steel industry in the 1940s and automobile manufacturing in the 1950s. During the military regime spanning the 1960s and 1970s, the country experienced a phase of great investment, especially in infrastructure. However, the economic policy of the period generated an inflationary process, which reached its critical point during the 1980s. The period was also

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W. Piotrowicz, R. Cuthbertson (eds.), *Supply Chain Design and Management for Emerging Markets*, DOI 10.1007/978-3-319-05765-1_2

characterised by economic stagnation, and on the political front, by the redemocratisation of the country. The first half of the 1990s marked the end of high inflation, the result of a successful economic plan called Real, which was well developed and implemented by the federal government. The ensuing economic stability, allied to the privatisation process in basic sectors, such as telephony, steel and highways, led to the emergence of an economic development cycle that has lasted right up to the present day. Thus, from the second half of the 1990s, the country has been receiving a series of new (mainly foreign) investments, especially in the following sectors: automobiles, electro-electronics, agribusiness and large scale retailing. Consequently, the country has diversified its industrial economy substantially, becoming a large producer and exporter of goods, which range from commodities to finished products, such as automobiles and aircraft. In parallel, great expansion occurred in some Brazilian companies operating abroad, as in the case of Vale (iron ore mining), Petrobras (oil), Gerdau (steel), Embraer (aircraft), Odebrecht (construction), Marfrig (animal-based foods) and AB InBev (brewing).

The country ended 2011 with a GDP of US$2.4 trillion, exceeding that of the UK and occupying sixth place in the world rankings (Monaghan 2012). However, this positive figure needs to be analysed with care, as this wealth must be divided among a population of approximately 194 million with an income distribution that, despite much improvement in the last decade, still remains quite unequal.

Furthermore, for almost two decades, the country has enjoyed a period of stability from both political and economic aspects. During this period, success in managing some commodity supply chains has transformed the country into a major world producer and exporter, of, for example: frozen concentrated orange juice, beef, pork, chicken, soya, iron ore and ethanol, among others. Moreover, there is currently a series of new investments being made in the country (as in the case of new factories like Fiat, Nissan, General Motors, Ford, Hyundai, Toyota, Caterpillar, Foxconn, etc.) and for the mega sporting events scheduled for 2014 (the World Cup) and 2016 (the Olympic Games). Likewise, the country will need investments to execute the challenging project about to be undertaken by Petrobras—petroleum exploration in the pre-salt layer offshore. Such an enormous oil reserve could, in the near future, place the country among the world's six leading producers.

In this context, the main objective of this chapter is to present to the international audience a broad panorama of the current state of SCM in the country, such that the reader can increase his/her knowledge about some key issues that characterize and/or influence it. The SCM in the country is described and analyzed from the macro perspective of some positive and negative issues which exert an influence on it. Furthermore, some successful cases of implementation of SCM practices are highlighted.

The chapter is structured into six main sections. The first introduces the text, presents its contextualization and main objective. The second describes the basic aspects of the research design, emphasizing some peculiarities of this text developed and written as a book chapter. The third and fourth describe and analyze some current issues that, respectively, positively and negatively influence SCM in the country. The fifth presents some cases of successful implementation of SCM practices in the country. The sixth presents the final remarks.

2 Research Design

Following the guidelines specified for the book content, this chapter seeks to concentrate on the practical aspects of SCM in the country, in order to provide the reader with a broader view of the important matters that facilitate or complicate its effectiveness. Also, considering the scope and contemporaneous nature of the theme in methodological terms, it uses an exploratory approach with reference to some case studies. Despite the specificity of the text as a book chapter, it is sought, as far as possible, to follow the standard procedures suggested in the conduct of the case studies, such as that by Voss et al. (2002). Likewise, Yin (2008) stated that an exploratory study is adequate when the situations analysed are contemporary, comprehensive and complex; there is greater focus on the understanding of the facts and not on their measurement; there are various methodological sources for the evidence of the facts, and when there is no control over the events/behaviour regarding the facts/persons involved in the research meaning.

Therefore, owing to the text's purpose, although the methodological question is not constantly explained, the data presented was obtained from (1) the companies studied (primary data) and (2) bibliographical research, particularly in Brazilian publications.

Primary data reported in the text was obtained from the companies as part of a broader ongoing research project on the identification and analysis of SCM best practices currently implemented in the country. The project is co-ordinated by the author of this chapter and is still at the stage of compilation and analysis of data obtained by a mixed process of surveys and on-site interviews using semi-structured questionnaires. The vast majority of issues concerning positive/negative practices and successful practices presented here arose in this preliminary data during the first 2 months of 2012.

It is also important to point out that the author's first-hand experience in previous works in the country, which took place over two decades, has facilitated the development of this text. However, many of these previous works were performed for companies under contract. Hence, as these were not public works and/or publications, they may not be quoted directly.

As illustrated in Fig. 1, a framework was developed with the aim of guiding and illustrating the logic of the development of the chapter. The framework illustrates that SCM in the country is described and analysed from a macro perspective of its positive and negative issues. In this environment, some cases of successful implementation of SCM practices emerged. Concomitantly, these descriptions and analyses are performed in the country, the industrial sector and at company level.

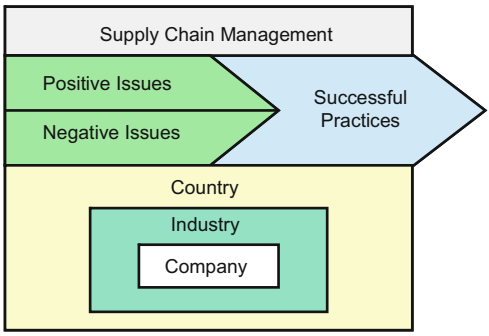

Fig. 1 Chapter development framework

3 Positive Issues

This section presents six current issues that have a positive effect on SCM in the country. They are: (1) political and economic stability, (2) a large domestic market and demographic bonus, (3) diversification of the economy, (4) a flexible workforce, (5) future major sporting events and (6) the pre-salt project. As aforementioned, they were identified by an ongoing research project, which is co-ordinated by the author of this chapter, on the identification and analysis of SCM best practices currently implemented in the country.

3.1 Political and Economic Stability

After the military government that lasted from 1964 to 1985, in the last few decades, the country has gradually consolidated its democratic regime. Unlike some other Latin American countries, Brazil has striven to maintain independence of the executive, legislative and judiciary powers, as well as keep the armed forces under the administration of elected politicians. With free media, cases of corruption, especially those of politicians, are much more frequently divulgated and debated. But the most important point for SCM is that, at present, there is an environment of free enterprise, and rules and contracts are respected. This seems an obvious statement, but one should remember that it was not always (nor does it remain) so in some countries in Latin America. This is one of the main factors that explains the quantity of new foreign investment over the last decade.

Another factor is the stability of the currency and the relatively low inflation rate. In 2011, the rate was 6.5 %, the highest since 2004. Moreover, since 1999, the country has adopted a policy of floating exchange rates, that is, without direct government control and subject to market forces.

During the last decade, the significant entry of foreign capital for new investment and the increase in export value, have ended up generating a strong valuation of the

national currency (Real), in particular, against the US Dollar and the Euro. Consequently, importation has been favoured, whereas exportation has suffered. Despite frequent complaints from exporting companies, the floating exchange rate policy remains firmly in place.

For SCM, this political and economic stability has been positive, above all for the definition and planning of new investments and implementation of a more technical and predictable management process, as well as the development and management of long term partnerships.

3.2 Large Domestic Market and Demographic Bonus

Besides the economic stability and new investments in the last decade, in an attempt to eradicate extreme poverty, the country has also intensified social programmes for redistribution of income to the poorest class. In this period, great change has been seen in terms of socio-economic class ascension, such that approximately half of the population (97 million) now belongs to the middle class. Thus, even in this period of world economic crisis, the domestic market has proven to be strong, indeed thriving sufficiently well or consumption of the major part of the industrial production. For the supply chains, principally those involved with consumer goods, this has been very positive.

With respect to its demographic data, according to the IBGE (Brazilian Institute of Geography and Statistics), the country currently has a population of approximately 194 million inhabitants, which positions it as the fifth most populous country in the world. The vast majority of this population resides in the coastal region, especially in the southeast, and the population density is low (22.43 inhabitants/km^2). The population growth has declined significantly in the last two decades and the current average fertility rate is 1.94 children per woman, which is below the 2.1 technically defined as the population replacement rate (IBGE 2012). Furthermore, nearly half of the current population was considered young and able to work during the first three decades of the twenty-first century. This fact is often labelled as a demographic bonus, that is, it is a window of opportunity and advantage which the country is enjoying prior to reaching the situation found in most developed countries today.

3.3 Diversification of the Economy

At present, economic activities are diversified. Regarding the composition of the country's current GDP, the agricultural sector represents 6.1 %, industrial (manufacturing) 25.4 % and service 68.5 %. Brazilian agribusiness has become one of the most productive in the world, taking advantage of the tropical climate that is conducive to rapid crop maturity and high yields. A fundamental role in this

has been played by Embrapa, the agricultural research company created in 1973 by the Federal Government, which, in the last few years has become a world reference for tropical agricultural research. Today, agribusiness is a major driving force in the economy, such that, in the last decade, the country has become the main world producer and exporter of commodities, such as frozen concentrated orange juice, ethanol, meat (beef and chicken), sugar, soya and coffee.

Another remarkable point regarding agribusiness is that ethanol production and its use as a fuel in the country began back in 1975 and represents the largest renewable fuel programme implemented in the world. More recently, due to increased world interest in replacing fuels derived from petroleum by those from renewable sources, along with the campaign to reduce polluting gas emissions, allied to concerns over global warming, many countries are looking into following the Brazilian example. In this country, ethanol is produced from sugar cane, using technology that has been improved over the years, and today it is exported to various countries. As a fuel, it is also mixed with petrol, but the consumption in its pure form is much greater.

Almost all the vehicles that traditionally used to run on petrol are now flex, the engines being designed to use either fuel. However, in the last few years, the great increase in sales of such vehicles (especially to the burgeoning middle class) has not been accompanied by ethanol production. Therefore, over the next few years, investments in the sector should grow, bringing clear benefits to the various industrial sectors and supply chains.

Approximately 50 % of the country's energy matrix is renewable, as in the case of hydroelectricity and ethanol, compared to an average of around 15 % in the rest of the world. In view of the growing demand for energy, the Federal Government has already made a series of investments in new hydroelectric schemes. Belo Monte, already under construction on the Xingu River in the Amazon region, will be the second largest region in the country in terms of capacity after Itaipu, built three decades ago on the border with Paraguay.

The industrial sector can be considered mature, diversified and as having great capacity, especially in the south-east, the most industrially developed region. In the last few decades, significant expansion in the industrial sector has also occurred in the Centre-West, South and North-East Regions, which has brought new challenges for those supply chains most involved, especially those in the automobile and food sectors.

Another noteworthy fact concerning the country's industry over the last few decades is the process of internationalization of some major companies and the consequent expansion of their operations overseas, for example, Vale (iron ore mining), Petrobras (oil), Gerdau (steel), Embraer (aircraft), Odebrecht (construction), Marfrig (animal-based foods) and AB InBev (brewing).

The service sector is the major employer and is also quite dynamic and up-to-date. The banking sector, for example, presents a very positive situation today in terms of solidity.

The wholesale and distribution sector has also grown and increased its productivity significantly. In a country of continental proportions, this sector is

fundamental to guaranteeing that products, mainly those low in value and/or small in quantity, reach their destinations, even the most distant ones. The retail sector has also expanded substantially, particularly due to increased purchasing power. Small and medium size retailers have updated and increased their use of Information and Communication Technology (ICT) in their procedures. The large retailers rely on the major players from Europe and the United States, as well as some large national ones. Currently, they provide a strong power of governance in practically all of their supply chains.

E-commerce grew by 40 % in 2011 and topped $25 billion, according to recent data released by the Brazilian press. This is the highest in the whole of Latin America but still only represents about 1 % of GDP and has very little impact on conventional SCM.

3.4 Flexible Workforce

In relation to the workforce, despite the problems discussed later in this text, it is worth highlighting the multicultural and flexible nature of the Brazilian people, which seems to be a welcome factor, especially with the growth of the so-called globalisation of the economy.

3.5 Future Major Sporting Events

Two mega sporting events are scheduled to take place in the near future, the first being the Football World Cup, in 2014. After 64 years, the country will once again host the event for the second time in history. Matches will take place in 12 state capitals, which will have to prepare the infrastructure, in particular, the construction and/or modernisation of the stadiums, hotels and transport network. The second event, the Olympic Games, which the country has never hosted before, will be held in August 2016 in Rio de Janeiro.

As happens in these cases, diverse industrial sectors and supply chains are receiving investments to meet the various requirements of the events, and it is expected that many of these investments will leave a positive legacy in terms of the country's infrastructure and SCM.

3.6 Pre-salt Project

Petroleum exploration in the country is managed by Petrobras, which is an open capital company whose major shareholder is the government. Since 2006, the country has been self-sufficient in petroleum production. However, as the majority

of its refineries have been designed for light imported petroleum and the country produces the heavy type, it has ended up having to import and export the product. With the modification and construction of new refineries, importation may become unnecessary in the near future.

In its trajectory, Petrobras has developed recognised competence in deep-water exploration, and, currently, the great majority of its production comes from offshore platforms, close to the coast in the South-East region. In 2009, the company announced the discovery of gigantic petroleum reserves in the pre-salt area, which is a set of submarine rock strata located along much of the Brazilian coast bearing great potential for the generation and accumulation of petroleum. Such an enormous oil reserve could, in the near future, place the country among the world's six leading producers. However, it will need to face the challenge of extracting petroleum from a depth of 10 km and processing it at a distance of 300 km from land.

The project has already introduced positive effects (such as large investments, increased demand, hiring of labour, etc.) for diverse industrial sectors and supply chains and this should intensify in the years up to 2020, when it is expected that the country will produce approximately 6 million barrels per day—triple the present figure. On the other hand, many of the future impacts of this mega-project are still difficult to evaluate, especially with respect to the current programmes of renewable energy, such as ethanol.

4 Negative Issues

This section presents five current issues that adversely affect SCM in the country. They are: (1) infrastructure (telecommunication and transport), (2) the taxation system, (3) geographical localization, (4) shortcomings in the workforce and (5) environmental sustainability. They were identified by the same research project (which has already been mentioned) that identified the positive issues.

4.1 Infrastructure

With regard to infrastructure, two elements are presented for effective SCM: telecommunication and transport.

4.1.1 Telecommunication

Until the mid-1990s, the country had a precarious telephone system administered by state companies. Then the Federal Government promoted a major process of

privatisation in the sector, which, today, is much more equipped to provide for communication needs in the business world.

According to the International Telecommunications Union agency (of the United Nations), Brazil is the sixth largest market in mobile telephony and currently has 247 million active mobile phone lines, making it the fourth largest user of cell phones in the world, just behind China, India and the U.S. Furthermore, with 76 million (39.1 % of the population) Internet users, the country has the fifth largest number of people connected to the network, after Japan, India, the U.S. and China. Also, 45 % of households (in the country) have a computer and 38 % of them have an Internet connection (ITU 2012).

However, the capacity of Brazilian telephony, especially in terms of Internet broadband, is still lacking compared with that of developed countries. The charges for using it are still relatively high, but the prospects of improving the sector are positive, especially considering the future demand which should be generated by the two aforementioned mega sporting events.

4.1.2 Transport

The country is usually presented as the fifth largest in the world in terms of its territorial dimensions (8.5 million km^2), occupying 47 % of the area of South America. From the perspective of a continuous land mass, it is the fourth, if one discounts the territories of Alaska and Hawaii in the USA. As mentioned earlier, although its demographic density is still relatively low, the bulk of the population (and the principal consumer market) remains concentrated in the South-East Region and along the coast. Allied to the difficulties of the transport infrastructure already mentioned, this creates a complex situation for SCM, especially in the distribution of perishable products, such as food. Traditionally, this difficulty (inbound) has always been attenuated by positioning the productive units as close as possible to the supply sources, except in the case of the Manaus Duty Free Zone. But the logistical difficulties in the distribution (outbound) of certain products have always been marked.

However, the unbalanced use of modals in the country's transportation is greatly inconvenient. Table 1 illustrates the 2011 values for the transport matrix of the country.

It is noteworthy that the matrix is quite unbalanced, featuring high usage of the road transport mode. Since the end of the 1950s, with the establishment of the automobile industry, the road option has been growing and taking over space previously occupied by the rail transport mode. This has created scrapping of a great part of the rail network. Only in the last decade, with the privatisation of the state-run rail companies, has investment in this mode been resumed. Even so, some obstacles remain, such as the difficulty in crossing large urban centres, due to the lack of ring-rail lines that avoid trains having to pass through heavily populated regions. The best example of this is the limited rail access to the Port of Santos (the

Table 1 Transport matrix in Brazil in 2011 (TKU—tons per kilometre)

Mode	Millions of TKU transported	Participation (%)
Air	3,169	0.4
Pipeline	33,300	4.1
Water	108,000	13.5
Rail	164,809	20.7
Highway	485,625	61.3
Total	794,903	100.0

Source: Confederação Nacional do Transporte—CNT (2011) [National Transport Confederation]

main port in the country), precisely because trains have to pass through the metropolitan region of São Paulo, the largest urban region in South America.

Moreover, with regard to the rail mode, it is important to stress that, despite numerically representing around 20 % participation, at least half of this figure is operated by the company, Vale, whose private network is dedicated to iron ore transport. Regarding the percentage participation of the road mode (61.3 %), it is important to point out that this is not homogeneous throughout the country. Thus, in São Paulo State (the most industrialised state, producing almost 40 % of the GDP), the participation of the road mode is approximately 85 %.

Paradoxically, Brazil, which possesses mainly flat relief, and is the fifth largest territorial area in the world after Russia, Canada, China and the USA, presents a transport matrix quite distinct from these other four and is more akin to some European countries with much smaller territorial dimensions, e.g. Belgium and Holland.

As there is little use of the rail mode, and river and coastal transport are still incipient, the country is still highly dependent on road transport. As an illustration, a lorry journey from Porto Alegre in the south to Belém in the north covers a distance of 4,000 km. Such journeys are often made more difficult by a lack of ring road, forcing vehicles to pass through large urban centres, such as the São Paulo metropolitan region, which is becoming progressively congested.

In addition, even with great reliance on the road mode, the majority of the network still consists of basic two-way roads, often in a state of disrepair. One exception to the rule is São Paulo State, where the majority of major roads are duplicated and well-maintained. On the other hand, since the mid-1990s, they have been administered under a concessionary regime by private companies which charge significant tolls for their use.

For businesses, transport costs have thus ended up being quite significant and atypical situations have arisen. For example, to transport a basic container from China to Brazil, it is necessary to make a voyage of approximately 17,000 km, usually taking 30–35 days. At present, the respective freight charge is US$1,200. However, although the subsequent road journey from the Port of Santos to São Paulo City is only 80 km, the transport cost (freight plus tolls plus insurance and eventual security services) is practically the same. This is one of the great distortions in supply chain costs.

Another relevant factor is the growing use of cars and motorcycles for personal transport. With the relative reduction in vehicle prices, the increase in purchasing power and the lack of investment in public transport (especially railways), the country currently travels on powered road vehicles and the congestion worsens every day, especially in the large urban centres. This has various negative consequences for SCM, including significantly growing costs.

Despite significant government efforts to improve the situation, another negative point concerning road haulage is the considerable rate of theft, especially that of electronic goods, medications, cigarettes and other items that are easier to commercialize. This has led to some products being transported by private security escorts and being tracked by satellite. In some chains, especially those for electronics and medications, such expenditure can be quite significant.

With respect to the water transport mode, the country has made considerable public and private investment to improve the efficiency of its ports. New private terminals and ports, specializing in handling the import/export of certain cargoes, have been constructed. However, in comparison with some major world ports, there is still much room for improvement, principally in terms of productivity and speed of service. The use of inland waterways is still very incipient, this being most significant in the Amazon and particularly concerning the rivers near Manaus and Belém, the two major cities in the region.

Use of the air transport mode, particularly for passengers as opposed to cargo, has grown significantly over the last decade. Factors such as the increase in income of those with the least purchasing power, growth of competition between firms in the sector and the consequent reduction in fares, along with larger travelling distances, have all influenced the growth of air passenger transport. However, government investment in the sector has been less than that required, which has generated a clear bottleneck in the development of the country's infrastructure. The expectation is that this situation will tend to be aggravated during the two forthcoming mega sporting events. Regarding this, the current Federal Government finally revised its nationalistic rhetoric, and in January 2012 it conducted the privatisation of three major airports: Guarulhos, Campinas e Brasília. Among them, Guarulhos, located in the São Paulo metropolitan region, has the largest volume of passenger traffic in Latin America. Great investment in improvement and expansion are scheduled for these airports over the coming years, as well as in others that remain under state company control.

The use of the air mode for cargo transport has also grown. The main airports in terms of the volume of cargo handled, in descending order, are: Guarulhos, Campinas and Manaus. The first presents a heterogeneous cargo profile and takes advantage of passenger aircraft to carry small- to medium-sized cargoes. Campinas Airport is located 80 km from São Paulo City and acts as an important link in the supply chains for electronic goods and computer industries located in the region, especially imported low volume, high added value, electronic components. Manaus Airport is located in the city, which is inhabited by almost 2 million and is in the middle of the Amazon jungle, where access is only possible by river or air.

The so-called Duty Free Zone (which has a special taxation system) of Manaus was created by the Federal Government in 1967 with the aim of promoting economic development in the western Amazon. When based in this region, companies are exempt from import and export taxes, as well as enjoying partial exemption from state and municipal taxes. Despite all the difficulties of transporting cargo in and out of the region, today the place possesses a large industrial park, comprising mainly companies that require large volumes of imported components, such as the electronics and motorcycle industries. However, the SCM involving suppliers or customers located in the region is always a great challenge because transport is limited to the joint use of lorries and river, that is, as stated above, there is no highway linking the region to the rest of the country. Thus, land transport between the cities of São Paulo and Manaus usually takes a fortnight, which is in fact a very long time considering the reality of SCM in some of the more competitive industrial sectors.

However, it is not all bad news in the transport area. The privatisation of most of the rail network and the growth in the use of LSPs have also stimulated the growth of intermodal terminals and distribution centres (whether for exclusive or shared use), especially near large urban centres or major highway, rail and river intersections in the interior. This has already begun to bring positive results for SCM, as in the case of the sugar-exporting chain. Much of the present produce is carried by lorries to intermodal terminals near the production area in the interior, from where it continues its journey by train to the Port of Santos.

In turn, whenever long-term demand justifies, the duct transport mode is used to transport bulk volumes of material in a liquid or gaseous state. In this instance, the comparative advantages of duct transport over other modes are generally quite clear. As a result, the use of ducts has also been extended to the transport of solid materials, such as ores, cement and cereals. The transport of ore over long distances is effected with the aid of a fluid (such as water), and the transport of cement and cereals over short journeys with the aid of air.

One successful case of ore transportation is that of the company Samarco's iron pellet exportation process. It uses two parallel ore ducts (pipes that have special pumps capable of handling solid material), approximately 400 km in length, linking the mining area to the processing area, as well as to the exporter located on the Espírito Santo State coast. Both ducts are the longest in the world and the first of their kind in the sphere of ore transport. The company is also currently planning to construct a third (Samarco 2012).

4.2 Taxation System

The present Brazilian taxation system is a serious obstacle to business development in the country. The system dates back to the 1960s, when the tax burden was approximately 15 % of (the) GDP. Since then, the tax burden has increased significantly, the present figure being around 37 %, which is far in excess of what

would be expected, especially in view of the services the State provides for citizens. The system is composed of around 60 taxes (levied at federal, state and municipal levels) which generally require a series of slow, onerous, bureaucratic procedures. This means that many companies have to maintain specific sectors specialising in tax planning. A major part of the tax revenue (that is, indirect or cascade taxes) is collected at each transaction stage from the companies in the supply chain, rather than when the product is finished or sold to the final consumer. This represents, on average, about 33 % of company revenue, or 45 % of their production costs. For example, nowadays, tax accounts for, on average, around 43 % of food prices, 45 % in the case of road vehicles. This happens in practically all industrial sectors, including the naturally-differentiated sectors, such as medications, where the average tax component is 35 % of the retail price.

The existence of federal, state and municipal taxes, as well as the taxation of every transaction among the firms in the supply chain, has also created a curious demand in many enterprises. Besides designing and managing their supply chains based on classical criteria propagated in the world literature, many of the companies also have to consider the taxation question to decide where (in which municipality or state) they are going to produce their goods or buy their inputs. This occurs because the states and municipalities have autonomy to stipulate the rates of the taxes they administer. As a consequence, "fiscal war" occurs among states and/or municipalities in their attempts to attract companies. In turn, many companies end up structuring sectors, commonly labelled "financial logistics", to constantly seek reductions in the cost of taxation in their supply chains.

In the last two decades, with the intensification of the "fiscal war" among states and/or municipalities, new factories have been installed in locations chosen more by tax incentive criteria than logistical concerns. This is the case, for example, with new automobile assembly plants built in the extreme south and north-east. In these cases, the great difficulty lies mainly in the supply process (inbound), because the great majority of the suppliers of auto parts remain installed in the South-East Region, more specifically in São Paulo State. Thus, generally, it remains for the professionals who conduct the SCM to face the interminable challenge of seeking solutions that make the operations in the supply chain viable, as well as minimise their logistical costs.

Another negative point in this context concerns the bureaucracy, still in existence, involved in opening a firm. Some social scientists attribute this bureaucratic culture to the complexity of operation over the country's history, that is, the legacy of Portuguese colonization (from 1500 to 1822), its lifestyle and way of conducting public administration.

However, in the schools, right from the start, one is taught that the country has been sovereign and independent since September 1822. So, long ago, there may have been a taxation system that was simpler, less burdensome and which provided more incentive for productive activity.

4.3 Geographical Localization

The geographical location of the country in Latin America often places it at a disadvantage in competitive terms due to the great distance that separates it from its main trading partners. In 2010, its 10 main partners, in decreasing order of value transacted, were: China, USA, Argentina, Japan, South Korea, Holland, Italy, France, Chile and England. In other words, the great majority of its trading partners are located far away in the northern hemisphere. Also, in 2010, the 12 main products exported were: ores, petroleum, vehicles/parts, soya, sugar, iron/steel, paper/pulp, chicken, chemical products, beef, machinery/equipment, and aircraft. This illustrates that the majority of the products exported continue to be commodities that incur significant costs in shipping to their respective country destinations. It is also important to emphasize that the offer and/or availability of ships and aircraft to transport cargo in the country is much lower than in other industrialized regions of the planet.

4.4 Shortcomings in the Workforce

The country presented in 2012 a general unemployment rate of 5.5 %, which is relatively positive when compared to the current situation in some European countries. Curiously, just as at the end of the nineteenth century and the beginning of the twentieth century, the country is once again a destination for immigrants, at the moment, mostly with poor educational levels, from neighbouring Latin American countries.

However, the cited unemployment rate of 5.5 % could, in fact, be even lower, as many vacancies cannot be filled for lack of qualifications. This has occurred more frequently with technical and more specific functions, especially in the ICT sector and in practically all engineering specialisations. Therefore, at the moment, there is a significant lack of technicians and engineers for some specific functions. Every year, around 30,000 engineers graduate, which is too few to meet the current demand when compared with other industrialised countries or those with emerging economies. Engineers also represent around 5 % of the total number of graduates. In order to meet the work demands projected for the country over the next few years, this percentage needs to be doubled or tripled. On the other hand, despite the clear saturation of the labour market, the country continues to be one of the world's largest producers of some university level professionals, such as lawyers and dentists.

The average schooling of the Brazilian is 9 years, which is relatively low for the future development of the country. In some situations, the lack of skilled labour represents a bottleneck in the development process, as well as an obstacle to effective SCM.

4.5 Environmental Sustainability

Briefly, so-called sustainable development has sought to reconcile the current needs of economic development with a commitment to preserve nature for future generations. The concept of Green Supply Chain Management (GSCM) concerns conducting SCM in an environmentally sustainable way, which has increasing importance in the context of supply chain stakeholders (Kirchoff et al. 2011).

Therefore, the environmental question is transformed, at times, into a complicating factor for the management of some supply chains, especially when (directly or indirectly) it paralyses or delays projects to improve infrastructure, especially transport. At first, such a statement could nowadays sound rather "politically incorrect", but the environmental question, despite all its positive aspects, also has its negative implications for SCM, as there are tradeoffs between environmental issues and development, which should be addressed.

As, for a long time, the matter of Amazon forest preservation has been a constant theme on the agenda of various NGOs and world meetings about the environment, pressure to patrol the area has also become frequent. The following two cases illustrate this question well:

The first concerns transport from Manaus (and the Duty Free Zone), with its aforementioned population of almost two million, to the rest of the country, which, as mentioned, is currently only possible by air or water. The transport costs and the time required could be reduced quite considerably by the construction of a long highway and/or railway connecting the city to the rest of the country. But, in this case, the potential immediate and long-term damage to the environment are clear, especially in the case of a highway. On the other hand, the country continues to pay a considerable price in many of its supply chains by not having this transport option. The second case involves the project for a ring road around the São Paulo metropolitan area, which, in almost 30 years of attempts, has only recently reached the halfway stage. The impediments have generally been innumerable legal actions regarding environmental issues (sometimes exaggerated or fanciful) that seek to paralyse the work while awaiting judgement. As the courts are usually slow and overloaded with cases to analyse and judge, this basic infrastructure project remains halted. For this reason, unlike many metropolitan areas in the world, in São Paulo most lorries (coming from various highways that start in the city, or pass through it) have to enter the urban region. This has many negative consequences for the already complicated, saturated city traffic, besides increasing CO_2 emissions. Due to this, there are very significant losses in terms of cost and time for the supply chains that need to carry cargo across the city.

5 Successful Practices

This section presents some SCM practices that have been implemented successfully in the country. They are: (1) new configurations in supply chains in the automotive industry (modular consortium and industrial condominium), (2) supplier base reduction and Early Supplier Involvement in the aircraft industry, (3) outsourcing (in the frozen concentrated orange juice industry and in the poultry industry), (4) cross-docking in wholesaling, and (5) added value and supply sustainability.

As previously mentioned, they were also identified by an ongoing research project co-ordinated by the author of this chapter focusing on the identification and analysis of SCM best practices currently implemented in the country.

5.1 New Configurations in Supply Chains in the Automotive Industry

During the twentieth century, the automotive industry developed and became a reference in terms of innovation in industrial environments. In the case of SCM, the auto industry has played a leading role since the emergence of the concept (Pires and Sacomano Neto 2008).

The country began installing its automotive industry at the end of the 1950s, and, since then, it has grown into an industrial sector that is highly representative of the economy. During the last two decades, the country has undergone various waves of investment in the sector, and, currently, there are 26 plants owned by 19 distinct manufacturers (OEM—Original Equipment Manufacturers). This means it has the greatest diversity of manufacturers in the world. At the end of 2010, the total production was approximately 3.6 million vehicles (cars, vans, trucks, buses), making the country the sixth largest producer in the world, coming only behind China, Japan, the USA, Germany and South Korea. According to the ANFAVEA (Brazilian Association of Motor Vehicles Manufacturers) this scenario was repeated in 2011 (ANFAVEA 2012).

In the last two decades, in this industrial sector, innovative SCM configurations, which have helped to leverage and make the country outstanding in the context of the state-of-the-art in SCM practices, have been developed and installed. These two new configurations are covered below.

5.1.1 Modular Consortium

The concept of the modular consortium is considered to be one of the most innovative experiments in the automobile industry over the last two decades. The greatest example is the Volkswagen truck and bus factory, which has been operating since November 1996 in the city of Resende, Rio de Janeiro State. In general

terms, the modular consortium can be considered an important example of outsourcing; its key suppliers (seven in this case) take over the assembly of the module and assume responsibility for its subsequent assembly in the final assembly line of the automaker, the investment in equipment and tools, and the administration (even partial) of the module supply chains. Meanwhile, the automaker provides the plant and the final assembly line, co-ordinates and conducts the final testing of the vehicles (Pires 1998).

The modular consortium rapidly allowed Volkswagen to implement a productive strategy of mass customisation, obtaining a significant reduction in costs, and, at the same time, seeking to meet the demands of its customers for customisation. Thus, the company began to offer vehicles better adapted to specific uses, and, generally, at prices less than those of its competitors. Even without a tradition in the market for lorries and bus chassis, a few years after opening the factory, the company became the leader (in sales volume) in the Brazilian market, overtaking major competitors like Mercedes Benz, Volvo, Scania, Ford and Iveco. At present, the company remains the leader of the local market and is undergoing major expansion of its productive capacity. It has also begun to produce its first super heavy goods vehicles under the make Man (of which the Volkswagen group is the major shareholder) and to which the group, in 2008, decided to pass on the management of its lorry and bus division in the country. Anyway, the concept of the modular consortium remains firm, including its partial application in its vehicle assembly installations (in the CKD—Complete Knock-Down and/or SKD—Semi Knock-Down form) in South Africa and Mexico.

The success of the modular consortium model has also encouraged expansion of the installation of an outsourcing model for activities in the country's automobile industry, which is not too extreme, as described below.

5.1.2 Industrial Condominium

A series of large automobile plants has been established in Brazil over the last 15 years. All of these plants have been built and are operating based on the logic of special supplier parks known as industrial condominiums, whereby a small group of key suppliers are physically installed inside the automaker plant and participate in a share of the plant infrastructure costs. These suppliers generally provide the automaker with systems (usually more complex ones with difficult logistics, or ones that facilitate postponement of diversification of the product to increase its customisation potential) on a just-in-sequence basis right next to the assembly line, but do not participate in the final vehicle assembly line, the latter remaining in the hands of the automaker. To make business more viable in terms of scale, in most cases, the automaker does not require that the key suppliers' resources be used exclusively for its supply. For the key suppliers, this ensures greater flexibility and less dependence on the automakers than in a modular consortium.

At present, there are around a dozen industrial condominiums installed in the automobile industry. The great majority are used for vehicle production, that is, the

automakers recognise the benefits of having key suppliers installed next to them, but prefer to keep the final assembly under their own responsibility. Furthermore, after Volkswagen's success with the modular consortium model, most of its competitors in the country have installed new plants or transformed old ones into industrial condominiums. This means that they will also keep the final assembly under their control.

These industrial condominiums in the automobile sector have also served as a model for new plants in other sectors (such as food and cosmetics), which have key suppliers (especially packaging) installed beside their facilities.

5.2 Supplier Base Reduction and Early Supplier Involvement in the Aircraft Industry

Reducing the supplier base has become a common practice for a company building partnerships and collaborative processes within a supply chain (Slack et al. 2002). In turn, the Early Supplier Involvement (ESI) is a usual practice in the aerospace and automotive industry, and has contributed greatly to reducing the time and cost of product development. It was developed in the Japanese automotive industry and introduced by Chrysler at the beginning of the 1990s (Dyer 1996).

In Brazil, the aircraft industry is very closely linked to the company Embraer, the outstanding leader in the sector. In the last 2 years, the company has overtaken the Canadian company Bombardier and has become the third largest civilian aircraft producer in the world, behind Airbus and Boeing. Currently, it produces both civilian (commercial, executive and agricultural) and military aircraft (Embraer 2012).

The company was created by the military government in 1969 and privatised in 1994. After privatisation, the company acquired a new work dynamic and prospered significantly. Although the literature frequently attributes the main reason for the company's success to privatisation, the reality is that, as a private enterprise, it began to have more freedom to act in the market, especially in SCM. By a fortunate coincidence, the company was privatised and grew in a period in which the concept of SCM was in full ascension, as much in academia as in the industrial environment. Consequently, various SCM practices found fertile soil in the company. The main one was the application of Early Supplier Involvement (ESI) in the development of its first series of commercial jets, the ERJ 145. Of importance in this was the company's previous experience in the development of the subsonic fighter AMX, in co-operation with the Italian company Aeritália and promoted by both the Brazilian and Italian governments at the turn of the decade, 1970–1980.

The development of the product ERJ 145 had the participation of four key suppliers, labelled risk-sharing partners, but, in fact, they were ESI practices, frequently used in the SCM of other industrial segments, especially that of automobiles. After the development of the product, the implementation of the supply

chain also involved (besides the four key suppliers) approximately 350 suppliers, most of which were located in the USA and Europe. Later, in the first half of the 1990s, the development of the ERJ 170/190 series had around 11 key suppliers involved in the ESI of the product development, and, subsequently, around 22 suppliers in the production phase. This indicates a clear reduction in the supplier base, totally aligned with the recommendations commonly found in the SCM literature.

5.3 Outsourcing

In recent decades, demands from the market on some industries have grown significantly and forced many companies to focus on their core businesses and competences, transferring to the suppliers the activities considered less important or non-strategic. This practice was initially labelled as "strategic outsourcing" and later only as "outsourcing" (Quinn and Hilmer 1994). Three cases of outsourcing in the country are described as follows:

5.3.1 Outsourcing in the Frozen Concentrated Orange Juice Industry

Over the last two decades, Brazil has consolidated its position as the world's largest producer and exporter of frozen concentrated orange juice (FCOJ). At present, the country is responsible for 50 % of the world production, exporting 98 % of its production, and represents an 85 % world market share. Curiously, only 2 % of the FCOJ production remains in the country, consumed in the form of raw material for a soft drink. This is due to the fact that the local consumer prefers freshly extracted natural juice. Industrialisation of this product in Brazil began in 1959, and, today, it is concentrated in three large companies (Citrosuco, Cutrale and Louis Dreyfus), operating plants in the interior of São Paulo State and exporting all over the world.

During the development of the supply chain for FCOJ, there were significant updates in terms of the respective management practices. The increasing level of outsourcing by these juice producers is outstanding. Inside the plants, generally, the juice extraction process is undertaken by the extractor machinery supplier, using a process that is largely automated. Thus, the machinery supplier has ceased to be merely this, becoming instead an active part of the production process, transformed into a "supplier of solutions", as they like to be labelled. As all the FCOJ exports are made by tankers sailing from the Port of Santos, situated approximately 400 km away, large road tankers with thermal insulation are used. For a long time, the producers were the owners of the lorry fleets, which required an enormous maintenance structure, but, in the last few years, specialised logistical operators have gradually assumed responsibility for the resources and management of this large transport operation.

5.3.2 Outsourcing in the Poultry Industry

In the last few decades, an outsourcing process has been developed in the agribusiness SC, involving the production and commercialisation of chicken, a segment in which the country has been the world's major producer and exporter for some years. Today, the leading Brazilian company in the sector is BRF (Brazil Foods), created in 2009 through the association of the two largest national enterprises in this sector, namely Perdigão and Sadia. At the moment, the company is one of the major global players in the food sector, strengthening its position in the country as an agribusiness power. It acts in the segments of meat (poultry, pork and beef), industrialised food (margarine and pasta) and dairy products, exporting to 140 countries. It employs 115,000 workers, runs 61 factories in Brazil and 7 abroad, including in the UK.

The company's origin was in the South Region, which has various sub-regions of agribusiness, formed of small and medium-sized rural properties, contrasting with the land distribution in the rest of the country. Some decades ago, the poultry producers opted to outsource the fattening process to small- to medium-sized rural suppliers. Besides reducing the investment cost of land ownership, the practice also performed a social role, since it reduced the migratory flow to urban centres. In order to operationalise the practice, the chicken producer handles the development and genetic homogeneity of the fowl from day one of their lives and then transfers them to the rural suppliers. It then provides the feed and veterinary assistance, as well as all the transport services. In turn, the rural supplier undertakes investment in sheds for fattening (as requested by the producer) and assumes the basic daily operational costs. Approximately 40 days later, the bird has acquired the right weight and is returned to the meat producer for slaughter and the remaining supply chain sequence. In this process, much of the slaughter is accompanied on site by in-plant representatives whose task is to guarantee observance of religious requirements (especially those of Muslims and Jews). Thus, the large chicken producer keeps control of this crucial step in the supply chain, benefiting from significant cost reductions in terms of investment and operation.

5.4 Cross-Docking in Wholesaling

Cross-docking emerged when large ships at berth began to unload their cargo "over the dock," that is, directly into other vessels, lorries and railway trucks. Thus, it has achieved a significant improvement in terms of storage cost reduction and an increase in material flow. Quickly, the practice has extended to several supply chains, especially at the stage of product distribution (Kinnear 1997).

The wholesaler/distributor is usually an important link in various supply chains, performing the integration between producer and retailer. In a country of continental proportions and with a deficient transport infrastructure, it is difficult for

producers to handle the distribution of their products directly to small retailers scattered throughout the land.

In Brazil, the retail sector represents around 5 % of GDP, and has grown year after year. In recent years, with the increased purchasing power of the middle class (defined by the federal government according to global standards), consumption has increased significantly, mainly of food and domestic appliances, including in the Centre-West, North and North-East Regions, which had always been the poorest. As a result, small and medium-sized retailers have also grown, especially in the cited regions.

Among the country's retailers, principally from the SCM perspective, the company Martins is worth special mention (see Martins 2012). Established in the 1950s, with its head office situated in the city of Uberlândia (about 600 km to the north-west of São Paulo City), it is the largest wholesaler-distributor in Latin America. It is renowned for the effectiveness with which it generally performs its distribution operations, even to the furthest corners of the country. This has been achieved by developing a high degree of competence in particular SCM logistical practices wherever it acts. Most noteworthy is the practice of cross-docking at around 40 strategically placed points. Along with intense use of ICT, this practice has become crucial for the agility of material flows, reduction in stock levels and working capital, and the consequent increase in profitability.

5.5 Added Value and Supply Sustainability

The basic objectives of effective SCM are cost reduction and value added to the product and/or service. However, generally, published works about the area deal more with cost reduction. In the case of Brazil, it is possible to identify some cases that work with the aim of the supplier adding value to what it passes on to the customers in the supply chain. Here, three cases deserve mention:

The first concerns the role assumed by the company, VDO (currently belonging to the Continental group) since the implementation of a modular consortium in 1996 by Volkswagen trucks. From a traditional supplier of tachometers, the company has assumed responsibility for the assembly module and the finishing of the cabin (trim assembly). What was a great challenge has rapidly been transformed into a large process of gain in capacity and redefinition of its core business. In practical terms, the company has ceased to be a supplier of commodities and has become transformed into a supplier of solutions (as it came to call itself), providing greater added value to the customers.

The second case concerns the supply process for steel used in road vehicle body presses, performed by the company Usiminas for the automaker Fiat. When it was established in the second half of the 1970s, the automaker opted for the construction of its factory in the Belo Horizonte metropolitan region, in Minas Gerais State, considered, at that time, to be a greenfield, far from other automakers and the great majority of parts/components suppliers established close to São Paulo City. Over

time, the company developed an important role, including the suppliers located close to the factory, and became the leader in the production and sales of vehicles in the country. In fact, its factory became one of the largest in the world in terms of production volume. The steel company Usiminas soon became one of its most important suppliers. Since the mid-1990s, the company has ceased to be a supplier of steel coil and has passed through a phase of becoming a flat sheet steel supplier to finally become a pressed parts supplier for Fiat. The supplier company's experience in terms of increased added value has been a success, and has ended up creating a new business unit aimed at supplying pressed and/or pre-assembled parts for various customers in the automobile sector. Thus, it has also advanced by increasing added value to the supply chain.

The third case closes this chapter, and, considering the place where the book is being idealised and produced, indirectly pays special homage to the country that has "supplied" the music world in the twentieth century with excellent guitarists. The company Ronay Brazilian Woods Components is a wooden component supplier in the supply chain for both electric and acoustic guitars. The company embarked on its activities over a decade ago in the interior of São Paulo State, when the then luthier, Mr. Ronay, after receiving various orders from large world string instrument producers, identified great potential for transforming himself into a prime supplier of wooden components in the sector. With an average level of formal education, but with a great enterprising spirit and a liking for literature about the management of operations and supply chains, he soon developed an interesting business plan. Knowledgeable of the distinct quality of certain types of wood in the country, the relatively high cost of transport in the timber industry and the country's interest in projects to add value to commodities, generation of employment and sustainable exploitation of natural resources, he decided to install a production unit in the city of Rio Branco, Acre State, in the extreme west, in the Amazon region. There he developed his supply chain on three traditional fronts. In the inbound, he developed partnerships with local, internationally certified timber producers, that is, timbers that were produced using modern, sustainable methods of forest management. Internally, he sought to train the locally-hired labourers (the majority of whom had a low level of schooling) for the production of high-quality components capable of fulfilling the precise requirements of the customers. In the outbound, he developed partnerships with the LSP for exportation via the Port of Santos (on the Atlantic coast) and via the recently built pioneering highway linking the city to Peru, thus allowing access to the Port of Ilo on the Pacific coast. The latter route has become a promising option due to the great reduction in cost and time, especially in trade with Asia. Moreover, Ronay Components has implemented a creative sustainable SCM in the Amazon jungle, training the workforce, generating jobs in the region, as well as transforming itself into a premium wooden components supplier for producers of high quality musical instruments. Exacting musicians from all over the world greatly appreciate this.

6 Conclusions

First, it is worth remembering the limitations inherent in the research methodology used, and that this prevents the text from being conclusive. More focused and redesigned research needs to be conducted, especially in supply chain performance measurement and in the touted benefits of the so-called best practices in the area, as suggested by Shepherd and Günter (2006) and Cuthbertson and Piotrowicz (2008). Anyway, this chapter has sought to present the reader with a broad overview of the current state of SCM in Brazil, seen from the perspective of some of the issues that influence it, positively or negatively. It also presents some cases of successful implementation of SCM practices in the country.

From the text it is also possible to deduce mainly that, although the country has recently reached sixth position in the world economy, and presents several positive aspects for SCM, some negative issues still remain to be addressed, so that the country can more effectively manage its supply chains. Moreover, it should be noted that the vast majority of the negative issues regarding SCM presented here are located at country level, that is, they come under the responsibility of the government. This corroborates another well-known opinion among the industrial managers in Brazil: that is, that there is a large gap commonly found between the management of private companies and the government's management in the country. While the first presents itself as very up-to-date and aligned with the best managerial practices worldwide (Pires and Cardoza 2007), government management, despite the progress of the last two decades, is still quite outdated, bureaucratic and low in productivity. This means that at the time of doing business in the country, foreigners will usually find a private sector updated and aligned with the best practices in SCM worldwide. On the other hand, if they need to dialogue with the public sector, they should be prepared for bureaucracy and slowness.

Questions for Review and Discussion

1. What are the main current advantages and disadvantages of Brazil in relation to other important countries with emerging economies in terms of the competitiveness of its supply chains?
2. Based on the information in this chapter, which logistical and SCM practices published in the literature and/or practiced in developed countries could be successfully implemented in Brazil? Justify/Explain your answer.
3. Considering the environmental/sustainability issues and the interest these usually arouse, discuss the main trade-offs that you can identify for an effective SCM with operations carried out (partially or fully) in the Brazilian Amazon region.
4. The Modular Consortium implemented by Volkswagen in its lorry and bus chassis factory is very often labelled revolutionary and regarded as largely

responsible for the success of the company in the country. How then could you explain the fact that it is still the only such case in the country, and that Volkswagen's competitors have not yet set up an modular consortium?
5. This chapter considers the future major sporting events that will happen in Brazil that, at least in theory, should leave a positive legacy to the country in terms of infrastructure. Based on experience in other countries where these events have occurred in the last decades, do you consider this true or a fallacy? Justify/Explain your answer.
6. The chapter presents five current issues that adversely affect SCM in the country. From the Brazilian government's viewpoint, if you could do a ranking (in descending order) of priority to address these issues, what would you do? Justify/Explain your answer.
7. The chapter presents five cases of successful implementation of SCM practices in the country. For you, what are the main lessons that can be extracted from these cases?
8. In relation to the workforce, the multicultural nature of the Brazilian people was presented as a welcome factor in the current SCM context. Do you agree with this statement? Justify/Explain your answer.

References

ANFAVEA. (2012). *Brazilian association of motor vehicles manufacturers (ANFAVEA)*. www.anfavea.com.br

CNT. (2011). *Confederação Nacional do Transporte – CNT, National Transport Confederation*. www.cnt.org.br

Cuthbertson, R., & Piotrowicz, W. (2008). Supply chain metrics – review of supply chain best practices. *International Journal of Productivity and Performance Management, 57*(5), 389–404.

Dyer, J. (1996). How Chrysler created an American *keiretsu*. *Harvard Business Review, July–August*, 42–56.

Embraer. (2012). www.embraer.com.br

IBGE. (2012). *Brazilian Institute of Geography and Statistics (IBGE)*. www.ibge.gov.br

ITU. (2012). *International Telecommunications Union agency, United Nations*. www.itu.int

Kinnear, E. (1997). Is there any magic in cross-docking? *Supply Chain Management, 2*(2), 49–52.

Kirchoff, J., Koch, C., & Nichols, B. (2011). Stakeholder perceptions of green marketing: The effect of demand and supply integration. *International Journal of Physical Distribution & Logistics Management, 41*(7), 684–696.

Monaghan, A. (2012). *Brazil overtakes UK to become world's sixth-largest economy*. Retrieved March 6, 2012, from Telegraph.co.uk/finance

Martins. (2012). www.martins.com.br

Pires, S., & Cardoza, G. (2007). A study of new supply chain management practices in the Brazilian and Spanish auto industries. *International Journal of Automotive Technology and Management, 7*(1), 72–87.

Pires, S., & Sacomano Neto, M. (2008). New configurations in supply chains: The case of a condominium in Brazil's automotive industry. *Supply Chain Management: An International Journal, 13*(4), 328–334.

Pires, S. (1998). Managerial implications of the modular consortium model in a Brazilian automotive plant. *International Journal of Operations & Production Management, 18*(3), 221–232.

Quinn, F., & Hilmer, F. (1994). Strategic outsourcing. *Sloan Management Review, 35*(4), 221–232.

Samarco. (2012). www.samarco.com.br

Slack, N., Chambers, S., & Johnston, R. (2002). *Operations management*. São Paulo: Atlas.

Shepherd, C., & Günter, H. (2006). Measuring supply chain performance: Current research and future directions. *International Journal of Productivity and Performance Management, 55* (3/4), 242–258.

Voss, C., Tsikriktsis, N., & Frohlich, M. (2002). Case research in operations management. *International Journal of Operations and Production Management, 22*(2), 195–219.

Yin, R. (2008). *Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: Sage.

Designing Supply Chains into Africa: A South African Retailer's Experience

Hamieda Parker and John M. Luiz

Abstract The key to understanding how to promote growth in Africa is being able to comprehend supply chain management. South Africa has been a leader in terms of expanding its retail businesses throughout the rest of Africa. One of the most successful firms that has managed to do this has been Game stores (owned by Massmart Holdings—now part of Walmart). The supply chain issues which face firms wanting to spread out across this continent are illustrated by describing the experience of this firm's expansion into Africa. This paper uses an exploratory approach. Based on an in-depth case study of Game stores, insights are gained into how firms, particularly in the retail sector, can expand their supply chains throughout Africa. The case study sheds light on the challenges that the external environment creates for such firms. Much supply chain theory is focussed on firm level factors and this study highlights the need for new supply chain theories to take account of the external environment in order to be practically relevant to emerging markets in Africa.

We discuss the supply chain management challenges faced by firms in Africa, especially with regard to infrastructure, legal institutions and regulatory processes. We describe the experience of a South African retailer (Game Stores) who have expanded their operations throughout Africa. We highlight the need to develop supply chain theory further in order to become more relevant in emerging markets. Finally, we discuss the implications for firms intending to design supply chains in Africa.

1 Introduction and Background to Africa

Africa has a population of more than 900 million people. Currently Africa is home to 300 million of the world's poorest people, who survive on less than $1 per day. This group has been referred to as the "Bottom of the Pyramid" group by Prahalad (2005) and as the "86 % market" by Mahajan and Banga (2006).

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W. Piotrowicz, R. Cuthbertson (eds.), *Supply Chain Design and Management for Emerging Markets*, DOI 10.1007/978-3-319-05765-1_3

Africa comprises a number of different countries and is often divided into two major regions—Middle East and North Africa (MENA) and Sub-Saharan Africa (SSA)—which is the region that has historically been particularly poverty-stricken. Sub-Saharan Africa has been plagued by poverty, disease, conflict, corruption and poor infrastructure. The region has been endowed with numerous resources such as gold, platinum, diamonds and agricultural products. Despite these resources, multinational corporations from developed countries have had very limited success in this region. Retail firms have found Sub-Saharan Africa a particularly difficult region to penetrate. Even retail firms who have expanded into emerging markets in South America and Eastern Europe have not ventured into Sub-Saharan Africa. The costs of developing supply chains in regions where there is poor infrastructure and corruption has been too high for these retail firms.

2 The Growing African Market

Africa has experienced great change over the last decade. From 1998 to 2008, the average GDP in Sub-Saharan Africa has grown by 5.6 % (Broadman 2009). Although it is home to 900 million people, 50 % of this population is under the age of 24. This population profile strongly contrasts that of Europe and the USA where a significant percentage of the population is over the age of 60. While the population of Africa is growing, the GDP per capita is also expected to increase more rapidly. An important factor in this growth over the last decade has been the New Partnership for Africa's Development (NEPAD), a programme focussed on promoting intra-Africa trade and the strengthening of the African economic environment.

Sub-Saharan Africa has increasingly attracted Foreign Direct Investment (FDI), particularly from China and India. The Frontier Advisory Group has recently (10 April 2012) stated that intra-emerging market trade is growing and is gradually displacing traditional European and North American trade with emerging markets. Bilateral trade between India and Africa has swelled from US$ 967 million in 1991 to US$ 46 billion in 2010. South African companies have also increased their investments in India, focussing on mining, infrastructure, logistics, communications and infrastructure.

Broadman (2009, p. 52) notes that "China and India's newfound interest in investing in Africa—home to 300 million of the globe's poorest people and the world's most formidable development challenge—is beginning to present a potentially significant opportunity for growth and integration of the Sub-Saharan continent into the global economy. It is also yielding some handsome profits for Chinese and Indian multinational corporations."

3 Poor Infrastructure, Weak Legal Institutions, and Expensive Regulatory Processes in Africa

In analysing why so many African countries have been disappointing in terms of competiveness, the Investment Climate Assessment (March 2009) comments as follows: "High indirect costs and losses are dampening the productivity and competitiveness of manufacturers in Africa—these are often higher than labour costs at 20–30 %, and are further widening its productivity gap with other regions. Poor port performance and slow customs procedures partly explain why manufacturing firms in Sub-Saharan Africa are less likely to export than firms in Asia. Firm level competitiveness can seriously be enhanced by improvements in the business environment; "factory-floor" productivity is not that low compared with China, but when indirect costs such as power supply, transport, telecommunications and security are factored in, Africa's productivity falls to very low levels".

Table 1 shows the ranking, time and cost associated with trading with a particular country. It shows the ranking based on the time to export and import and the number of documents required; an overall ranking which captures the ease or difficulty of doing business with a country is calculated and reported in the Doing Business Report (2012). The data for this table appears for a few African countries primarily in Sub-Saharan Africa; it also shows the ranking for the three countries ranked first, second and third. This allows comparison of African countries with those countries where doing business is most efficient.

"Inland transport in Sub-Saharan Africa is characterized by high costs, long times, and high levels of uncertainty. Although geographic features such as low road density contribute to costs, time and uncertainty, other factors include regulation, market structure, administrative barriers, and corruption." (Christ and Ferrantino 2011, p. 1750). In addition to the costs of transport, there are great costs and uncertainty associated with crossing borders. Often the time spent at borders is more than the time spent travelling on the road. At borders, corruption and demands for informal payments exacerbate costs.

Poor infrastructure is often compounded by bad weather conditions. The collapse of bridges and roads in adverse weather means trucks need to take alternative routes which may be substantially longer. They also increase the risk of truck breakdowns. Fixing trucks can be very difficult, and it is not uncommon for a truck to be delayed for a week or two before a mechanic is found to fix it.

Insufficient infrastructure at ports also causes great delays. Insufficient port capacity may lead to a ship being unable to dock and offload its goods, until capacity becomes available. The delays serve to increase costs but also increase uncertainty and unpredictability if the goods are to be transported via truck for the next leg. The truck is then forced to wait and incur delays. Inadequate warehouse capacity at ports results in goods being left exposed or trucks serving as storage facilities, which is risky, particularly for perishable goods. Christ and Ferrantino (2011, p. 1757) summarize the three dimensions of costs associated with exporting from Sub-Saharan countries as follows: "financial costs of land transport,

Table 1 Time, effort and cost to trade across country borders (Data from Doing Business Report (2012))

Country	Trading across borders (rank)	Documents to export (number)	Time to export (days)	Cost to export (US $ per container)	Documents to import (number)	Time to import (days)	Cost to import (US $ per container)
Singapore	1	4	5	456	4	4	439
Hong Kong SAR, China	2	4	5	575	4	5	565
Estonia	3	3	5	725	4	5	725
Angola	163	11	48	1,850	8	45	2,690
Botswana	150	6	28	3,185	8	41	3,420
Congo, Dem. Rep.	167	8	44	3,055	9	63	3,285
Congo, Rep.	181	11	50	3,818	10	62	7,709
Ethiopia	157	7	42	1,760	9	44	2,660
Ghana	90	6	19	1,013	7	29	1,315
Kenya	141	8	26	2,055	7	24	2,190
Lesotho	147	8	31	1,680	8	35	1,665
Madagascar	111	4	21	1,197	9	24	1,555
Malawi	164	10	41	1,675	9	51	2,570
Mauritius	21	5	13	737	6	13	689
Namibia	142	9	29	1,800	7	24	1,905
Nigeria	149	10	24	1,263	9	39	1,440
Rwanda	155	8	29	3,275	8	31	4,990
South Africa	144	8	30	1,531	8	32	1,795
Sudan	151	7	32	2,050	7	46	2,900
Swaziland	148	9	18	1,855	9	27	2,030
Tanzania	92	6	18	1,255	6	24	1,430
Uganda	158	7	37	2,880	9	34	3,015
Zambia	153	6	44	2,678	8	56	3,315
Zimbabwe	172	8	53	3,280	9	73	5,101

opportunity costs of time in slow processes, and uncertainty associated with unpredictable arrival times and incomplete information."

4 South Africa and Its Retail Sector

South Africa is located in Sub-Saharan Africa (SSA) and has a population of 50 million people. The GNI per capita is US$ 6,100. There is a striking inequality amongst the different population race groups in South Africa, and this is a consequence of the previous (pre-1994) apartheid system. The current government is making efforts to address this (through initiatives such as Black Economic Empowerment-BEE) and is starting to see success on a number of levels. The country's rank in terms of the ease of doing business is 35th in a list of 183 countries (Doing Business 2012). Starting and running a business in SSA is more costly and more difficult than in any other region in the world. The current Doing Business Report (2012), however, notes that in this region "36 of 46 governments improved their economy's regulatory environment for domestic business in 2010/2011".

Despite the global recession, South Africa's GDP increased from 2003 to 2008 and is expected to continue to grow at a rate of 3–4.5 % from 2011 to 2015 (Supply Chain Foresight Report 2012). South Africa's recent entry into the BRICS (Brazil, Russia, India, China, South Africa) emerging market trade bloc is envisaged to increase South Africa's volume of trade with these regions. The current Supply Chain Foresight (2012) report observes that "investment by the BRIC nations, mostly by China, is focused on developing regional trade infrastructure—especially connecting key regional markets via road and rail".

In examining the South African FMCG and retail industry, the Supply Chain Foresight Report (2011) notes that "South Africa's FMCG and retail industries are generally focused on the South African and regional Southern African market, where the majority of retail businesses trade and are supplied. While emerging economy competition can and does affect the sector in different ways, the market focus, and the ability to source and supply to a local market relatively efficiently, keeps the sector relatively successful. This picture may change, with the imminent entry of Walmart into the local market, with their purchase of a controlling stake in Massmart." Indeed, it is clear from the Supply Chain Foresight Report (2011) that South African retailers feel that Walmart's entry into the South African retail sector was one the most important events for the sector in 2011.

In discussing their challenges, retailers are very concerned about the high cost of transportation they are currently burdened with. Retailers agree that much of the current retail volume that is transported by road should be transported by rail to reduce transportation costs and make retail supply chains more efficient. Unfortunately, South Africa suffers from an extremely inadequate rail infrastructure; "we can blame historical accident for this—the rail network being largely originally built for the transport of resources out of the country when it was an Imperial Colony" (Supply Chain Foresight Report 2011).

Due to rail capacity constraints, less than 10 % of retail goods are moved by rail, thus roads need to carry more than 90 % of goods. Road transportation is much costlier than rail transportation, and the roads have consequently become increasingly congested. "A multi-modal solution combining road and rail transport is clearly what the sector requires, but is currently heavily reliant on overloaded road transport" (Supply Chain Foresight Report 2011).

In examining how retail stores expand beyond their home borders, Corstjens and Lal (2012) observe that retailing is a "high fixed cost, low margin business with returns that accrue only over time." They observe that in order to achieve economies of scale and to benefit from their investment into their supply chain, they require a large number of stores in a city. In reality, a firm will initially only open one store in a new city and gradually add to this. They note that Walmart in China took 15 years to break even, achieving breakeven for the first time in 2010.

Two South African retail firms have put extensive effort into expanding their supply chains throughout Africa. They are Shoprite Checkers and Game Stores. Despite its success, Shoprite has experienced a number of difficulties in expanding its supply chain. In their most recent (2011) annual report, their Chairman, Christo Wiese, articulates the following: "I believe the biggest problem of doing business in Africa is the bureaucratisation of its economies, which assumes frightening proportions in terms of the costs and delays in which it involves businesses wishing to invest. The endless delays apply in the case of virtually every approval a business needs, from visas for skilled workers to those for building plans or rezoning applications." Figure 1 shows how the lack of clearly enforced laws is associated with increased cost and complexity of regulatory processes, particularly in Sub-Saharan Africa.

Note: *Strength of legal institutions* refers to the average ranking in getting credit, protecting investors, enforcing contracts and resolving insolvency. *Complexity and cost of regulatory processes* refers to the average ranking in starting a business, dealing with construction permits, getting electricity, registering property, paying taxes and trading across borders. The size of the bubble reflects the number of economies in each region and the number is the average ranking of the ease of doing business in the region. Correlation results for individual economies are significant at the 1 % level after controlling for income per capita.

The above points out the difficulties of doing business in Africa related to institutional weaknesses, infrastructure deficiencies and significantly higher transaction costs. These costs and risks need to be measured against the rising economic opportunities. Many corporations have entered the African market and are making significant returns on their investments. In the following section we examine the experience of Game stores expanding their supply chain throughout Africa and developing a successful model which made them a target for Walmart's first foray into the continent.

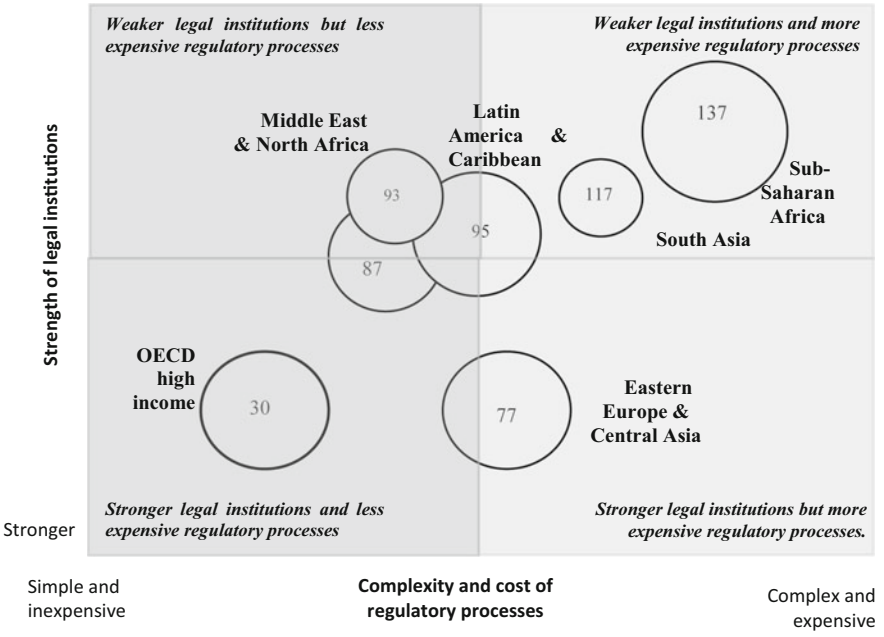

Fig. 1 Average ranking on sets of *Doing Business* indicators. Stronger legal institutions and property rights are associated with more efficient regulatory processes. (Source: Doing Business Full Report 2012, p. 3)

5 Game: Navigating the Challenges to Become Africa's Retailer[1]

5.1 Background to Game

Game, originally a family-owned business, had come a long way since it opened its first Durban-based store—Game Discount World—in 1970. At the time, its concept of providing a vast range of products under one roof was new to retail in South Africa. Moreover, the founders wanted to create a fun shopping environment and, as such, conceptualised retailing as a game—hence the name. Pink was chosen as its corporate colour, to attract attention and add to the fun element.

Founded in 1990 as a holding company, Massmart Holdings Limited (Massmart) comprised four business segments: Masscash, Massdiscounters, Masswarehouse and Massbuild, and focused on low-cost wholesale and retail of goods in sub-Saharan Africa.

[1] The case is based upon a Wits Business School case entitled "Game: Competing in Africa's Playing Fields" which was originally prepared by Stephanie Townsend and John Luiz. It is based upon interviews conducted with the senior management of Game between March and July 2010, as well as company data.

According to its 2009 annual report, Game consisted of 87 large format stores (average of 4,000 m^2), 12 of which were outside South Africa. It described itself as "a promotionally-driven discount cash retailer of predominantly general merchandise, electrical appliances, fast-moving consumer goods and non-perishable groceries for home, leisure and business use". In South Africa, Game stores were generally located in large shopping malls, only in some cases operating as stand-alone entities. As with its holding company Massmart, Game operated according to a big-box business, targeting families and small to medium businesses in the mid- to high-income segments of the market. As a discount cash retailer, Game had a high-volume, low-margin, low-cost operating model that depended on making huge numbers of sales at low prices, and on a sound and consistent promotional strategy.

Game's value proposition to its customers was to offer the widest range of branded products at the best price, and it offered customers three guarantees: an exchange or refund guarantee, to beat any competitor's price, and guaranteed service on every product sold.

5.2 *Expansion into Africa*

Game had started expanding into Africa in the early 1990s when it realised that its South African market would mature quickly, and that there was little space for investment in the already over-traded local market. Recognising the retail market potential of the neighbouring Southern African Development Community (SADC) countries,[2] Game started investing in Africa by opening its first store in 1993 in Gaborone, Botswana (replaced in 2002 by a bigger store, measuring 8,000 m^2, in a shopping mall called Game City[3]). Game Gaborone performed extremely well from day one, and went on to become the company's second-best performing store in Africa by 2010. A second store followed in Francistown (also Botswana) in 1999. Namibia was next in line, with stores opening in Windhoek and Oshakati, both during the course of 1999.

Encouraged by the success of its stores in the two SADC countries, Game continued working from Botswana to open other stores in Africa, and subsequently invested in Lusaka, Zambia—also in 1999. Game Lusaka soon became Massdiscounter's top-performing store. Some SADC countries, such as Namibia and Botswana, so closely resembled South African conditions and ways of conducting business that Game experienced no real difficulties during the early years of trading in Africa. In contrast, the store in Port Louis, Mauritius, did not

[2] SADC countries: Angola, Botswana, Democratic Republic of the Congo (DRC), Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zimbabwe, Zambia and Swaziland. [*Source*: *www.sadc.int* (accessed 21 July 2010).]

[3] Game City, a shopping mall financed by Massmart, was a 150 million pula development of 80 retail shops with 40,000 m^2 of floor space on a 1,400 ha site on the outskirts of Gaborone. [*Source*: *www.eprop.co.za*, news link (accessed 25 May 2010).]

perform well at all in 2002, to the point where Jan Potgieter, chief executive of Massdiscounters (a division of Massmart), called it a "bit of a challenge to make profit". Richard Fuller, store operations director of Game, explained that Game had found that its target market there, which comprised locals and not tourists, was extremely price-sensitive. Moreover, the size of the market was smaller than anticipated. It turned out that the local people did not like to travel from one end of the island to the other as a result of the busy road network. This situation forced Game to reduce the size of its store in Mauritius. Potgieter said, nevertheless, that in the context of Game's broad portfolio of stores, the Mauritius store did not present a major risk to the company.

The store that opened in Maputo, Mozambique in 2004 had also proved to be successful, particularly because brand equity was strong: people knew about Game because of Mozambique's proximity to South Africa, and supported it straight away.

It was only when the company decided to invest further afield—specifically in Uganda (2004), Nigeria (2005), Tanzania (2006) and Ghana (2007)—that the reality of Africa kicked in. In Uganda, for example, Game was unknown, and the company had to promote its brand very aggressively. The advertising paid off, and within 6 months the store was operating successfully. Likewise, in Nigeria, Game had to advertise more, because the local people initially thought Game was a game—a lottery or some sort of gambling game.

Game's early experiences in Nigeria led it to decide in 2005 that it would not invest further in Africa, and that it would simply maintain the status quo and continue the investments that were already underway. The opening of the Nigeria store was "extremely challenging", Potgieter recalled. The first container of stock was held up for 9 months at the local customs office. Fortunately, the situation in Nigeria subsequently improved. In the course of the next year, said Potgieter, the "supply chain improved and the stock was released and Game started operating successfully in Lagos".

In retrospect, the company regretted that 2-year period of consolidation, as it had slowed down Game's growth plans in Africa considerably. It was only in 2007, with the support of Massmart, that Game renewed its interest in Africa. Game, acting as a pioneer for the broader Massmart, turned its Africa strategy around drastically. Leaving behind its jitters about future investment in Africa, the company decided to advance aggressively into Africa, based on a new understanding of the challenges of doing business in other African countries.

With hindsight, Potgieter believed that Game had been far too rigid in its approach to investment in Africa in the past. As far as he was concerned, Africa was now "a massive opportunity" for Game, and nothing would stand in its way. Accordingly, Massmart increased its budget for investment in Africa tenfold. The company also started targeting new countries in sub-Saharan Africa and changed its single store policy to a multi-store strategy in 2008.

By 2010, Game had a presence in 11 African countries: Botswana, Ghana, Malawi, Mauritius, Mozambique, Namibia, Nigeria, South Africa (80 stores), Tanzania, Uganda and Zambia. (See Fig. 2 for map.) Game planned to expand its

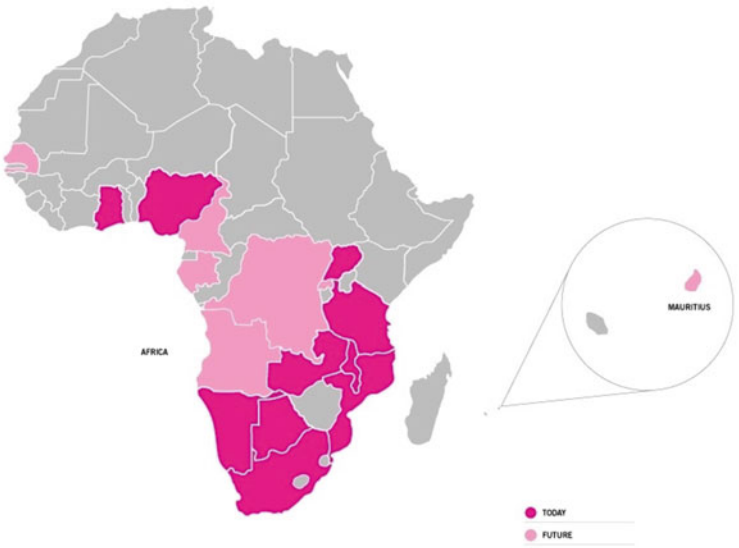

Fig. 2 Game locations in Africa

current footprint in Africa over the next 5 years by setting up stores in Angola, the Democratic Republic of the Congo (DRC), Rwanda, Cameroon, Gabon and Senegal.

5.3 Decision-Making Process

Every potential investment was preceded by a thorough and detailed process of investigation and assessment, involving research into the targeted country's economy and political stability, among other things. Game management used any available information and advice, even if it came at a cost. It was difficult to estimate the size of the retail market in African countries, because the informal market made up such a huge component of that market. Mark Turner, Game director, Africa, pointed out some areas that were important to understand: a country's import restrictions, and the duties and taxes payable, the process of getting dividends out of the country, how the cash flow would work, the market conditions and market-entry options and transport costs.

Taking all of the above into account, and adding a healthy dose of 'gut feel' based on prior experience, the company subsequently used a country risk checklist to decide whether the size of the market warranted a Game store. This process, which could take up to 6 months or more, was the "easy part", Turner noted. To establish a store was the real challenge. On average, this process took 2–3 years—but, in some extreme cases, it could stretch to 6 or even 10 years. Key to this process

was securing a prime location, finding the right partners to do the development and obtaining financing.

5.4 Positioning Game in Africa

Game wanted to position itself as an African brand for the African people. Accordingly, its policy was that, over time, at least 90 % of employees in stores outside of South Africa should be local people. However, it was standard practice with new outlets to appoint South Africans at a senior level (such as the store manager, merchandise manager and administrative manager) to start the ball rolling, because they were familiar with Game and its systems and processes. Once the store was established, these employees would gradually be replaced with local people. Training a local person for a senior position could take up to 5 years, Potgieter noted, as it was crucial for the incumbent to understand Game's mode of conducting business. "We have now reached a stage where half of our store managers are locals and the other half are expatriates," he said.

Potgieter was impressed by the working culture among the local people in the various countries. The high unemployment and poverty rate were reason enough for them to treasure their jobs, he noted, adding that Game's attitude to its employees was also a contributing factor. A floor manager position at Game in any of the African countries, for example, was regarded as very important, and the person was treated accordingly. "It is a special thing," explained Potgieter. "The staff are very proud of the brand and the company, which makes it great to operate in Africa, so we make sure that employees are treated fairly and that we pay them at the right levels, and that they have pension benefits. In fact, we sometimes get into trouble with other companies for what we pay the local people, but it would damage our brand to have double standards."

Equally important was Game's contribution to local upliftment by contracting local developers to build the stand-alone Game stores and shopping malls across Africa. The company's social responsibility programmes extended to its Africa operations, and played a very important role in establishing Game as a company that cared for the local African communities.

5.5 Promotions Strategy

Game was dependent on making massive sales, due to its business model of high volumes and low prices. In turn, particularly because the business was strictly run on a cash basis in Africa, sales were dependent on the correct pricing. South African expatriates played some role in recognising and supporting the brand, but Game still had to create awareness among the local people. Opening days were, therefore, all about creating excitement about low prices and, as such, Game had to keep its

margins as low as possible on these days. Potgieter believed that this approach was worth it, as people stood in queues of up to 2–3 km on opening day, some even arriving with wheelbarrows to carry their goods.

As far as long-term promotion was concerned, Game's strategy throughout Africa and South Africa was to have consistent weekly inserts in local papers, advertising the goods that were on promotion that week—4 million copies in total. Such was the positive response to these inserts that on Thursdays in Game Lusaka, for example, people formed long queues outside the store before the doors opened, in order not to miss out on the deals.

Potgieter observed that such popularity could be attributed to Game's value proposition to its customers. The good price points, the advice, the after-sales service and the guarantees on products all contributed to trust in the brand. In some countries, Game's own brand, Logik, outsold global brands such as Samsung and LG, because Game had a physical presence and customers trusted the company for back-up service. Moreover, Potgieter was determined that Game's role in any new country would and should be to force prices down in the formal market as a whole. "Our model is not to make excessive profits in Africa, as some of the other businesses are doing. We are there for the long run. That is how you build the brand: rather take a little bit less margin, but over a longer period of time," he explained.

Game had also become increasingly aware of how important timing was. In one shopping centre in Ghana where Game and rival supermarket group Shoprite were both trading, Game managed to open 1 week ahead of Shoprite. The shopping mall thus became known locally as the Game Centre and not the Shoprite Mall, as was the case in other areas.

5.6 Experiences in Africa: Adapting to Each Country

Game found that it could not simply cut and paste its South African business model into other African contexts. The company, therefore, had a separate business plan and business model for every country. Thus, for example, in South Africa every store stocked 12,000 active products, whereas some remote African stores, such as Game Kampala, stocked only 8,000. This was because the logistics of supplying the full range of products was prohibitive, and because Game realised that the market was satisfied with a slightly more limited choice. Turner noted that it took about 3 years to get to understand and adapt to each country's customer needs, to stock the store and to price the products accordingly.

Game also had to make a 'fundamental mind shift' to think smaller when doing business in Africa. Shopping centres, as South Africans knew them, were an unknown concept in most African countries; so Game opted for stand-alone stores in most instances, and in some countries developed its own small shopping centres, consisting of one or two anchor shops and a few other outlets. Still, securing finance from local banks proved to be trying, as the bank officials did not understand the concept of a shopping mall, having only had to finance roads or bridges in the past.

The Game philosophy of giving a customer exactly the same experience in all of its stores prevailed across all countries. Potgieter was very clear on this: "The standards are the same, the operational model is exactly the same and our promises to the customer are exactly the same. All that Game stands for applies to the African countries as well."

However, local needs and the culture in the different countries dictated the choice of additional merchandise in a store. Game attributed the success of the Lusaka store in part to the fact that it was able to satisfy local demand. For example, the store sourced liquor (a category of goods Game did not stock in South Africa), which included Zambia's very popular Mosi beer. Other favourites such as local chocolates, biscuits, bath foam and body lotion were also brought in. This made Game acutely aware of the need to supply trusted local brands in the other African countries as well. Customers in Lagos demanded a broad range of furniture, while in Mozambique, Game was experimenting with stocking 250 lines of dry and pre-packed food in its Maputo store—a product line not usually sold in all Game stores.

5.7 Managing the Supply Chain

As for the supply chain to African countries, until about 3 or 4 years previously (when Game was still only investing in SADC countries), all distribution of stock had been managed centrally from South Africa. Game's experience in Nigeria changed this. While it was never part of the original procurement model, Game decided it was best to turn to local suppliers in Nigeria because of restrictions on certain imported products, which meant that even one restricted product could hold a whole container back. When Game opened in Accra (Ghana) in 2007—with "surprising" success, Fuller noted—it learned from the situation in Nigeria and decided to source local suppliers upfront. "Now we have separate operational buyers just for Africa," Turner explained. "I think as we are learning more about these countries our supply chains to these countries will need to change. When we opened in Nigeria, we never thought we would procure more than 70 % [of the stock] locally."

Over time, Game developed a range of local suppliers, but having to buy from local suppliers brought other challenges—among them having to pay cash upfront for stock, and poor fulfilment of orders. Local suppliers also imported most of the products or raw materials, so ordering from locals did not automatically smooth out the supply chain. Turner noted that the clearing cycle for the remaining products that Game imported into Nigeria itself had improved dramatically over the past 3 years, to 60 days.

In other countries, however, Game imported up to 90 % of its stock from South Africa without any major difficulties. That said, both Potgieter and Turner emphasised that each African country had its own unique ways, and thus Game had to find the optimum way of dealing with each situation. In Ghana, for example,

Game had more than 40 local suppliers, and was looking to increase that number. Compared to Nigeria, where Game dealt with hundreds of suppliers, this was still considered a small number.

As for the future, Potgieter pointed out that Game's Regional Distribution Centre (RDC) model[4] in South Africa would be extended to create a West African regional warehouse, as soon as economies of scale justified such a move.

5.8 Challenges of Doing Business

Transparency International's Global Corruption Barometer points out that bribery is still prevalent in a number of African countries. This—sometimes called a 'facilitation fee'—remained a major challenge for Game as it worked in Africa. Nevertheless, in accordance with Massmart's code of ethical conduct, Game took a hard-line approach and refused to accept bribery, Potgieter said—even if it meant losing business or having to fire employees caught in the act.

It was partly because of the issue of bribery that the company avoided cultivating relationships with officials at ministerial level. Turner noted: "The only reason one would want to see a top government official is because you want something and they generally want something in return." Potgieter agreed that, indeed, "there are no free lunches", but pointed out that the Game model fortunately did not rely on knowing people at the highest level.

Nevertheless, Game had found it important to cultivate relationships with officials in local government and on other levels, and to make the effort to understand the very different African approach to doing business, such as observing hierarchies. This helped to sort out day-to-day issues, such as tax, repatriation of funds or port clearing issues, said Potgieter. "In South Africa, Game is a player of note. In Africa, we are a nobody in their lives, and we should act accordingly," he explained.

In a few instances, the repatriation of funds—the process of getting cash out of a country and back to South Africa—had proved to be a challenge. Game resolved this difficulty by meeting with the country's reserve bank to find out how to do this. The company had found that African countries generally wanted its investment because of the positive impact it had on their economies. They would thus support Game in whichever way they could. If all else failed, Game was prepared to consider reinvesting the money in the country by, for example, financing local development. For Potgieter, these problems were just part of the game: "That is Africa for you, we are so used to it—every day a new challenge."

[4] Game opened one massive warehouse in Cape Town, and planned to open two others in Johannesburg and Durban as distribution points to Game stores in South Africa. Although common practice among supermarkets and other retail chains, Game as a general merchandiser was the first in South Africa to apply the RDC model.

Logistical challenges were commonplace for Game in Africa. A large portion of its goods had to be transported by road, but getting those goods to certain countries meant that, in some cases, truck drivers had to cross five different borders. The drivers, therefore, had to build up good relations with the various border officials to speed up the process, particularly because Game incentivised the drivers with bonuses if they were able to deliver the goods on time.

Since Game started its negotiations with Mozambique and Angola—both Portuguese-speaking countries—language and cultural barriers had become much more of an issue. Turner described Angola as difficult to enter. Both countries adhered to Portuguese legislation, which impacted on all legal agreements, and all documentation was produced in Portuguese. Turner, who had to negotiate through an interpreter, found that communication was very challenging, in that so much "gets lost in translation". It was for this reason that Game was not interested in doing business in Francophone countries for the time being. It had considered opening up in Cameroon, Senegal, Mali and Côte d'Ivoire but, said Turner, the "logistical nightmare" of having to change the labelling on all products was reason enough to put a temporary hold on entering those countries, and rather to concentrate on gaining entry into Angola.

Finally, Potgieter pointed out that the company could face another challenge in the future. Ever since Game had started investing in Africa, the company's policy had been to have full ownership of each Game store in every country. But this was not possible in all countries. For example, Ethiopia required that 51 % of ownership be in local hands, and for that reason Game had passed the country by in favour of other opportunities. Nevertheless, Game was open to the possibility of changing its model in the years to come, when growth opportunities in other countries started to slow down.

5.9 Growth in Africa

By 2010, it had become evident that despite the risks, it was indeed profitable for the company to invest in Africa. Game stores in Africa generated higher profit and return on investment than their South African counterparts, Potgieter noted. He pointed out that Game in Africa contributed between 15 % and 20 % of the chain's total sales, varying with the prevailing exchange rates, and that the profit contribution was higher than that. Profitability, therefore, underpinned the decision to continue expanding into Africa.

Yet, apart from profitability, there was another reason for Game's African business growth strategy. As Potgieter put it: "The more countries you are in and the more stores you have, the more you mitigate your risk. There is no guarantee that every single country will perform every year, but by having a broader platform, the portfolio can be better balanced."

Growth, on the whole, had been exceptional. Game's Africa contribution to Massmart had doubled in the past 5 years and would double again by 2015.

5.10 Lessons Learned

One very important lesson that Game had learnt in its dealings in the rest of Africa was that any business undertaking took far longer than anticipated. Perseverance, patience and flexibility were key factors in any African deal, because the processes proved completely unpredictable, Potgieter noted. For example, negotiations around lease agreements were often the single most important reason for considerable delays. "Far down the road with the negotiations, you would suddenly discover that the partner you negotiated with doesn't own the land—or else, when you went back to conclude the deal, the price had suddenly risen," Potgieter said.

Nonetheless, he stressed that the company would never give up on any targeted country. "If we believe the market is big enough, we go for it. We also believe if you want to be in Africa and you are not in three countries, you are actually not in Africa: you have to be in Nigeria—the biggest opportunity that exists—Angola and in the DRC, even though investors tend to shy away from the latter," said Potgieter. It had been 6 years since Game targeted Angola, and the company had yet to make the breakthrough that would gain it market entry. Likewise, Game had been negotiating to enter the DRC for 3 years, but kept "hitting another wall".

Being so unique, each country was a learning curve in itself. Still, Game management found that, over time, they became much more sensitive to the ways of the local people. To gain acceptance, they had to be careful not to appear self-righteous or arrogant. By respecting the local culture, they managed to build trust, and once the relationship was sound, said Potgieter, "suddenly banks will start supporting you and role players will find legal ways to assist you with some of your frustrations." Building a local network was invaluable, Turner noted, and Game therefore encouraged its store managers to become involved in matters that were important to the local people. Meeting with expatriates also helped Game in gaining information that would help the company to establish itself in a country—such as names of suitable property developers.

Potgieter noted that they were still learning. Yet, as he put it, the "opportunity is so big, you actually cannot walk away from it". Both Potgieter and Turner agreed that the actual risk rested rather in not being in African countries at all, because there would never be a perfect situation for investment in Africa.

Over time, Game had found that it was possible to conduct business in certain African countries, such as the DRC or Nigeria, despite ethnic and religious violence flaring up every now and again. The unrest was often very far from where Game was situated, because these countries were massive geographically. Turner described the company's viewpoint thus: "There are many different provinces, different cultures, different religions. Because people don't understand Africa, they hesitate, but there are parts that are perfectly safe and there are parts we will not risk going into now. It is all about getting an understanding of what is really happening on the ground."

5.11 Competitive Environment

Massmart expects to open up to 40 new outlets annually in the coming years, with an emphasis on countries such as Nigeria, Malawi and Zambia, where it already has a presence. Furthermore, Massmart is targeting new markets such as Senegal, Cameroon and Angola.

To date, Game has been fortunate not to have had serious competition from international players, although the company did face some competition on the local front. Its leading local competitor was the South African-based supermarket retailer, Shoprite Holdings. Shoprite had been investing in Africa since 1998 and, by 2010, had 146 stores and 57 franchises in 16[5] countries outside of South Africa. Although Shoprite had far more stores in African countries than Game, the company was still trading primarily as a supermarket. As such, it competed mainly with the street vendors. However, Shoprite had slowly started extending its range to include products very similar to those of Game—such as small household appliances—and it could pose a future threat to Game.

Game's other local competitor, albeit to a much lesser extent, was the informal market, which presented itself in the form of hundreds of street vendors trading along the roads or in small shops. Potgieter and Turner were not too concerned about the informal market, though, as they believed that the company differentiated itself sufficiently by offering a wide range of products under one roof, backed up by its promises to the consumer and the guarantees on products.

As far as international competition was concerned, while China was actively involved in developing infrastructure in Africa, Game did not foresee any real competition coming from that country yet. In fact, Game would benefit from the upgrading of the infrastructure in Nigeria, Turner noted. He reckoned that the Chinese were probably already trading informally in Africa on a small scale, but were not affecting Game as such.

However, Potgieter expected a complete change in the African business landscape in the next 5 years, and foresaw that more and more international businesses would start realising the investment potential of Africa. He was fairly convinced that big multinational players such as Walmart and Carrefour—which, up until now, had shied away from investing in Africa—would form partnerships with existing investors in Africa rather than risk going alone.

This finally happened in September 2010, when Walmart announced that it was making a $4 billion bid for Massmart, the holding company of Game. The fact that Walmart decided to enter the African market through the acquisition of a South African company surprised some analysts. Chairman of Asda, Andy Bond, who is responsible for operations in Africa, said that acquiring Massmart would

[5] Shoprite mentioned 16 countries, but only the following were named on the website (excluding South Africa): Angola, the DRC, Ghana, Madagascar, Malawi, Mauritius, Mozambique, Nigeria, Tanzania, Uganda, Zambia and Zimbabwe. [*Source*: *www.shoprite.co.za*, about Shoprite in Africa link (accessed 13 May 2010).]

Table 2 Location of stores in African countries other than South Africa

Country	Today	Future
Angola		Luanda
Botswana	Francistown and Gaborone	
Cameroon		Yaoundé and Douala
DRC		Lubumbashi and Kinshasa
Gabon		Libreville
Ghana	Accra	Kumasi
Malawi	Blantyre	Lilongwe
Mauritius	Port Louis	
Mozambique	Maputo	
Namibia	Oshakati and Windhoek	
Nigeria	Lagos	Ikeja, Kano, Abuja, Enugu
Rwanda		Kigale
Senegal		Dakar
Tanzania	Dar Es Salaam	
Uganda	Kampala	
Zambia	Lusaka	Kitwe

Source: Courtesy of Massdiscounters, photograph supplied by Bronwen Browley, May 2010

give Walmart a good platform to enter the continent and expand into some of its faster-growing, more politically stable countries. He insisted that Massmart's direction would be set by the South African retailer's existing senior management, who would remain in place and that Walmart's involvement would simply "accelerate the current strategy". He stated that Walmart likes emerging markets and is expanding there to make up for a slowdown in parts of the industrialized world, amid strong competition and a prolonged economic downturn (Table 2).[6]

6 Supply Chain Theory and Africa

In supply chain management research, some of the most influential work has been done by Fisher (1997). Fisher proposed that functional, basic products should be distributed through efficient supply chains, while innovative products should be distributed through responsive supply chains. The work of Fisher (1997) has been further developed by researchers such as Lee (2002) who incorporate aspects of supply uncertainty into the Fisher model. The work of Lee (2002) is, however, also focused on developed country contexts. Fisher (1997) and Lee (2002) are in agreement that efficient supply chains are best matched with a relatively stable environment (Qi et al. 2009). This assumption of a stable, predictable environment cannot be made when examining Africa. Qi et al. (2009) further note that "very few

[6] http://www.guardian.co.uk/business/2010/nov/29/walmart-expands-south-africa-massmart

studies have examined supply chain strategies in emerging economies and cultural settings other than North America and Europe". It is highlighted that these well-cited supply chain theories have been developed in developed country contexts and their ability to assist us in understanding supply chain management and design in developing country contexts needs to be questioned (Qi et al. 2009).

In addition, many of these theories promote firm-level strategies to manage the supply chain, again assuming that the external environment is stable and predictable. In Africa, this assumption cannot be made, and the external environment has a significant influence on supply chain management.

The Game case study further reinforces the important role of the external environment. It is thus evident that in conceptualizing supply chain theories or frameworks that will be practically relevant in emerging markets such as in Africa, researchers will need to explicitly include the external environment as a strong and significant variable in such theories or frameworks.

7 Implications for Firms Intending to Design Supply Chains in Africa

In the past decade, six of the ten fastest expanding economies in the world were located in Sub-Saharan Africa. As the economic power of Sub-Saharan African countries strengthens and GDP grows, more people will move from the bottom of the pyramid (poverty level) to the next level up (lower middle class). The market for goods and services in Africa will grow. Firms that have designed supply chains through Africa will be well-located to benefit from this growth. Prahalad (2005, 42) notes that, "The bottom of pyramid markets exist in a hostile infrastructure. Design of products and services must take this into account." In discussing the supply chains that need to distribute products and services through this market, he adds that, "distribution systems that reach the bottom of the pyramid are critical for developing this market. Innovations in distribution are as critical as product and process innovations." (2005, 43).

Key to developing a successful supply chain is achieving the flow of information between each link in the chain, and the role of information technology in integrating various steps in the supply chain is well documented (Handfield and Nichols 1999). Shoprite has used technology to overcome a number of deficiencies in the infrastructure in Africa. Grobbelar (2006) notes that Shoprite "makes use of global tracking systems to follow its delivery trucks throughout Africa and has invested substantially in information technology to streamline its procedures for ordering and stock control." Mahajan and Banga (2006) have found much evidence that firms in emerging markets that are able to effectively utilise technology can use this to overcome certain emerging market difficulties.

Much recent work in the area of Supply Chain Management has attempted to model various supply chain processes. Those doing research in the area of supply

chain management need to be cognizant of the fact that modeling supply chain processes in Africa is much more difficult. This difficulty is caused by a number of factors, including the high variability and unpredictability of each stage in the supply chain, for example, from transportation time to time spent at border crossings to time spent at ports. Many MNC firms from developed countries have very structured ways of operating. While this structure enables them to operate efficiently in predictable environments, the structure often limits their flexibility. This lack of flexibility becomes problematic in unpredictable, turbulent environments.

In a sense, South African firms have been exposed to high levels of turbulence and uncertainty over the last two decades in their home country. This has allowed them to develop capabilities to be flexible, to improvise, to bootstrap and to find solutions to problems they had not envisaged. The ability to be flexible and to cope in an environment which is uncertain, is a valuable capability. Prahalad and Mashelkar (2010) have drawn attention to this capability: "Learning to do more with less for more people, we believe, should be the innovator's dream. While this undertaking is proving to be a nightmare for many Western Companies, our research suggests that a few pioneers in developing countries are showing the way." They have further added that, "Faced with shortages of capital, technology, and talent, audacious entrepreneurs in emerging markets have had no choice but to overturn accepted wisdom." (Prahalad and Mashelkar 2010, p. 134).

For firms intending to expand their supply chains throughout Africa, the best practices in designing supply chains still hold strong, for example, the employment of relevant technology to achieve supply chain coordination is beneficial (as illustrated by Shoprite). It is however critical that firms are cognizant of the steep challenges the African context holds for supply chain management. Poor infrastructure, difficulties in crossing country borders, various sources of delays and uncertainty are some of the challenges that need to be taken into account when a firm designs and tries to manage their supply chain in Africa. In contrast, the current reports of economic growth, and the future expectation of increasing profits to those firms who are able to establish supply chains despite current challenges, make Africa the continent of great expectation. As illustrated by the case discussed, firms wanting to be successful will need to develop an additional innovative capability. In Africa, designing a supply chain is about improvisation. The ability to improvise and to solve unexpected problems needs to be developed throughout the firm's supply chain, from the truck driver, to the supply chain manager, to the warehouse manager, to the retail manager, right through to the CEO of the firm. How theory is able to address the need for improvisation is yet to be tested.

Questions for Review and Discussion

1. What makes Africa an attractive market?
2. What are the major supply chain challenges faced by firms trying to expand throughout Africa?

3. How could some of the problems firms face be mitigated?
4. How would planning and forecasting methods for operating retail supply chains in Africa need to differ from conventional methods of planning and forecasting?
5. What are some of the supply chain measures which could be put in place in order to reduce the risks that retailers in this environment are exposed to?
6. In trying to make their supply chains Lean, what are the challenges that firms expanding into Africa face?
7. Regarding our case study, why did Walmart choose to acquire Massmart (holding company for Game Stores) as an entry strategy into Africa, rather than go for a Greenfield approach?
8. How does existing supply chain management theory need to be adapted to account for the conditions experienced in Africa?

References

Broadman, H. G. (2009). First mover 'investment advantages' in sub-Saharan Africa: Why northern multinationals should react (quickly) to their southern counterparts. *CESifo Forum, 4*, 52–58.

Christ, N., & Ferrantino, M. J. (2011). Land transport for export: The effects of cost, time, and uncertainty in sub-Saharan Africa. *World Development, 39*(10), 1749–1759.

Corstjens, M., & Lal, R. (2012). Retail doesn't cross borders. *Harvard Business Review, April*, 105–111.

Doing Business Full Report. (2012). Accessed March 1, 2012, from http://www.doingbusiness.org/~/media/fpdkm/doing%20business/documents/annual-reports/english/db12-fullreport.pdf

Fisher, M. (1997). What is the right supply chain for your product. *Harvard Business Review, 75* (2), 105–116.

Grobbelar, N. (2006). In J. Luiz (Ed.), *Managing business in Africa*. Cape Town: Oxford University Press Southern Africa.

Handfield, R., & Nichols, E. (1999). *Introduction to supply chain management*. Upper Saddle River, NJ: Prentice Hall.

Investment Climate Assessment, ICA Briefing Note. (2009, March). Accessed March 1, 2012, from http://siteresources.worldbank.org/INTAFRSUMAFTPS/Resources/Investment_Climate_Assessment_Briefing_Note.pdf

Lee, H. (2002). Aligning supply chain strategies with product uncertainties. *California Management Review, 44*(3), 105–119.

Mahajan, V., & Banga, K. (2006). *The 86 % solution: How to succeed in the biggest market opportunity of the 21st century*. Wharton, NJ: Wharton School Publishing.

Prahalad, C. K. (2005). *The fortune at the bottom of the pyramid*. Wharton, NJ: Wharton School Publishing.

Prahalad, C. K., & Mashelkar, R. A. (2010). Innovation's holy grail. *Harvard Business Review, 88* (July–August), 132–141.

Qi, Y., Boyer, K. K., & Zhao, X. (2009). Supply chain strategy, product characteristics, and performance impact: Evidence from Chinese manufacturers. *Decision Sciences, 40*(4), 667–695.

Supply Chain Foresight. (2011). Accessed July 10, 2012, from www.supplychainforesight.co.za

Supply Chain Foresight. (2012). Accessed July 10, 2012, from www.supplychainforesight.co.za

Malaysian Government Transformation Towards Effective Supply Chain Management: The Case of IT-Based Trade Facilitation

Erne Suzila Kassim and Fazidah Abu Bakar

Abstract Trade facilitation is an important integral part of the supply chain. Facilitating the trade processes especially in automating the traders' submission of regulatory documents is therefore very crucial for enhancing the management of the supply chain, especially with increased volumes of international trade. Hence, information and communication technologies are applied and they play a very pivotal role in reducing the complexity of international trade and minimizing the transaction and purchasing costs. Similar to other countries, Malaysia has taken initiatives to transform the trade facilitation processes of the supply chain via a single window system. Although the general approach to implementing the IT-based trade facilitation system may be similar across countries, several unique strategies and transformation plans have been adopted by the Malaysian government to spearhead the use of ICTs in creating paperless, electronic Customs-related services for improving the transparency and predictability in international trade transactions and supply. Based on an interview and selected reports, the study seeks to explore vital motivations behind the Malaysian transformation towards a National Single Window for effective supply chains, identify the core functions and services that simplify the business trading activities across borders and discuss the alignment strategies of government agencies in meeting the business and supply chain strategies within the national and international setting. Via the Malaysian National Single Window, the trade facilitation services have been able to reduce non-tariff trade barriers and deliver many benefits to the trading community, including improving transparency, enhancing predictability and advancing on the management of uncertainties and risks.

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W. Piotrowicz, R. Cuthbertson (eds.), *Supply Chain Design and Management for Emerging Markets*, DOI 10.1007/978-3-319-05765-1_4

1 Introduction

Trade facilitation is an important integral part of the supply chain. The supply of raw materials that requires collaborative processes of procurement, manufacturing, assembly and distribution across different countries often intersect at maritime port, an airport or a road border crossing. Goods and materials must be declared and approvals must be obtained. Import and export compliance requirements, which comprise of government approvals, customs declarations and other supporting documents such as certificates of origin and trading invoices are the formalities that must be adhered to. Facilitating the trade processes especially in automating the traders' submission of regulatory documents is therefore very crucial for enhancing the management of a supply chain, especially with increased volumes of international trade.

Hence, information and communication technologies are applied and they play a very pivotal role in reducing the complexity of international trade and minimizing the transaction and purchasing costs. In many countries, the ICTs facilitate system that serves as a virtual national gateway to international trade is known as a single window. The national single window initiatives involve significant changes to the business model and process, and it demands a sophisticated governance effort for the adoption of technology. Although there is no universal model that can be adopted, a large number of countries, including Malaysia, have taken initiatives to transform the trade facilitation processes of the supply chain via a single window system.

Over the past decade, Malaysia has achieved significant economic and social progress. The shift from an agricultural and commodity-based low-income economy to a successful middle-income economy is accompanied by sustained rapid economic growth and a steady political situation. In addition, continuous transformation initiatives by government administration have also made significant changes to the business atmosphere and economic development.

Since the late 1990s, the Malaysian government has been actively deploying Information and Communication Technologies (ICTs) in many aspects of its administration. The major vision is to streamline various administrative and business processes in order to strengthen its competitiveness and transform the nation into a knowledge economy. One of the areas of concern is the management of the international supply chain that involves interactions from diverse sectors and requires approvals from local and international government authorities.

This chapter discusses the Malaysian government strategies and transformation innovations to spearhead the use of ICTs in creating paperless, electronic Customs-related services for improving transparency and predictability in international trade transactions and supply, known as the Malaysian National Single Window. Some key questions were asked: What are the imperative reasons that drive Malaysia to transform the trade facilitation process? What are the core functions and services of the Malaysian National Single Window that simplify the business trading activities for effective supply chains? With the National Single Window in place, how do

government agencies align the business and supply chain strategies within the national and international setting? Therefore, the study seeks to:

1. Explore the vital motivations behind the Malaysian transformation towards a National Single Window for effective supply chains.
2. Identify the core functions and services of the Malaysian National Single Window that simplify the business trading activities across borders.
3. Determine the alignment strategies of government agencies in meeting the business and supply chain strategies within the national and international setting.

In this chapter, first the Malaysian economic setting is outlined. Total trade, import and export indexes are provided. In addition, supply chains and documentation requirements for trading are discussed. The Malaysian international trading atmosphere is also detailed. Understanding the economic and supply chain setting is important for giving a clear understanding of the context being discussed. Next, the motivation of the innovative trade facilitations towards a single window is presented. This includes a discussion on the increasing complexity of international trade documentations, faster approvals, complexity of data submission and regulatory control. Then, it proceeds with the discussion of the transformation of supply chains with regards to the National Single Window design and features. After that, the strategies set by the government agencies in order to align with the National Single Window are highlighted. The chapter ends with a discussion on how the IT-based Malaysian National Single Window has resulted in effective and efficient trade facilitation processes.

2 The Malaysian Economic Setting and Supply Chain Designs

Malaysia, a federal constitutional monarchy in Southeast Asia, lies between Thailand in the north and Singapore in the south. With 13 states and 3 federal territories, the governance of the states is divided between the federal and the state governments while the federal government has direct administration of the federal territories. Malaysia is the 67th largest country by total land area and as of 2010 census, the population was 28,334,134, making it the 42nd most populated country. The population consists of three major races, in which the Malays make up to 50.4 % while the Chinese and the Indians form the other 24.6 % and 7.3 % respectively (Malaysian Statistics Handbook 2011).

The Malaysian constitution guarantees freedom of religion, and Islam is the state religion. Data from the Malaysian Statistical Handbook (2011) shows that about 61.3 % of the population practice Islam, 19.8 % Buddhism, 9.2 % Christianity, 6.3 % Hinduism and 1.3 % Confucianism or Taoism. The official language is the Malay language and English remains as the second language. It serves as the medium of instruction for mathematics and science subjects in all state schools.

Improving the education level has always been the primary agenda of the nation. Realizing the importance of a good education for the k-economy, the education system has faced several phases of significant transformation planning. Today, there are more than 20 public universities and hundreds of private colleges and universities to support the people's higher education needs.

Malaysian economics has faced several stages of transformation; from a predominantly mining and agricultural-based economy to an industrial based sector and later towards a more multi-sector economy. Its status as a newly industrialized market economy has served Malaysia as the 3rd largest economy in ASEAN and the 29th largest in the world (Malaysian Statistics Handbook 2011).

The nation is the largest producer of tin, rubber and palm oil in the world while the manufacturing industry has a large influence on the country's economy. Malaysia is also the world's largest Islamic banking and financial centre. The government is also giving numerous incentives and liberating plans to make Malaysian Islamic financial sector the most progressive and attractive leader (MIFC 2012). The Global Competitiveness Index 2012–2013 has placed Malaysia in 25th position. The most notable advantages are found in Malaysia's efficient and competitive market for goods and services, their supportive financial sector and business friendly institutional framework.

The Malaysian economy relies heavily on the import and export of goods and services. At the end of 2011, its total trade amounted to RM13.2 billion (USD4.29 bil and GBP2.68 bil) and its exports were valued at RM60.7 billion (USD19.73 bil and GBP12.34 bil). However, although there was a decline in electrical and electronic products through most of 2011, the slowdown was compensated by robust commodity-related exports (The World Bank 2011). Real exports increased 4 % in the first quarter of 2011 on a sequential basis. In addition, domestic demand (private consumption excluding imports of consumer goods) rose by 11 % and 10 % in the first and second quarters of 2011. The international supply chain activities that support the imports and exports are then relatively huge.

The value of the total export and import is increasing every year. Table 1 depicts the statistical figures on the total export, import and trade balance since 2006, measured in the local currency (RM) (Malaysia Statistics Handbook 2011).

Located in the southern part of Asia, and strategically located at the Straits of Malacca, international trade plays a significant role in the Malaysian economy. Malaysia's international trade has been growing tremendously over the last three decades. The export-import-based industry is well promoted and exercised, which creates a very positive investment environment. There has been a consistent shift in the export commodities from agricultural products, raw and processed natural resources, and labor intensive manufactured goods to skill-intensive products, including electrical and electronic equipment parts, and also services (MITI 2011).

Malaysia's major export commodities are primarily electronic and electrical equipment, palm oil, liquefied natural gas, chemicals and chemical products, refined petroleum products, crude petroleum, machinery, appliances and parts, and manufacturers of metals. The main export partners are shared among Singapore, China, the United States of America, Japan, Thailand and Hong Kong. In the year 2011,

Table 1 Malaysian import, export and trade balance in 2011

Year	Total exports (RM billion)	Total imports (RM billion)	Trade balance (RM billion)
2006	588.97	480.77	108.19
2007	605.15	504.81	100.34
2008	663.49	521.61	141.88
2009	553.30	434.94	118.35
2010	639.43	529.19	110.23

Note: 2011 exchange rate to USD and GBP

exports to the ASEAN countries amounted to RM171.5 billion (USD55.75 bil and GBP34.86 bil) with 51.4 % of the trading going to Singapore, 20.8 % to Thailand, 12.1 % to Indonesia, 6.8 % and 6.4 % to Vietnam and the Philippines respectively.

On the other hand, data from MITI (2011) indicated the Malaysian import commodities are primarily derived from electronics, machinery, petroleum products, plastics, vehicles, iron and steel products and chemicals. The largest groups of the importing countries are China, Japan, the United States of America, Singapore, Thailand, Indonesia, South Korea, Germany and Taiwan. Imports from the ASEAN countries in 2011 were valued at RM159.3 billion (USD51.79 and GBP32.38 bil). 41.6 % of the goods were mainly imported from Singapore, 22 % from Indonesia, 21.7 % from Thailand and 6.5 % and 3 % from Vietnam and the Philippines respectively.

In order to strengthen its economic position and become a high income economy, Malaysia has embarked on an Economic Transformation Program (ETP), which is built upon the policy directions, strategies and programs of the tenth Malaysia Plan. The success of the ETP will rely very much on the key growth engines of 12 National Key Economic Areas (NKEA); Oil, Gas and Energy; Palm Oil; Financial Services; Tourism; Business Services; Electronics and Electrical; Wholesale and Retail; Education; Healthcare; Communications Content and Infrastructure; Agriculture; and Greater Kuala Lumpur/Klang Valley (Malaysian Economic Transformation Program 2010).

3 Supply Chains Management in the Trading Perspective

3.1 International and Global Supply Chains

In order to place the single window into an international trade perspective, it may help to understand how an international supply chain is organized and functions. Supply chain may be defined as "a system of organizations, people, technology, activities, information and resources involved in moving a product or service from supplier to customer. Supply chain activities transform natural resources, raw materials and components into a finished product that is delivered to the end customer. In sophisticated supply chain systems, used products may re-enter the

supply chain at any point where their residual value is recyclable" (UN/ESCWA 2011).

The Council of Supply Chain Management Professionals (CSCMP) in (UN/ESCWA 2011) defines supply chain management as:

> Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies.

Supply chain management is an integrating function with primary responsibility for linking major business functions and business processes within and across companies into a cohesive and high-performing business model. It includes all of the logistics management activities noted above, as well as manufacturing operations, and it drives the coordination of processes and activities with and across marketing, sales, product design, finance and information technology.

3.2 Role of ICTs in Trade Facilitation of Supply Chain

It is without doubt that information and communication technology (ICT) has now become the backbone for businesses and enterprises, and also provides significant impacts on organizations. More and more ICT innovations are designed to equip organizations with competitive necessities. ICT is defined as the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data (Daintith 2009). It is concerned with improvements in a variety of human and organizational problem-solving endeavors through the design, development, and use of technologically based systems and processes that enhance the efficiency and effectiveness of information in a variety of strategic, tactical, and operational situations (O'Brien and Marakas 2010).

The international trade supply chain is a highly complex network of business relationships and business processes. Within the supply chain framework, trade facilitation is a feature within many customs modernization programs. It seeks to improve the regulatory interface between government bodies and traders at national borders (Grainger 2008). According to Hesketh (2010), in these days of information management rather than the physical control of the goods, the role of export data is increasingly important. He adds a multilateral, international legal framework where enforceable jurisdiction is needed with more emphasis placed on the point at which the international movement of the goods begins.

The ongoing challenge for customs administration in balancing trade facilitation with border security and control in an environment of increased trade volume requires the automation of customs procedures (Holloway 2009). The automation has increased the speed with which cargo is cleared by enabling the required data to

be sent in advance of the arrival of the shipment. Lewis (2009) emphasized that ICT is no longer just an enabler; it is fundamental to the future of customs administration. They have to acknowledge technology as a key strategic business issue. Despite the fundamental role of ICT, Tan et al. (2006) caution on the complexity of the redesign of the customs automation as it could be far more problematic than traditional business process and network innovation.

In order to tackle the complexity issue, Misovicova and Azhari (2007) suggest for simplification of processes, procedures and documents, that a core principal 'first, simplify, and then align to international standards' should be observed. When automation is applied, it influences the relationship between customs and trading partners. The distribution of the responsibilities (horizontal supervision) between the government and business is shifted (Bukhsh and Weigand 2011). Thus, it requires more knowledge discovery on the evaluation of the relationship viability and identification of ICT requirements.

The deployment of ICTs in trade facilitation not only allows for more systematic document management, but also gives consequential beneficial impact towards a green environment. Thus, in order to assess the degree of dematerialization of customs supporting documents, a survey was conducted by the World Custom Organization in 2011. As there were a limited number of responses, the findings need careful interpretation. The key observations are (Jae 2011):

1. Customs administration is still highly dependent on paper forms;
2. There are frequent and extensive requirements for the submission of supporting documents in order to apply for or comply with Customs procedures;
3. Dematerialization has largely been on the policy agenda;
4. Members generally acknowledge the existence of a basic legal framework for paperless customs procedures but are not fully aware of the practices involved;
5. The relevant services for document archiving and repository are now available; and progress in dematerialization has taken place in several countries.

3.3 Malaysian Supply Chains Context

Supply chain management has been an important integral part of business processes in many industries in Malaysia. Although, literally, empirical investigations and academic publications on supply chain management in Malaysia are still at an infant stage, the actual practices are rigorous. Hence, this section highlights on some significant national cases.

Viewing the vital SCM role towards an organizational competitiveness and sustainability, for example, Proton as the local primary car manufacturer has extended their just-in-time (JIT) strategy from a basic internal approach to external integration that incorporates not only the suppliers, but also the customers. Partnering and alliance formation has been applied as a strategy for improving the vertical integration of the supply chain performance (Zailani and Rajagopal

2005). The primary objective is for Proton to have a well-balanced, cost effective production and delivery at the right quantity without compromising on the quality.

Similarly, a large number of manufacturing firms in the semi-conductor industry in Malaysia deploy a supplier selection strategy for their manufacturing flexibility (Ndubisi et al. 2005). It was found supplier selection based on technology works well for the manufacturer whose focus is on product and launch flexibility. On the other hand, when the manufacturer emphasizes volume flexibility, quality becomes an important criteria. It was concluded that appropriate planning in all outsourcing phases determines for better relationship management.

From another aspect, organizations do not regard supply chain management as the sole strategy for enhancing their operations and production capability. When the supply chain is integrated with other discipline, it promises a more successful business achievement. For instance, Othman and Abdul Ghani (2008) examined the impact of supply chain management on the human resource management (HRM) of companies whose suppliers originated from Malaysia. The suppliers recognized the need to develop good HRM practices for higher adaptability in fulfilling their roles in the supply chain.

Although having a well managed supply chain strategy is essential, Mustaffa and Potter (2009) found evidence of its ineffective application in the Malaysian health care industry. In their study, 28 % of clinics' orders could not be delivered as required due to poor inventory control methods. As a result, costs of logistics and transportation rose to a substantial amount. In order to curb the issue, vendor managed inventory (VMI), which uses the information and communication technology as the data transfer platform was proposed. A relatively strong position of Malaysia's ICT capabilities through the nation's Economic Transformation Program enables not only VMI to be widely applied, but also other technology and e-based SCM initiatives. Considering the importance of ICT, Chong et al. (2009) investigated the relationship between supply chain factors and the adoption of e-Collaboration tools in the supply chain of electrical and electronic organizations in Malaysia. They found the adoption of the tools was highly influenced by supply chain factors of trust, complexity and volume.

The Malaysian government has been making substantial efforts to improve and enhance the facilities for supporting the supply chain and trade processes of many industries. Trade facilitation as part of supply chain has been recognized as the engine of growth. It simplifies, harmonizes, standardizes and modernizes the customs activities (Grainger 2008). Trade facilitation offers Malaysia the path to expand its commerce by lowering trade costs and reducing the time to markets, which results in significant increases in the import and export volume. However, each international trade transaction requires an average of 40 documents to meet a set of rules and regulations. The cost of trade documentation on the other hand is approximately 5–10 % of the cost of goods produced (Mah 2009). In fact the cost may be higher if there are typing or other errors. Issues of international trading include time, processes, accuracy of data, duplication of work and efficiency and effectiveness.

The procedural requirements for importing and exporting goods can be multi-faceted (Mah 2009; Jaafar 2011). Documentation, time and cost (excluding tariffs) are the key components for trading across borders by ocean transport, and they must be recorded. For goods to be exported, procedures range from packing the goods into the container at the warehouse to their departure from the port of exit. On the other hand, for importing goods, procedures range from the vessel's arrival at the port of entry to the cargo's delivery at the warehouse. Information on the documents is provided by local freight forwarders, shipping lines, customs brokers, port officials and also the financial institutions (Islam et al. 2005).

Required documents for the import and export of goods are bank documents, customs clearance documents, port and terminal handling documents and transport documents. The time required to handle the import and export activities is measured in days as the time needed to obtain all documents, to handle the inland transport, to clear the customs and inspections needs and to handle the port and terminal procedures. However, the time does not include the ocean transport time and travelling. Next, the cost required to import and export are the official costs of all documents, inland transport and handling, customs clearance and inspections, and port and terminal handling.

4 Research Methodology

The methodology of the study is limited to a desk research approach, combined with an empirical investigation based on the qualitative technique. The data of this paper is based primarily on reports which have been produced locally and internationally. The secondary data was generated by the World Bank, the Ministry of International Trade and Industry Malaysia (MITI), the Ministry of Finance Malaysia (MOF), the Malaysian Statistics Department, the Malaysian Economic Transformation Program (ETP) and the World Bank and United Nations selected reports.

However, although the main research data was based mainly on analysis of reports and secondary information, there were issues that required specific explanation by the authorized person of the Malaysian National Single Window. Hence, an interview was also conducted with a senior officer who is responsible for the policy and implementation of the Malaysian National Single Window. The insights and knowledge of the senior officer, being in the unit that overviews and manages the trade facilitation system, and has controls to the implementation and adoption, provided useful inputs to the study. Therefore, the results of the investigation could be generated as lessons learned from business and research practices.

Based on the two sets of data, the remaining sections discuss the findings related to the research questions, as mentioned in the introductory section.

5 Imperative Transformation of Malaysian IT-Based Trade Facilitation

Trade facilitation is a substantial feature in a Malaysian custom modernization program, delivered towards effective supply chains for the principal stakeholders, suppliers, government authorities, trade community and customers. Driven by an international and regional agenda, technology-infrastructure capability and image and competitiveness improvement, Malaysia is making a giant leap in transforming the trade facilitation of customs.

5.1 Alignment to International and Regional Agenda

Following the requirements of the Revised Kyoto Convention and the United Nations Centre for Trade Facilitation and Electronic Business, Malaysia's National Chambers of Commerce and Industry (NCCIM) was given a mandate to align all relevant international trade documents. The Revised Kyoto Convention, Standard 3.12 in Chap. 3 states that "Clearance and Customs formalities" stipulate that "The Customs shall limit the data required in the Goods declaration to only such particulars as are deemed necessary for the assessment and collection of duties and taxes, the compilation of statistics and the application of Customs law" (pp 9). On the other hand, the recommendation of the United Nations Center for Trade Facilitation and Electronic Business (UN/CEFACT) emphasizes that sellers and buyers should align all relevant in house documents to the United Nations Layout Key for Trade Documents. It suggests that government authorities should require minimum data and documents for control purposes and, where possible, utilize commercial information. It is proposed that Government should request import and export data only once and should allow the submission of data to a single entity.

Over 25 % of Malaysia's trade is within the region and ASEAN is a key market for its exports. Enabling electronic trading for improved efficiency has a huge relevance for boosting Malaysia's trade. Therefore, to reduce the complexity, and streamline the international trading processes, in the early 1990s, the first initiative for transforming the trading facilitation was on the development of the Electronic Document Interchange (EDI) system for the Malaysian Customs Department. Continuous efforts are consistently placed to ease the international trading operations, simplify the imports and exports procedure and minimize the complexity of documentation requirements. In early 2000, the government of Malaysia had taken the initiative to transform the international supply chains through an environment called the Malaysian National Single Window (MNSW) (Ministry of Finance 2011).

5.2 Capability of Information Technology and Infrastructure

The technical solution of the National Single Window requires appropriate IT infrastructure in terms of software, hardware and network connectivity. IT infrastructure is the extent to which the core IT technologies have been embedded into the organization's value-chain activities. IT infrastructure is generally considered as the foundation of system capability that enables the development and support of electronic business conduct.

The Malaysian government has played a vital role in catalyzing the development of information technology and related technology infrastructure for promoting the growth of the IT-enable trade facilitation system. This includes developing plans and creating several agencies to encourage information and communication technology growth. The mission to automate and promote the use of information and communication technology for all government-related processes and procedures started in the early 1990s. Efforts to support the mission included setting up the Malaysian Communication and Multimedia Commission (MCMC) in 1998 to promote broadcasting, telecommunications and Internet services and launching a public service portal in 2005 to enhance the access to and delivery of government services to the community and businesses.

Being a national agenda, the National Single Window is another platform to move towards zero face-to-face services and full end-to-end online processes. A target has been set to accommodate 90 % of trading transactions online while the remaining 10 % are in the form of electronic forms (ETP 2010).

5.3 Image and Competitiveness Improvement

Based on the logistics infrastructure and performance, in 2009, the World Bank placed Malaysia to number 27 out of 150 countries, next to Spain and the Republic of Korea. The Logistics Performance Index (LPI) is a country's rating of six different attributes (Arvis et al. 2012):

- Efficiency of the customs clearance process
- Quality of trade and transport-related infrastructure
- Ease of arranging competitively priced shipments
- Competence and quality of logistics services
- Ability to track and trace consignments
- Frequency with which shipments reach the consignee within the scheduled or expected time

With a motivation to improve image and to offer a better solution for conducting international businesses, Malaysia is determined to make continuous improvements to its international logistics related processes and activities. Hence, the development of the National Single Window by utilizing the information and

communication technologies to simplify and facilitate trade is seen as a means for improving image and competitiveness in the global economy.

5.4 *Reform-Based and Objective Driven Uses of Malaysian National Single Window*

The primary goals of Malaysian electronic trade facilitation that drives towards the development and implementation of a National Single Window are to improve the operational efficiency and effectiveness of procedures, documentation flow and data exchange in international trade transactions, reduce trade transaction costs and to improve border control, compliance and security. It is intended to serve as a platform for the elimination of re-keying and resubmitting identical pieces of data, to conform with the requirements of business processes in different stages of trade and transport in the international supply chain and to integrate data and business processes throughout the international supply chain.

The primary aims of the Malaysian National Single Window are grouped as:

1. Strategic transformation: this objective is also known as risk-based governance. The government of Malaysian has been highly emphasizing the end-to-end information transparency in a trusted environment. Transparency is seen as an outcome of an exchange process between two or more entities. In the meta-systems of governments, electronic markets and international trade, transparency is realized via information transfer and sharing of sensitive information that seeks to distribute or share the benefits of greater openness as widely as possible. Greater transparency can be achieved via information systems as several literatures recognize the important enabling role of information systems in this situation (Kassim and Hussin 2010).
2. Efficiency improvement: the objective is primarily to reduce the burden of redundant administration. As international trading and facilitation requires integration between government agencies, business organizations, logistics, customs and other related entities across the borders, data automation between and within organizations allows the agencies to gain process efficiency. The Single Window will eliminate the repetitious document preparation and submission. This is achieved via improved process management and reliable lead times. The benefits of process improvement include reduced paperwork, decreased redundancy and process and documentation standardization. Hence, the National Single Window allows for data and document harmonization.
3. Effectiveness enhancement: according to UN/ESCWA (2011), the objective is also identified as coordinated inspections. The National Single Window will be a platform for controlling agencies to coordinate and simplify international trading agencies' activities. With this system, physical inspections by different government authorities will only be conducted once. Therefore, the time, documentation and costs needed to transfer the goods will be reduced.

5.5 Challenges to Transformation and Critical Success Factors

Despite the anticipated values and benefits of the Malaysian National Single Window, there still exist some challenges and hurdles that decelerate the implementation. As the Malaysian NSW is an IT-based innovation, the most critical challenge comes from the complexity of the technical and data integration aspects. The system is intended to integrate data and business processes by different stakeholders in different phases of supply chains. Examples of complexities include the issues of signature and validation of foreign documents, security and equaling the e-documents and paper formats.

In addition, legacy information systems by different stakeholders may further complicate the integration. In Malaysia, more than 90 % of businesses are operated by small and medium size companies. Studies on SMEs in Malaysia consistently reported a low level of IT adoption among them due to lack of knowledge and skills, financial support and organizational commitment (Hairuddin et al. 2012). Thus, it creates another challenge and conflict for the full implementation, integration and deployment of the NSW.

To deal with the technical and SME stakeholder issues, the Ministry of International Trade and Industry (MITI) as the authorized owner has played a significant role. The agency is responsible for emphasizing long-term commitment and support from top management and serving as a reliable institutional collaboration platform. Strong political will, effective management of different stakeholders' expectations, perceptions and acceptance, workable business and architectural models and vigilant regulatory reforms are among the principle strategies for responding to the challenges. Furthermore, the government and the authorized system developer have remained focused on active involvement of all stakeholders from the conceptual to the development and implementation stages, conducting regular training sessions to raise awareness of the National Single Window concept, providing detail plans to ensure that project priorities and goals were adequately set and implemented and making clear implementation guidelines including mutual agreements on its standards and technologies. The plans and strategies require commitment and coordination from the following key drivers of the Malaysian National Single Window:

1. Ministry of Finance: the lead agency and the important initiator of the system.
2. Ministry of International Trade and Industry: the oversight agency tasked with setting up the Trade Facilitation Action Council to prepare the National Single Window's strategic directions, goals, vision and mission.
3. Royal Malaysian Customs: the major implementing agency responsible for the clearance of import/export and transit of related goods.
4. Dagang Net Technologies: the organization appointed to design, develop, implement and maintain the Malaysian National Single Window.

Accordingly, Salleh (2010) highlighted three factors that determine the success of the National Single Window implementation. These determinants involve the

important role of the government administration. First is the support and influence towards the transformation initiative by allocating sufficient resources and encouraging and promoting the development and usage exercise. Second, their central role in shaping organizational strategies as the Malaysian National Single Window constitutes a core component of not only a firm, but different levels and types of stakeholders' strategic planning process. Finally, the government as the key authority has placed significant effort in reducing conflicts as the system entails the creation and coordination of information flows across various organizations and considerable changes to their business process. This is essential especially in dealing with deployment issues, system compatibility and interoperability between agencies.

Furthermore, group effort is also fundamental as a success factor. The active involvement and continuous inter-agency collaboration demonstrated by the 30 participating permit-issuing agencies have led to the full implementation of the Malaysian National Single Window. Similarly, the establishment of the public-private partnership has yielded a significant contribution to the success. Whilst the government takes a leading role in developing and implementing forward-looking and sustainable e-trading facilitation, the private sector is given the important role of devising and implementing the paperless move to achieve a more transparent and efficient public delivery system for enhancing productivity and reducing the costs of doing business across the border.

6 Malaysian National Single Window Design and Functions

The Malaysian Single Window is an inter-organizational system that connects information systems of stakeholders engaged in various business processes of the international supply chain from after the goods area ordered until the payment for goods is made. The United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT 2005) defines the Single Window as "a facility that allows parties involved in the international supply chain to lodge data in a standardized format at a single entry point to fulfill all import, export and transit-related regulatory requirements. Electronic data should be submitted only once". It is also suggested that the Single Window as a system "should facilitate a synchronous processing of data as well as enable the decision-making for customs release and clearance at a single point".

The stakeholders of the international supply chain and thus the Malaysian National Single Window are categorized into four main players. They are:

- Authority: the authority group includes the Ministry of International Trade and Industry (MITI), Ministry of Transport, port authorities, dangerous goods authorities, civil aviation, free zone authorities and customs of Malaysia, and also the authorities of the importing/exporting country and country in transit.

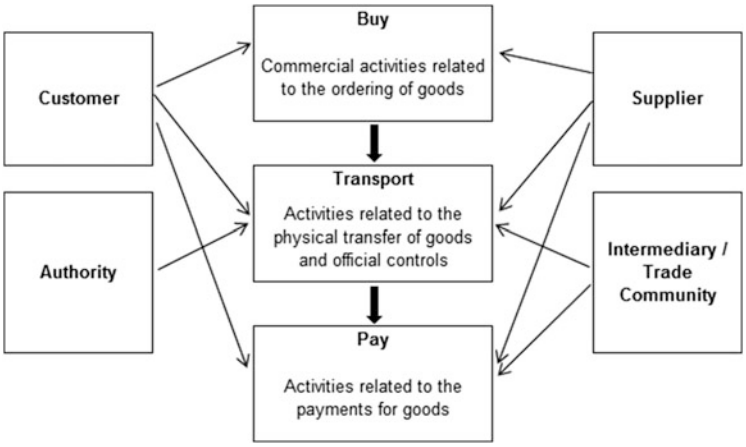

Fig. 1 Malaysian National Single Window general design

Their main role is to monitor goods that cross borders and reflect the national and international public interests, standard and requirements

- Supplier: they are the exporters or sellers who sell goods or services as stipulated in the contracts and agreement
- Customer: they are the importer or buyer to whom the goods and services are sold as stipulated in the contracts and agreement
- Intermediary: the stakeholders who provide commercial, financial, and transport services within an international supply chain such as a freight forwarder, custom broker, third party logistic service provider, port, terminal operator, inland container depot, bank, insurance company and IT service provider.

The simplified scope of the Malaysian Single Window is presented in Figure 1.

6.1 Export, Import and Transshipment Process Re-engineering

The Ministry of International Trade and Industry (MITI) as the Ministry responsible for trade facilitation in Malaysia, has set up the National Single Window Business Process Reengineering (NSW BPR) Working Group that is responsible for formulating and recommending re-engineering of import/export processes. The working group has taken the initiative to discuss and identify with related government agencies and industry associations the issues and the most common practices for import and export process flows, particularly pertaining to documentation requirements, time taken and the cost involved for import and export processes.

The industry players (traders) in Malaysia, especially at Port Klang, have identified major issues in import and export procedures that need to be addressed by the authorities concerned. Issues raised include the excessive documentation requirements and lack of transparency or unclear import and export process requirements. For this purpose, the Working Group was set up in early 2008 with the objective of identifying the best practices for export and import process flows in order to address gaps or barriers as well as to improve the efficiency of international trade in general. It is important for the affected exporters and importers to have sufficient information on the process flow and time taken in order for them to learn and to adopt the new procedures.

Initially, five initiatives were developed for facilitating trade across borders (Tiong 2011):

1. Process improvement on import/export process cycle time
2. Document reduction study
   - Project to improve efficiency of logistics stakeholders
   - To reduce cycle time for import and export processes in Exporter/Importer Offices
   - To reduce Number of Documents used
   - Focus on Documents Preparation Time (*longest time recorded in DB report*)
   - Findings to be channeled to government for improvement
3. Identify business process for import and export:
   - Streamlining of import/export process flows at Malaysia's main port–Port Klang
   - To provide clear guidelines and avoid confusion
   - 18 activities of import/export have been streamlined
   - Published on websites for reference (*http://www.miti.gov.my*)
4. Standardisation of import/export process flow:
   - Standardised process flows—easier for traders
   - Port Klang's finalised process flows as guidelines for other ports
   - Consultations with other port authorities in Malaysia
5. Reduction of number of documents; merged document of invoice and packing list

Based on detailed discussions with the industry associations, the Working Group has developed and identified nine process flows of import and export at Port Klang. The study specifically focuses on moving a 20-foot container from a factory to the deck of a ship that is ready for departure (for import and export). The process includes four stages:

1. Document preparation;
2. Customs clearance;

3. Technical control, port and terminal handling; and
4. Inland transportation and handling.

The Working Group has streamlined nine types of process flows, based on the Port Klang scenario:

1. Full Container Load (FCL)—(Import and Export);
2. Lesser Container Load (LCL)—(Import and Export);
3. Transshipment;
4. ZB form—(Import and Export);
5. Barter Trade—(Import, Export and In-transit);
6. Roll On and Roll Off (RORO)—(Import and Export);
7. Break Bulk Cargo—(Import and Export);
8. Liquid Bulk Cargo—(Import and Export); and
9. Dry Bulk Cargo—(Import and Export).

6.2 Core Services and Functions

The Malaysian National Single Window initiative serves as an integrated gateway to enable trade-related information and documents to be submitted by importers and exporters, Customs brokers, freight forwarders, shipping agents, banks, insurance companies only once and at a single entry point. The emergence of the Single Window has allowed for the electronic submission of applications and approval of import-export permits via the Net. The Malaysian National Single Window environment and services is depicted in Fig. 2 (mytradelink 2012).

In 2009, the Malaysian National Single Window was fully implemented and used. With six core services, the system has become the national single entry point that allows trade-related information and documents to be submitted online and only once by exporters, importers, freight forwarders, shipping agencies and other stakeholders in the international trade chains.

The Malaysian government has identified three main objectives of the National Single Window:

1. To enable a secure, safe and efficient electronic exchange of trade-related documents through a single point of entry on order to expedite the smooth flow of information and goods for import, export and transit.
2. To simplify, standardize and harmonize trade processes and thereby enhance trade efficiency and national competitiveness.
3. To facilitate the exchange of international trade data through the NSW via seamless connection or integration with the ASEAN Single Window (ASW) and/or its other trading partners.

In meeting the above objectives, six services and functions of the Malaysian National Single Window are designed. Table 2 summarises the core services that align to the international supply chain design (mytradelink 2012).

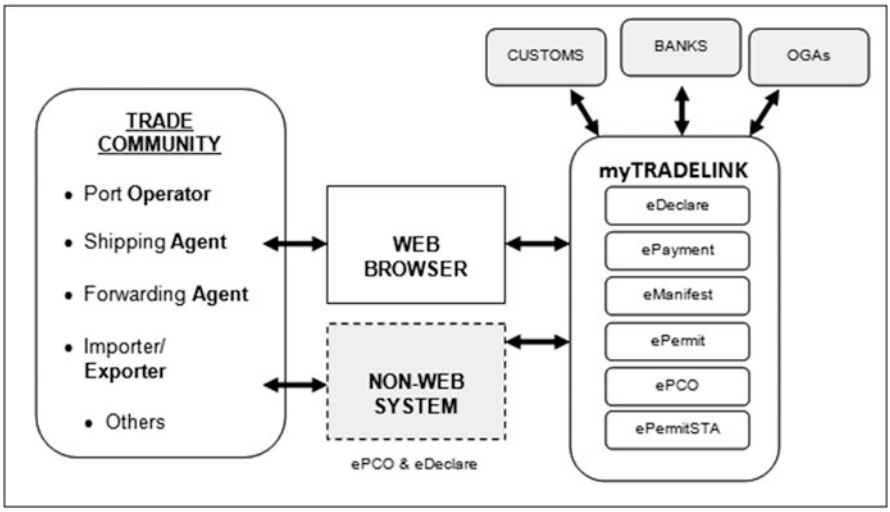

Fig. 2 Malaysian National Single Window environment.

Table 2 Malaysian National Single Window core services

Core services	Purpose
1. Electronic Customs Declaration (e-Declare)	Facilitates the preparation and submission of electronic declaration to Customs
2. Electronic Customs Duty Payment (e-Payment)	Facilitates the generation of Customs duty payment instructions by business to the banks
3. Electronic Permit System (e-Permit)	Allows importers, exporters and forwarding agents to apply for permits from relevant permit-issuing agencies and obtain online approval
4. Electronic Manifest System (e-Manifest)	Allows port users such as principal shipping agents, shipping agents and freight forwarders to submit manifest to Customs
5. Electronic Preferential Certificate of Origin (ePCO)	A document attesting that goods in a particular shipment are of a certain origin under the definitions of a particular bilateral or multilateral Free Trade Agreement
6. Electronic Permit Strategic Trade Act (ePermitSTA)	Allows for pre-registration and permits under the purview of Strategic Trade Act 2010

6.2.1 Electronic Customs Declaration (e-Declare)

e-Declare enables importers and exporters to submit trade declarations and documentations to Customs via the online system. E-Declare speeds up and simplifies the Customs declaration process as it allows for multi-tasking requirements, for instance issuance of tariff codes and duty/tax rates. Moreover, with very minimal computer and system requirements, it is a user friendly and convenient system to use. E-Declare is available at all ports and entry points in Malaysia. The average

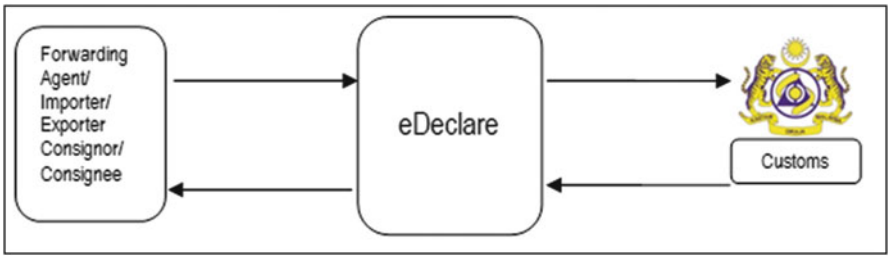

Fig. 3 Electronic Customs Declaration (e-Declare).

number of Customs related transactions conducted per month are 968,141 and in 2010, the number of users reached 3,316 (Salleh 2010). Figure 3 depicts the process flow of e-Declare (mytradelink 2012).

6.2.2 Electronic Customs Duty Payment (e-Payment)

e-Payment as shown in Figure 4 (mytradelink 2012), allows for online preparation and submission of duty payment by importers, exporters or forwarding agents to Customs. There are three modes of duty payment, which are:

1. Electronic fund transfer: by utilizing this payment mode, importers, exporters or forwarding agents may pay for the Customs duty via an electronic multi payment gateway. Eight local banks participate in the payment gateway.
2. Duty Net: the mode of payment is similar to the electronic fund transfer. Payment via DutyNet can be made over almost 24 h, 7 days a week.
3. Financial Service Payment Gateway (FSPG) via Financial Process Exchange (FPX): this is the national Internet payment gateway of an industry-wide multi-bank payment platform. It facilitates e-commerce, particularly business-to-business and business-to-consumers payments. FPX is operated by FPX Payment Gateway Sdn Bhd, a subsidiary of the Malaysian Electronic Payment System (MEPS) and supported by member financial institutions.

6.2.3 Electronic Permit System (e-Permit)

e-Permit facilitates international trading by enabling importers, exporters and appointed forwarding agents to apply for permits from the Permit Issuing Authorities (PIA). The PIA are the Ministry of Agriculture, Department of Environment and Film Censorship Board. They are responsible for verifying and approving permit applications before the approved permits are forwarded to the Customs Information System.

Currently, e-Permit is being used at 17 Permit Issuing Authorities and has registered 12 billion (RM) worth of combined annual trade buying volume. Each electronic permit issuance cycle takes less than a day to be processed and 284,655 permits were issued in 2009. Figure 5 illustrates the process flow of e-Permit (mytradelink 2012).

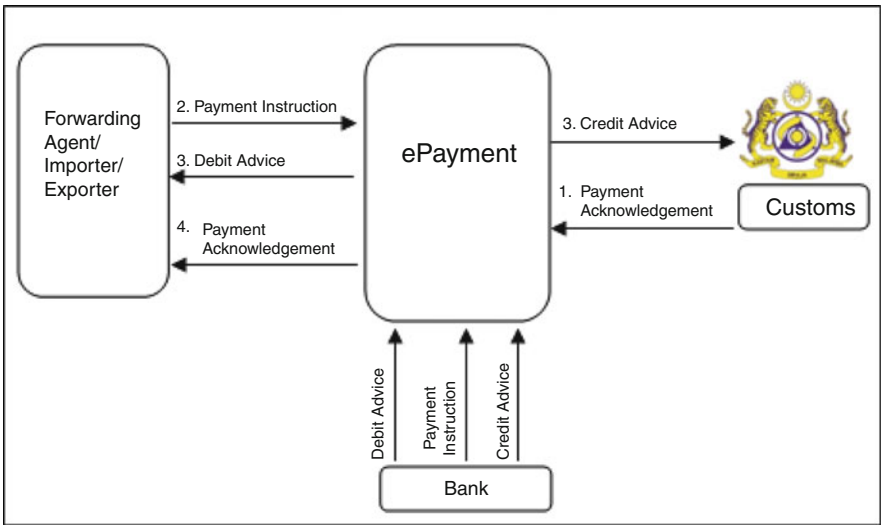

Fig. 4 Electronic Customs Duty Payment (e-Payment).

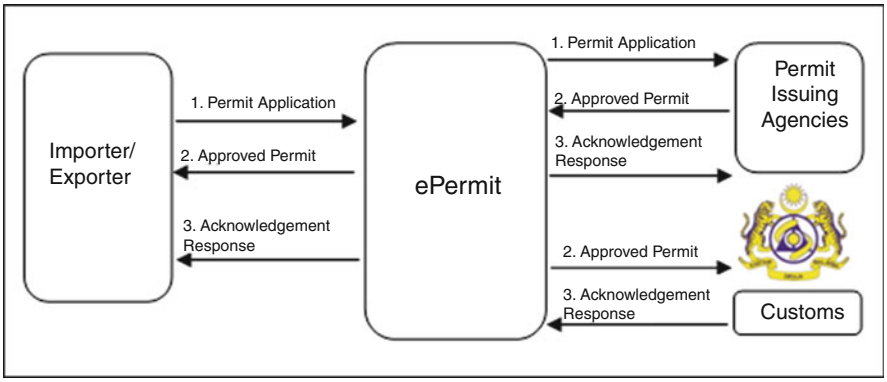

Fig. 5 Electronic Permit System (e-Permit).

6.2.4 Electronic Manifest System (e-Manifest)

The e-Manifest was designed to simplify and reduce the complexity of cargo and vessel manifest submission to the respective authorities. It is a comprehensive system that allows port users such as Principal Shipping Agents (PSA), Shipping Agents (SA) and Freight Forwarders (FF) to submit applications for vessel berthing and cargo manifests to the respective authorities. Figures 6 and 7 (mytradelink 2012) illustrate the process flow of e-Manifest as ship call application and manifest submission respectively.

e-Manifest also allows port users to submit their application for the Ship Call Number (SCN) and the ship manifests to the respective authorities. Available access to value-added information such as location codes, port codes and other

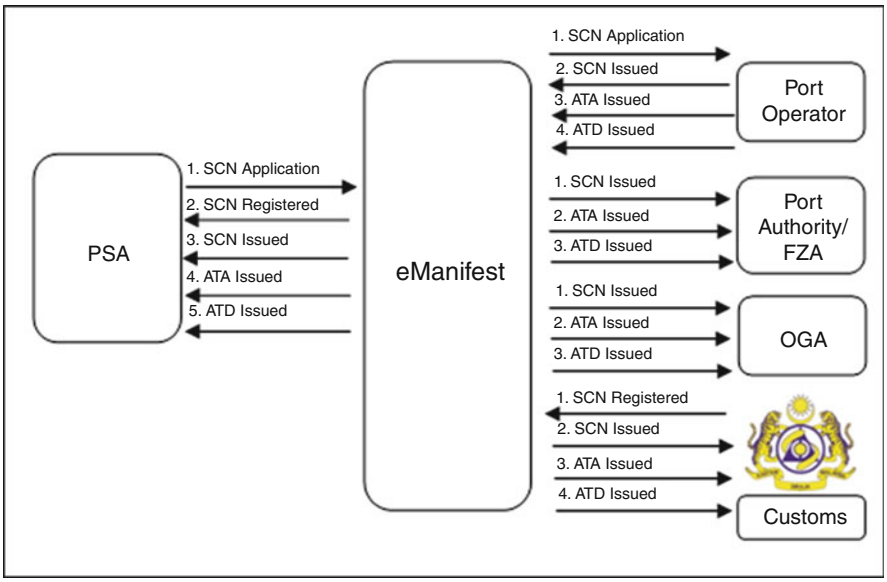

Fig. 6 Electronic Manifest System (e-Manifest)—ship call application flow.

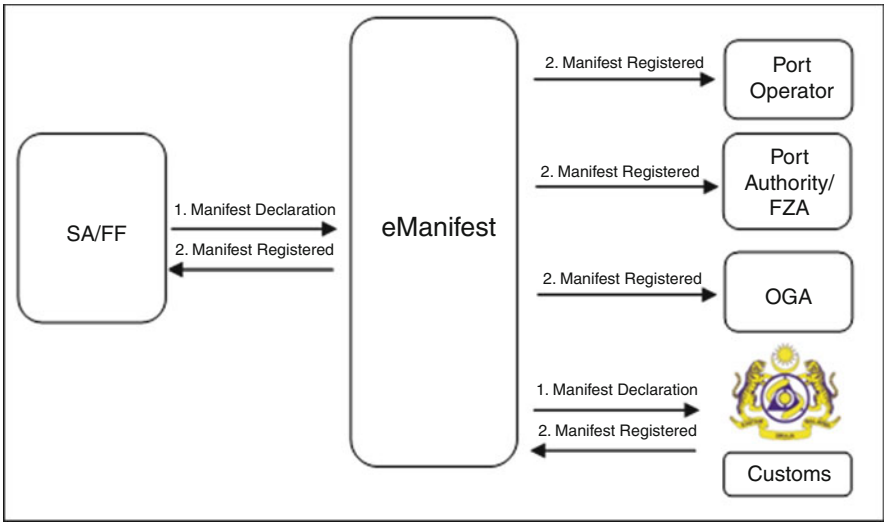

Fig. 7 Electronic Manifest System (e-Manifest)—manifest submission flow.

UN/DIFACT codes further allows for speedier documentation recording. Since its inception, the system has catered for an average of 482,920 electronic CUSREPs, CUSCARs and Inter Terminal Transfer Documents (ITTs) every month to the respective authorities including the Customs (Salleh 2010).

6.2.5 Electronic Preferential Certificate of Origin (ePCO)

ePCO is a web-based Certificate of Origin application and approval system that allows traders and authorities to certify the country of origin of the products. In addition, the system also provides online application for Cost Analysis (CA) and Preferential Certificate of Origin (CO) forms for:

1. ASEAN Trade in Goods Agreement (ATIGA)
2. Generalized System of Preferences (GSP)
3. Common Effective Preferential Tariff (CEPT)
4. ASEAN-Korea Free Trade Area (AKFTA)
5. ASEAN-China Free Trade Area (ACFTA)
6. Malaysia-Japan Economic Partnership Agreement (MJEPA)
7. Malaysia-Pakistan Closer Economic Partnership Agreement (MPCEPA)
8. Textile

There are two modules of ePCO; the standard module and the manufacturer module. The standard module allows traders and manufacturers to apply for online Cost Analysis and a Certificate of Origin. On the other hand, the manufacturer module accommodates manufacturers who would like to assign their Cost Analysis to other Traders without exposing their finished products' actual cost. Figure 8 illustrates the process flow of ePCO (mytradelink 2012).

6.2.6 Electronic Permit Strategic Trade Act (ePermitSTA)

For manufacturers, traders and forwarders of strategic items, getting a trading permit under the Strategic Trade Act (STA) 2010 is necessary. STA2010 is the Malaysian legislation that controls the export, shipment transit and brokering of strategic items and technology, which include arms and related materials, as well as activities that will or may facilitate the design, development, production and delivery of weapons

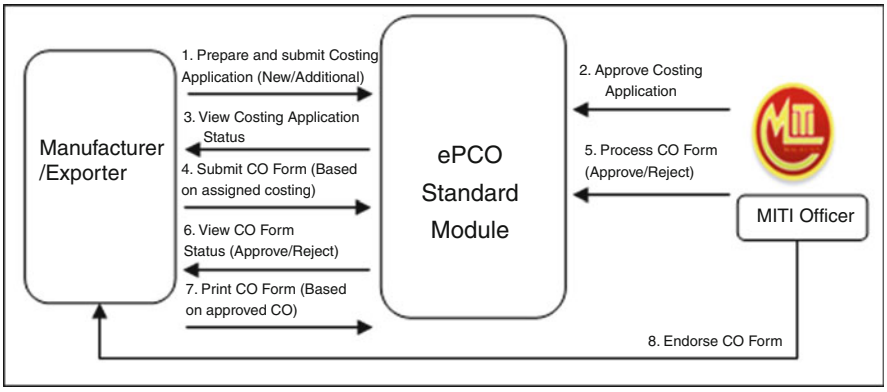

Fig. 8 Electronic Preferential Certificate of Origin (ePCO).

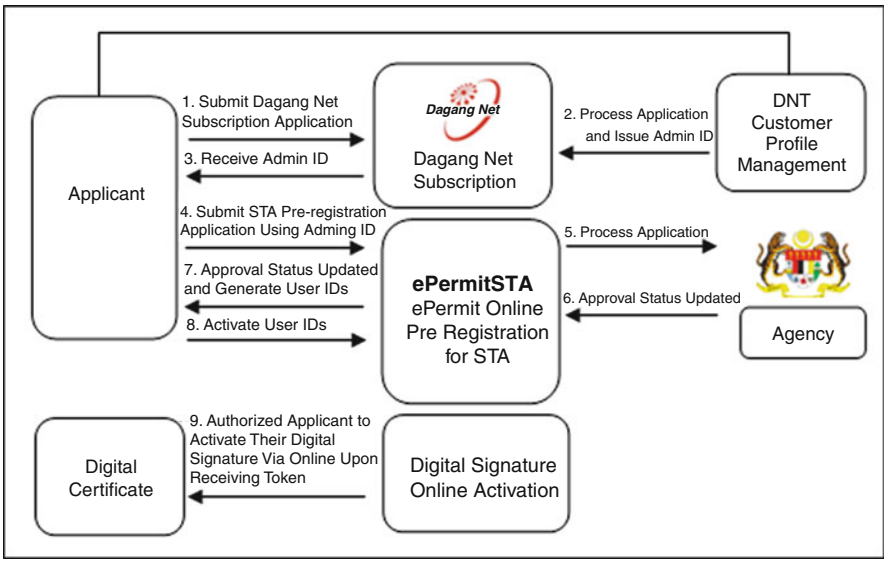

Fig. 9 (ePermitSTA) Pre-registration process flow.

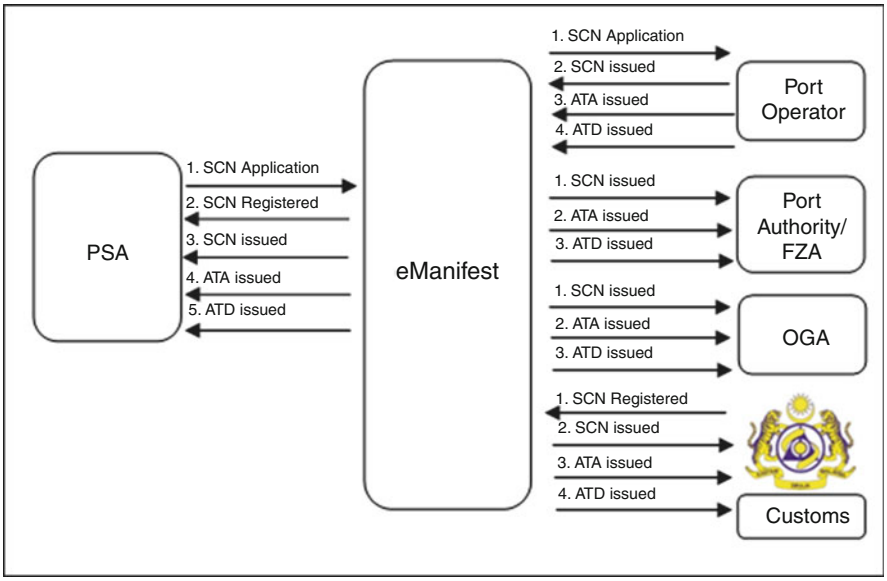

Fig. 10 (ePermitSTA) Permit application process flow.

of mass destruction. The pre-registration process flow and permit application process flow are depicted in Figs. 9 and 10 respectively (mytradelink 2012).

The act is in line with Malaysia's national security and international obligations. Through ePermitSTA, traders are able to conduct a pre-registration of strategic items

for a permit application. Once an approval is obtained from the Ministry of International Trade and Industry and other relevant agencies, traders are able to start applying for the permits electronically.

7 Alignment Strategies of Government Agencies

In order to meet the agenda of a National Single Window establishment, the government agencies have set vital strategies. These include upgrading the infrastructure and network availability, implementing related policy and establishing the governance structure to govern the system usage.

7.1 Infrastructure Upgrade and Network Availability

Multiple parts of the local landscape have been identified for infrastructure enhancement (ETP 2010). Widening the IT coverage, improving the quality of the bandwidth and increasing affordability by reducing the costs are the fundamental strategies to boost the infrastructure and network availability. To enable greater access of businesses and suppliers to the trading facility, the National Development Master plan is amended to require rooftop sites for wireless infrastructure by early 2011.

In addition, the establishment of a National Single Window requires extending the regional network. Thus, the government aims to add up to 3 terabits per second (Tbps) of international bandwidth by the year 2020. Today, there are approximately 200 Gbps of capacity being used, with an estimated 600 Gbps that can become available. To close the gap, plans have been placed for service providers to form a local consortium to acquire the 3 Tbps capacity (Malaysian Economic Transformation Program 2010).

7.2 Legislation and Policy Implementation

Security and privacy are among the main concerns of information systems implementation and online trading, including the National Single Window. For the purpose of enhancing security and protecting confidential data of trading across borders, the government has taken several initiatives by implementing cyber laws. Five acts related to e-business have been in place since 1997;

1. Digital Signature Act 1997
2. The Copyright Act 1997
3. Communication and Multimedia Act 1997
4. Communication and Multimedia Commission Act 1997
5. The Copyright Act 1997

In addition, the Electronic Commerce Act was introduced in 2006 to further protect the online community while conducting business.

7.3 Governance Structure

To govern the successful implementation of the Malaysian National Single Window, the government has formed the institutional structure of trade facilitation. Three councils were given the mandate to monitor and control the trade facilitation activities;

- Trade Facilitation Action Council (TFAC)
- Malaysian Logistics Council (MLC)
- Malaysian National Shippers' Council (MNSC)

Chaired by Secretary General of Ministry of International Trade and Industry, TFAC is responsible for enhancing national competitiveness through trade facilitation and addressing issues related to trading across borders. Specific terms of reference include setting directions and developing strategies for trade facilitation, analyzing and resolving issues and factors related to trading across borders, engaging relevant stakeholders in resolving related issues, proposing recommendations for improving Malaysia's performance towards enhancing national competitiveness and monitoring the initiative implementation undertaken to facilitate trade.

On the other hand, the Malaysian Logistics Council (MLC) was given a mandate to overview the growth and contribution of the logistics industry to the national economy and coordinate the development and promotion of the targeted logistics industry in Malaysia. Finally, the Malaysian National Shippers' Council (MNSC), which was formed under the auspices of the Economic and Social Commission of Asia Pacific (ESCAP) has the responsibility to look after the interests of shippers. This is to ensure efficient shipping services are provided at a fair rate.

8 Effective Supply Chain Management

The application of the six core services of the Malaysian National Single Window has allowed for an effective operation of the international trading and supply chain. The system usage has also improved the ranking of doing business in Malaysia as depicted in the report of the *Doing Business Project* (The World Bank 2012). The

Table 3 Documents, time and costs of international trading in Malaysia

Indicator	Explanation	Actual data
Documents to export (number)	The total number of documents required per shipment to export goods. Documents required for clearance by government ministries, customs authorities, port and container terminal authorities, health and technical control agencies and banks are taken into account.	6
Time to export (days)	The time necessary to comply with all procedures required to export goods. If a procedure can be accelerated for an additional cost, the fastest legal procedure is chosen.	17 days
Cost to export (US$ per container)	The cost associated with all procedures required to export goods. Includes the costs for documents, administrative fees for customs clearance and technical control, customs broker fees, terminal handling charges and inland transport.	USD450
Documents to import (number)	The total number of documents required per shipment to import goods. Documents required for clearance by government ministries, customs authorities, port and container terminal authorities, health and technical control agencies and banks are taken into account.	7
Time to import (days)	The time necessary to comply with all procedures required to import goods. If a procedure can be accelerated for an additional cost, the fastest legal procedure is chosen.	14 days
Cost to import (US$ per container)	The cost associated with all procedures required to import goods, including for documents, administrative fees for customs clearance and technical control, customs broker fees, terminal handling charges and inland transport.	USD435

Doing Business Project by the World Bank provides objective measures of business regulations and their enforcement across 185 economies and selected cities at subnational and regional level. Part of the analysis is to measure the procedural requirements for exporting and importing a standardized cargo of goods. Documents associated with every official procedure are counted—from the contractual agreement between the two parties to the delivery of goods—along with the time necessary for completion. The ranking is completed by analyzing data for the following indicators: documents to export (number), time to export (days), Cost to export (US$ per container), documents to import (number), time to import (days), cost to import (US$ per container).

Table 3 represents the achievements of doing business in Malaysia for the year 2012 (The World Bank 2012). For simplicity, the data is presented by providing the explanation of each indicator, and the actual number of documents, days and costs.

In addition, many advantages govern the use of the Malaysian National Single Window. The government has been able to significantly increase the customs duty payments, be more transparent by removing red tape, have better control of managing the associated risks, conduct a more efficient and effective management of resources and promote a higher level of compliance for document transfers as set by international standards.

Similarly, traders and users have a wider and faster access to export markets, are more satisfied with the facilities and services provided, have less risk of errors, enjoy time saving and higher efficiency and accuracy. In addition, the integrated supply chain initiatives have also enabled a 50–70 % decrease in cargo turnaround time, an 88 % decrease in document error rate, a 97 % decrease rate for document processing and a 99 % IT literacy rate among the port community (Salleh 2010).

Another important improvement is the rate of predictability which has been significantly increased. The predictability of actual delivery is more important than average import/export lead time in understanding logistics performance. With the system also, Malaysian Royal Customs is able to predict revenue collection as the latest data related to shipping information and declaration of import/export trade is able to be shared with authorized partners. As a result, leakage of customs revenue could be reduced from 18 % to 15 % by 2015 as stipulated by the International Monetary Fund (IMF) (New Straits Times 2012).

Other efficiency processes can be summarized as the following (Salleh 2010):

- Increased access and speed to export markets as trade transactions are now undertaken electronically.
- Removal of red tape across Ministries and Government agencies.
- Improved customer satisfaction via its 24/7 Careline Service.
- Reduced manual labour costs as labor-intensive tasks can now be done via an automated electronic data system.
- Less administrative work as keyed data can now be used for different transactions and sent to all relevant parties.
- Reduced risk of errors, increased time savings and higher efficiency.
- Longer service hours to allow greater market activities and greater response to market demands.
- Speedier processing of permit applications via the Network resulting in reduction of number of days required to export.
- More accurate and increased collection of customs duty payments which has risen to RM1.8 billion annually.
- Better compliance by trade communities as seen in the huge increase from 40 million electronic document transfers in 2003 to 275 million in 2009.
- Use of technologically-advanced "risk management" tools for better control and enforcement purposes.
- Provision of necessary enforcement and risk management tools that are on a par with international standards.
- More effective and efficient management of resources, in particular reduction of manpower needs and hardware costs.

9 Conclusion

This chapter discusses the Malaysian experience in transforming the supply chain management of its international trade facilitation. Via the Malaysian National Single Window, the trade facilitation services have been able to reduce non-tariff trade barriers and deliver many benefits to the trading community. Even though issues and barriers have been strategically dealt with, close attention should be paid to its sustainable deployment. First, to cultivate the commitment of all stakeholders to carry out the reforms, it is vital to constantly involve stakeholders in every aspect of the reform. Second, trade procedures, data and documents should be developed based on international conventions, standards and practices. Third, all information about the exchanged data needs to be aligned at all levels (national, regional and international). Fourth, all stakeholders must have the capability and capacity to integrate with the system. Lastly, the key players must ensure that the blueprint for the national single window project is developed to address the end to end trade chain (government-to-government, government-to-business, business-to-government and possibly business-to-business). Yet, most important is the ability of all parties to adapt to the changes and dynamically show and prove their capability to engange in the transformation initiative.

To widen the transformation, the Malaysian Government continues its inventiveness by taking a further step to integrate the current national system into the ASEAN trade community. Following a bilateral pilot project between Malaysia, Thailand and the Philippines, the country is working on the establishment of a high level of interoperability and interconnectivity data set. This will ensure a higher level of regional trade efficiency and make the supply chain system more harmonious, paperless, easily accessible and firmly aligned with international standards. In addition to preparing data and system harmonization, the government is continuously taking several other key measures to improve competitiveness in doing business in Malaysia.

Questions for Review and Discussion

1. Besides the trade facilitation system, identify two sub-functions of supply chain management.
2. Discuss how a seamless and effective trade facilitation system will add value to the supply chains.
3. Identify and discuss any public-related supply chain management initiatives in your country.
4. Identify a national single window strategy for a country. Compare and contrast its functions with the Malaysian national single window.

5. Taking into consideration the market, economy, information technology capability and business partner attitude, how would you recommend the national single window be designed?
6. What are the important aspects of information technology that will determine the success of trade facilitation?
7. Discuss how the single window promotes a sustainable green environment.
8. What are the possible issues that may hinder the successful implementation of trade facilitation automation?

References

Arvis, J. F., Mustra, M. A., Ojala, A., Sherperd, B., & Saslavky, D. (2012). *Connecting to compete 2012: Trade logistics in the global economy – The logistics performance index and its indicators*. Washington, DC: The World Bank.

Bukhsh, F. A., & Weigand, H. (2011). eGovernment controls in service-oriented auditing perspective: Beyond single window. *WITNESS, 2011*, 76–90.

Chong, A. Y.-L., Ooi, K.-B., & Sohal, A. (2009). The relationship between supply chain factors and adoption of e-collaboration tools: An empirical examination. *International Journal Production Economics, 122*, 150–160.

Daintith, J. (Ed.). (2009). *"IT", a dictionary of physics*. Oxford: Oxford University Press.

Grainger, A. (2008). Customs and trade facilitation: From concepts to implementation. *World Customs Journal, 2*(1), 17–30.

Hairuddin, H., Md Noor, N. L., & Kassim, E. S. (2012). Developing therapy-based IT adoption model for microenterprises. *Journal of Southeast Asian Research, 2012*, 1–14.

Hesketh, D. (2010). Weaknesses in the supply chain: Who packed the box? *World Customs Journal, 4*(2), 17–30.

Holloway, S. (2009). The transition from eCustoms to eBorder Management. *World Customs Journal, 3*(1), 3–20.

Islam, D. M. Z., Dinwoodie, J., & Roe, M. (2005). Towards supply chain integration through multimodal transport in developing economies: The case of Bangladesh. *Maritime Economics & Logistics, 7*, 382–399.

Jaafar, H. S. (2011). *The competitiveness of the Malaysian logistics industry*. Workshop on National Single Window and global competitiveness of the logistics industry, Malaysia, 2011.

Jae, Y. C. (2011). *A survey of single window implementation*. World Customs Organizations (WCO) Research Paper No. 17.

Kassim, E. S., & Hussin, H. (2010). *User attitude, organizational learning and dynamic capability in government-to-business success*. Paper presented at the IEEE 5th International Conference on Management of Innovation and Technology, Singapore.

Lewis, G. (2009). The impact of ICT on customs. *World Customs Journal, 3*(1), 3–12.

Mah, A. C. K. (2009). *Business models for single window and paperless trade environment*. High-Level Symposium on Building Regional Capacity for Paperless Trade, Bangkok, March 24–25, 2009.

Malaysia Statistics Handbook. (2011). Department of Statistics Malaysia.

Malaysian Economic Transformation Program. (2010). Prime Minister's Department.

MIFC. (2012). *Shaping Islamic finance together*. The Malaysia International Islamic Financial Centre (MIFC). http://www.mifc.com

Ministry of Finance. (2011). *National single window for trade facilitation*. Workshop on Customs Information System, Ministry of Finance, Cyberjaya, Malaysia, August 15, 2011.

Misovicova, M., & Azhari, N. (2007). *Facilitating cross-border trade by simplifying and aligning trade documents*. United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). Staff Working Paper 01/07.

MITI. (2011). *Imports and exports by major products*. Ministry of International Trade and Industry Malaysia. http://www.miti.gov.my/cms

Mustaffa, N. H., & Potter, A. (2009). Healthcare supply chain management in Malaysia: A case study. *Supply Chain Management: An International Journal, 14*(3), 234–243.

Mytradelink. (2012). http://www.mytradelink.gov.my

Ndubisi, N. O., Jantan, M., Loo, C. H., & Ayub, M. S. (2005). Supplier selection and management strategies and manufacturing flexibility. *Journal of Enterprise Information Management, 18*(3), 330–349.

O'Brien, J. A., & Marakas, G. M. (2010). *Introduction to information systems* (15th ed.). New York: McGraw-Hill.

Othman, R., & Abdul Ghani, R. (2008). Supply chain management and suppliers' HRM practices. *Supply Chain Management: An International Journal, 13*(4), 259–262.

Salleh, Z. M. (2010, July). *Towards a single window trading environment* (Brief No. 4). UNESCAP.

Tan, Y. H., Klein, S., Higgins, A., & Baida, Z. (2006). *eCustoms innovation and transformation: A research approach*. Slovenia: Bled eConference eValues.

The Global Competitiveness Index 2012–2013. (2012). *World Economic Forum*. Retrieved from www.weforum.org/gcr

The World Bank. (2011). *Malaysia economic monitor: Brain drain*. Washington, DC: World Bank. http://documents.worldbank.org/curated/en/2011/04/14134061/malaysia-economic-monitor-brain-drain

The World Bank. (2012). *Doing business economic profile: Malaysia*. The international bank for reconstruction and development.

Tiong, K. (2011). *Implementing trade facilitation: Institutions and initiatives in Malaysia*. Asia Pacific Trade Facilitation Forum 2011, Seoul, Korea, October 4–5, 2011.

U-Customs to boost system and services. (2012, April 20). *The New Straits Times*.

UN/CEFACT United Nations Centre for Trade Facilitation and Electronic Business. (2005). *Recommendation and guidelines on establishing a single window: To enhance the efficient exchange of information between trade and government*. Recommendation No. 33. Geneva.

UN/ESCWA United Nations Economic and Social Commission for Western Africa. (2011). *Key factors in establishing single windows for handling import/export procedures and formalities: Trade facilitation and the single window*. New York: UN/ESCWA

Zailani, S., & Rajagopal, P. (2005). Supply chain integration and performance: US versus East Asian companies. *Supply Chain Management: An International Journal, 10*(5), 379–393.

Modelling Chinese Manufacturer Oriented Domestic and International Supply Chains with Uncertainties

Wei Xu, Dong-Ping Song, and Michael Roe

Abstract This chapter presents a generalised model for a manufacturer oriented Domestic Supply Chain (DSC) and International Supply Chain (ISC) based on two empirical case studies in China. The model considers some key characteristics such as uncertainties and constraints that are typical in the emerging economy in China. Various cost elements in association with supply chain activities are identified and used to measure the supply chain performance. Two supply chain management issues are discussed. The first is the integrated raw material procurement and finished goods production planning, and the second is the international market sales plan. A Simulation method is used to evaluate the model under specific strategies. Numerical examples are given to illustrate the usefulness of the model. We contribute to the literature in two aspects: (i) through two case studies of medium-sized manufacturers in China, the characteristics and differences between DSC and ISC can be better understood; (ii) a simulation tool is developed to evaluate specific management strategies and assist decision-making in various scenarios. Because of the limited number of case studies, the model is required to be validated in more companies and other industries.

1 Introduction

China has experienced rapid economic development in the last few decades. However, the development of logistics and Supply Chain Management (SCM) is lagging behind. A number of studies have addressed the problems related to infrastructure and technology (Martinsons 2004), labour and product quality (Zhang and Goffin 1999; Chien et al. 2009), business culture and government policy (Pyke et al. 2000; Cai et al. 2010), and supply chain risk of poor quality (Franca et al. 2010). As a result, these issues lead to poor production quality, low productivity, unfilled orders, low operational performance, and low customer

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W. Piotrowicz, R. Cuthbertson (eds.), *Supply Chain Design and Management for Emerging Markets*, DOI 10.1007/978-3-319-05765-1_5

satisfaction. It is reported that the quality and safety issues stemming from Chinese products have increased the USA import risk (Zhao et al. 2011) and outsourcing quality management risk (Liu 2008). Chinese special business culture and governmental attitude, enterprise ownership, and relationship management have a significant impact on the role and performance of Chinese companies. For example, Cai et al. (2010) investigated the impacts of Chinese companies' institutional environments, e.g. legal protection, government support, and Guan Xi (interpersonal relationships) on the development of trust and integration of information between buyers and suppliers, and claimed that the institutional environment positively influences supply chain (SC) integration (Zhao et al. 2011).

As China has become a world manufacturer, sourcing in China has benefited many foreign firms in terms of lower cost and vast labour force. However, the Chinese and global economic environment has changed considerably in recent years (since 2007) because of the global financial crisis, increased labour cost, and competition from other emerging economic countries such as Thailand. Consequently, the traditional benefits of undertaking business in China have been affected. It is therefore necessary to examine the current cases of domestic and international SCs in China, and investigate their management by taking into account some unique characteristics which have emerged from the Chinese context.

Small and medium enterprises (SME) have made a large contribution to China's economic growth and it is reported that SMEs made up over 99 % of all enterprises in China in 2007 (Liu 2008). The output value of SMEs accounts for at least 60 % of the country's gross domestic product, generating more than 82 % of employment opportunities in China (Liu 2008). It should be pointed out that the definition of SME in China is complicated and different from that of Europe. The Interim Categorising Criteria on Small and Medium-sized Enterprises (SMEs), published in 2003 and based on the SME Promotion Law of China, sets the guidelines for classifying SMEs. Guidelines for the industrial sector require SMEs to employ a maximum of 2,000 people, and to have an annual revenue not exceeding RMB300 million. Their total assets should not exceed RMB400 million. Medium-sized enterprises should employ a minimum of 300 people. Small-sized enterprise can employ up to 300 people with the annual revenue and total assets not exceeding RMB30 million and 40 million respectively (N. P. s. C. S. Committee 2003).

This study conducted two case studies of Chinese medium-sized manufacturers. Case company A is an aluminium industry located in the north of China and case company B is a chemical company located in the south of China. Case company A makes its main sales to mainland China. Case company B produces different types of finished goods that serve as raw materials of other chemical products for many other companies in mainland China and the international market (Spain, Korean and Brazil). However, since the financial crisis, the amount of exports has declined over 20 %. But in order to keep a certain percentage of international market share (because of government policy and the company's own strategy), case company B has to satisfy a certain amount of international customer orders.

The aims of this chapter are twofold. Firstly, we attempt to provide insights into understanding the key characteristics and differences of domestic supply chains and

international supply chains in China based on case studies. Three aspects of the key characteristics are discussed: uncertainties, constraints and cost elements. This leads to a reasonably generalized model for Chinese domestic supply chains and international supply chains. Secondly, we discuss the model evaluation to demonstrate the usefulness of the model. More specifically, we use the simulation method to evaluate different management strategies in various scenarios, which can assist managers to make better decisions in terms of raw material ordering, finished goods production, and international sales plans.

This rest of this chapter is organized as follows: in the next section, we briefly review the relevant studies on SCM in China. In Sect. 3, the background of two case studies is described and the data collection methods are explained. In Sect. 4, based on the case studies, a generalized model representing Chinese domestic supply chains and international supply chains is presented. Three aspects of the key characteristics of the DSC and ISC are analyzed and contrasted: uncertainties, constraints and cost elements. In Sect. 5, model evaluation is discussed and implemented using the simulation method. Two important management strategies, i.e. the raw material procurement and finished goods production strategy, and the international market sales plan, are explained in the Chinese supply chain context. In Sect. 6, numerical examples are given to show the results in a range of scenarios with different levels of uncertainties under different management strategies. Finally, conclusions are drawn and limitations are indicated in Sect. 7.

2 Current SCM Research in China

In this section, we review the SCM studies in China; these provide a general background of this subject in China. In the last decade, SCM has attracted much attention in many Chinese industrial sectors, e.g. the agriculture (food) industry (Stringer et al. 2009; Waldron et al. 2010), the manufacturing industry (Pyke et al. 2000; Cai et al. 2010; He and Chen 2009), the energy industry (Zhu and Sarkis 2006; Hui and Xiao-ping 2009; Zhu et al. 2007a), the automobile industry (Hatani 2009; Zhu et al. 2007b), the e-business industry (Cai et al. 2010; Lancioni et al. 2003) and outsourcing (Ni et al. 2009). The reason that the majority of SCM studies in China focus on manufacturing and food industries may be explained by the fact that China has been acting as a world manufacturer for many products such as toys and clothes.

In terms of research methods, both empirical study and modelling research methods have been employed. The empirical studies mainly include questionnaires, interviews (e.g. Zhu and Sarkis 2006; Zhu et al. 2010; Lu et al. 2008; Lockström et al. 2010) and statistics (e.g. Pyke et al. 2000; Cai et al. 2010; Zhu and Sarkis 2006; Zhu et al. 2007b, 2011; Jiang et al. 2009; Han et al. 2011; Yaibuathet et al. 2008; Li et al. 2011). Modelling studies (e.g. Franca et al. 2010; Ni et al. 2009; Xu et al. 2009; Hua et al. 2006; Wang et al. 2007; Reyes 2005) include mathematical programming and simulation (e.g. Zou et al. 2011; Xu et al. 2008)

and theoretical frameworks based on literature reviews (e.g. Stringer et al. 2009; He and Chen 2009; Zhu et al. 2010, 2011; Jiang et al. 2009; Yu et al. 2010; Humphreys et al. 2001; Qu et al. 2007; Ge and Voß 2009; Berman and Swani 2010). Case studies (e.g. Hatani 2009; Lockström et al. 2010; Sheu 2003; Liu et al. 2005; Park et al. 2010; Zhu and Cote 2004; Yuan and Shi 2009; Wu et al. 2010) can be based on empirical studies and modelling.

In terms of the research contents, one of the most popular topics is green supply chain management (e.g. Zhu et al. 2007a, b, 2010, 2011; Hatani 2009; Park et al. 2010; Zhu and Cote 2004; Yuan and Shi 2009; Zhu and Sarkis 2004; Zhu and Geng 2013; Zhang et al. 2008; Li 2002). Other popular topics include information systems (e.g. Cai et al. 2010; Humphreys et al. 2001; Ge and Voß 2009; Liu et al. 2005; Trkman et al. 2010; Ke et al. 2009), technology in systems and applications aspects (e.g. Lancioni et al. 2003; Xu et al. 2008; Humphreys et al. 2001; Qu et al. 2007; Ge and Voß 2009; Liu et al. 2005; Wu et al. 2010; Huang et al. 2009; Guo et al. 2000; Geng et al. 2007); quality in production and producing (Franca et al. 2010; Ni et al. 2009; Han et al. 2011; Berman and Swani 2010; Wu et al. 2010; Jia et al. 2012; Brown et al. 2002), and labour quality (e.g. Jiang et al. 2009; Yaibuathet et al. 2008; Li et al. 2011). A relatively small number of studies concern cooperation (e.g. Lu et al. 2008; Hua et al. 2006; Ke et al. 2009; Su et al. 2008a), warehouse and transportation (e.g. Wang et al. 2007; Reyes 2005; Zou et al. 2011; Sheu 2003), and supply chain integration (e.g. Zhao et al. 2008, 2011; Lockström et al. 2010; Zhu and Cote 2004).

More specifically, in the area of the manufacturing supply chain in China, Pyke et al. did a survey on state-owned, collective-owned, and privately-owned enterprises in order to understand the status of supply chain management in Chinese manufacturing firms, e.g. how sophisticated are Chinese manufacturing firms? Do they understand modern principles of manufacturing strategy and SCM? What is the level of installed technology, from traditional production planning systems, like MRP, to robotics? Based on a survey of 100 firms in the Shanghai area, they found that those enterprises were indeed using advanced manufacturing strategies, but were not as advanced in supply chain management as many Western firms (Pyke et al. 2000). He (2004) surveyed 100 manufacturing enterprises in China and found that most of the enterprises have become aware of the importance of supply chain management. Robb et al. (2008) surveyed 72 furniture manufacturers in China. Their research reveals that Chinese furniture manufacturers are actively engaged in many forms of improvement relating to operations and supply chain management. Generally, compared with Western firms, the SCM level of Chinese firms has been lagging behind (Chen and Yang 2003; Su et al. 2008b).

As we mentioned earlier, SME is a very important economic sector in China. With regard to manufacturing SMEs, there are 82,028 SMEs that belong to case company A's industry sector, and 72,459 SMEs belonging to case B's industry sector (Liu 2008). We believe that those SMEs have a similar supply chain structure to the case companies, as they are influenced by similar structural factors such as inter-provincial and inter-ministerial relationships, history and culture factors,

institutional organization, logistics infrastructure, and industrial nature (Su et al. 2008b).

However, the research on supply chain management in Chinese SMEs is rather limited. In particular, to the best of our knowledge, there is no specific research in the sectors of the case companies (Aluminium Industry for case company A and Chemistry Industry for case company B). It is therefore worthwhile to perform in-depth case studies to better understand the characteristics of supply chains in Chinese SMEs and explore ways to improve their supply chain performance.

3 Case Study

This section explains the rationale of using case studies and provides a brief description of the case companies. In addition, the data collection methods and the main supply chain management issues in the case companies are discussed.

3.1 Case Study Approach

Case studies are increasingly important in the research of logistics and SCM (e.g. Ojala and Hilmola 2003; Dinwoodiea and Xu 2008; Vafidis 2002). Abrahamsson (2003) reviews the issues that could be studied by using case studies, including (1) a retro-perspective study on logistics restructuring, (2) sales and marketing issues, (3) organisational issues, (4) dynamic capabilities, and (5) logistics platforms. Abrahamsson et al. (2003) have classified three different types of logistics areas that are more suitable for using case studies, namely: optimisation of activities, logistics structure and dynamic capabilities.

Multiple case studies enable us to better understand the detailed practical operations in Chinese SCs, identify the challenging issues in the case companies, develop appropriate strategies, and generate a more general model that could be used in a wider context. Therefore, a multiple case studies method is more appropriate for this study.

The case study approach employed in this project includes the following steps. Firstly, the primary data will be collected from the selected case companies. Secondly, based on the collected data, the case companies' SCs are illustrated and constructed through the SC process mapping approach. Thirdly, the issues and key characteristics within the case SCs are identified and analysed. Fourthly, the raw material procurement and production strategies and international sales plans are evaluated in various scenarios using simulation.

3.1.1 Description of Case Companies

Two medium-sized manufacturers in China have been contacted. The research involves the collection of primary data and requires huge efforts from case companies because companies are often very sensitive to data confidentiality and have limited human resources and relevant technologies to support data collection. Therefore, it is difficult to select many case studies. However, two of them have agreed to give full support to the data collection. These companies are reasonably representative and their SCs include multiple functions and parties, e.g. many suppliers, manufacturing, private warehouses, transport companies, and many customers. More importantly, the supply chain structure in the two case companies is similar in terms of information flows and material flows and their associated characteristics, e.g. multiple uncertainties, although the scale of some uncertainties may be different. Additionally these two manufacturers are located in the north and south of China respectively, which represent local economic and society influences. Also, these two companies are in different industries, therefore the investigation of their differences and similarities can contribute to the model generalisation.

Case Company A
Company A was founded in 2000 with its headquarters located in Shandong province. In 2009, the company had about 900 employees. The turnover was just over 10 million pounds. The fixed assets of the company were valued at 1 billion pounds. The company specialises in manufacturing aluminum pigments, mainly focusing on four types of finished goods, e.g. aluminum pig A199.90, A 199.85, A199.70A and A199.70. Each of them requires four main raw materials, which are procured from different suppliers. The company sells the products across the whole of mainland China. The associated supply chains are termed domestic supply chains.

Case Company B
Case company B is a sino-foreign joint-venture founded in 2003 with its headquarters located in Jiangxi province and their R&D centre located in Jiangsu province. In 2009, the company had about 150 employees with less than 10 million pounds turnover. This company specialises in the manufacturing of kinds of fine chemicals, pharmaceutical intermediate, pesticide intermediate and dye intermediate. There are 2 main types of product and over 20 kinds of finished goods. Meanwhile it acts as a supplier of materials to many large companies in China and also exports to European and American markets and middle-east areas. We select one production SC (sales in the domestic market and international market) from this company. In the selected SC, one type of finished goods is produced which requires three main types of raw materials.

3.2 Data Collection Method

The primary data are collected through individual interviews, group interviews, observations, and archived data. These types of methods are suitable for this study, as we require extensive and specific operational data from the case companies.

3.2.1 Interviews

The interviews were conducted with the company's senior managers who are in charge of procurement, transaction, warehousing, production, finance, and marketing. Group interviews could be useful in identifying key themes (Zikmund 2000). The group interview may also motivate participants' contributions because the interaction and effective communication could enrich the proposals by the group. On the other hand, a group interview may inhibit some contributions because of the lack of trust between group members (Kahn and Cannell 1965).

We combine the group interviews with individual interviews. The former is used to develop an overall SC map in a broad context and identify which piece of data can be collected from which department in the case companies. The latter is used to collect in-depth data and to modify and refine the primary data.

We contacted the case companies in 2009. Before the interviews, we sent the semi-structured interview questions to case company A in late 2009 and case company B in early 2010. The semi-structured interview questions consist of 3 parts including 63 questions. The first part covers the general information of the company, e.g. background, organisational structure. The second part is about the production process, SC members, characteristics of the supply chain, and supply chain management issues. The third part includes detailed questions about management policies (e.g. raw material ordering and finished goods productions strategies, sales plans), finished goods inventory data (company A is on a weekly basis, while company B is on a daily basis), operational costs in detail, and customer services. We conducted face-to face interviews in 2010 and 2011. In between, there were a number of email contacts and telephone interviews. We formally interviewed five people in case company A, and eight people in case company B, including the directors and senior managers, who were from different departments.

The data collection procedure is described in more detail below. Firstly, a group of managers was asked to complete a pipeline map about the SC showing the inventory information and warehouse information such as safe stock level and replenishment. Secondly, interview questions related to material flows, information flows and financial flow in the case of SCs were sent to managers. This includes lead-time, materials' categories, inventory levels, how to manage inventories, suppliers, how to choose suppliers, partnership management, both internal and external communication methods, ordering decisions, and customer services. Most questions are open questions that may help mapping the SC in a broad context and clarify the links between SC parties. Thirdly, a group interview has been

employed to discuss characteristics such as customer order uncertainty, production quality uncertainty, transportation uncertainty in the SC and issues for case company's managing strategies. Finally, based on the collected data, the case company's SCs were developed. The models of the SCs are then confirmed by the corresponding companies' managers to ensure their appropriateness, and refined if necessary.

3.2.2 Observation

Observation provides a systematic viewing of people's actions and recording, analysis and interpretation of their behavior (Gray 2009). Observers can either participate in the event (as participant observers) or simply observe the event or situation without participating in it (non-participant observers). Structured observation means that the observer will not try to observe everything but will observe what has been decided in advance for him/her to watch. When using this method, observers try not to influence the environment they observe (Saunders et al. 2003).

In this study, the non-participant structured observation was employed to gain quantitative data such as that from the production processes of the products, the time-phased labour action, the constraints of resources, the layout of production facilities and the manufacturing workshops. As this project is based on industrial case studies, observation will give us a deeper understanding of the backgrounds of the industries, the manufacturers operation and management strategies, and the SC systems.

3.2.3 Archived Data

For both case companies, much historical data was held in archives, such as the time series of finished goods inventory level, main raw material inventory level, and domestic customer orders during the period 2009–2010. The companies' issues have been discussed in the group interview. For case company B, we also collected data relating to their international SC process, and daily international customer orders from 2009 to 2010.

3.2.4 Validity and Reliability

Validity and reliability are top quality criteria concerning data collection. Validity refers to the essential truthfulness of a piece of data, and reliability refers to the accuracy of the collected data. In our studies, qualitative data about supply chain processes/activities and supply chain member relationships are first collected through group interviews by senior managers, and then refined and confirmed by top managers via individual interviews. The participation of multiple senior managers and the combinations of group interviews and individual interviews ensure

that the collected qualitative data is trustworthy and reliable. On the other hand, the quantitative data relating to production operations, resource capacities, inventory levels, lead-times, and customer orders are collected through non-participant observations and companies' archived data, which are regarded as actually measuring and reflecting the specific phenomena of the case supply chains.

3.3 Supply Chain Management Issues for Case Companies

Two main supply chain issues were identified through the discussions with case companies. The first is the ordering of raw material and production planning of finished goods in the presence of multiple types of uncertainties. For both companies, there are many uncertainties in their SC (see Table 1), for example, raw material delivery lead-time is subject to not only the inventory availability at the suppliers, but also to the traffic conditions on the way from the suppliers to the raw material warehouse. More detailed explanations about the types of uncertainties in the case supply chain will be given in Sect. 4.1.2.

The second issue was identified from case company B. Because of the limited production capacity, the company has to design an appropriate plan to serve both domestic and international markets. On the one hand, the company has to consider the constraints imposed by government policy (e.g. the minimum percentage of exporting to foreign market) and the company's long-term strategy (e.g. maintaining international customer relationships). On the other hand, the company has to consider the short-term or medium-term profitability because in the current economic climate the profit from the international market is significantly lower than that from sales in the domestic market.

4 Model Development

This section firstly presents the model for DSC and ISC, then based on the data from the case studies, the multiple uncertainties are categorised and explained. Finally, the total SC costs in the DSC and the ISC are discussed.

4.1 Model Description

The model is generalised from two case studies, representing Chinese medium-sized manufacturers. It includes two interacting supply chains, a domestic supply chain and an international supply chain, to serve domestic and international markets respectively. The model is described in terms of three processes involving 17 channel members including supplier, customer, banks, transportation company, and

Table 1 Classifications of uncertainties in four sub-models

Model	SC	Types of flow	Uncertain types		
			Lead-time	Quantity	Delay
Sub-model I	Domestic supply chain (DSC)	Demand	Customer contracted delivery date	Customer demand	
		Information flow	Customer order information lead-time	Inaccurate order quantity	Information delay lead-time of inaccurate order
	International Supply Chain (ISC)	Demand	Customer contracted delivery date	Customer demand forecasting Customer demand	
		Information flow	Customer order information lead-time	Inaccurate order quantity	Information delay lead-time of inaccurate order
Sub-model II	Domestic supply chain (DSC) and International supply chain (ISC)	Material flow	Production lead-time	Defective production	Remanufacturing lead-time
Sub-model III	Domestic supply chain (DSC) and International supply chain (ISC)	Information flow	Raw material order information lead-time/booking transportation lead-time		Raw material order information delay lead-time/transportation arrangement delay lead-time
		Material flow	Raw material availability/raw material transportation lead-time	A fraction of raw material transportation delay	Raw material delay transportation lead-time
Sub-model IV	Domestic supply chain (DSC)	Information flow	Arranging finished goods transportation lead-time		Finished goods Transportation arrangement delay lead-time
		Material flow	Finished goods domestic market sales availability/finished goods transportation lead-time	A fraction of finished goods transportation delay	Finished goods delay transportation lead-time
	International Supply Chain (ISC)	Information flow	Arranging internal finished goods transportation lead-time/arranging external finished goods transportation lead-time		Finished goods internal transportation arrangement delay lead-time/finished goods external transportation arrangement delay lead-time
		Material flow	Finished goods international market sales availability/finished goods internal transportation lead-time/finished goods international shipping availability/finished goods external transportation lead-time	A fraction of finished goods internal transportation delay/a fraction of finished goods external transportation delay	Finished goods internal transportation delay lead-time/finished goods external transportation delay lead-time

Note: Sub-model I = customer order model; Sub-model II = manufacturing model; Sub-model III = raw material procurement with transportation model; Sub-model IV = finished goods satisfying customer order with transportation model

port. Multiple uncertainties and constraints will be discussed and categorised in the supply chain context. The cost elements in association with flows and activities in DSC and ISC are summarised. The mathematical model of the DSC can be referred to (Xu et al. 2011).

4.1.1 Model Description

The developed manufacturing SC model is shown in Fig. 1, which includes three processes, namely (i) raw material procurement and raw material shipping to raw material warehouse process; (ii) finished goods production, satisfying customer demand and finished goods shipping to the domestic customer; (iii) finished goods production, satisfying customer demand and finished goods shipping to the international customer.

In terms of raw material procurement and transportation, the associated activities in order of their occurrence include:

a. Manufacturer shares the production plan with raw material warehouse
b. Raw material warehouse reports the raw material on-hand inventory information to manufacturer

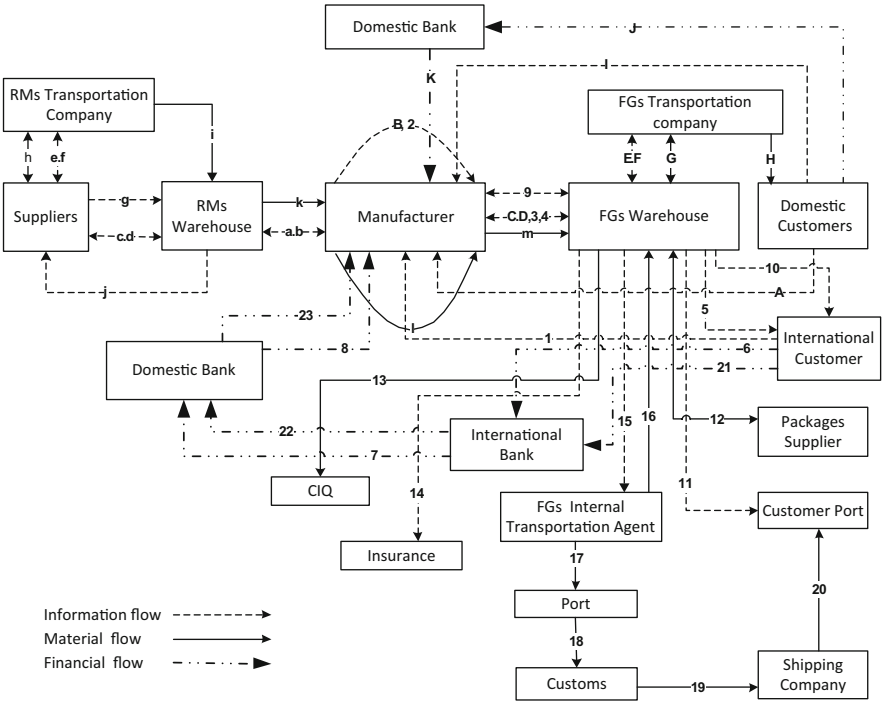

Fig. 1 A generalised domestic and international supply chain model with information, material and financial flows with uncertainties

c. Raw material warehouse places order to suppliers
d. Supplier gives feedback incorporating inventory availability to raw material warehouse
e. Supplier contacts raw material transportation company to arrange the delivery
f. Transportation company confirms the delivery requirements with suppliers
g. Supplier provides delivery information to raw material warehouse
h. Raw material transportation company picks up raw material from supplier
i. Raw material transportation company ships raw material to raw material warehouse
j. Raw material warehouse gives feedback to supplier and makes the payment
k. Raw material warehouse updates inventory and delivers raw material to manufacturer workshop
l. Manufacturer produces finished goods
m. Manufacturer delivers finished goods to finished goods warehouse

In terms of the finished goods production, transportation and satisfying customer demand (domestic market), the associated activities according to their occurring sequence include:

A. Domestic customer places the order with the manufacturer
B. Manufacturer receives the order with internal checking
C. Manufacturer shares the customer order information with finished goods warehouse
D. Finished goods warehouse reports inventory information to manufacturer
E. Finished goods warehouse contacts finished goods transportation company to arrange delivery
F. Transportation company confirms the delivery requirements with finished goods warehouse
G. Transportation company picks up finished goods from finished goods warehouse
H. Transportation company ships finished goods to customer
I. Customer makes payment to manufacturer
J. Customer gives feedback to manufacturer's bank
K. Manufacturer receives the payment

In terms of the finished goods production, transportation and satisfying customer demand (international market), the associated activities according to their occurring sequence include:

1. International customer places the order with the manufacturer
2. Manufacturer receives the order with internal checking
3. Manufacturer shares the customer order information with finished goods warehouse
4. Finished goods warehouse reports inventory information to manufacturer
5. Finished goods warehouse contacts international customer to share finished goods quality, quantity information

6. International customer issues deposit payment (credit) (30–70 %) with the customer's bank. The company accepts credit letter (L/T) and Telegraphic transfer (T/T)
7. The company's bank asks for the credit and currency (usually in USD or RMB) from the customer's bank (international bank)
8. The company's bank informs the deposit payment to manufacturer
9. Manufacturer informs finished goods warehouse to prepare the order for delivery
10. Finished goods warehouse informs international customer of expected delivery information
11. Finished goods warehouse contacts shipping company to book container lots
12. Finished goods warehouse contacts packages supply company to package finished goods in the light of shipping requirements
13. China Entry-Exit Inspection and Quarantine (CIQ) checks finished goods and issues export certification
14. Finished goods warehouse arranges insurance of the finished goods
15. Finished goods warehouse contacts finished goods transportation company to arrange delivery
16. Finished goods Internal Transportation Agent picks up finished goods from finished goods warehouse
17. Finished goods Internal Transportation Agent ships finished goods to port of origin
18. Finished goods go through China customs
19. Finished goods are loaded onto ship
20. Shipping company ships finished goods to international customer's port
21. International customer makes final payment (L/T, T/T)
22. The company's bank asks for the credit and currency from the customer's bank
23. The company's bank informs the manufacturer of the payment

The above activities are categorised and consolidated into four sub-models namely: (i) the customer order model (DSC: A–C/ISC: 1–3); (ii) the manufacturing (production) model (a, k–m); (iii) raw material procurement with transportation model (b–j) and (iv) finished goods, satisfying the customer order with the transportation model (DSC: D–I/ISC: 4–23). The main decisions in the underlying SC are placing raw material orders with suppliers and determining production quantity for the manufacturer in order to meet customer demands efficiently and effectively. However, in the light of interview, many uncertainties in the above processes have arisen which make decisions difficult. Those uncertainties will be discussed later.

Although the model in Fig. 1 is generalised and based on the operations of two Chinese manufacturers, its specific application to China can be explained from the following four angles. Firstly, the relationship between the company and the international customer is harder to manage and prevent delay (in processes 1, 2, 3, and 5). This may be due to different cultures, technological systems, decision-making processes and even time zones. Secondly, in process 13, there is a government China Entry-Exit Inspection and Quarantine (CIQ). The export company has

to make an appointment with CIQ in advance. CIQ will check finished goods, then issue a certification which allows the company to export the finished goods. Usually, it takes at least a week to issue the export certification. Thirdly, in process 18, the Chinese customs will check the finished goods randomly. In some ports such as Guanzhou port in China, the customs will not go to the port warehouse to check the goods; instead, the goods are transported from the port warehouse to a special place to await checking. This increases the waiting time and unreliability. Finally, process 14 is different in China, because the major Chinese insurance companies are state-owned companies which are not very internationalised. Their operation processes are different with EU insurance companies. This is due to the fact that the Chinese government does not yet allow foreign companies to undertake this business.

It should be pointed out that the model in Fig. 1 is developed based on data collected during 2009–2010. However, the overall structure of the model will not change dramatically in recent years. In later sections, we will parameterize the input data of the model so that it can be applied to more recent scenarios by appropriately changing the input parameters. In the remainder of this section, we discuss the key characteristics of the supply chains in the model from three aspects: uncertainties, constraints and cost elements, in association with the relevant flows and activities.

4.1.2 Classification and Summary of Uncertainties in the Model

In this section, based on the information from interviews, we first discuss the uncertainties in each sub-model in relation to the Chinese special context, and then classify them into different categories in Table 1.

4.1.2.1 Uncertainty in Sub-model I

According to interview, there are many common types of uncertainties that exist in both case companies in Sub-model I, such as: customer contracted delivery date; customer demand; customer order information lead-time; inaccurate order quantity; information delay lead-time due to inaccurate orders in both DSC and ISC. However, the ranges of those uncertainties are quite different. For example, for case company B, the upper bound of customer order information lead-time in DSC is around 7 days, whereas in ISC, it is up to 30 days, which may be due to the nature of international business, including communication issues, business culture, different standards, international contracting and negotiation. Compared with the DSC, the ISC in Sub-model I is more complicated. From the interview, the differences in business culture, time zone, language and production quality standards are regarded as the key factors. The case company B pointed out that the customer demand forecasting uncertainty in ISC, together with the coupled relationship between the domestic market and international market, and the limited production capacity, greatly influences the supply chain performance.

4.1.2.2 Uncertainty in Sub-model II

In Sub-model II, we focus on the uncertainties associated with material flows in the supply chain. According to interviews, production lead-time, defective production and remanufacturing lead-time are the main uncertainties. The bounds (lower and upper) of production lead-time in China are influenced by labour working time. In both case companies, the manufacturing processes are running 24 h/day and up to 340 days/year. However, the labour quality is generally lower in China than in Western (developed) countries. Therefore the degree of uncertainty in terms of defective production rate could be significantly higher. In addition, for case company B, the production process is more sensitive to human operational errors owing to the higher skill requirements of its finished goods (drugs), whereas for case company A, the impact of labour quality on the production process is relatively low because it is a labour intensive industry. Moreover, both companies attempted to adopt information systems such as the ERP system; however, the ERP system (and its different versions) may not be compatible with the company's existing production control system, and may not be compatible with the supply chain partners' information system. These obviously cause integration problems which lead to production uncertainty. In China, there is a domestic ERP technology company that provides cheaper packages (but less service support) with similar functions to the international ERP package (e.g. that provided by SAP). Most Chinese companies use domestic information systems instead of international standard information systems. Due to economic considerations, both case companies have employed the domestic system; however, for case company B, especially, how to integrate their manufacturing control system with their ERP system is a big issue. Remanufacturing lead-time uncertainty depends on the production plan and relevant constraints. This type of uncertainty may occur in both companies. There is also a small probability that part of external transportation of finished goods may be delayed.

4.1.2.3 Uncertainty in Sub-model III

The raw material order information lead-time depends on the characteristics of raw material, the supplier relationship and the SC integration level. For both case companies, the main raw material order is placed by a traditional method such as email, or telephone, with closely related suppliers. The integrated systems are rarely implemented in Chinese medium sized companies. According to the interviews, there are three main reasons, namely: cost, employee quality, and business culture. The typical Chinese business culture such as industry-oriented professional communities/organisations helps companies build up informal relationships. Thus, even without the implementation of an integrated information system, both case companies' raw material procurement managers would not face big challenges for placing orders to their suppliers. The delays are mainly caused by traffic jams rather than the raw materials inventory availability. The transportation capacity and traffic

conditions affect the raw material transportation lead-time, the raw material delays transportation lead-time and the delayed raw material by percentage. For case company B, due to special requirements on raw material transportation (chemical transportation), the uncertainties of lead-time and delay lead-time are higher than that in company A.

4.1.2.4 Uncertainty in Sub-model IV

The uncertainties of DSC related to transportation in this model are similar to that in Sub-model III. The availability of finished goods depends on the finished goods inventory, production plan, and international sales plan. The uncertainties of ISC in this sub-model are complicated. Here we divide the transportation processes into two parts: internal transportation, which includes information flows and material flows relating to internal delivery (from the finished goods warehouse to the manufacturer's port), and external transportation, which includes information flows and material flows related to international shipping (from the manufacturer's port to the international customer's port). According to data from the interviews, we found that internal transportation in the ISC (including arranging the internal finished goods transportation lead-time; finished goods availability for satisfying international orders; finished goods internal transportation lead-time; a fraction of the finished goods internal transportation delay; finished goods internal transportation delay lead-time) is subject to more uncertainties than internal transportation in the DSC. This is due to the fact that government policy (e.g. export certification issues, customs), package standards, and communication issues with international customers often demand extra effort for the internal transportation in the ISC. The uncertainties of finished goods external transportation lead-time in the ISC depend on the shipping destination and other factors. For example, from China to Brazil it would normally take 40 days subject to unpredictable events in the shipping route. Finished goods external transportation delay lead-time depends on shipping lines' operations (e.g. schedule, frequency) and port operations (e.g. traffic, handling).

Based on the above discussion, we may classify those uncertainties into three categories according to their sources: (i) information flow uncertainty, (ii) material flow uncertainty, and (iii) customer demand uncertainty. On the other hand, according to the nature of uncertainty and the convenience of mathematical modelling, they can also be classified into three types: lead-time, quantity, and delay. Table 1 summarises the classifications of those uncertainties within four sub-models:

4.1.2.5 Explanation of Lead-Time, Quantity and Delay Uncertainty in the Model

The lead-time uncertainty represents the stochastic lead-time in the flows between two channel members. Quantity uncertainty represents the incompleteness of

materials, products, and orders. For example, part of raw materials, finished goods and order information may be delayed due to random factors. The delay uncertainty indicates the lead-time for those delayed goods or orders, e.g. the stochastic remanufacturing time for defective products, the random lead-time for delayed amount of raw materials.

There are three main reasons for us to select the above three types of uncertainties. Firstly, according to our investigations, we find that these three types of uncertainties occur in most flows (information, material and financial flows) in both DSC and ISC. Secondly, they represent the majority of uncertainties in supply chains directly or indirectly. For example, machine break down is a common type of uncertainty, but its outcome can be represented by longer and more unreliable manufacturing lead-times. Thirdly, our classification offers great flexibility in the model by parameterizing those uncertainties. This means that the model can be used to model a wider spectrum of scenarios with uncertainties by appropriately setting up the input parameters.

To illustrate the relationship between these three types of uncertainties, lead-time, quantity and delay, we take the raw material transportation from suppliers to the raw material warehouse in Sub-model III as an example (Fig. 2). The manufacturer makes a raw material procurement plan regarding the type and amount of raw material to be ordered from suppliers. There is a quantity uncertainty about whether suppliers can fulfill and dispatch the order on time. In other words, the purchase order is divided into two parts: (i) the on-time dispatched part of the order (as shown in the left side of Fig. 2); (ii) the delayed part of the order (as shown in the right side of Fig. 2). For the on-time dispatched part, there is lead-time uncertainty during the transportation. This part of the order will reach the raw material warehouse after the uncertain lead-time. For the delayed part of the order, it is more complicated. Firstly, the fraction of the purchase order that is delayed depends

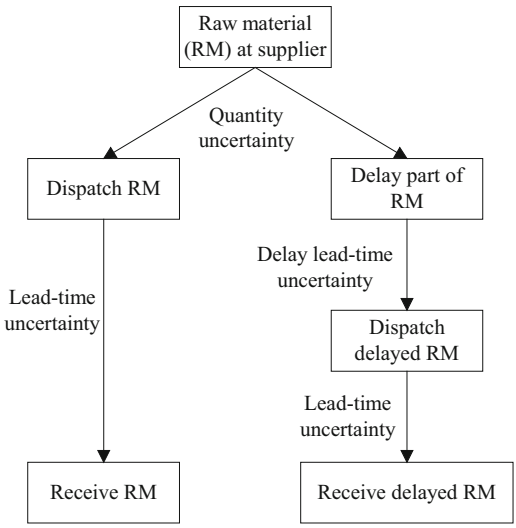

Fig. 2 The relationship among lead-time, quantity and delay uncertainties

on the quantity uncertainty. Secondly, there is a delay lead-time that represents how long it is delayed. Thirdly, from the dispatch of the delayed part of the raw material to the time that the warehouse receives it, there is a lead-time uncertainty. The lead-time uncertainty on the right side may be different from that on the left side in Fig. 2.

4.1.3 Constraints in the Model

Various constraints exist in both case companies including inventory capacity, transportation capacity and production capacity. For example, the interviews show that labour quality and operation management could influence the production capacity and productivity in China. Based on the data from the case studies, we can classify the constraints into three groups corresponding to three supply chain processes, namely DSC, ISC, production and raw material procurement (Table 2). These constraints are designed as input parameters in the model so that they can be easily changed according to company's data.

4.1.4 Supply Chain Performance

4.1.4.1 Total Cost

We use the total cost to measure the supply chain performance. There is a wide range of cost components incurred in the case supply chains. We classify them into three categories, i.e. domestic supply chain cost (based on cases A and B), international supply chain cost (based on case B), and production and raw material procurement cost (based on cases A and B).

Domestic SC Cost

In DSC, five types of cost have been taken into account. The finished goods domestic market transportation fee has increased greatly in China in accordance with the interviews. There are two factors that have directly generated an increase in this type of cost including increased gas price and inflation rate in China. The average growth rate for the two cases is around 15 % in 2010 compared with 2009.

Table 2 Classification of constraints in the model

Domestic SC	International SC	Production and raw material procurement
Finished goods inventory capacity Finished goods transportation capacity	Finished goods inventory capacity Finished goods internal transportation capacity Finished goods external transportation capacity	Production capacity Raw material inventory capacity Raw material transportation capacity

Another reason leading to a higher domestic transportation fee is the lack of standardised commission fee in different cities in China. A commission fee could be charged differently based on local government policy. Consequently, in some cities, the commission fee is extremely high. We also considered the delay penalty cost (customer order and shipping) because those delays negatively influence the manufacturer's integrated raw material ordering and production plans. For example, the infrastructure plan and the capacity of roads lead to much traffic congestion on Chinese highways, which leads to many transportation delays of finished goods and raw materials. Domestic banking fees and payment delay penalty costs are cheaper than in the ISC. In China, the business account payment transaction fee (usually £5 for one payment) is much cheaper than the international payment. The lead-time for domestic payments usually takes one working day, maybe less, but this depends on the system of the particular bank.

International SC Cost

There are further types of cost in ISC. The internal transportation fee is similar to the transportation fee in DSC. The external transportation fee is more standardised but is increased in 2010 (according to the interviews) in terms of the international shipping fee. The currency exchange rate substantially increased the cost of international shipping in 2010. For case B, the exchange rate increased by around 8 % in 2010. According to the interviews, the company is willing to reduce exports, however, in order to keep its target international market share and meet the local government's requirement, although the cost for exporting is higher than sales in the domestic market, case companies still accept at least 10 % international orders in case company B. Thus, we setup a penalty cost based on the situation that the company did not satisfy the international target percentage. The target percentage could be set up by using the input parameter. E.g. for case B, the target percentage is 10 %, therefore the penalty cost is equal to a large number or infinity, or equal to zero otherwise. The international banking commission fee and payment delay penalty cost is much more expensive and complicated. For example, the fee for issuing a credit letter is around 0.2 % for HSBC, and the company will be charged again when they cash a credit letter or cheque. The payment lead-time will be longer because of international trade issues e.g. an international bank transaction usually takes 3–5 working days. For a domestic bank (i.e. a manufacturer's bank in China), the opening hours of a large branch are usually from 8 a.m. to 5 p.m. each day, including Sunday. However, an international bank (i.e. from the customer side) is usually open only from Monday to Friday. Additionally, different national holidays influence companies receiving payments as well. The company has had troubles because of this reason in the last 5 years.

Production and Raw Material Cost

The production fee in the model includes the labour cost, raw material cost, tax, and machine depreciation fee. In China, the labour cost increased significantly in 2010—by around 12 % in case company A and 14 % in case company B. However,

Table 3 Classification of cost elements in the model

Domestic SC	International SC	Production and raw material procurement
Domestic customer order delay penalty cost Finished goods in domestic market transportation cost Finished goods backorder cost Finished goods shipping delay and inaccurate quantity penalty cost Domestic banking fee and payment delay penalty cost	International customer order delay and inaccurate penalty cost Finished goods internal transportation (from finished goods warehouse to manufacturer's port) delay and inaccurate penalty cost Finished goods internal transportation cost Finished goods external transportation (from manufacturer's port to customer's port) delay and inaccurate penalty cost Finished goods external transportation cost Finished goods international back order cost Banking fee and payment delay penalty cost Lose international market share penalty cost	Production fee Setup cost Defective quality penalty cost Finished goods inventory holding cost Raw material inventory holding cost Raw material transportation cost Raw material transportation delay penalty cost

the setup fee and finished goods inventory holding cost was stable in 2010 for both companies. The reason for a stable finished goods inventory holding fee is that the location of finished goods warehouses is normally far from the city centre and those warehouses are company owned. In 2010, the average raw material cost increased around 10 % for case companies in Q3 compared with Q2. It is increasingly high. Therefore the production fee keeps rising in China. Raw material transportation cost is similar to finished goods transportation in DSC. However, the payment method for raw materials is flexible in China. Case company A usually makes payments to suppliers monthly. Case company B usually makes payment to suppliers every 2–3 months. However, the Chinese business culture decides that all payments have to be made before the Chinese Spring Festival which is usually in February.

Based on the above discussion, Table 3 gives the classification of the cost elements in the model. There are more cost elements in ISC compared to DSC. In order to increase the flexibility, all cost parameters are set as input variables so that a company can input those data according to their own price (cost) structure and context.

5 Model Evaluation (How to Use the Model)

In this section, we explain how the model can be used to evaluate the supply chain performance through simulation. We first describe how to set up the input parameters representing uncertainties and constraints in the model, and then evaluate the performance of specific strategies.

5.1 Simulation

Simulation has been identified as using a computer to evaluate a model numerically, and gathering data in order to estimate the desired true characteristics of the model (Law and Kelton 2000, p. 1). The simulation method has been used in modeling logistics and SC problems in many cases, e.g. measuring the bullwhip effects in dynamic situations (Min and Zhou 2002). Simulation is a good alternative for large-scale SC systems or those too complicated for analytical methods.

Due to the complexity of the SC system in Fig. 1, in association with multiple types of uncertainties in Table 1 and constraints in Table 2, a simulation method has been employed to evaluate the model and assist in the decision-making. We have developed a simulation tool using Matlab, which offers great flexibility for evaluating specific procurement and production strategies and international sale plan strategies in various scenarios.

5.2 Uncertainty Parameters in the Model

In this model, all uncertainties are represented by random variables that can follow different distributions. Uncertainties are bounded by lower and upper parameters and treated as input data based on a company's historical data. To simplify the narrative of the experiments, we use LT_D to represent the upper bound of lead-time uncertainties in DSC, which means that all types of lead-time uncertainty in Table 1 related to DSC have been given the same upper bound value. In ISC, we use LT_I to represent the upper bound of lead-time uncertainties shown in Table 1. We use LT_d to represent the upper bound of delay lead-time uncertainties in both DSC and ISC. The default lower bound is zero for all uncertainties. In the interest of examining specific types of uncertainty, the user could give different values to individual uncertainties. However, in order to simplify the test, this chapter sets up the same upper bound value to lead-time uncertainties in both DSC and ISC. According to the interviews, those lead-time (in DSC and ISC) and delay lead-time uncertainties largely follow uniform distributions but vary within the bounds.

In terms of quantity uncertainty, we use a parameter, F_d to represent the upper bound of the fraction to be delayed. To simplify the experiment, we apply the same F_d to all quantity uncertainties (e.g. the fraction of raw materials being delayed, the fraction of defective products, and the fraction of finished goods being delayed) in both DSC and ISC. The default lower bound of quantity uncertainty is equal to 0. The quantity uncertainty is also modeled as a uniform distribution, limited by the lower bound and the upper bound. For example, the fraction of defective products follows a distribution U(0, F_d).

In our experiments, the combination of lead-time uncertainty and delay lead-time uncertainty, i.e. (LT_D LT_I and LT_d), is used to denote the level of time uncertainty. We consider three levels of time uncertainty as follows:

- High level: $LT_D \sim U(0, 7)$; $LT_I \sim U(0, 10)$; $LT_d \sim U(0, 3)$;
- Middle level: $LT_D \sim U(0, 3)$; $LT_I \sim U(0, 7)$; $LT_d \sim U(0, 3)$;
- Low level: $LT_D \sim U(0, 1)$; $LT_I \sim U(0, 3)$; $LT_d \sim U(0, 1)$.

The quantity uncertainty has two levels, i.e. $F_d = 0.1$ as a low level of quantity uncertainty and $F_d = 0.3$ as a high level of quantity uncertainty. Therefore, the combination of three levels of time uncertainty and two levels of quantity uncertainty gives rise to a total of six different scenarios. Case company B's data have been used in the experiments.

5.3 Decisions in the Model

To illustrate the usefulness of the model, we examine two raw material procurement and finished goods production strategies, and two international sales strategies in a range of scenarios with different levels of uncertainties. This section gives details of the strategies in the experiment.

5.3.1 Integrated Raw Material Procurement and Production Strategy

Strategy I is case company B's original strategy. We employ the data we collected (on a daily basis for case company B) as an input matrix in the simulation system. The company's original raw material procurement policy is a combined strategy (50 % of the order is a regular order from long term relationship suppliers). Usually, at the beginning of the manufacturing year (February) the company will have an annual meeting with suppliers to set up an annual sales plan that determines total quantity from each supplier; however, the delivery data is flexible. The remaining 50 % of the order is an emergent order; the company sells finished goods according to their market price and on hand inventory. So there is no clear formula for the company to make those decisions. We also undertook regression by using the historical customer order data during the same period (2009–2010) and added a random parameter to simulate customer order uncertainty. The manufacturer's original production plan was made based on the received customer order—plus the usual extra 10 % if there is no backorder. However if there is a backorder, the manufacturer will satisfy this by using full production capacity. If the on-hand inventory level is too high, considering the market price, the manufacturer will reduce the amount in the production plan. We use the historical manufacturing data (2009–2010) as the input matrix in this simulation.

Strategy II is a JIT with a 30 % safety stock strategy, in which the manufacturer makes production decisions based upon the received customer order plus an extra 30 % of the received customer order quantity as safety stock. Meanwhile, the manufacturer makes raw material ordering decisions based on the finished goods production plan plus an extra quantity of raw material that can be used to produce

an extra 30 % of finished goods (based upon the production plan) as raw material safety stocks.

5.3.2 International Market Sales Plans

The international sales plan is represented by the percentage of produced finished goods that are planned to satisfy international customer demand in each period, which is limited within a lower bound and an upper bound. In the ISC Plan I, the lower bound is 0.2 and the upper bound is 0.3, which means that at least 20 % but at most 30 % of produced finished goods will be used to satisfy international demands. In the SC Plan II, the lower bound is 0.3 and the upper bound is 0.4, which means there will be a minimum of 30 % of produced finished goods and a maximum of 40 % of produced finished goods to satisfy international demands in each period. In the model, if the domestic market has backorders and meanwhile there is a positive inventory of finished goods after serving international demands, then the amount of this international inventory will be used to satisfy domestic backorders in the next period because the domestic market is more profitable in the current Chinese economic environment. Here, the period is on a daily basis, and the planning horizon is 1 year ahead.

6 Experiment Results

The total supply chain costs (including three components: DSC cost, ISC cost, production and raw material procurement cost) under two strategies for ordering and production, and two international sales plans, in six different scenarios are shown in Table 4 (averaged over 200 runs for each scenario). In the following, we explain and interpret the results.

The Impact of Time Uncertainty
From Table 4, we can observe that as the level of time uncertainty (representing both lead-time uncertainty and delay lead-time uncertainty) decreases, the total supply chain costs under strategy II are generally decreasing. This is in agreement with intuition because quicker and more reliable material flows can better meet customer demands and reduce inventory costs. However, under strategy I, the pattern is less obvious and sometimes the total cost increases as the level of time uncertainty decreases. Such behaviour may be explained by the fact that the company's original strategy is extracted from its historical data, which is a reflection of the particular scenario and may not perform well even for more reliable scenarios. It is worth noting that individual cost components respond to the level of time uncertainty quite differently, e.g. the DSC cost component is always decreasing whereas the ISC cost component is sometimes increasing as the level of time uncertainty decreases.

Table 4 Supply chain costs under different strategies in different scenarios

Ordering and production strategy	Quantity uncertain level	High			Low		
	Time uncertainty level (days)	High	Middle	Low	High	Middle	Low
ISC sales plan I							
Strategy I	DSC cost	1,629	1,556	506	1,438	1,351	92
	ISC cost	1,953	2,563	5,210	1,577	2,128	3,785
	Prod. RM cost	3,705	3,667	2,792	3,767	3,733	2,732
	Total cost	7,287	7,786	8,508	6,782	7,212	6,609
Strategy II	DSC cost	1,515	1,374	279	1,327	1,202	118
	ISC cost	1,268	1,438	150	1,053	1,131	172
	Prod. RM cost	3,334	3,385	2,478	3,109	3,156	2,177
	Total cost	6,117	6,197	2,907	5,489	5,489	2,467
ISC sales plan II							
Strategy I	DSC cost	1,584	1,514	672	1,406	1,325	96
	ISC cost	1,728	2,319	4,465	1,322	1,848	3,185
	Prod. RM cost	3,705	3,666	2,786	3,767	3,733	2,723
	Total cost	7,017	7,499	7,923	6,495	6,906	6,004
Strategy II	DSC cost	1,492	1,359	360	1,314	1,196	208
	ISC cost	1,017	1,112	110	723	750	110
	Prod. RM cost	3,333	3,383	2,472	3,108	3,155	2,166
	Total cost	5,842	5,854	2,942	5,145	5,101	2,484

The Impact of Quantity Uncertainty

From the results corresponding to two levels of quantity uncertainty, it can be seen that the total costs of quantity uncertainty at the lower level are always smaller than that at the higher level under either ordering and production strategy. However, the production and raw material cost is sometimes increasing as the level of quantity uncertainty decreases under the company's original strategy. The pattern does not change with regard to two international sales plans. The implication is that reducing quantity uncertainty appears to be beneficial in a wider range of scenarios.

The Comparison of Two International Sales Plans

The international sales plan II achieves lower total costs in most scenarios compared to the international sales plan I. This indicates that within the given range of uncertainties, the ISC sales plan II is more economical and robust. However, it should be pointed out that such a conclusion is highly related to the cost parameters in the model (e.g. the penalties of backordering domestic and international customer orders). In particular, in the recent economic crisis situation, the Chinese domestic market was more profitable than the international market. Nevertheless, the model can be used as a tool to quantify the relative difference between different ISC sales plans.

Table 5 Relative performance of two procurement and production strategies in different scenarios

Quantity uncertain level	High			Low		
Time uncertainty level (days)	High	Middle	Low	High	Middle	Low
ISC sales plan I						
DSC cost (%)	7	12	45	8	11	−28
ISC cost (%)	35	44	97	33	47	95
Prod. RM cost (%)	10	8	11	17	15	20
Total cost (%)	16	20	66	19	24	63
ISC sales plan II						
DSC cost (%)	6	10	46	7	10	−117
ISC cost (%)	41	52	98	45	59	97
Prod. RM cost (%)	10	8	11	17	15	20
Total cost (%)	17	22	63	21	26	59

The Comparison of Two Ordering and Production Strategies

As for the ordering and production strategy, it can be observed that strategy II is significantly better than strategy I in all scenarios. For a clearer view of their relative difference, we give the percentage of cost reduction achieved by strategy II from strategy I in Table 5. It shows that the cost reduction ranges from 16 % to 66 % under ISC sales plan I, and from 17 % to 63 % under ISC sales plan II. It appears that the cost saving achieved by strategy II is more sensitive to the time uncertainty than to the quantity uncertainty. It is also worth noting that although the total cost is reduced, it is not necessarily true for all cost components. For example, when both the quantity uncertainty and the time uncertainty are low, the DSC cost is actually significantly increased under strategy II. This implies that a trade-off between those cost components is required. Our model can achieve the intelligent trade-off between the domestic supply chain and the international supply chain.

7 Conclusions and Limitations

In this chapter, based on two empirical case studies, we developed a generalised model representing the domestic supply chain (DSC) and the international supply chain (ISC) for medium-sized manufacturers in China. The key characteristics in the DSC and ISC such as uncertainties, constraints, and cost elements are identified and categorized. The model consists of four sub-models (customer order model, production model, raw material procurement with transportation model, and finished goods satisfying customer order with transportation model). The simulation method is used to evaluate the model under different strategies (e.g. the ordering and production strategy, and the international sales plans) in a range of scenarios with different levels of uncertainties.

The contributions of this chapter are twofold. Firstly, we provide empirical examples of the associated processes in both domestic supply chains and international supply chains for medium-sized manufacturers in China. It is found that there are a variety of uncertainties associated with the information flow and the physical flow in the case supply chains. According to the nature of the uncertainties, we can classify them into three categories: quantity uncertainty, lead-time uncertainty, and delay uncertainty; and we can illustrate the relationships between them. We have also discussed the various constraints and cost elements in association with the flows and activities, and the differences and interactions between DSC and ISC. This would help practitioners and academics to better understanding the key characteristics of supply chains for medium-sized manufacturers in China; this is lacking in the literature.

Secondly, we have developed a simulation tool that is able to evaluate specific management strategies in various scenarios and to examine the impact of uncertainties on the supply chain performance. For example, under a given management policy, as the level of uncertainty (either in quantity, or in lead-time, or in delay) decreases, the total supply chain cost is generally decreasing. However, the individual cost components (e.g. DSC cost, ISC cost, production and raw material cost) may respond to the level of uncertainty in opposite ways. We have experimented with two international sales plans and the results show that international sales plan II outperforms international sales plan I within a given range of uncertainties. As for the ordering and production strategies, the results show that the JIT with a 30 % safety stock strategy could reduce the supply chain cost by 16–66 % compared to the company's original strategy, and the achieved cost savings appear to be more sensitive to the time uncertainty than to the quantity uncertainty. This may help managers to understand the effort required to reduce different types of uncertainty. In addition, since different cost components respond to the level of uncertainties differently, an intelligent trade-off between those cost components is required. The proposed tool can assist managers in making better decisions in terms of raw material ordering, finished goods production, and an international sales plan.

This study is limited with two case studies representing medium-sized manufacturers in China, and further research is required to validate or adapt the model for other companies and industries. Nevertheless, it is believed that many key characteristics identified in this study could be common for similar types of manufacturers in China as they face similar structural factors such as inter-provincial and inter-ministerial relationships, history and culture, institutional organization, and logistics infrastructure.

Questions for Review and Discussion

1. What are the main activities and processes in the domestic supply chain in China?
2. What are the main activities and processes in the international supply chain?

3. How do information flow, material flow, and bill flow interact with each other in the domestic supply chain in China?
4. How do information flow, material flow, and bill flow interact with each other in the international supply chain?
5. What are the main types of uncertainties in the domestic supply chain and international supply chain? Discuss their differences.
6. What are the main types of constraints in the domestic and international supply chains? Discuss their differences.
7. What are the main cost components associated with the domestic and international supply chains? Discuss their differences.
8. How to model the integrated planning for international sales and domestic sales, raw material procurement and production plan in emerging market?

References

Abrahamsson, M. (2003). Best practice case study. In L. Ojala & O. Hilmola (Eds.), *Case study research in logistics*. Turku: Turku School of Economics and Business Administration.

Abrahamsson, M., Aldin, N., & Srahre, F. (2003). Logistics platforms for improved dynamic effectiveness. *International Journal of Logistics: Research and Applications.*

Berman, B., & Swani, K. (2010). Managing product safety of imported Chinese goods. *Business Horizons, 53*, 39–48.

Brown, C. G., Longworth, J. W., & Waldron, S. (2002). Food safety and development of the beef industry in China. *Food Policy, 27*, 269–284.

Cai, S., Jun, M., & Yang, Z. (2010). Implementing supply chain information integration in China: The role of institutional forces and trust. *Journal of Operations Management, 28*, 257–268.

Chen, G. Y., & Yang, M. M. (2003). On supply chain management about Chinese enterprises. *Journal of Sun Yatsen University (Social Science Edition), 43*, 76–82.

Chien, C.-F., Lee, C.-Y., Huang, Y.-C., & Wu, W.-T. (2009). An efficient computational procedure for determining the container-loading pattern. *Computers & Industrial Engineering, 56*, 965–978.

Dinwoodiea, J., & Xu, J. (2008). Case studies in logistics: A review and tentative taxonomy. *International Journal of Logistics Research and Applications, 11*, 393–408.

Franca, R. B., Jones, E. C., Richards, C. N., & Carlson, J. P. (2010). Multi-objective stochastic supply chain modeling to evaluate tradeoffs between profit and quality. *International Journal of Production Economics, 127*, 292–299.

Ge, L., & Voß, S. (2009). ERP application in China: An overview. *International Journal of Production Economics, 122*, 501–507.

Geng, S., Ren, T.-z., & Wang, M.-h. (2007). Technology and infrastructure considerations for e-commerce in Chinese agriculture. *Agricultural Sciences in China, 6*, 1–10.

Gray, D. (2009). *Doing research in the real world*. London: SAGE.

Guo, W., Wei, K. C., Li, X., & Wang, F. (2000). A decision support system for automotive product planning and competitive market analysis. *International Transactions in Operational Research, 7*, 509–523.

Han, J., Trienekens, J. H., & Omta, S. W. F. (2011). Relationship and quality management in the Chinese pork supply chain. *International Journal of Production Economics, 134*, 312–321.

Hatani, F. (2009). The logic of spillover interception: The impact of global supply chains in China. *Journal of World Business, 44*, 158–166.

He, M. K. (2004). A report on supply Chain management in China's manufacturing industry. *Journal of Shanghai Maritime University, 25*, 5–11.

He, Y., & Chen, X. (2009). Wind turbine generator systems. The supply chain in China: Status and problems. *Renewable Energy, 34*, 2892–2897.

Hua, Z., Li, S., & Liang, L. (2006). Impact of demand uncertainty on supply chain cooperation of single-period products. *International Journal of Production Economics, 100*, 268–284.

Huang, J., Jiang, X., & Tang, Q. (2009). An e-commerce performance assessment model: Its development and an initial test on e-commerce applications in the retail sector of China. *Information & Management, 46*, 100–108.

Hui, S., & Xiao-ping, W. (2009). Market characteristics of new energy supply in China. *Procedia Earth and Planetary Science, 1*, 1712–1716.

Humphreys, P. K., Lai, M. K., & Sculli, D. (2001). An inter-organizational information system for supply chain management. *International Journal of Production Economics, 70*, 245–255.

Jia, X., Huang, J., & Xu, Z. (2012). Marketing of farmer professional cooperatives in the wave of transformed agrofood market in China. *China Economic Review, 23*, 665–674.

Jiang, B., Baker, R. C., & Frazier, G. V. (2009). An analysis of job dissatisfaction and turnover to reduce global supply chain risk: Evidence from China. *Journal of Operations Management, 27*, 169–184.

Kahn, R., & Cannell, C. (1965). *The dynamics of interviewing: Theory, technique, and cases*. New York: Wiley.

Ke, W., Liu, H., Wei, K. K., Gu, J., & Chen, H. (2009). How do mediated and non-mediated power affect electronic supply chain management system adoption? The mediating effects of trust and institutional pressures. *Decision Support Systems, 46*, 839–851.

Lancioni, R., Schau, H. J., & Smith, M. F. (2003). Internet impacts on supply chain management. *Industrial Marketing Management, 32*, 173–175.

Law, A., & Kelton, W. (2000). *Simulation modeling and analysis*. New York: McGraw-Hill.

Li, S. (2002). Junk-buyers as the linkage between waste sources and redemption depots in urban China: The case of Wuhan. *Resources, Conservation and Recycling, 36*, 319–335.

Li, Y., Liu, Y., & Liu, H. (2011). Co-opetition, distributor's entrepreneurial orientation and manufacturer's knowledge acquisition: Evidence from China. *Journal of Operations Management, 29*, 128–142.

Liu, X. (2008). SME development in China: A policy perspective on SME industrial clustering. In H. Lim (Ed.), *SMEs and globalization*. ERIA Research Project Report 2007. Chiba: IDFJETRO.

Liu, J., Zhang, S., & Hu, J. (2005). A case study of an inter-enterprise workflow-supported supply chain management system. *Information & Management, 42*, 441–454.

Lockström, M., Schadel, J., Harrison, N., Moser, R., & Malhotra, M. K. (2010). Antecedents to supplier integration in the automotive industry: A multiple-case study of foreign subsidiaries in China. *Journal of Operations Management, 28*, 240–256.

Lu, H., Trienekens, J. H., Omta, S. W. F., & Feng, S. (2008). Influence of guanxi, trust and farmer-specific factors on participation in emerging vegetable markets in China. *NJAS – Wageningen Journal of Life Sciences, 56*, 21–38.

Martinsons, M. G. (2004). ERP in China: One package, two profiles. *Communications of the ACM, 47*, 65–68.

Min, H., & Zhou, G. (2002). Supply chain modeling: Past, present and future. *Computers & Industrial Engineering, 43*, 231–249.

N. P. s. C. S. Committee. (2003). *Law of the People's Republic of China on promotion of small and medium-sized enterprises*.

Ni, D., Li, K. W., & Tang, X. (2009). Production costs, scope economies, and multi-client outsourcing under quantity competition. *International Journal of Production Economics, 121*, 130–140.

Ojala, L., & Hilmola, O. (2003). *Case study research in logistics*. Turku: Turku School of Economics and Business Administration.

Park, J., Sarkis, J., & Wu, Z. (2010). Creating integrated business and environmental value within the context of China's circular economy and ecological modernization. *Journal of Cleaner Production, 18*, 1494–1501.

Pyke, D., Robb, D., & Farley, J. (2000). Manufacturing and supply chain management in China: A survey of state-, collective-, and privately-owned enterprises. *European Management Journal, 18*, 577–589.

Qu, X.-h., Zhuang, D.-f., & Qiu, D.-s. (2007). Studies on GIS based tracing and traceability of safe crop product in China. *Agricultural Sciences in China, 6*, 724–731.

Reyes, P. M. (2005). Logistics networks: A game theory application for solving the transshipment problem. *Applied Mathematics and Computation, 168*, 1419–1431.

Robb, D. J., Xie, B., & Arthanari, T. (2008). Supply chain and operations practice and performance in Chinese furniture manufacturing. *International Journal of Production Economics, 112*, 683–699.

Saunders, M., Lewis, P., & Thornhill, A. (2003). *Research methods for business students*. London: Prentice Hall.

Sheu, J.-B. (2003). Locating manufacturing and distribution centers: An integrated supply chain-based spatial interaction approach. *Transportation Research Part E: Logistics and Transportation Review, 39*, 381–397.

Stringer, R., Sang, N., & Croppenstedt, A. (2009). Producers, processors, and procurement decisions: The case of vegetable supply chains in China. *World Development, 37*, 1773–1780.

Su, Q., Shi, J.-h., & Lai, S.-j. (2008a). Study on supply chain management of Chinese firms from the institutional view. *International Journal of Production Economics, 115*, 362–373.

Su, Q., Song, Y.-t., Li, Z., & Dang, J.-x. (2008b). The impact of supply chain relationship quality on cooperative strategy. *Journal of Purchasing and Supply Management, 14*, 263–272.

Trkman, P., McCormack, K., de Oliveira, M. P. V., & Ladeira, M. B. (2010). The impact of business analytics on supply chain performance. *Decision Support Systems, 49*, 318–327.

Vafidis, D. (2002). *Methodological tendencies in logistics research: Empirical evidence from 25 Finnish and Swedish doctoral dissertations 1994–1998*. Turku: Turku School of Economics and Business Administration.

Waldron, S., Brown, C., & Longworth, J. (2010). A critique of high-value supply chains as a means of modernising agriculture in China: The case of the beef industry. *Food Policy, 35*, 479–487.

Wang, Z., Yao, D.-Q., & Huang, P. (2007). A new location-inventory policy with reverse logistics applied to B2C e-markets of China. *International Journal of Production Economics, 107*, 350–363.

Wu, X., Wu, H., Xia, L., Ji, K., Liu, Z., Chen, J., Hu, D., Gao, C., & Wu, Y. (2010). Socio-technical innovations for total food chain safety during the 2008 Beijing Olympics and Paralympics and beyond. *Trends in Food Science & Technology, 21*, 44–51.

Xu, M., Hu, Z., Wu, J., & Zhou, Y. (2008). A hybrid society model for simulating residential electricity consumption. *International Journal of Electrical Power & Energy Systems, 30*, 569–574.

Xu, J., Li, B., & Wu, D. (2009). Rough data envelopment analysis and its application to supply chain performance evaluation. *International Journal of Production Economics, 122*, 628–638.

Xu, W., Song, D., & Roe, M. (2011). *Production and raw material ordering management for a manufacturing supply chain with uncertainties* (pp. 747–751). 2011 I.E. International Conference on Industrial Engineering and Engineering Management (IEEM).

Yaibuathet, K., Enkawa, T., & Suzuki, S. (2008). Influences of institutional environment toward the development of supply chain management. *International Journal of Production Economics, 115*, 262–271.

Yu, X., Li, C., Shi, Y., & Yu, M. (2010). Pharmaceutical supply chain in China: Current issues and implications for health system reform. *Health Policy, 97*, 8–15.

Yuan, Z., & Shi, L. (2009). Improving enterprise competitive advantage with industrial symbiosis: Case study of a smeltery in China. *Journal of Cleaner Production, 17*, 1295–1302.

Zhang, B., Bi, J., Yuan, Z., Ge, J., Liu, B., & Bu, M. (2008). Why do firms engage in environmental management? An empirical study in China. *Journal of Cleaner Production, 16*, 1036–1045.

Zhang, L., & Goffin, K. (1999). Joint venture manufacturing in China: An exploratory investigation. *International Journal of Operations and Production Management, 19*, 474–490.

Zhao, X., Huo, B., Flynn, B. B., & Yeung, J. H. Y. (2008). The impact of power and relationship commitment on the integration between manufacturers and customers in a supply chain. *Journal of Operations Management, 26*, 368–388.

Zhao, X., Huo, B., Selen, W., & Yeung, J. H. Y. (2011). The impact of internal integration and relationship commitment on external integration. *Journal of Operations Management, 29*, 17–32.

Zhu, Q., & Cote, R. P. (2004). Integrating green supply chain management into an embryonic eco-industrial development: A case study of the Guitang Group. *Journal of Cleaner Production, 12*, 1025–1035.

Zhu, Q., & Geng, Y. (2013). Drivers and barriers of extended supply chain practices for energy saving and emission reduction among Chinese manufacturers. *Journal of Cleaner Production, 40*, 6–12.

Zhu, Q., Geng, Y., & Lai, K.-h. (2010). Circular economy practices among Chinese manufacturers varying in environmental-oriented supply chain cooperation and the performance implications. *Journal of Environmental Management, 91*, 1324–1331.

Zhu, Q., & Sarkis, J. (2004). Relationships between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises. *Journal of Operations Management, 22*, 265–289.

Zhu, Q., & Sarkis, J. (2006). An inter-sectoral comparison of green supply chain management in China: Drivers and practices. *Journal of Cleaner Production, 14*, 472–486.

Zhu, Q., Sarkis, J., & Lai, K. H. (2007a). Initiatives and outcomes of green supply chain management implementation by Chinese manufacturers. *Journal of Environmental Management, 85*, 179–189.

Zhu, Q., Sarkis, J., & Lai, K.-h. (2007b). Green supply chain management: Pressures, practices and performance within the Chinese automobile industry. *Journal of Cleaner Production, 15*, 1041–1052.

Zhu, Q., Sarkis, J., & Lai, K.-H. (2011). An institutional theoretic investigation on the links between internationalization of Chinese manufacturers and their environmental supply chain management. *Resources, Conservation and Recycling, 55*, 623–630.

Zikmund, W. G. (2000). *Business research methods*. Fort Worth, TX: Dryden Press.

Zou, Z., Tseng, T.-L., Sohn, H., Song, G., & Gutierrez, R. (2011). A rough set based approach to distributor selection in supply chain management. *Expert Systems with Applications, 38*, 106–115.

Supply Chain Competitiveness in Food Industry: An Indonesian Case

Ade Febransyah and Elliot Simangunsong

Abstract In this study, it is of great interest to determine the supply chain competitiveness in Indonesia. We limit our study to the food industry only, due to the facts that the food industry is a major industry in terms of its contribution to national GDP and is still lacking in its supply chain competitiveness. The objective of this paper is to present the current state of supply chain competitiveness of the food industry in Indonesia. We use four perspectives to measure the supply chain competitiveness: cost, differentiation, sustainability, and infrastructure. While cost and differentiation measure the performance perspective of supply chain competitiveness, sustainability measures the demand perspective of the future supply chain, and infrastructure is the requirement perspective of supply chain competitiveness.

Using the Analytic Hierarchy Process (AHP) and Analytic Network Process (ANP), our empirical analysis in the food industry finds that infrastructure is the most important perspective that determines supply chain competitiveness, followed by differentiation, cost and sustainability. Having learned that the infrastructure is a major constraint in Indonesia, the players in the food supply chain place more emphasis on differentiation rather than on cost in creating their supply chain competitiveness. Our calculation using 12 criteria from the four perspectives shows that the food supply chain in Indonesia is highly competitive with the weight factor of 0.825. These findings suggest that even in markets lacking good logistics infrastructure, the players in the supply chain can still be competitive.

1 Introduction

In today's globally fierce competition, companies are extremely pressurized to improve their product quality, product variety and responsiveness to satisfy customers' requirements. At the same time, in order to secure profitability, they need to respond all pressures by being able to reduce production cost, shorten lead time, and

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W. Piotrowicz, R. Cuthbertson (eds.), *Supply Chain Design and Management for Emerging Markets*, DOI 10.1007/978-3-319-05765-1_6

eliminate all forms of waste. However, for companies in a developing country like Indonesia, competitiveness becomes too great to pursue.

In this study, it is of great interest to determine the supply chain competitiveness in Indonesia. We limit our study to the food industry only; due to the fact that the food industry is a major industry in terms of its contribution to national GDP and is still lacking its supply chain competitiveness. It is reasonable to argue that the food industry, especially in the context of Indonesia, is an appropriate choice for this investigation. Several reasons can be highlighted: a large number of suppliers, the importance of optimizing the process and cost reduction initiatives, product differentiation, globalisation effects that increase food supply chain complexity and contribution of the food industry to the national economy.

We applied four perspectives to measure the supply chain competitiveness, i.e., cost, differentiation, sustainability and infrastructure, applying the analytic hierarchy process (AHP) and analytic network process (ANP). The AHP model was developed and validated. Data from eight case companies were used in the model, to illustrate the application of the diagnostic tool. This chapter is structured as follows. Firstly, Indonesia and the importance of the food industry are presented, including two illustrative short case studies. This is followed by the literature review which is focused on supply chain competitiveness and performance. The third part describes the process of model creation, which is followed by model validation. Results from the empirical work are discussed and concluding remarks are written.

2 Indonesia

Indonesia is the largest archipelago country in the world that is composed of over 17,000 islands (Fig. 1), 300 languages, and over 100 cultures. It is the fourth most populous nation in the world after China, India and the United States. About 60 % of the population resides in Java, the centre of the country's economic and political power; the total population is over 237.6 million people (BPS-Statistics 2012). The motto of the country is "*Bhinneka Tunggal Ika*", meaning "Strength through Diversity". The 'glue' that binds the people together is Bahasa Indonesia, the national language, and Pancasila, the national philosophy, which stresses the doctrine of unity and universal justice for all Indonesians (State Secretariat of the Republic of Indonesia 2010). Formal Bahasa Indonesia is expected to be used in every business communication. Newspapers and television news also use formal Bahasa Indonesia. English may be spoken in international and high-level business contexts in large cities, for example, in Jakarta, the capital city of Indonesia. The currency of Indonesia is the Rupiah; 1 GB pound sterling is worth around 14,641 rupiah (Bank Indonesia 2012).

The main exports of Indonesia are oil & gas, coal, copper ore, palm oil, coffee, tea, tobacco, cocoa beans, shrimp, tuna, plywood and garments. The major imports are capital goods, transport/motor vehicles for industry, machinery for special

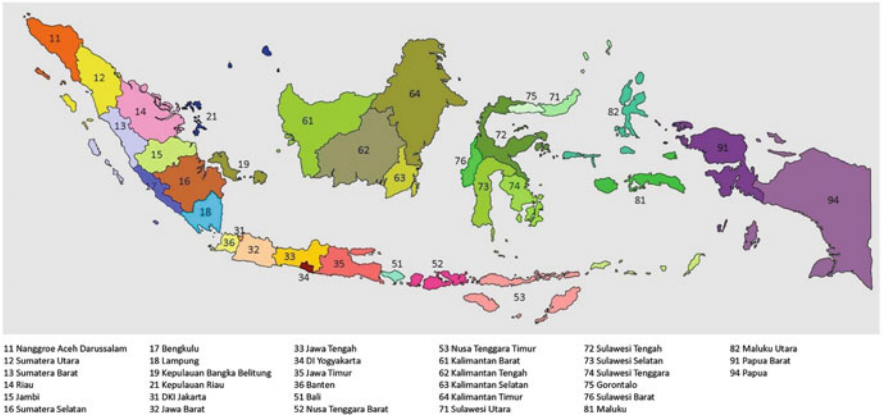

Fig. 1 Map of Indonesia. *Source*: BPS-Statistics (2009)

industry, rice, fertilizers, cement, petroleum products, iron and steel (BPS-Statistics 2009). In 2008, the export of products from Indonesia to the United Kingdom was worth 986.5 million GBP (9,855.3 million GBP for the European Union) while the import of products from the United Kingdom was worth 680.8 million GBP (6,734.1 million GBP for the European Union) (BPS-Statistics 2009). Most exports from Indonesia go to Japan (17,692.3 million GBP) while most imports are from Singapore (13,895.2 million GBP)—(note: the exchange rates used are 0.6448 GB pound sterling for 1 US dollar, Bank Indonesia (2012)). The large number of islands means that there is more water than land, which makes managing supply chains very challenging.

2.1 The Importance of the Food Industry in Indonesia

The food industry is a very important contributor to the economy of Indonesia, estimated to represent 33.61 % of Gross Domestic Product (GDP) of the total Manufacturing Industry (BPS-Statistics 2011). Given the importance of the food industry to the Indonesian economy (see Table 1), finding ways to improve this supply chain is important, because improving this industry would bring positive benefits to the economy of Indonesia.

The main stakeholders of the food supply chain in Indonesia generally consists of local producers (e.g. farmers), food manufacturers, logistics (i.e., local and national-wide distributors), retailers (traditional markets and modern retail channels) and end-customers. Major food products are prepared food and beverages, cereals, tobacco and betel, fish and vegetables; these food products represent 70 % of consumer expenditure for food (BPS-Statistics 2010). The other food products are tubers, meat, eggs and milk, legumes, fruits, oil and fats, beverages and miscellaneous food items.

Table 1 The contributions of manufacturing sectors to the gross domestic product (GDP) of Indonesia (billion rupiahs)

No.	Sector	2006	2007	2008	2009	2010	2010 (%)
1	Food, beverage & tobacco	212,738	264,101	346,186	420,363	465,368	33.61 %
2	Textile, leather goods & footwear	90,117	93,598	104,830	116,547	124,204	8.97 %
3	Timber & forestry products	44,603	54,881	73,196	80,198	80,542	5.82 %
4	Paper & printed products	39,637	45,403	51,912	61,155	65,822	4.75 %
5	Fertilizer, chemical & rubber goods	94,079	110,770	154,117	162,879	176,212	12.73 %
6	Cement & non metal quarry products	29,013	32,814	40,179	43,531	45,515	3.29 %
7	Base metal, steel & iron	20,687	22,908	29,213	26,807	26,854	1.94 %
8	Means of transport, machine & equipment	209,460	254,278	329,912	346,403	389,600	28.14 %
9	Other goods	7,111	7,577	9,126	9,818	10,524	0.76 %
	Total	747,444	886,330	1,138,670	1,267,700	1,384,640	100 %

Source: BPS-Statistics (2011)

The food industry suffered heavily when an economic crisis occurred in Indonesia in 1997/1998. This is because consumer purchasing power declined and the food and retail industry faced a major decline in sales (Data Consult 2007; Bank Indonesia 2011); it took many years before sales increased to the normal level. Food processing industries were among the hardest hit by an increase in production and logistics costs.

Data Consult (2011) reported that despite the global financial crisis, Indonesia has been able to avert the impact of global financial woes and grow steadily with an annual economic growth of more than 6 % in the past 3 consecutive years after the 2008 crisis. A stable government and a pro-market economy have helped to improve macroeconomic conditions, e.g., stable exchange and inflation rates, although global recession was still affecting Indonesia. For example, government initiatives to simplify procedures and reduce bureaucracy helped to reduce manufacturing costs, which were increasing because of soaring oil prices. Low interest rates also helped businesses to grow and increased consumer spending. Therefore it is reasonable to assume that the retail trade has begun to revive and the demand for retail goods, including foods, has increased.

The retail industry is very important in the food supply chain because most consumers buy food through retailers. There are two types of retailers in Indonesia,

i.e., traditional retailers and modern retailers. Traditional retailers consist of traditional markets (called *pasar*) and traditional stores (called *warung*). Here, the sellers gather (usually) in the morning, in a rough, temporary structure or building provided by the local authority and perform transactions with buyers from nearby area. Prices are not usually marked and often buyers have to bargain to get the best price. Modern channels (e.g., supermarkets, wholesalers and mini markets) usually have a fixed price and are located in strategic areas, which are easily accessed and offer a better shopping experience. In Indonesia, traditional retailers have 70 % of the market share and modern retailers have a share of 30 % (Data Consult 2007). This means that traditional retailers still play an important role in the retail business in Indonesia although Data Consult (2007) reported that modern retailers continue to expand with new retailer outlets in cities all over Indonesia. Most modern retailers, including both local and foreign companies, are located in Java, the most densely populated island of the country (Data Consult 2007).

There is a trend for players of modern retailers to practice food commoditization, for example, by selling private label products, to boost profitability through efficiency. Of course, this current practice offers a serious threat to local food producers. Arguably, decommoditization of the product may play an increasing role in the future as an alternative strategy for food producers to differ from their competitors. Differentiation strategy is also compatible with the demand factor coming from people who love to eat.[1] Short case no 1 illustrates the special case of food commoditization in the food industry in Indonesia.

Short Case 1
Food Commoditization: A Threat to Supply Chain Competitiveness?[2]

Efficiency is a strategy many companies use these days because of the pressure of market changes, intensity of global competition and increasingly savvy buyers which have led to a shortened product life cycle and increases in pressure on the profit margin of a company. Efficiency helps to maintain competitiveness by enabling companies to sell products with cheaper prices and to remain attractive in the eyes of customers.

Chasing cheap prices can indeed help companies to have a very strong position in the market. But this option may not be suitable for all companies, as there is the possibility of a conflict between business strategy and

(continued)

[1] Indonesia is like typical countries in the region where food establishments are all over the place, especially in the big cities. The food supply chains are reliant on people's appetite of food. In all modern shopping malls, there are always many food courts offering many kinds of foods, from local Indonesian food to Oriental and Western food. Not only in the food courts do people enjoy the food but they can also go anywhere else with cheaper prices. This strong demand factor helps food supply chains remain competitive in spite of poor infrastructure.

[2] This case is developed based on the co-author, Elliot Simangunsong's research in 2008 and 2012.

efficiency activities. Efficiency efforts may also contain another serious risk, i.e. the commoditization of the product. Commoditization is a process where competitive differentiation of a product is dynamically eliminated and has a negative impact on the profitability of the company. For example, when a product that an enterprise produces can also be produced by other companies, then commoditization of the product occurs, which makes price the main factor in choosing a product.

Food products in Indonesia are increasingly vulnerable to commoditization. One of the major causes is an increasing presence of private label in modern retailers. Private label is defined as generic product offerings, usually produced by the retailers, that compete with local brand counterparts by means of a price-value proposition. Indonesia, the fourth most populous country in the world with a low income, is a potential market target for cheap private label food products. An interview with a purchasing manager of a major retailer in 2008 showed that private label items, i.e., products with plain packaging and cheaper prices, were becoming more important for them to gain more sales and market share. She gave an example how in 2008 they already have 500 products of private label and a target of 200 new private label products for the following year. An executive director of a major processed food, in an interview with the author] in February 2012, expressed his concern about market pressure of these private label products against his company products offering.

Arguably, modern retailers in Indonesia will continue to push more and more private label products to the market because they represent high margins and the promise of profitability with little to no marketing effort. The growing popularity of private label products brings challenge to local food producers on how to differentiate their products and avoid products commoditization.

Business ethics is another problem in the food supply chains in Indonesia. At the normative level, all players in the supply chain should include business ethics in building a strong relationship with others; in practice that is not the case. For instance, a monopolistic foreign supplier heavily dominates the buyer-supplier relationship in which the supplier exploits the buyer through price. The other case illustrates a business cartel practiced by transportation service companies. They can change the price easily for no particular reason. Short case no 2 provides an example of such an issue.

Short Case 2
Business Collusion in Food Supply Chains in Indonesia[3]

Complexity in a supply chain exists because of two unique characteristics within the boundaries of the supply chain: firstly, the number of components and type of organisations involved in a supply chain; secondly, the interdependent nature of interactions between components that potentially produces complex behaviour (Amit et al. 2005). The food industry in Indonesia is an example of a complex, interconnected system with a large variety of relationships. It is common in food supply chains, organisations may play different roles in different chain settings and therefore collaborate with differing chain partners, who may be their competitors in other chain settings. For example, hypermarket retail is a supplier of local-traditional retailers, but in another context are competitors (traditional retailers usually have advantage in terms of proximity to the target customer).

The complexity of the food supply chain in Indonesia may also initiate another issue, i.e., parallel interaction, as discussed in a study by Wilding (1998). Parallel interaction, in terms of collusion of suppliers, increases uncertainty in the supply chain. Ellis et al. (2010) explains that collusion of suppliers would increase vulnerability of a supply disruption because sourcing organizations are not in a position to easily switch suppliers. Moreover, suppliers who collaborate in terms of price-fixing, for example, would effectively prohibit free market competition and put buyers in a disadvantaged position. Price-fixing may also raise ethical issues such as promoting anti-competitive business practices.

It is interesting to note that the eight respondents in our interviews in 2012 have faced these issues regularly in their supply chains. One of the reasons is the lack of a number of suppliers, and these suppliers control the market. The other reason is infrastructure problems (mainly transportation) that enable suppliers to speculate in the market. It is reasonable to conclude, at least in the context of food supply chains in Indonesia, that power in a supply chain is one of the key elements that affects the balance in buyer-supplier relationships, and the balance of power could be changed because of parallel interaction issues. Ethical issues, such as price fixing, are also identified in the interview, as a result of the approaches employed by the supply chain members to change the balance of power to their advantage, and may reduce overall supply chain competitiveness.

With all the strategic importance of the food industry to the Indonesian economy, it is of great interest to examine how strong the food supply chain is. The objective of this paper is to present the current state of supply chain competitiveness

[3] See Footnote 2.

of the food industry in Indonesia. From the current picture of the competitiveness, any stakeholder in the food industry can take more justified actions in strengthening the supply chain competitiveness.

3 Literature Review

This literature review section briefly covers two interlinked topics. Firstly the importance of the food industry in the global context is discussed, then supply chain competitiveness and performance are overviewed.

Webster (2001) explains that the food supply chain generally consists of primary producers (e.g. farmers), food manufacturers (e.g. dairy, ice cream, and bakery manufacturers), distributors, retailers and end-customers. In addition to these primary players, a food supply chain also includes other participating partners such as packaging companies, third party logistics providers, or shipping companies. Maloni and Brown (2006) find that the food industry is an extremely complex supply chain, where the path of a specific food product may vary. Reiner and Trcka (2004) also find that supply chains within the food industry have different structures from each other, which require detailed analysis in evaluating the possible improvements of the supply chain. Another important characteristic of the food industry is the high frequency of the new product (Fisher et al. 1994; Beer 2001; Maloni and Brown 2006); this increases choice for consumers and initiates uncertainty related to product issues such as high product failure rates, short product life cycles and high inventory holding costs.

Food supply chains have also become global (Beer 2001); for example, nowadays it is common to buy food which originates from other countries in a local supermarket. One can buy rice which originates from Thailand or chocolate from Belgium. The global nature of food supply chains, with all of the complexity and uncertainty of global supply chains, means that there is a particular need for management techniques to improve the competitiveness of the food supply chain.

It is widely believed that in this interconnected global economy, the competition is no longer between companies, but between supply chains (Schorr 1998). Continuous improvement in an enterprise with collaborative and strong relationships among players within the supply chain becomes mandatory for any supply chain to stay competitive. Hence, supply chain competitiveness becomes a common objective for any company to pursue. The challenge of this work is how to measure accurately the competitiveness of a supply chain. Previous works have included performance measurement in supply chain. Beamon (1999) identifies three types of performance measures: resources, output, and flexibility. Gunasekaran et al. (2001) develop a framework for respectively measuring the performance from strategic, tactical, and operational levels in supply chains; this framework deals mainly with supplier, delivery, customer service, and inventory and logistics costs.

Most critics of existing performance measurement in SCM suggest that they are financially focused, encourage local optimization, and fail to support continuous improvement (Holmberg 2000; Kaplan and Norton 1992; Toni and Tonchia 2001).

Several works consider flexibility as a determinant factor of supply chain competitiveness. Duclos et al. (2003) use six dimensions for measuring flexibility: production system, market, logistics, supply, organizational and information systems. Swafford et al. (2000) and Pujawan (2004) use four dimensions for assessing supply chain flexibility: sourcing, product design, manufacturing/production and delivery.

As the green issue becomes global, any company and its supply chain are pressurized to become sustainable through green initiatives. However, little work has been done to analyze the impact of a sustainable supply chain on company performance and firms' overall economic well-being (Markley and Davis 2007). A green supply chain is a sustainable enterprise that integrates social, environmental and economic responsibilities (Carter and Rogers 2008). This is also termed "the triple bottom line" (Markley and Davis 2007). Today many companies have accepted their responsibility to do no harm to the environment (Cruz and Matsypura 2009). The increased focus on the environment is significantly influencing supply chains. Environmental pressure from consumers has, in part, affected the behavior of certain manufacturers so that they attempt to minimize their emissions, produce more environmentally friendly products and/or establish sound recycling network systems. Poor environmental performance, at any stage of the supply chain process, may damage a company's most important asset—its reputation. As a result, organizations are expanding their responsibilities to include managing the corporate social responsibilities of their partners within the supply chain. Carter and Rogers (2008) propose that supply chain management is in an "outstanding position" to impact industry green practices. For example, the relationship with chain partners may initiate efforts to reduce packaging, improve working conditions in warehouses, use more fuel efficient transportation, and introduce a code of conduct for suppliers to understand the environmental impact of economic activity in the supply chain.

While most studies in supply chain performance have focused on developing and proposing frameworks to measure supply chain performance, there is also a need to analyse the effectiveness of any proposed performance measurement system in different supply chain contexts (Cuthbertson and Piotrowicz 2011). To understand how a supply chain performance measurement system has developed and is used, there is a need to capture its context, process and content.

The challenges for supply chain competitiveness in Indonesia are mainly referred to logistics. A recent study has reported that companies operating in Indonesia face difficulties to gain competitiveness due to the high cost which is mainly caused by poor logistics performance (Arvis et al. 2010). According to the report, the logistics performance index (LPI) of Indonesia is 2.76 (out of 5) in 2010 and dropped from 3.01 in 2007. This result is more or less in accordance with the Global Competitiveness Index for Indonesia which is 4.4 out of 7.0 (Geiger 2011).

There are six dimensions used in calculating LPI: (1) efficiency of customs clearance process, (2) quality of trade and transport-related infrastructure, (3) ease of arranging competitively priced shipments, (4) competence and quality of logistics service, (5) ability to track and trace consignments and (6) timeliness. Therefore it is of great interest to determine the supply chain competitiveness in

Indonesia. In this paper, we limit our study to the food industry only, due to the fact that the food industry is a major industry in terms of its contribution to national GDP and is still lacking in its supply chain competitiveness.

4 Methodology

Measuring supply chain competitiveness, by its nature, is a Multi-Criteria Decision-Making (MCDM) problem. When dealing with MCDM problems, it is commonly assumed that decision makers can assign accurate weights to criteria and scores to alternatives with respect to each criterion. In practice, the evaluation process becomes difficult due to the ill-structured situations, conflicting multiple objectives from players within the supply chain and imprecise information used by them for making a judgment. The intent of the decision-making process is then to provide decision makers with an insight into their preferences as they relate to the relative priority which they place among objectives, criteria, a set of sub-criteria, constraints and alternative decisions. In order to build a good decision-making model, decision makers will most likely use their judgment in identifying key variables explaining the objective of the decision-making problem. Decision makers also need to find the relationships between those variables. In attacking a multi criteria decision-making problem, we structure it in such a way that the objective determines the criteria and the criteria determine choices (Aziz 2005).

We develop a multi-criteria decision-making model to determine the current supply chain competitiveness of the food industry in Indonesia based on the Analytic Hierarchy Process (AHP)/the Analytic Network Process (ANP) approach. The model is built on four perspectives of supply chain competitiveness: cost, differentiation, sustainability and infrastructure. Using the ANP allows us to exercise dependence so that the supply chain competitiveness can depend on the perspectives as in a hierarchy but they may also depend on each other.

An empirical study has been completed based on eight interrelated case companies from the food sector. We conducted a semi-structured interview with top decision makers representing the whole supply chain, to obtain their judgments on determining the supply chain competitiveness (more details about sampling and interviewees is presented later in the chapter). Their judgments were then used to perform the routine pairwise comparisons in the ANP process.

The model developed based on the AHP/ANP approach was then validated. It is expected from this work that the supply chain competitiveness can be explained by its performance: responsiveness and efficiency (Fisher 1997) which are in line with two generic strategies pursued by any company in the supply chain: cost and differentiation (Porter 1980). It is also of great interest to note how the other two perspectives, infrastructure and sustainability, affect the supply chain competitiveness. Knowing how all the perspectives influence, and are interdependent on, each other will help any stakeholders in the supply chain to set the right approach to improve their supply chain competitiveness.

This research lays the foundation of determining the supply chain competitiveness using a decision-making model with interdependence among variables and imprecise information. However, further research needs to be done to accommodate the dynamics of supply chain competitiveness in the future. The refinement of the model can be done by adding more criteria and changing the degree of interdependencies among perspectives and criteria.

5 Development of the Model

As seen in Fig. 2, the first level states the objective that is to determine the supply chain competitiveness. All elements representing criteria and sub-criteria used in our model are based on existing literatures in the field of supply chain performance and current practices as well.

At the second level there are four perspectives—COST, DIFFERENTIATION, SUSTAINABILITY and INFRASTRUCTURE—that are used in determining the supply chain competitiveness. The first two perspectives, COST and DIFFERENTIATION, explain the supply chain performance. Any player in the supply chain can pursue competitiveness either in cost or differentiation. This choice is in line with the generic strategy any company can choose (Porter 1980). The choice in cost or non-cost for any player in the supply chain also depends on the product type, either functional or innovative (Fisher 1997). The SUSTAINABILITY perspective explains how any player in the supply chain spends some effort in assuring that their business is sustainable in the long run. The last perspective, INFRASTRUCTURE, is the requirement perspective that any supply chain is equipped with. The yearly report of the nation's logistics performance index by World Bank explains how the logistics infrastructure determines the supply chain competitiveness. At this level, we assume that each perspective depends on the other as it does in reality. For instance, there is always a trade-off between cost and differentiation, differentiation and infrastructure, and so on.

The third level in the model contains the competitiveness criteria for each perspective. Procurement, operations and transportation costs are the competitiveness criteria within the COST perspective. It is of great interest to see how players in the supply chain reduce their cost; whether it is from procurement, operations or their transportation.

The DIFFERENTIATION perspective contains availability, quality and service level. In the food's supply chain, any players can attach more importance either to availability, quality or service level. As the pressure on companies to become more green becomes inevitable, the supply chain is also pressurised to become more green. Also, increased business ethics and corporate social responsibility become demanded more of companies in Indonesia. These green, business ethics, and social responsibility related issues are within the SUSTAINABILITY perspective. The INFRASTRUCTURE perspective will guarantee the supply chain competitiveness

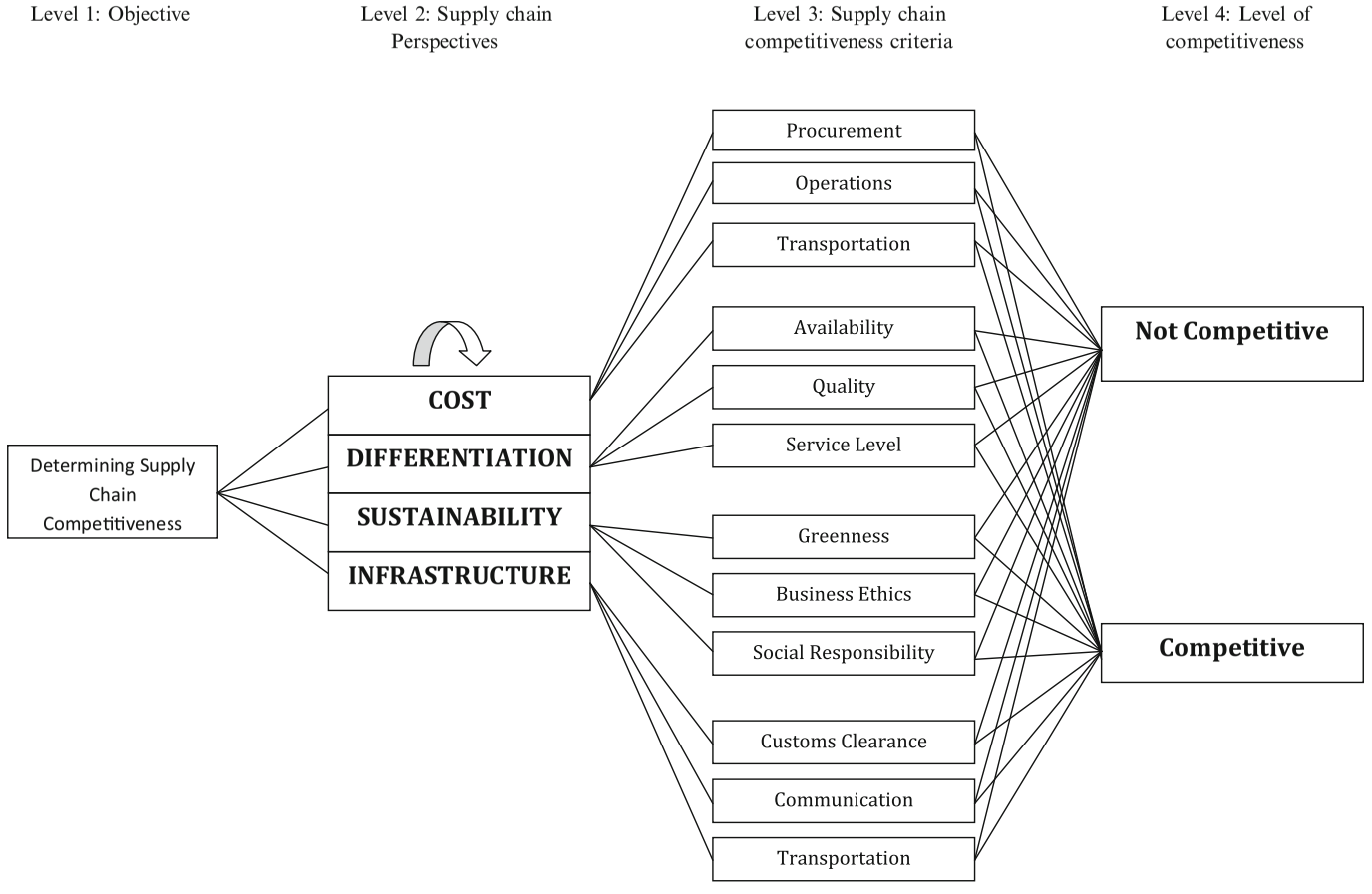

Fig. 2 Supply chain competitiveness model

from the quality of the customs clearance process, communication and transportation infrastructure.

The fourth level in the model explains the level of competitiveness of a supply chain. Based on the perspectives and the criteria, the supply chain competitiveness will be measured.

6 Model Validation

There are two considerations with regard to the applicability of the proposed model of determining supply chain competitiveness. First, it is worth questioning whether or not the decision hierarchy containing four levels, namely objectives, perspectives, perspective criteria and degree of supply chain competitiveness, sufficiently represents the real problem. Starting from the four perspectives being used—COST, DIFFERENTIATION, SUSTAINABILITY and INFRASTRUCTURE—the validation should be on the appropriateness of those four perspectives in determining supply chain competitiveness.

The first two perspectives are seemingly the most frequently used perspectives in previous works in the area of supply chain performance. These performance perspectives pursued by any player in the supply chain are also in accordance with the two generic strategies. Hence, COST and DIFFERENTIATION are clearly the appropriate perspectives to be included in the model. The next validation that should be made is on SUSTAINABILITY. While COST and DIFFERENTIATION are pursued by any supply chain to remain competitive, SUSTAINABILITY is just beyond the performance that must be achieved by a supply chain. Sustainability is the competitiveness perspective that will secure the supply chain competitiveness in the long run. In the long run, the supply chain can no longer be managed as it not only maximizes monetary value, but environmental and social value as well. Any efforts in sustainability made by players in the supply chain are not for short-term benefit in terms of cost or differentiation. The last perspective, INFRASTRUCTURE, is considered to be the qualifier that must be readily available for any supply chain to be competitive.

The next validation should be on the criteria being used for each perspective. Within the COST perspective, we use the criteria of procurement cost, operations cost and transportation cost. With a typically huge procurement cost spent by any player in the supply chain, it is evident that cost saving from procurement activity becomes a priority in order for companies to reduce their cost. Inefficient operations have traditionally become a common problem in any company. Cost reduction programs then become a major theme for most companies in Indonesia.[4] Besides

[4] Prasetiya Mulya Business School, a leading business school in Indonesia, has coached and supervised many companies in implementing business improvement projects. Most of the projects are in the area of cost reduction.

procurement and operational costs, transportation cost is also a real challenge for any company in Indonesia to stay competitive. As the largest archipelago country in the world still with poor transportation infrastructure, the transportation cost is too tough to reduce.[5] The hike of fuel price with a high variability across the country has a spiralling effect on many sectors, including transportation.

We place criteria including availability, quality and service level within the DIFFERENTIATION perspective. In the food industry, for a certain product like poultry or raw material of milk, availability is something that cannot be bargained for; it must be available at any cost. On the other hand, quality and service level have become a competitive weapon for a company when cost is not an order winner.

The SUSTAINABILITY perspective includes criteria such as greenness, business ethics and social responsibility. While, traditionally, supply chain performance focuses on the performance perspective covering cost and differentiation, the future supply chain is considering sustainability as its competitiveness factor. Since the increasing pressure nowadays to any company is to be more environmentally friendly, it becomes inevitable to pursue greener strategies. Business ethics is normatively taught in any supply chain course or training, but in practice it is easily broken by any player in the supply chain. The last criterion that guarantees sustainability is social responsibility. Like greenness and business ethics, social responsibility is still expensive for companies in emerging economies. But for the sake of company's sustainability, these three criteria cannot be neglected.

The last perspective of supply chain competitiveness is INFRASTRUCTURE. While infrastructure is still a major constraint in emerging economies, the improvement on the customs clearance process, the communication infrastructure and the transportation infrastructure starts gaining attention from the government. The stakes are high; if the infrastructure within the three criteria is not well developed then supply chain competitiveness is too difficult to reach.

6.1 Pairwise Comparison and Relative Importance-Weight Factors

Pairwise comparison is at the heart of the AHP/ANP process in which the decision maker will compare two entities at one level with respect to a 'control' factor at the higher level. Then pairwise comparisons are made systematically including all the combinations of element/cluster relationships. This comparison scale enables the decision maker to incorporate experience and knowledge intuitively (Harker and Vargas 1990).

[5] In a current interview (January, 2012) with senior supply chain practitioners in the Indonesian food industry, it is known that transportation cost is in the range of 20–30 % of COGS.

Table 2 The fundamental scale of AHP/ANP (Saaty 1980)

Intensity of importance	Definition	Explanation
1	Equal importance	Two activities contribute equally to the objective
3	Moderate importance	Experience and judgment slightly favor one activity over another
5	Strong importance	Experience and judgment very strongly over another, its dominance demonstrated in practice
7	Very strong importance	An activity is favored very strongly over another, its dominance demonstrated in practice
9	Extreme importance	The evidence favoring one activity over another is of the highest possible order of affirmation
2,4,6,8	For compromise between the above values	Sometimes one needs to interpolate a compromise judgment numerically because there is no good word to describe it

The decision maker can express his or her preference between each pair of elements verbally as equally important, moderately more important, strongly more important, very strongly more important and extremely more important. These descriptive preferences would then be translated into numerical values 1,3,5,7,9 respectively, with 2,4,6 and 8 as intermediate values for comparisons between two successive judgments. Table 2 shows the comparison scale used by AHP/ANP.

Following all pairwise comparisons, the local priority showing the relative importance of one element over another with respect to the element at the higher level of hierarchy will surface. Finally, the global priority, which is a set of priorities of the alternatives, is obtained by synthesizing all local priorities.

Here are the steps to determine the degree of supply chain competitiveness:

Step 1: Model Construction The first step is to structure the decision problem of measuring supply chain competitiveness. The hierarchical structure of the problem is previously seen in Fig. 2.

Step 2: Pairwise Comparison at the Perspective Level Firstly, assuming that there is independence among the perspective factors, pairwise comparison of the perspective factors is performed with respect to the objective. The following question, "*What is the relative importance of COST when compared with DIFFERENTIATION in determining supply chain competitiveness?*" is a typical question used in pairwise comparison. The result from completing this step is the perspective-importance eigenvector, w_p.

Step 3: Inner Dependence Among the Perspective Factors Inner dependence among the perspective factors is determined by analyzing the impact of each perspective on every other perspective using pairwise comparison. The previous eigenvector is obtained from the assumption of independence among the perspective factors, which is not the case in practice. More appropriate and realistic results can be obtained by applying the ANP approach in which there is dependence among the perspective factors. The following question, "*What is the relative importance of*

DIFFERENTIATION when compared with SUSTAINABILITY on reducing COST?" is a typical question in pairwise comparison. Completing this step will result in the inner dependence eigenvector, W_i.

Step 4: Adjusting the Eigenvectors of Perspective Competitiveness In this step, the interdependent priorities, $w_{factors}$, of perspectives of supply chain competitiveness are calculated:

$$w_{factors} = W_i \times w_p$$

Step 5: Calculating Local Priorities/Relative Importance of the Criteria In this step, the local priorities or relative importance of criteria of each perspective are calculated. The typical question in pairwise comparison is "*What is the relative importance of PROCUREMENT COST when compared with TRANSPORTATION COST in reducing COST?*"

Step 6: Calculating the Overall Priorities of the Perspective Criteria In this step, the overall priorities of the criteria of supply chain competitiveness, $w_{criteria}$, are calculated by multiplying the interdependent priorities of the perspectives, $w_{factors}$, obtained in Step 4 with the local priorities of the perspective criteria obtained in Step 5.

Step 7: Determining the Degree of Supply Chain Competitiveness with Respect to the Perspective Criteria We perform pairwise comparisons using the typical question as follows: "*What is the relative importance of COMPETITIVE when compared with NOT COMPETITIVE in explaining supply chain competitiveness with respect to QUALITY*?". The result is the eigenvector of competitiveness degree, W_c.

Step 8: Determining the Overall Degree of Supply Chain Competitiveness In this last step, the overall degree of supply chain competitiveness is calculated as follows:

$$w_{competitiveness\ (overall)} = \begin{bmatrix} Not\ competitive \\ Competitive \end{bmatrix} = W_c \times w_{criteria\ (overall)}$$

6.2 An Illustration Determining Supply Chain Competitiveness

Using the supply chain competitiveness diagnostic model (Fig. 2), an empirical study has been conducted in the food industry in Indonesia with eight inter-related companies (eight cases). Eisenhardt and Graebner (2007) explained that random sampling is not recommended for selecting cases because the number of cases is usually small; using a random selection process may result in a set of cases which is not sufficient or appropriate for the purpose of the study. Therefore, the selection of companies should be focused on the suitability or usefulness of the potential case

companies for the purpose of this study. In addition, other reasons for choosing these eight companies are that:

- All companies are major players in their respective market; this means that they have relatively strong market competitiveness or influence which is important for this study.
- All companies have long business experience in Indonesia, they have established their presence and endured business dynamics and crisis in Indonesia.
- The companies selected represent major chains in the food industry i.e., one supplier, four food manufacturer, two third party logistics provider and one retailer. This enables rich data collection and analysis with supply chain coverage.
- These companies have supply chains in the market; it is interesting to learn how competitive their supply chains are.

The respondents selected from these eight companies are senior managers and all of them also have direct influence ton supply chain operations. The respondents understand the scope of their businesses well, have sufficient supply chain knowledge and are experienced decision-makers. The respondents and their companies are briefly explained as follows:

- The first respondent is a head of division of a plastic packaging company; this company owns the largest market share in Indonesia for plastic packaging at the time of interview. It is a public listed company with headquarters in Jakarta. This company supply rigid plastic for packaging in many industries all over Indonesia, including food, electronics, automotive and home ware. For food manufacturers, for example, this company supplies bottle packaging for soft drinks and milk.
- The second respondent is a director of an integrated pineapple plantation and factory; this company is one of the largest in the world. It mainly produces canned pineapple to serve local market and exports to over 50 countries in Europe, America, Asia Pacific and the Middle East.
- The third respondent is a production manager for a food manufacturer that was established in 1958. This company produces many food products such as crispy peanuts, jelly, snacks, beverages and soy milk. They are one of the major food manufacturers in Indonesia and some of their products are market leaders in Indonesia, e.g. crispy peanuts and jelly.
- The fourth respondent is a director of a food and poultry manufacturer. Established in 1985, this company is one of the major players in the retailing of food processing, poultry feed and animal pharmaceuticals in Indonesia.
- The fifth respondent is a director of a company which has three business units i.e. Third Party Logistics distribution (3PL), food manufacturing and investment. Established in 1988, the company distributes local and imported products such as food and beverages, household products and many others. The distribution network covers the whole country. For manufacturing, they produce milk powder, air freshener and garments.

- The sixth respondent is the general manager of one of the major players in Indonesia for transportation and logistics services, better known as a 3PL provider. Established in 2003, this company has over 6,000 vehicles that serve the whole country. The services include transportation/logistics solutions, car rental and driver management services. One of their main customers is the food industry.
- The seventh respondent is also a general manager of a 3PL provider, which provides varied logistics services including land transport, distribution, custom clearance, warehousing activities (such as general warehouse and bonded warehouse), stevedoring, international and domestics freight forwarding. This company also handles ship brokerage to facilitate exports/imports. One of their main customers is their parent company, a major palm oil producer in Indonesia, and also other food manufacturers.
- The eighth respondent is an executive director of an association of traditional retailers, which has about 350 members. A member is usually a shop owner in a wet market; in Indonesia, a wet market still constitutes a larger retail share than modern retail.

Table 3 summarises the interviewee and company profiles. The seniority of the interviewees means that it is reasonable to assume that they have knowledge or opinions regarding the research questions. These invited companies come from the most upstream to the most downstream in supply chain. A semi-structured interview, with eight top executives from their respective companies, has been conducted. Therefore, their expert judgment can be regarded as reliable in explaining the competitiveness of food supply chain in Indonesia. The interview was audio recorded and video recorded. Three research assistants helped to take notes during the discussion and later finalized the data. Where necessary, a follow-up telephone call or email was conducted with the interviewee to clarify vague or ambiguous responses.

In this research, the interview questions were a series of predetermined but open-ended questions, as suggested by Ayres (2008) for semi-structured interviews. The supply chain competitiveness model (see Fig. 2) is used as the basis of the interview questions. For example, to get information about the importance of the four perspectives (Cost, Differentiation, Infrastructure, and Sustainability) in supporting supply chain competitiveness, six questions were generated to obtain respondent answers as shown below (Fig. 3).

The interview questions were tested in a pilot interview with three interviewees: a director of food manufacturer and two senior researchers. The objective of the pilot was to test and develop the interview protocol. Following the pilot, several improvements were made to the interview questions to make the protocol more concise and the questions easier to understand.

For the purpose of this study, it was important to select companies that represent many parts of the food supply chain. Selecting companies that represent supplier, manufacturer, distributor and retailer brings many advantages, i.e., it facilitates

Table 3 Interviewee and company profiles

Interviewee	1	2	3	4	5	6	7	8
Type of company	Supplier	Manufacturer	Manufacturer	Manufacturer	Distributor & trading	Logistics	Logistics	Retail
Typical product	Plastic packaging	Canned food	Food & drinks	Processed food	Food & imported food	4PL	3PL	Traditional market
Managerial position	Division Head	Director	Senior Manager	Director	Director	General Manager	General Manager	Director
Scope of business	International	International	National	National	National	National	International	National
Headquarter	Jakarta	Jakarta	Jakarta	Jakarta	Jakarta	Jakarta	Jakarta	Jakarta
Number of employees	1,000–5,000	>10,000	>5,000	1,000–5,000	500–1,000	500–1,000	500–1,000	350
Sales (2011) in billion Rps	500–1,000	N/A	>1,000	500–1,000	100–500	100–500	100–500	N/A
Sales (2007) in million £*	35–70	N/A	>70	35–70	7–35	7–35	7–35	N/A

*This data uses an exchange rate of 1£ = 17,000 rupiah (rounded value), data accessed from http://finance.yahoo.com/q?s=GBPIDR=X on March 20, 2009.

Fig. 3 Sample of interview question

(in your opinion) Which perspective is more important in determining supply chain competitiveness?

1. COST or DIFFERENTIATION
2. COST or SUSTAINABILITY
3. COST or INFRASTRUCTURE
4. DIFFERENTIATION or SUSTAINABILITY
5. DIFFERENTIATION or INFRASTRUCTURE
6. SUSTAINABILITY or INFRASTRUCTURE

richer data analysis, provides data triangulation and is important in gaining a better understanding of the phenomenon being studied.

We develop the supply chain competitiveness diagnostic tool which contains two categories of question: the importance of perspectives and the degree of supply chain competitiveness. In the first category, we perform pairwise comparisons at Levels 2 and 3 of Fig. 2. The participants are asked to compare each perspective with one another using a scale from 1 to 9. From this comparison process, we will obtain the most important perspective in supply chain competitiveness. Assuming there is an inner dependence among perspectives, we also ask the participants questions related to inner dependence. For each perspective, we ask the participant to compare one criterion with the other one using a scale of 1–9.

The pairwise comparison matrix is shown in Appendix 1. Using the Expert Choice software, all pairwise comparison values are transformed into the following eigenvector that explains the importance of each perspective to the supply chain competitiveness.

$$w_p = \begin{bmatrix} Cost \\ Differentiation \\ Sustainability \\ Infrastructure \end{bmatrix} = \begin{bmatrix} 0.207 \\ 0.455 \\ 0.106 \\ 0.231 \end{bmatrix}$$

Assuming independence among the perspective factors, it is determined that 'differentiation' is the most important perspective determining supply chain competitiveness, followed by infrastructure, cost and sustainability. This finding is quite interesting since, due to the lack of infrastructure performance, companies consider differentiation to be the determinant factor for supply chain competitiveness.

Due to inner dependency among the perspective factors, the eigenvector above is to be adjusted. The pairwise comparison matrices for inner dependence among the perspective factors is shown in Appendix 2. As infrastructure is the qualifier perspective in determining supply chain competitiveness, no pairwise comparison is performed with respect to infrastructure. The resulting eigenfactors, W_i, obtained from inner dependence among the perspective factors are as follows:

$$W_i = \begin{bmatrix} 1.000 & 0.317 & 0.158 & 0.000 \\ 0.258 & 1.000 & 0.519 & 0.000 \\ 0.061 & 0.099 & 1.000 & 0.000 \\ 0.681 & 0.584 & 0.323 & 1.000 \end{bmatrix}$$

Using the eigenfactors W_i, we can obtain the interdependent priorities, $w_{factors}$, of perspectives of supply chain competitiveness as follows:

$$w_{factors} = W_i \times w_p = \begin{bmatrix} 1.000 & 0.317 & 0.158 & 0.000 \\ 0.258 & 1.000 & 0.519 & 0.000 \\ 0.061 & 0.099 & 1.000 & 0.000 \\ 0.681 & 0.584 & 0.323 & 1.000 \end{bmatrix} \times \begin{bmatrix} 0.207 \\ 0.455 \\ 0.106 \\ 0.231 \end{bmatrix}$$

$$= \begin{bmatrix} 0.208 \\ 0.319 \\ 0.093 \\ 0.380 \end{bmatrix}$$

There is a significant difference from the first-obtained eigenvector. INFRASTRUCTURE (with the a weighting factor of 0.380) replaces DIFFERENTIATION as the most important perspective determining supply chain competitiveness, followed by DIFFERENTIATION (0.319), COST (0.208) and SUSTAINABILITY (0.093).

Pairwise comparison process continues to the third level. The pairwise comparison matrices for the perspective criteria are shown in Appendix 2. Table 4 shows the results of the priority of the criteria.

By calculating the priority of each criterion with its priority of the perspective, the overall priorities of the perspective criteria are as follows:

Table 4 Priority of the criteria

Perspectives	Priority of the perspective	Perspective criteria	Priority of criteria
COST	0.208	Procurement cost	0.340
		Operations cost	0.354
		Transportation cost	0.305
DIFFERENTIATION	0.319	Availability	0.187
		Quality	0.686
		Service level	0.127
SUSTAINABILITY	0.093	Greenness	0.087
		Business ethics	0.662
		Social responsibility	0.251
INFRASTRUCTURE	0.380	Customs clearance	0.135
		Communication	0.198
		Transportation	0.667

$$w_{criteria\ (overall)} = \begin{bmatrix} Procurement \\ Operations \\ Transportation \\ Availability \\ Quality \\ Service\ Level \\ Greenness \\ Business\ ethics \\ Social\ responsibility \\ Customs\ clearance \\ Communication \\ Transportation \end{bmatrix} = \begin{bmatrix} 0.071 \\ 0.074 \\ 0.063 \\ 0.060 \\ 0.219 \\ 0.040 \\ 0.008 \\ 0.061 \\ 0.023 \\ 0.051 \\ 0.075 \\ 0.253 \end{bmatrix}$$

In the second category, we ask the participant to determine whether or not their supply chain is competitive with respect to each criterion of the perspective. The pairwise comparison table for the criteria competitiveness is shown in Appendix 3. The eigenvectors of competitiveness degree, W_c, are as follows:

$$W_c = \begin{bmatrix} 0.167 & 0.121 & 0.219 & 0.231 & 0.181 & 0.175 & 0.357 & 0.197 & 0.203 & 0.325 & 0.136 & 0.130 \\ 0.833 & 0.879 & 0.781 & 0.769 & 0.819 & 0.825 & 0.645 & 0.803 & 0.797 & 0.675 & 0.864 & 0.870 \end{bmatrix}$$

Finally in the last step, we calculate the overall degree of supply chain competitiveness as follows:

$$w_{competitiveness\ (overall)} = \begin{bmatrix} Not\ competitive \\ Competitive \end{bmatrix} = W_c \times w_{criteria\ (overall)} = \begin{bmatrix} 0.175 \\ 0.825 \end{bmatrix}$$

The AHP/ANP analysis shows that the supply chain competitiveness of the food industry in Indonesia is highly competitive with an overall priority value of 0.825.

6.3 Validation of the Results

The reliability of the AHP/ANP model depends on the quality of the subjective judgment of the experts. In determining the supply chain competitiveness we ask senior supply chain practitioners coming from the upstream to the downstream parts of the supply chain. In performing pairwise comparisons, we use the judgment of experts who sometimes cannot easily assign a numerical value to the comparison. This is due to the ambiguous nature of objects being compared or the unavailability of past data that can be used as a reference in assigning numerical values during pairwise comparisons. Nevertheless, AHP/ANP is still widely used to solve multi criteria decision problems. One of the strengths of the AHP is the ability to measure the degree of consistency of pairwise comparisons during the process. The inability of decision makers in assigning accurate measurements during

pairwise comparisons should not be viewed as a major shortcoming of the model. Another challenge in using the AHP/ANP model is to get a consensus from a group of experts during the pairwise comparison process. It is not unusual for a group of experts to come up with different scales of 1–9 when performing pairwise comparisons. When this happens, it is the task of the facilitator in a group's decision-making process to firstly bring all experts to a converged scale before finding the geometrical mean of the different experts' scales.

Using the software Expert Choice, the validity of the model can be verified by the consistency ratio (CR) of the pairwise comparison matrices. It is calculated using the so-called consistency index and the random index (Saaty 1980). If the consistency ratio is no greater than 0.10, the pairwise comparison matrix is (or matrices are) generally acceptable. For all pairwise comparisons in which all the numbers are based on experts judgments, we find that the CR of all pairwise comparison matrices are still less than 0.10. Therefore, we are confident that the results obtained in this study are appropriate.

7 Discussion

The first challenge in measuring supply chain competitiveness is in selecting the main perspectives of competitiveness for the supply chain. We select infrastructure as the requirement perspective for any supply chain to be competitive, followed by cost and differentiation, as the performance perspective that is widely used in the works of supply chain performance. As more pressures of greenness, social responsibility and business ethics in companies are higher than ever, we include sustainability as the demand perspective for the supply chain to be competitive in the future.[6]

From the current interview with senior supply chain practitioners in the food industry, it is found that infrastructure is considered the most important perspective that determines supply chain competitiveness, followed by differentiation, cost and sustainability. The finding of infrastructure as the major determinant factor is in accordance with the logistics performance index that put Indonesia in a poor position with regard to infrastructure, including customs clearance, communication infrastructure and transportation infrastructure.

Infrastructure that is a prerequisite for supply chain competitiveness needs serious attention and intervention from government. After the political turmoil in 1998, Indonesia is still in the reformation phase. Bureaucracy reformation is being conducted in all ministries including those related to infrastructure development.

[6] For any local companies partnering with foreign principal companies, green campaigns and corporate social responsibility become their effective selling point to the public. Even though the degree of importance of sustainability is the lowest among the perspectives, sustainability is likely to be the determinant factor in future supply chain competitiveness.

Any effort to make the customs clearance process more efficient and transparent is to be welcomed. It is a real challenge but already shows a major improvement. While the infrastructure of communication is considered sufficient based on the current interview with senior supply chain practitioners, transportation infrastructure still generates a huge amount of work for (the) government. The acceleration in infrastructure development is a must to improve (the) supply chain competitiveness.

However, given the serious problem from infrastructure, any players in the food industry are still creative in finding ways to remain competitive. The binary choice between differentiation and cost is exercised very well. Depending on where their position is in the supply chain, the choice could be about either differentiation or cost. For any companies in the supply chain, there is no clear cut guidance in selecting the supply chain strategy.[7] Consumer goods companies and retailers put more emphasis on differentiation rather than on cost while distributors are more cost-effective. It becomes evident that in the food supply chain in Indonesia, each player at a different tier of a supply chain has a different supply chain strategy to the other. As the supply chain goes downstream, it is more about differentiation; at the more upstream side of supply chain, players are more focused on cost. The finding is in accordance with the legalities that can occur in a supply chain (Christopher and Towill 2000; Mason-Jones et al. 2000; Qi et al. 2009). The current finding of the study shows that differentiation is more important than cost in affecting supply chain competitiveness.

8 Concluding Remarks

This paper has presented the current study on supply chain competitiveness of the food industry in Indonesia. Due to its strategic importance to the Indonesian economy, it is of great interest in this study to find out what makes food supply chains competitive. Through the analysis and synthesis of the experts' judgment of senior supply chain practitioners, it is found that infrastructure is the most important perspective that determines supply chain competitiveness. It is no surprise, since infrastructure in Indonesia is still a major constraint for any supply chain to be competitive. This finding is in accordance with the result of the logistics performance index (LPI) for Indonesia based on the World Bank in 2010 that gives a score of 2.76 out of 5.0. Given the poor infrastructure, nevertheless, players in the food supply chain are playing the mixed differentiation-cost supply strategy. The differentiation strategy is chosen by players at the more downstream end of the

[7] Fisher (1997) on "What is the right supply chain for your product?" gives two mutually exclusive supply chain strategies for companies. Depending on the types of the product, either functional or innovative, the supply chain strategy is efficiency for functional products and responsiveness for innovative products.

supply chain, while cost strategy is preferred by players at the upstream end of the supply chain. Besides those performance perspectives that must be excelled by any players in the supply chain, current pressures on sustainability mean that companies in the supply chain cannot run business as usual but have to start thinking of implementing green business, social responsibility and business ethics.

Given the status quo of the ongoing poor performance in infrastructure, the food supply chain is still highly competitive. This finding shows that players in the supply chain find the competitiveness through differentiation and cost. Differentiation can be justified due to the demand factor of the food appetite of Indonesian people. This strong food appetite makes food supply chains competitive. However, the pressure of making food cheaper makes modern retailers practice commoditization through private labels. This practice on the one hand favours modern retailers' profitability, but on the other hand (it) scraps the local food producers' market and profitability. Hence, the decommoditization strategy taking advantage of the strong appetite of Indonesian people becomes a good choice for local producers to stay in business. Innovation in food products seems to be a pivotal key to making food supply chains competitive.[8]

Even though sustainability is still not the most important factor in supply chain competitiveness, a few companies have already started campaigning for green business. In the near future, as customers become more sophisticated and aware of the importance of greenness, companies will have no choice but to start making their supply chain green. As social conflicts often occur involving companies and local people, large companies, in particular, have started running corporate social responsibility programs. Lastly, from the senior supply chain practitioners, it is found that some business ethics problems are still the status quo in the buyer-supplier relationships. The practice of exploiting others with weaker positions cannot be avoided. The normative form of the win-win solution is hardly found in practice. With regard to the buyer-supplier relationships that will affect supply chain sustainability, the trustworthiness factor is still an elusive thing to pursue.

Questions for Review and Discussion

1. What are the four perspectives used in determining supply chain competitiveness in this study? Can those perspectives be used for sectors other than the food industry?

[8] Many foreign franchised food restaurants like KFC, McDonalds and Pizzahut differentiate their products from their principals by offering more products that are more tasteful to the Indonesian's tongue. For example, as fried chicken is the favorite food of many Indonesian, not only does KFC serve fried chicken, but McDonalds serves it as well. This kind of product innovation works very successfully in Indonesia.

2. Since infrastructure is still the major problem in emerging economies, how can players in the food industry in Indonesia still be competitive? What is their supply chain strategy?
3. How can players in the food industry learn from the findings of this study?
4. What is the multi criteria decision-making approach employed in this study? What are the advantages and shortcomings of this approach in determining supply chain competitiveness?
5. It is found from this study, that there is no clear cut strategy in the whole supply chain of the Indonesian food industry. As the supply chain goes downstream, it is more [on?] differentiation; at the more upstream side of supply chain, players are more [on?] cost. Will it happen in other industry's supply chains too, i.e. in the automotive or electronics industries?
6. Sustainability is still considered to be the least-important perspective in determining the competitiveness of the food supply chain in Indonesia. However, some problems in business ethics are identified in this study. Collusion among suppliers is one of them. Do you think that this problem is typical in emerging economies (or not)? Is there any simple and innovative way to alleviate the problem?
7. Even though differentiation outweighed cost as the influential perspective of supply chain competitiveness, the practice of product commoditization is inevitable leading to the practice of chasing a cheap price. How can players in the supply chain differentiate themselves from others? What kind of differentiation strategy is worth pursuing?
8. Of all the elements explaining perspectives for supply chain competitiveness, greenness is still trivial to players in the supply chain. Do you think that this is the case in emerging economies?

Appendix 1: Pairwise Comparison Matrix for the Degree of Importance of Supply Chain Perspectives

w.r.t Supply chain competitiveness	Cost	Differentiation	Sustainability	Infrastructure
Cost				1.50
Differentiation	1.55		3.00	3.51
Sustainability	2.00			
Infrastructure			2.80	

Appendix 2: Pairwise Comparison Matrices with Respect to Each Perspective of Supply Chain Competitiveness

w.r.t Cost	Differentiation	Sustainability	Infrastructure	Procurement	Operations cost	Transportation cost
Differentiation		5.76				
Sustainability						
Infrastructure	3.60	8.20				
Procurement						1.20
Operations cost				1.12		1.08
Transportation cost						

w.r.t Differentiation	Cost	Sustainability	Infrastructure	Availability	Quality	Service level
Cost		2.80				
Sustainability						
Infrastructure	1.60	6.82				
Availability						2.00
Quality				4.99		3.98
Service level						

w.r.t Sustainability	Cost	Differentiation	Infrastructure	Greenness	Business ethics	Social responsibility
Cost						
Differentiation	2.40		2.20			
Infrastructure	2.80					
Greenness						
Business ethics				6.43		3.11
Social responsibility				3.39		

w.r.t Infrastructure	Cost	Differentiation	Sustainability	Customs clearance	Communication	Transportation infrastructure
Cost						
Differentiation						
Sustainability						
Customs clearance						
Communication				1.64		
Transportation infrastructure				4.41	3.77	

Appendix 3: Level of Competitiveness with Respect to Elements of Supply Chain Perspectives

w.r.t the criteria below	Importance of high competitiveness compared with low competitiveness
Procurement	4.99
Operations cost	7.26
Transportation cost	3.57
Quality	4.51
Availability	3.33
Service level	4.72

(continued)

w.r.t the criteria below	Importance of high competitiveness compared with low competitiveness
Greenness	1.80
Business ethics	4.07
Social responsibility	3.93
Customs clearance	2.08
Communication	6.37
Transportation infrastructure	6.69

References

Amit, S., Soundar, K., Mark, G., & Usha Nandini, R. (2005). Supply-chain networks: A complex adaptive systems perspective. *International Journal of Production Research, 43*(20), 4235–4265.

Arvis, J. A., Mustra, A. M., Ojala, L., Shepperd, B., & Saslavsky, D. (2010). *Connecting to compete 2010: Trade logistics in the global economy*. Washington, DC: The World Bank.

Ayres, L. (2008). *Semi-Structured interview*. Thousand Oaks, CA: Sage.

Aziz, I. J. (2005). A regional cooperation to support financial crisis management and prevention: An application of a model with uncertainty and feedback influences. *The International Journal of Organizational Analysis, 13*(3), 196–215.

Bank Indonesia. (2011). *2011 Economic report on Indonesia*. Department of Economic Research and Monetary Policy.

Bank Indonesia. (2012). *Exchange rates on transaction*. Retrieved July 25, 2012, from http://www.bi.go.id

Beamon, M. B. (1999). Measuring supply chain performance. *International Journal of Operations and Production Management, 19*(3), 275–292.

Beer, S. (2001). Food and society. In J. F. Eastham, L. Sharples, & S. D. Ball (Eds.), *Food supply chain management: Issues for the hospitality and retail sectors* (pp. 21–36). Oxford: Butterworth-Heinemann (Chapter 2).

BPS-Statistics. (2009). *Trends of the selected socio-economic indicators of Indonesia*. http://www.bps.go.id

BPS-Statistics. (2010). *Trends of the selected socio-economic indicators of Indonesia*. http://www.bps.go.id

BPS-Statistics. (2011). *Trends of the selected socio-economic indicators of Indonesia*. http://www.bps.go.id

BPS-Statistics. (2012, June). *Monthly report: Socio-economic data* (25th ed.). http://www.bps.go.id

Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management: Moving toward new theory. *International Journal of Physical Distribution & Logistics Management, 38*, 360–387.

Christopher, M., & Towill, D. R. (2000). Supply chain migration from lean and functional to agile and customized. *Supply Chain Management: An International Journal, 5*(4), 206–2013.

Cruz, J. M., & Matsypura, D. (2009). Supply chain networks with corporate social responsibility through integrated environmental decision-making. *International Journal of Production Research, 47*(3), 621–648.

Cuthbertson, R., & Piotrowicz, W. (2011). Performance measurement systems in supply chains: A framework for contextual analysis. *International Journal of Productivity and Performance Management, 60*(6), 583–602.

Data Consult. (2007, January). *Indonesian commercial newsletter*. Data Consult (Indonesia) Ltd.

Data Consult. (2011, March). *Indonesian commercial newsletter*. Data Consult (Indonesia) Ltd.
Duclos, L. K., Vokurka, R. J., & Lummus, R. R. (2003). A conceptual model of supply chain flexibility. *Industrial Management & Data Systems, 103*(6), 446–456.
Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal, 50*(1), 25–32.
Ellis, S. C., Henry, R. M., & Shockley, J. (2010). Buyer perception of supply disruption risk: A behavioral view and empirical assessment. *Journal of Operations Management, 28*, 34–36.
Fisher, M. L. (1997). What is the right supply chain for your product? *Harvard Business Review, March–April*, 105–116.
Fisher, M. L., Hammond, J. H., Obermeyer, W. R., & Raman, A. (1994). Making supply meet demand in an uncertain world. *Harvard Business Review, 72*(3), 83–93.
Geiger, T. (2011). *The Indonesia competitiveness report 2011: Sustaining the growth momentum*. Geneva: World Economic Forum.
Gunasekaran, A., Patel, C., & Tirtiroglu, E. (2001). Performance measurement and metrics in a supply Chain Environment. *International Journal of Operations & Production Management, 21*(1/2), 71–87.
Harker, P. T., & Vargas, L. G. (1990). Reply to remarks on the analytic hierarchy process. *Management Science, 36*, 269–273.
Holmberg, S. (2000). A system perspective on supply chain measurement. *International Journal of Physical Distribution & Logistics Management, 30*(10), 847–868.
Kaplan, R. S., & Norton, D. P. (1992). The balanced scorecard–measures that drive performance. *Harvard Business Review, January/February*, 71–79.
Maloni, M., & Brown, M. (2006). Corporate social responsibility in the supply chain: An application in the food industry. *Journal of Business Ethics, 68*(1), 35–52.
Markley, M. J., & Davis, L. (2007). Exploring future competitive advantage through sustainable supply chains. *International Journal of Physical Distribution & Logistics Management, 37*, 763–774.
Mason-Jones, R., Naylor, B., & Towill, D. R. (2000). Lean, agile or leagile? Matching your supply chain to the marketplace. *International Journal of Production Research, 38*(17), 4061–4070.
Porter, M. E. (1980). *Competitive strategy: Techniques for analyzing industries and competitors*. New York: Free Press.
Pujawan, I. N. (2004). Assessing supply chain flexibility: A conceptual framework and case study. *International Journal of Integrated Supply Management, 1*(1), 79–97.
Qi, Y., Boyer, K. K., & Zhao, X. (2009). Supply chain strategy, product characteristics, and performance impact: Evidence from Chinese manufacturers. *Decision Sciences, 40*(4), 667–695.
Reiner, G., & Trcka, M. (2004). Customized supply chain design: Problems and alternatives for a production company in the food industry. A simulation based analysis. *International Journal of Production Economics, 89*(2), 217–229.
Saaty, T. L. (1980). *The analytic hierarchy process*. Pitsburgh, PA: RWS Publication.
Schorr, J. E. (1998). *Purchasing in the 21st century*. New York: Wiley.
State Secretariat of the Republic of Indonesia. (2010). *Profile of Indonesia*. Retrieved February 8, 2010, from http://www.indonesia.go.id/en
Swafford, P., Ghosh, S., & Murthy, N. (2000, November). *A model of global supply chain agility and its impact on competitive performance*. Proceedings of the 31st National DSI Meeting, Orlando, FL, pp. 1037–1039.
Toni, A., & Tonchia, S. (2001). Performance measurement systems: Models, characteristics and measures. *International Journal of Operations & Production Management, 21*(1/2), 46–70.
Webster, K. (2001). The scope and structure of the food supply chain. In J. F. Eastham, L. Sharples, & S. D. Ball (Eds.), *Food supply chain management: Issues for the hospitality and retail sectors* (pp. 37–54). Oxford: Butterworth-Heinemann (Chapter 3).
Wilding, R. (1998). The supply chain complexity triangle: Uncertainty generation in the supply chain. *International Journal of Physical Distribution and Logistics Management, 28*(8), 599–616.

Designing FMCG and Retail Supply Chains in Russia

Jana Pieriegud

Abstract Russia is an example of an emerging market, which has experienced fast growth and significant changes in logistics and supply chain development over the last decade. Key trends in the Russian logistics market include: a rising demand for professional logistics services (outsourcing), growth in the number of players in the logistics market, the widening scope of services offered by logistics providers, the development of modern warehouses in Russian regions, and implementation of IT solutions supporting logistics management. Large foreign trade and industrial enterprises that came to the Russian market as well as retail chains expansion were the main factors stimulating the development of warehousing and transport logistics. However, business environment of this market still differs from developed markets in many ways and poses specific challenges for distribution strategy and supply chain design.

The main barriers in supply chain design process in Russia are: huge territory, corruption, poor transport infrastructure development, a shortage of warehouse facilities and inadequate professional logistics culture. The transport system is heavily Moscow-centred and rail-based in long-distance countrywide freight transport. Different transport modes as well as distribution strategies need to be chosen for different regions.

This chapter describes and examines the Russian retail supply chain development, focusing on the ALIDI Group and its supply chain. For practitioners, the case study provides important insight into designing efficient FMCG supply chains in Russian regions.

1 Introduction

Russia is an example of an emerging market, which has experienced fast growth and significant structural changes in logistics and supply chains over the last decade. Current key trends in the Russian logistics market include: rising demand for professional logistics services (outsourcing), increasing competition in the

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W. Piotrowicz, R. Cuthbertson (eds.), *Supply Chain Design and Management for Emerging Markets*, DOI 10.1007/978-3-319-05765-1_7

transport and logistics market, widening scope of services offered by third-party logistics (3PL) providers, logistics costs optimisation, development of modern (class A) warehouses in Russian regions, implementation of IT solutions supporting logistics and supply chain management. Large foreign trade and industrial enterprises that came to the Russian market, as well as the expansion of retail chains, in the last two decades were the main factors stimulating the development of warehousing, transport and logistics services.

The aim of this chapter is to present the practical aspects of supply chain design in Russia. It begins with an overview of the country, which covers geographical features, demographical details and the administrative division. Subsequently, the business environment, which has a specific impact on the supply chains design in Russia, is discussed. The main legal restrictions are considered. The transport and logistics market and its main characteristics and players are analyzed. This is followed by an overview of the retail market development in Russia. Finally, the case study of the ALIDI Group is described and examined. The company was founded in 1992 in Nizhny Novgorod as a small regional FMCG (Fast Moving Consumer Goods) distributor. One year later ALIDI, as the first Russian company ever, signed a contract with Procter & Gamble. It was the beginning of ALIDI success story. Today, ALIDI is a leading distribution and logistics provider of FMCG in Russia, it operates in 21 regions and covers the largest part of the Central Russia. Company success in the Russian market can be attributed to a combination of core ALIDI' competencies: traditional distribution and logistics services. The final section concludes the chapter.

2 Literature Review and Methodology

The first sections of the chapter are prepared using publicly available data and papers published in Russian and English. The major macroeconomic trends analysis covers the period 2000–2011, with a special focus on changes in times of financial crisis, and is based on official statistics provided by the Federal State Statistics Service—Rosstat (2011). The main sources of information about developing retail sector in 1990–2007 are two books in Russian (Monin 2007; Blazhenov 2011). Details about the internationalization of the Russian retail market through cross-border mergers and acquisitions (M&A) before 2004 are provided by Lorentz et al. (2006). Consequences of retail internationalization for the agri-food business in Russia are also investigated by Hanf et al. (2009). A series of current statistics has been used to describe the largest retailers in this market. It draws upon real-life data from retailers' reports, presentations and press releases (X5 Retail Group 2012; Magnit 2012). Findings from A.T. Kearney Global Retail Development Index (GRDI) reports as well as financial data from the INFOLine&Retailer Russia Top-100 survey and its estimates have also been used (INFOLine 2011). A number of aggregate indexes used by independent international organizations (e.g. The Heritage Foundation (Miller et al. 2012), the World Economic Forum (Schwab 2012)), and financial institutions (e.g. The World Bank 2012a) have been cited. The

challenges of doing business and investing in Russia are fairly well described in country guides (GAIN 2010; PwC 2012).

Despite the growth of the supply chain in Russia, the subject is insufficiently covered in international literature. Jahns et al. (2006) discuss the evolution of strategies and structures of supply chains in Russia before 2005. A comprehensive analysis of supply chain challenges in Russia based on the SCOR model was conducted in an MA thesis prepared at the Gent University (Vanderhasselt and Van Esser 2009). A few research papers written by Lorentz et al. (2007) have studied the evolution of distribution structures and its consequent implications for supply chain management in the context of the emerging markets of Central and Eastern Europe, including a case study of foreign FMCG manufacturers in Russia (Lorentz and Hilmola 2008), and have identified the relevant assessment criteria for retailer supply chain capability from the perspective of foreign food manufacturers in Russia (Lorentz and Lounela 2011). Belaya and Hanf (2011) investigate the role of power in agri-food supply chain networks in Russia.

Reports on the warehouse real estate market and papers published in the Russian journal on business logistics "LogInfo" (Sologubov 2011; Elin 2011) were used to outline a situation in the logistics market. Some insight was also brought by the results of "The Best Logistics Provider of Russia" rankings prepared by EuroAsia Logistic Association (EALA) (2011) and the World Bank Logistics Performance Index (2012b). Furthermore, in 2012 the Deutsche Bahn and Russian Railways Center for International Logistics and Supply Chain Management prepared the report on contract logistics and outsourcing in Russia (Germain and Günter 2012).

The chapter also includes case study of ALIDI, which could be used as an example of a company which is successful in the Russian market. The company was founded in 1992 in Nizhny Novgorod as a small regional FMCG (Fast Moving Consumer Goods) distributor. One year later ALIDI was the first Russian company ever to sign a contract with Procter & Gamble. It was the beginning of the 20-year-long ALIDI success story. This business case was selected for two main reasons. First of all, this company is now one of the Russian logistics market leaders and operates in 21 regions. Secondly, this case is personally known to the author, who participated in organizing training and courses on logistics and supply chain management, both in Warsaw and Nizhny Novgorod in 2005, when the first part of the new warehouse was brought into use. Further insight was gained from discussions with ALIDI's top managers conducted during the world's largest trade fair for logistics, IT and supply chain management in Munich (transport logistic 2007 and 2009), later at the Moscow International Transport & Logistics Exhibition and Conference "TRANSRUSSIA" 2010, and finally in the form of online chats in March 2012. The presented case study is essentially an illustrative example of designing an FMCG & retail supply chain in the Russian market. However, the ALIDI business case is only one of the possible models.

3 Russia: Its Potential and the Key Socio-economic Trends

Russia or the Russian Federation (both names are official) is a country in northern Eurasia. It is the world's largest country in terms of area (about 17.1 million km^2), which covers 11 time zones with a wide range of natural resources, terrain and climate. It has the world's largest reserves of forest, mineral and energy resources. Russia is the second largest natural gas producer and from 2011 the world's leading oil producer (surpassing Saudi Arabia).

At the beginning of 2012 Russia's population was approximately 143.1 million. Roughly 78 % of the population lives in the European part of the country (25 % of the country's territory), with an average of 27 persons/km^2. However, 75 % of Russia's territory lies in Asia and accommodates only 22 % of the population, with 2.5 persons/km^2. Almost 73 % of Russians live in cities. Besides two major cities, Moscow (11.8 million) and St. Petersburg (5.1 million), there are ten other cities with a population of over one million: Novosibirsk (1.4), Nizhny Novgorod (1.3), Yekaterinburg (1.3), Samara (1.2), Omsk (1.1), Kazan (1.1), Chelyabinsk (1.1), Rostov-on-Don (1.05), Ufa (1.02) and Volgograd (1.02).

Russia is a federal semi-presidential republic, comprising 83 federal entities: 46 oblasts (provinces), 21 republics, 9 krais (territories), 4 autonomous okrugs (autonomous districts), 1 autonomous oblast and 2 federal cities (Moscow and St. Petersburg). These entities have equal representation (two delegates each) in the Federation Council, but they differ in the degree of autonomy they enjoy. The federal entities are grouped into eight federal districts that are administrated by presidential envoys.

The main feature of Russia's enormous potential is its unequal spreading over the country's territory as well as disproportions between the western European part and the eastern part of Siberia and the Far East. What is more, Russia's northern location imposes numerous limitations on the exploitation of natural resources and defines the specific features of the socio-economic development of its regions. The humid continental climate dominates in Russia. More than half of its total area has permafrost. Approximately 14 % of Russia lies beyond the Arctic Circle. Experts estimate that nearly three quarters of Russia's territory is not very conducive to human life at all (Kuzyk 2006), and only one third of this territory can be effectively used for economic activities (Gladkij and Chistobaev 1998).[1]

The Russian economy is the ninth largest in the world by nominal value of the gross domestic product (GDP) and the sixth largest by GDP measured in purchasing power parity (PPP) terms. In the decade following the 1998 Russian financial crisis, the economy grew by 7 % annually on average (see Fig. 1). According to official statistics the nominal GDP increased from USD 196 billion in 1999 to USD 1,850 billion in 2011 causing real disposable income to double (Rosstat 2011).

[1] Effective areas—regions located below the annual average isotherm of −2 °C and not higher than 2,000 m over sea level within the borders of a single country.

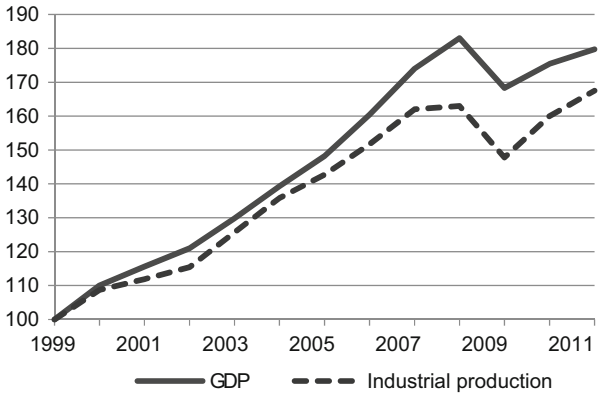

Fig. 1 Real GDP and industrial production growth in Russia (1999 = 100). *Source*: Based on Rosstat data

Table 1 Russia's main macroeconomic indicators in 2007–2011

Indicator	2007	2008	2009	2010	2011
GDP, USD billion (current prices)	1,300	1,661	1,222	1,480	1,850
GDP by PPP[a], USD billion	2,116	2,276	2,120	2,231	2,373
GDP per capita by PPP[a], USD	14,899	16,040	14,830	15,612	16,687
Real GDP growth rate (year-on-year), %	108.5	105.2	92.2	104.3	104.3
CPI (at the end of year), % to December of previous year	111.9	113.3	108.8	107.0	106.1
PPI (at the end of year), % to December of previous year	125.1	93.0	116.7	115.1	112.0
Unemployment rate (at the end of year), %	6.1	6.4	8.4	7.5	6.1
Nominal monthly average wage, USD	532	697	588	682	801
Real income rate (year-on-year), %	113.1	102.4	103.1	105.1	100.8
CCI (in the first quarter of year), %	−3.0	0.4	−35.0	−10.0	−13.0
Retail turnover rate (year-on-year), %	116.1	113.6	94.9	106.3	107.2
Export, USD billion	354.4	471.6	303.4	400.4	516.0
Import, USD billion	223.5	291.9	191.8	248.7	305.6
Crude oil price (Urals), USD/barrel	69.3	94.4	61.1	78.2	109.4

Source: Based on Rosstat data and Eskindarov and Sil'vestrov (2012)
[a]IMF estimations

Russia's economy, however, has sustained a more severe economic recession during the last global economic and financial crisis than any other G-20 country, with GDP shrinking by 7.8 % in 2009 and the stock index falling more than 80 % below its peak. The economic decline bottomed out in mid-2009 and the economy began to grow in the third quarter of 2009. In 2010 Russia's GDP increased by 4.3 %. Also in 2011 GDP was fuelled by high world oil prices and grew by 4.3 % (see Table 1), the world's third highest growth rate among leading economies (following China and India). As for industrial production growth (4.7 %), Russia ranked fourth following China, India and Germany. The inflation rate in Russia

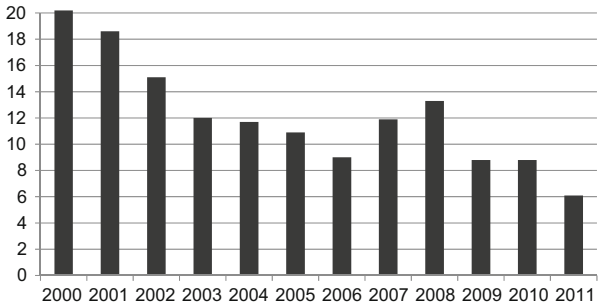

Fig. 2 Inflation rate in 2000–2011 (%). *Source*: Based on Rosstat data

Fig. 3 Retail sales growth rate and disposable income in Russia (1999 = 100). *Source*: Based on Rosstat (2012)

dropped from 13.3 % in 2009 to 6.1 % in 2011, reaching its lowest level since 2000 (see Fig. 2).

Retail trade in Russia demonstrated very dynamic growth from 1999 to 2008, which surpassed the real GDP growth rate. The increasing purchasing power and an expanding middle-class were the main drivers of the rapid growth in Russia's retail and consumer sectors (see Fig. 3). The economic downturn in 2009 cut demand for consumer goods. The retail sales growth rate fell significantly (−5.1 % in comparison to 13.6 % in 2008). In 2010, the Russian retail market began to recover after the economic slowdown and increased by 6.3 % to USD 535.7 billion or USD 3,750 per capita (almost four times more than in 2001).

According to Rosstat, in 2011 retail sales rose by 7.2 % and are expected to grow by a further 5.3 % in 2012. Recapture of the pre-crisis high dynamics of retail turnover is, however, limited by a slowdown in growth of the population's real disposable income and consumer expectations. The Consumer Confidence Index (CCI), which is calculated by Rosstat and reflects the aggregate consumer expectations of the population, fell to a 10 year negative record (−35 %) in the first quarter of 2009. Towards the end of 2009 the mood of consumers began to improve and the CCI jumped 5 % quarter-on-quarter in the fourth quarter of 2009 to −20 %. As of January 2010 the index stabilised at −10 % and during 2011 it improved to −7 %.

4 Business Environment

The business environment in Russia has been gradually improving since the transition from a centrally controlled planned economy to a free market. In recent years, many reforms have been implemented, the tax system has become more transparent, Russia has become increasingly integrated with global markets, and customs procedures have improved significantly. At the same time, the operating environment remains risky in a number of areas, with many foreign investors scared off by poor legal standards, as well as high levels of bureaucracy and corruption. Although the government has made fighting corruption a key priority, the Corruption Perception Index (CPI), which is prepared by Transparency International and measures the degree of public sector corruption, ranks Russia in 143rd place (see Table 2). Also the "2012 Freedom in the World" report (Freedom House 2012) indicates that corruption in the government and business is widespread. According to Euromonitor (2011), the share of informal retailing in Russia amounts to 10–25 % of total retail sales, depending on the region.

As was mentioned above, the Russian government has introduced a new Federal Law "On Trade", which imposes a ceiling on the share of one retailer of up to 25 % of total sales in a single region. The legislation aims to defend suppliers against discriminatory practices. Any compensation or fees paid to retail chains are forbidden, and an "entrance bonus" cannot exceed 10 % of the total value of purchases from one supplier. The Federal Law strictly limits the timeframe of payments from retailers to suppliers for grocery ranges, and the average payment lead time has been shortened. Earlier in 2009, the government supported the leading federal grocery chains, providing them with additional guarantees of credibility. The government's support helped highly indebted retailers to survive the credit crunch; in this way the government prevented stronger retailers from acquiring their closest competitors (Euromonitor International 2011).

The Heritage Foundation places Russia's economy 144th in the 2012 Index of Economic Freedom. Russia is ranked 41st out of 43 countries in Europe, and its overall score is below the global and regional averages. The authors stressed that the Russian government has demonstrated little if any commitment to economic reform in recent years, and the country's economic freedom score remains stuck at the lower end of the "mostly unfree" category. Extensive state interference with the economy mutes private sector dynamism. Layers of complex non-tariff barriers significantly increase the cost of trade. Deterrents to foreign direct investment include bureaucratic inconsistency and regulatory obscurity, as well as the fragility of the economy which is increasingly dependent on oil prices. The business environment has improved only marginally, and regulations remain burdensome. Pervasive corruption and limited respect for property rights undermine the rule of law, increasing uncertainty and investment risk (Miller et al. 2012).

For example, the Swedish furniture retailer IKEA, which owns 11 stores throughout Russia, has invested more than USD 4.0 billion in Russia since 2000, but their expansion plans for a possible additional 30 stores came to an abrupt halt

Table 2 Russia in international rankings

Index/ranking	Publisher of report, year	Number of countries on the ranking list	Place/country's status on the ranking list
Corruption Perception Index (CPI)	Transparency International, 2011	183	143
Index of Economic Freedom (IEF)	The Heritage Foundation, The Wall Street Journal, 2012	184	144 Country "mostly unfree"
Freedom in the World	Freedom House, 2012	195	"Not free country"
Freedom of the Press	Freedom House, 2012	197	172 "Not free press"
Worldwide Press Freedom Index	Reporters Without Borders, 2011–2012	179	142
Doing Business	The World Bank, IFC, 2012	184	120
Global Competitive Index (GCI)	World Economic Forum, 2012–2013	144	67
Human Development Index (HDI)	UNDP, 2011	187	66 Country with high human development

Source: Based on reports

in 2009 after a couple of projects ran into delays with local government officials. It has been reported that the issue of permits had been delayed by regulators in order to create barriers to protect local interests or to persuade the company to employ a particular local construction company. These practices give cause for concern, as these examples further illustrate the negative expectations as far as doing business in Russia is concerned (Kuczma 2011).

According to The World Bank's 2012 Doing Business Report, Russia is among the 30 economies that improved the most over recent years. In 2010–2011, Russia made the following easier: registering property transfers by eliminating the requirement to obtain cadastral passports on land plots, trading across borders by reducing the number of documents needed for each export or import transaction and lowering the associated costs, as well as filing a commercial case by introducing an electronic case filing system. However, Russia is still placed in 120th position. Although Russia eased construction permitted by implementing a single window for all procedures related to land use in 2009, according to data collected by Doing Business, dealing with construction permits there requires 51 procedures, takes 423 days and costs 183.8 % of income per capita. It is one of the worst performances globally (the 178th place among 183 economies). What is more, getting a permanent electricity connection and supply for a standardized warehouse requires

ten procedures for a local business in Russia, takes 281 days and costs 1,852.4 % of income per capita (the last place in the 2012 Doing Business Report) (Koshkin 2012).

While The World Bank report still ranks Russia at the bottom of its ranking list, Russia is among the Top 50 countries (48th place out of 160 countries analysed) for favourable investment climates, according to the "Bloomberg Best Countries for Business" ranking list (2012), which measures conditions favourable to attract foreign investment (The International Bank for Reconstruction and Development/ The World Bank 2012a).

Russia is also ranked a relativity high 67th position in the World Economic Forum's "Global Competitiveness Report 2012–2013". However, the lack of progress with respect to the institutional framework (133rd) as well as the low efficiency of its goods market (134th) continue to be among the most significant constraints with respect to Russia's competitiveness. Despite many efforts, its financial markets remain unstable, with banks assessed very poorly (132nd). These challenges reduce the country's ability to take advantage of some of its strengths—particularly its large and growing market size (8th), and its solid performance in higher education and training (52nd) (Schwab 2012).

Each year since 1990 the Human Development Report has published the Human Development Index (HDI), which was introduced as an alternative to conventional measures of national development, such as the level of income and the rate of economic growth. The HDI represents a push for a broader definition of well-being and provides a composite measure of the three basic dimensions of the human development: health, education and income. The Russian Federation's HDI is 0.755, which ranks the country 66th out of 187 countries with comparable data. A well-educated workforce is an important asset for the long-term growth of the Russian economy, and its relatively low-cost and generally highly skilled workers are one of the main attractions for investors.

5 Transport and Logistics Market in Russia

Russia has the world's second-largest railway network (after the U.S.), with a total track length of 85,200 km, of which 43,100 km are electrified and carry the majority of rail traffic. Railways in Russia use broad gauge of 1,520 mm (4 foot 11 5⁄6 in.). There are also about 38,000 km of industrial sidings, which are an important part of the railway system.

The state-owned joint-stock company Russian Railways (RZD) carries over 1.2 billion tonnes of cargo annually. In 2011 the transport performance reached 2,127 billion tonne-km and recovered to the pre-crisis level of 2008 (Fig. 4). Rail market share amounts to about 85 % of Russia's total freight traffic (calculated as per tonne-kilometres, excluding pipelines). Railways connect 85 of Russia's 89 regions and provide services to most of the major cities. However, the railway network density is low, at only 0.5 km/100 km^2 (in comparison to 5.8 in the Moscow region).

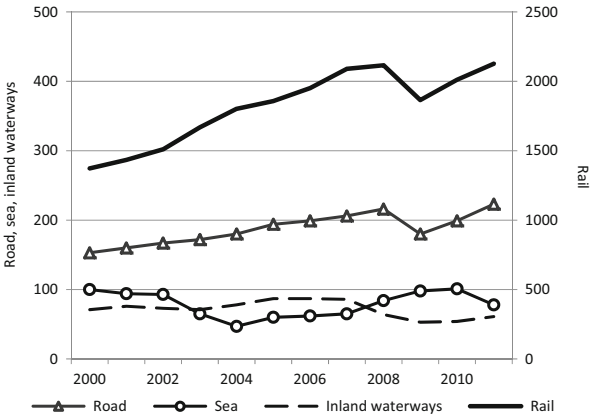

Fig. 4 Freight transport turnover in 2000–2011 (in billion tonne-km). *Source*: Based on Rosstat data

The average transport distance by railways amounts to almost 1,500 km. The Trans-Siberian Railway connects Moscow with the Russian Far East and China. It is the longest railway in the world with the length of the Moscow-Vladivostok mainline being 9,259 km (5,753 mi) and spanning seven time zones. There are several branch lines to China and North Korea.

Russia has 825,000 km of roads, of which 665,000 km are paved. Only 50,000 km make up the Russian Federal Motorway System. The density of paved roads (3.9 km/100 km^2) is very low both in comparison to EU countries and the Commonwealth of Independent States (CIS). The poor quality of the road network is one of the factors constraining the growth of the Russian economy.

The inland waterways are an important element of the Russian transport system. Total navigable routes amount to 101,000 km (two times that in the EU). Among Russia's most important ports are Arkhangelsk, Astrakhan, Kazan, Krasnoyarsk, Moscow, Murmansk, Nizhny Novgorod, Novorossiysk, St. Petersburg, Rostov-on-Don, Samara, Sochi, Vladivostok, Volgograd, and Vyborg.

Major seaports are Kaliningrad, St. Petersburg, Ust Luga and Primorsk on the Baltic Sea, Arkhangelsk on the White Sea, Murmansk on the Barents Sea, Vladivostok, Vostochnyy, Vanino and Nakhodka on the Japanese Sea, Novorossiysk on the Black Sea, Astrakhan and Makhachkala on the Caspian Sea. In 2011 they handled 535 million tonnes of cargo in total (three times more than in 2000). It should be noted that among 44 Russian major seaports only 24 are non-freezing.

Imported products arrive in Russia via land, sea or air freight, into ports or customs warehouses for clearance before proceeding to the next destination. Most consumer-oriented food and non-food products enter Russia through Moscow or St. Petersburg for customs clearance, to be shipped to final destination by rail or truck. The Central and Northwestern federal districts account for almost 80 % of imports (see Fig. 5). Moscow alone accounts for 39 % of exports and 42 % of imports. Northwestern Russian seaports handle about 43 % of the total foreign trade goods turnover.

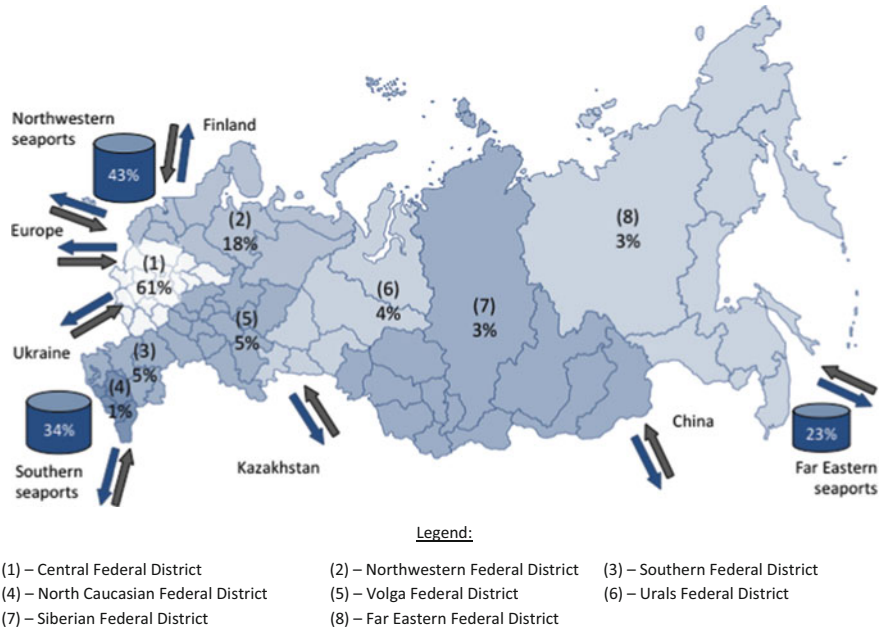

Fig. 5 Import goods distribution by federal districts. *Source*: Based on Rosstat data

Outside Russia, imported goods are also delivered through the Baltic and Black Sea ports (totalling about 95 million tonnes of cargo in 2011). Development of Russian seaports infrastructure in the last decade has redirected a part of these shipments to domestic seaports: St. Petersburg, Ust-Luga, Primorsk and Novorossiysk. From Moscow or St. Petersburg, products are further shipped into the interior via truck or rail to other regions. Most goods destined for the Far East enter through the ports of Vladivostok, Vostochnyy, Vanino and Nakhodka. Imported products intended for Russian retail chains enter the market through importers, distributors, and wholesalers. Large suppliers are typically also importers (GAIN 2010). Due to very long distances between Moscow and other cities as well as low road and railway availability in many regions it is very difficult and costly to establish a hub-and-spoke distribution system for a foreign company in Russia.

Logistics costs in Russia are high, significantly impairing production and trade efficiency, which in turn negatively affects competitiveness of companies and of the country in general. The share of logistics costs in Russia's GDP exceeds 20 %, as compared to 18 % in China, 13–15 % in Brazil and India, 9 % in the U.S., 11 % in Italy, and 8–9 % in Japan and Germany. The high level of logistics costs in Russia is mainly associated with inefficient internal logistics as well as the national transport and logistics system, multiplied by huge distances, poor quality of road

infrastructure and significant shortage of class A warehouses, particularly in the regional markets (Sologubov 2011).

The industrial property market remains among the commercial real estate segments that experience the most acute shortage of supply in Moscow and the Moscow Region. According to Colliers International, as of the end of 2011, the total stock of warehouse space in the Moscow region reached approximately 7.6 million m^2. In 2011, the vacancy rate for class A properties declined to 1.2 %. This was due to the fact that the volume of new constructions shrank by almost half in the 2 preceding years, while the take-up of quality warehouse space exceeded the pre-crisis indicators. Together, these factors were responsible for a record growth of rental rates in 2011, as compared to other segments: by 21 % and 24 % for class A and B warehouses,[2] respectively. Demand is driven by logistics companies, retail operators and FMCG companies, as well as by manufacturers. Together, these accounted for almost 80 % of global demand in the warehouse market of Moscow and the Moscow region. The share of logistics providers increased substantially from 15 % in 2010 to almost 38 % in 2011. In 2011, regional warehouse markets, especially in Krasnodar, Novosibirsk and Nizhny Novgorod, saw intensification of new constructions as well. The demand structure in Russia's regions was dominated by federal companies and retail operators. Lower rental rates are the main distinctive feature of warehouse markets outside the Moscow region. Depending on the region, the rental rate may differ within a range of 10–20 % (Colliers 2012).

The outsourcing penetration rate among retail chains in Russia amounts to about 22 % (in comparison to 55 % in Germany) (Elin 2011). Market-specific frameworks, significant regional differences and industrial and trading companies that do not trust the 3PL-providers remain the main barriers in outsourcing development in Russia (Lorentz et al. 2006). Still, only a few companies in the Russian market offer supply chain management services.

As far as the World Bank Logistics Performance Index (LPI) is concerned, Russia ranked 95th out of 155 countries in 2012. The LPI overall score reflects the perception of a country's logistics based on the six components: the efficiency of the customs clearance process (138th place in comparison to 115th in 2010), the quality of the trade and transport-related infrastructure (97th), the ease of arranging

[2] Warehouses can be categorized by class (A–D), depending on such factors as: the warehouse space and limits concerning the dimensions of the stored goods, the universality of the warehouse in terms of range of the stored goods, quality of roads leading to the site (including the presence of the railway branch) etc. Class A warehouses are built specially for the implementation of warehouse activities. They have to meet certain requirements concerning the materials used during the construction, height of the ceilings, width of the aisles and the possibility of adapting the inner space, depending on the type of the stored goods. It should be connected to a railway and be close to major highways. It should also be equipped with a modern security and fire-extinguishing system as well as autonomous electricity and water supply systems. These warehouses are usually one-story buildings with special floor covering, heavy equipment, the availability of specialized rooms (offices, administrative, auxiliary) and the ability to regulate the level of humidity, temperature, and illumination indoors. Class B buildings are a grade below class A—they are relatively new or reconstructed buildings (Storage vocabulary (2012), Knight Frank (2004)).

competitively priced shipments (106th), the competence and quality of logistics services (92nd), the ability to track and trace consignments (79th), and the frequency with which shipments reach the consignee within the scheduled or expected delivery time (88th) (The International Bank for Reconstruction and Development/ The World Bank 2012b).

Third-party logistics outsourcing began to develop in Russia in the late 1990s. Until the 2009 global financial crisis, the logistics market was growing over 10 % per year. According to RBK estimates, the total value of Russian transport and logistics market services is estimated today at USD 90 billion. However, about 90 % of this market is made by freight transportation services and only 8 % by warehousing and handling services.

According to the ranking "The Best Logistics Provider of Russia 2011" prepared by EALA, among the Top 20 are CV Protek, ALIDI, AsstrA, FM Logistic, STS Logistics, ItellaNLC (Itella Logistics), DPD, Kuhne + Nagel, GK Smile, ATL, EuroSib Group, VL Logistic, and MAXILOG (EALA 2011). Most of the key global and European leading 3PL-providers operate in the Russian transport and logistics market (like DHL, UPS, TNT, Panalpina, DB Schenker etc.); however, the domestic companies successfully compete with them. Russian leading 3PL-providers today have world-class logistics facilities (own or rented class A or B with warehousing space about 15,000–20,000 m^2, WMS) as well as range and quality of services. At the same time, in the Russian logistics market a well-known logo of a global or European 3PL-provider is not always an assurance of quality (Elin 2011).

6 Retail Market Development

Modern retail business in Russia dates back to the early 1990s. The first retail chains were established in the consumer electronics segment: Partiya (1992),[3] M.video (1993), Mir (1993), Eldorado (1994) and Technosila (1994). Lenta was the first home-grown company to open a store in cash & carry format (in St. Petersburg in October 1993), and then began to develop this chain in Russia. The first self-service grocery stores in Russia were brands such as: Seventh Continent (1994), which became the first supermarket chain in Moscow, Perekrestok (1995), Petrovskiy (1997), discounters Kopeyka (1998) and Pyaterochka (1998). Starting with 17 stores in St. Petersburg in 1999, Pyaterochka reached a turnover of USD 1.6 billion with about 1,000 store locations launched in only 5 years. This rapid expansion was achieved through a franchising strategy inside Russia and subsequent acquisitions as well as greenfield investments in the neighbouring countries. The trade company Tander, which started its activity in 1994 in Krasnodar as a wholesaler of perfumery, cosmetics and household chemicals (in 1997 became the

[3] This chain sold its stores and closed activities in 2004.

distributor of L'Oreal, Gillette and Unilever), began to develop from 1998 food retail trade under the brand Magnit, which became the largest retail chain in Russia by the number of stores in 2001 (Monin 2007; Blazhenov 2011).

Foreign retail involvement in the Russian market started a good few years after the 1998 financial crisis. Swedish IKEA in 2000 was first, followed by German Metro (2001), Dutch Spar (2001), French Auchan (2002), German OBI (2003), Billa (a joint venture of German Rewe and Russian holding Marta, 2004), British Marks & Spencer (2005) entering the Moscow market. The one exception was the Russian-Turkish joint venture Ramenka (Ramstore), established by Enka and the KOC Holding, which entered the Russian market in 1997, opening the first hypermarket. The first Russian hypermarket Mosmart[4] was built in 2003 near Moscow, at 10-km distance from Auchan (Monin 2007).

Both of the world's largest retailers—Wal-Mart and Carrefour—have withdrawn from Russia after unsuccessful acquisition attempts. In 2008, Wal-Mart opened a Russian office to identify potential business opportunities, yet closed the office after its acquisition target Kopeyka was acquired by the X5 Retail Group N.V. However, Wal-Mart is continuing to explore investment opportunities in Russia. The second largest retailer Carrefour opened its first Russian store in Moscow in June 2009, but pulled out after not being able to reach a deal with Seventh Continent.

Despite 20 years of organic growth, structural changes and consolidation,[5] the Russian retail market remains highly fragmented. In 2010 the Top 10 retailers accounted for about 8 % of the country's total retail sales value. The five largest players controlled only 6 % of the market (see Table 3). Modern retail formats (hypermarkets, supermarkets and discount stores) in 2010 held about 40 % of the market share (in 2006 it was 25 %). Convenience stores and stores located at gas stations held a 35 % share. Unlike retail in Central and Eastern Europe, Russian retail is still in a unique position given the limited number of multinational players in the domestic market, which continues to be led by large retailers with an annual turnover exceeding one billion USD each. In 2010–2011 there were several M&A transactions, which involved the largest retail chains.

The leading retailer in Russia in terms of revenues is the X5 Retail Group N.V., which was set up by the 2006 merger of Pyaterochka and the country's number one supermarket chain Perekrestok, owned by Alfa Group. At the end of 2010 the Kopeyka chain was also acquired by the X5 Retail Group. In 2010, its net sales totalled USD 11.3 billion, EBITDA reached USD 844 million, and net profit amounted to USD 271 million. In addition to the double figure year-on-year increase in total sales, there was a 7 % increase in the company's like-for-like sales.

The X5 currently operates several retail formats: the soft discounter chain under the Pyaterochka brand, the supermarket chain under the Perekrestok brand, the hypermarket chain under the Karusel brand, the online retail channel under the E5.

[4] In 2011, Mosmart's property and brand were sold to the Seventh Continent.

[5] See retail market overview and case studies described by Lorentz et al. (2006).

Table 3 Largest retailers in Russia in 2010 (by sales revenue)

No.	Retailer	Market segment	Chains	Year of first retail store opening	No. of stores	Sales revenue, RUB billion (USD billion)	Year-on-year change (%)
1	X5 Retail Group	FMCG	Karusel, Kopeyka, Pyaterochka, Perekrestok	1995 (Pere-krestok)	2,469	343.1 (11.3)	24
2	Tander	FMCG	Magnit	1998	4,055 (4,004—convenience stores, 51—hypermarkets)	236.1 (7.7)	39
3	Auchan Group	FMCG, gardening	Auchan, Auchan City, Auchan Sad, Nasha Radouga, Atak (supermarket)	2002	97	178.1 (5.8)	13
4	Metro Group	FMCG, consumer electronics	Metro Cash & Carry, Real, Media Market, Saturn	2001	106	170.4 (5.5)	13
5	M.video	Consumer electronics	M.video	1993	219	86.7 (2.8)	23
6	Eldorado	Consumer electronics	Eldorado	1994	328	83.5 (2.7)	16
7	O'KEY	FMCG	O'KEY (hypermarket), O'KEY-Express (supermarket)	2002	73 (35—hypermarkets, 38—supermarkets)	82.7 (2.7)	22
8	Lenta	FMCG	Lenta (hypermarket)	1993	39	70.6 (2.3)	27
9	Dixy Group	FMCG	Megamart (hypermarket), Minimart (supermarket), Dixy (convenience store)	1999	646	64.8 (2.1)	20
10	Euroset	Mobile phones	Euroset	1997	4,700[a]	61.9 (2.0)	12

Source: Based on INFOLine (2011)

[a]As of 2011, including stores in Belarus

ru brand and convenience stores under various brands. According to Romir's Global Reputation Index (GRI) consumer research, Pyaterochka was recognised as the most reputable and credible among the Top 5 grocery retailers in Russia in 2010. Nevertheless, the three major players are retail chains owned by the X5 Retail Group. The only international chain on this ranking list was the French chain Auchan.

At the end of March 2012, X5 was present in 567 locations in European Russia, the Urals and Ukraine, operating 3,139 stores in total (1,770,000 m^2 in selling space). This includes 2,643 Pyaterochka soft discounters, 337 Perekrestok supermarkets, 77 hypermarkets and 82 convenience stores. X5's franchisees operated 434 stores across Russia. The company operates 29 distribution centres and 1,392 of its own trucks (X5 Retail Group 2012).

The Tander Group, a grocery retailer, in 2010 occupied second place among the largest retailers according to sales revenue (USD 7.7 billion) and first place according to the number of stores and their coverage in Russia. In 2011, sales reached USD 11.4 billion, and EBITDA amounted to USD 934 million. 2010–2012 was a period of acceleration in Magnit chain growth, geographical expansion and complementary business development. Over 1,000 convenience stores, 42 hypermarkets and 208 cosmetics stores were opened in 2011. At the end of April 2012 the Magnit chain comprised more than 5,100 convenience stores, 96 hypermarkets and 266 cosmetics stores in 1,389 locations, with several tens of stores opening every month. Currently its focus has shifted to the strengthening of the Magnit chain position in Ural and Central regions. The company operates 64 branches, 15 of its own distribution centres (in total 358,000 m^2), the largest vehicle fleet (more than 3,900), and employs more than 140,000 people (Magnit 2012).

Two foreign players Auchan and Metro Group compete over third place in Russia's retail market. Over 10 years of operation in the Russian market, Auchan opened almost 100 stores in 14 cities. From 2005, Atak franchise discount supermarkets were developed alongside hypermarkets. In 2008, 12 Ramstores acquired from Enka adopted the Auchan City banner—the smallest format, which offers a product range specially selected for local convenience markets. In 2009, Auchan Russia also created an even more advanced discount format, Radouga, adapted to medium-sized towns. In 2009 Russia became the third country (after France and Hungary), in which Auchan developed the gardening chain Auchan Sad. At the end of 2011, Auchan's retail chain included 33 Auchan hypermarkets, 15 Auchan City hypermarkets, 2 Nasha Radouga hypermarkets, 4 Auchan Sad stores and 51 Atak supermarkets.

Metro Group is the leading cash & carry chain with 58 stores in more than 37 Russian towns. Its other brands are: Real hypermarkets (16 stores), Media Markt (30 consumer electronics stores) and 2 Saturn stores, which opened at the end of 2010 in Voronezh and Moscow.

A rapidly developing food retailer is O'KEY, which in 2010 operated 73 stores in the Northwestern, Southern, Central, Urals and Siberian regions, with a total selling space exceeding 358,000 m^2. 35 of the 73 stores were located in St. Petersburg. The company stores are based on a classic European hypermarket

concept and have two formats: hypermarkets (O'KEY) and supermarkets (O'KEY-Express).

Some significant changes took place in the consumer electronics industry. In 2010 Eldorado surrendered its leadership to M.video, which is the first and only publicly traded company in its sector. At the end of March 2012, M.video ran 267 brand name stores (650,000 m^2) in 118 Russian cities. At the same time, Media Markt took over Technosila, the third-largest player in this segment. The competitive landscape of the DIY (do-it-yourself) market also changed, as Leroy Merlin became the leader, with sales worth USD 1.2 billion in 2010 (Twardzik 2011).

In June 2011, the Dixy Group purchased the Victoria Group, which from 1999 developed the Victoria, Kvartal, Dyoshevo, Cash and Semeinaya Kopilka chains. As of November 2011, the Group operated 1,050 stores (384,011 m^2 of selling space), including 795 DIXY convenience stores, 207 stores under the Kvartal, Deshevo, Semeynaya Kopilka brands, 21 Victoria supermarkets, 18 Megamart (compact hypermarket) stores, 8 Minimart (supermarket) stores and 1 Cash (cash & carry) store. The Company operates in three Federal Districts of Russia: Central, Northwest, Urals, and in the Kaliningrad region. In May 2007 the Company raised USD 360 million on the IPO at the RTS and MICEX.

According to the Deloitte report (2009), Euroset—which specialised in mobile phones and ranked last among the Top 10 largest retailers in 2010—was the fastest developing retailer in the world in the period 2002–2007.

The retail industry in Russia varies significantly among the federal districts both in terms of value and character of development. Being the smallest and the most populated region of Russia, the Central Federal District remains the largest retail market in the country, accounting for one third of the country's sales in 2010. The Far East traditionally had the lowest share of retail sales. Despite regional expansion the presence of multinational brands and retailers is still limited to metropolitan cities such as Moscow and St. Petersburg as well as cities with a population of over half a million people.

According to INFOLine estimates, nationwide retail chains cornered about 30 % of the food retail market, with the highest concentration in two major cities: about 70 % in St. Petersburg and 50 % in Moscow. Half of St. Petersburg's market (with USD 10 billion food retail turnover in 2011) is controlled by the Top 3 hypermarkets chains (X5 Retail, O'KEY and Lenta). The share of leading chains (X5, Auchan and Metro Cash & Carry) in Moscow's food retail market (worth USD 60 billion) is lower and amounts to about 15 %.

The Russian non-food market, which accounted for 52 % of total sales in recent years, is expected to grow faster than food retail. For the time being, foreign investment in specialised chains is still limited, in particular in comparison to other emerging markets such as China or Brazil. Foreign specialised (non-food) chains present in Russia are, for example: German Media Markt (electronics), Stockmann (department stores), Karstadt Quelle (mail order sales) and Douglas (perfumery), Swiss Intersport (sports and leisure equipment), British Marks & Spencer (textile, clothes, accessories) and Body Shop (cosmetics), Spanish Inditex (Zara) (clothes, prêt-à-porter), French Hachette (press) or Yves Rocher (cosmetics).

So far, practically no foreign pharmaceutical chain has entered the Russian market. Also the majority of foreign operators—such as French cosmetics chain Yves Rocher, present in Russia since 1990—still prefer to enter via a local distributor or the franchise network.

Some successful examples are IKEA and Marks & Spencer. Marka Rus Ltd. (Marks & Spencer Russia) is an international holding company fully owned by Marka Mağazacılık (Marks & Spencer Turkey), which acquired the franchising rights of Marks & Spencer in Russia, and started its operations in November 2005. The total number of stores of Marks & Spencer Russia reached 26 in October 2011 with 13 stores in Moscow, 4 stores in St. Petersburg, 2 stores in Rostov and 1 store each in Yekaterinburg, Novosibirsk, Krasnodar, Omsk, Kazan, Nizhny Novgorod and Voronezh. Marks & Spencer Russia provides services to its 7.1 million customers over a net sales area of 27,200 m^2. The total sales turnover of the company reached USD 111.7 million in 2010. In this respect the example of IKEA, but also the take-off of Marks & Spencer's Russian sales offers, can serve as encouragement for other foreign investors (Sanders 2009). Foreign retailers are active mostly in FMCG, clothing and footwear, consumer electronic appliances and DIY retail. Russian chains dominate mobile phone stores and pharmacies.

Russia, which had experienced a decade of remarkable double-digit retail growth, was consistently ranked over the period 2003–2009 in the Top 5 A.T. Kearney Global Retail Development Index (GRDI) as one of the most attractive retail markets in the world. After ranking first place in 2003 and 2004, Russia moved to second place and remained there until 2009 (in 2008 it was ranked third). Compared to other emerging markets, Russia demonstrated the highest cumulative growth rate for consumer spending in 2001–2010 as well as the compound annual growth rate (CAGR). However, in 2010 Russia fell in the A.T. Kearney GRDI ranking to 10th place and in the following 2 years to 26th place. One of the main reasons for the drop in the ranking position is a lack of transparency in government regulations, which resulted in the curtailing of foreign investment (Kearney 2011a). Another reason is that the Russian retail market has become relatively more mature than other developing countries in the ranking. The 2012 GRDI report finds that while Russia may not be an early-opportunity market anymore, it may be entering a phase in which it is compared to established European markets (Kearney 2012).

Further market consolidation, particularly among local medium-sized players, and regional expansion will both be a major factor in the Russian retail market development over the coming years. For foreign companies, entry by M&A, however, has proven difficult as local companies have strong lobbying advantages. Additionally, the new Russian Law "On Trade" prohibits retailers with a market share of over 25 % and annual revenues of over one billion RUB in each Russian city from increasing their market share.

Entering Russia requires understanding and adapting to local operating conditions, including logistics challenges. Queues at borders and ports, poor service quality, infrastructure issues and long distances between large cities can cause delays and they make the supply chain hold a strategically crucial function. Additionally, there can be lengthy lead times and a steep learning curve to build

and open stores in Russia. IKEA, for example, spent years overcoming bureaucratic hurdles before opening stores in Russia. Nevertheless, it is possible to overcome these hurdles and be successful in the market. Multinationals such as Metro Group and Auchan have operated in Russia for years, understanding the rules of the game and continuing to grow through expansion.[6] Companies entering Russia should also pay close attention to business environment analysis and risk-mitigation strategies. Despite these difficulties, the fact that Russia is expected to become Europe's largest consumer market makes it a priority for many retailers (both domestic and foreign) seeking long-term strategies (Kearney 2011b).

One of the successful and still developing companies is the ALIDI Group. During the last 5 years this company has been placed among the leaders in the Russian logistics market and was named "The Best National Logistic Networks Provider of 2011" by EALA's in July 2012. In the next section the 20-year-long ALIDI's development, company strategy and capabilities will be presented. The case study findings indicated that the ability to design effective and efficient supply chain and distribution system was one of the key factors in the company's success.

7 ALIDI's Business Case

The company was founded in 1992 in Nizhny Novgorod (before 1990—Gorkiy), a city 400 km east of Moscow. One year later ALIDI, as the first Russian company, signed a distribution contract with Procter & Gamble. The 1990s was a decade of distribution business development. New branches in St. Petersburg, Vladimir, Ivanovo, Petrozavodsk, Murmansk, Penza, Ulyanovsk, Vologda, Veliky Novgorod, Arkhangelsk, Pskov, Ryazan and Syktyvkar were opened (see Table 4). The cooperation with Nestle, another of the world largest FMCG leaders, began in 2001.

With the launching in 2005 of an own class A warehouse (first 10,000 m^2) in Nizhny Novgorod and the signing of the first logistics contract with M.video in 2006, a new phase of ALIDI development began. Since 2005 ALIDI has provided a whole range of logistics services, including: all types of storage, value-added logistics services (picking and packing operations, labelling, kitting and assembly services, co-manufacturing etc.), consolidation/deconsolidation services, and door-to-door deliveries. In 2007, Wrigley became a customer of its logistics and distribution services. The purchase of the alcohol distribution business from "Baltic Business Group" in 2008 was ALIDI's debut in this new market segment.

At the beginning of 2012, ALIDI operated in 21 regions (see map on Fig. 6) and covered the largest part of Central Russia (2,200,000 km^2) inhabited by 36 million people (comparable with the population of Poland). The Central Federal District remains the largest retail market in the country, accounting for one third of the

[6] One of the difficulties that Auchan experienced when entering Russia was the uncooperative behaviour of Russian suppliers Roberts (2005).

Table 4 20 years of ALIDI's development

1992	• Company founded in Nizhny Novgorod
1993	• The first distribution contract with P&G signed
1994–1999	• Geographical expansion: 13 new regional branches opened
2001	• The distribution contract with Nestle signed
2005	• Logistics services launched in own warehouse (A class, 10,000 m^2) in Nizhny Novgorod
2006	• Acquisition of Souz Quadro (Procter & Gamble distributor in the North-West region) • The first logistics contract with M.video (in Nizhny Novgorod) signed
2007	• New contracts with M.video for logistics services in Ryazan, Arkchangelsk, Vologda, Pskov signed • Logistics services based on warehouse in Nizhny Novgorod and distribution for Wrigley launched
2008	• Alcohol distribution business entry (brands: Cinzano, Jagermeister, Stolichnaja, Grant's) • New distribution centres in regions with ongoing activities launched • Geographical expansion to new markets
2009	• St. Petersburg's logistics market entry • Acquisition of Tandem-Volga (P&G distributor in Kostroma and Yaroslavl) • National distribution center for M.Video (22,000 m^2) in Nizhny Novgorod launched
2010	• Moscow's logistics market entry (with M.video contract) • St.Petersburg's market of food distribution entry • License for storage and sales of alcohol production in Nizhny Novgorod obtained
2011	• Contract with "Russian Alcohol" Group in Nizhny Novgorod signed • Distribution for "Rusagro" in Nizhny Novgorod and St. Petersburg started • Belarus market entry

Source: Based on ALIDI data (2011).

country's total sales in 2010. The ALIDI Group has modern warehouses (totalling 180,000 m^2) in three cities with a population of over one million (Moscow, St. Petersburg, Nizhny Novgorod) and many others (see Table 5). All of them have state-of-the-art equipment and are supported by IT solutions such as Oracle JD Edwards EnterpriseOne and WMS Manhattan. Their Own fleet consists of more than 300 vehicles. The turnover of the ALIDI Group has grown dynamically since 2004 and reached USD 575 million in 2011 (see Fig. 7).

Today, the ALIDI Group is a leading distribution company, in particular the number one distributor of Procter & Gamble in Eastern Europe (among the Top 5 worldwide) and the number one distributor of Nestle as well as Wrigley in Russia. Having operated in Russia since 1991, primarily on a van-selling basis, Procter & Gamble owns three factories in Russia with annual sales in 2010 amounting to approximately USD 2.4 billion. Nestle, with its 13 factories, has a turnover of USD 2.0 billion. ALIDI's customers in distribution are also: Bunge, Bonduelle, Ehrmann, Heinz, Doshirak, Russian Alcohol, Upeco, and others. ALIDI is the number one logistics services provider for M.video in Russia. Other customers in

Fig. 6 ALIDI branches' network. *Source*: ALIDI

the segment of logistics services are Sharp, Nestle, Mars, Wrigley, Vitek, Kwb, Simba, Mart, and Haier.

The company employs 5,600 qualified specialists and 800 sales representatives servicing 40,000 customers, including retail stores and wholesalers. The company also supports distribution contracts with supplementary trade promotion activities carried out by its own personnel (called BTL—below-the-line sales promotion) and offers a full range of import services. In 2011, ALIDI started distribution in the Belarusian market.

During the last 4 years, ALIDI was named several times among the leaders of Russian logistics market in different ranking lists. ALIDI Group twice became a winner of the EALA's award "The Best Logistics Provider of Russia" in the category "The Best Warehousing Service Provider in Supply Chain" (2009, 2010) and was named "The Best National Logistic Networks Provider" in 2012. After almost 20 years of continuous development, in October 2011 Forbes listed ALIDI among the 200 biggest private companies in Russia. ALIDI was ranked 138th as the newcomer in the logistics category. In 2011, Peter Demchenkov, the head of the ALIDI Group, became the winner of "Ernst & Young Entrepreneur Of The Year

Table 5 ALIDI branches

The branch	Year	Warehouse area, m^2 (at the beginning of 2012)	Distribution customers
Nizhny Novgorod	1992	32,787 (class A)	P&G, Wrigley, Nestle, Nestle Purina, food and non-food distribution
St. Petersburg	1994	13,000 and 7,000	P&G, Wrigley, Mars, food distribution
Vladimir	1995	2,540	P&G, Nestle
Ivanovo	1996	3,150	P&G, Nestle
Petrozavodsk	1997	422	P&G
Murmansk	1998	2,880	P&G, food distribution
Penza	1998	3,417 (planned: 10,000)	P&G, Nestle, Nestle Purina, Nestle Professional
Ulyanovsk	1998	2,500	P&G
Vologda	1999	3,256	P&G, Wrigley, Nestle, food distribution
Veliky Novgorod	1999	–	P&G
Arkhangelsk	1999	2,275	P&G
Pskov	1999	2,965	P&G, food distribution
Ryazan	1999	5,000	P&G, Nestle, Nestle Purina
Syktyvkar	1999	2,363	P&G, Nestle
Saransk	2001	2,300 (planned: 10,000)	P&G, Nestle, Wrigley
Yaroslavl	2003	3,000 (planned: 10,000)	P&G, Nestle
Kaliningrad	2007	2,314	P&G, Nestle, alcohol distribution
Ukhta	2007	288	Nestle
Kostroma	2008	1,516	P&G, Nestle
Tcherepovets	2008	566	P&G, Nestle, Wrigley
Moscow	2010	$2 \times 40{,}000$ (class A)	–
Minsk	2011	5,000 (class A)	P&G

Source: Based on ALIDI's data (2011)

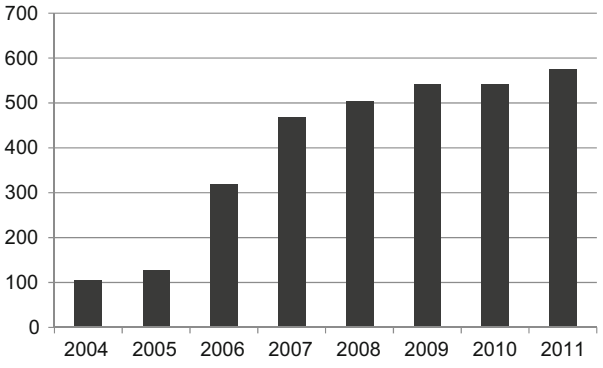

Fig. 7 Sales turnover of ALIDI Group in 2004–2011 (million USD). *Source*: ALIDI

2011" in Russia and won the award in the "Transport and Logistics" category. In 2009 and 2010 "Delovoy Petersburg" ranked him among the best top managers in the St. Petersburg and Leningrad region.

ALIDI's strategy includes organic growth as well as mergers and acquisitions. The logistics services were launched as a follow-up to the distribution services. The company entered new regional markets upon a distribution contract (mainly P&G and Nestle), which envisaged the opening of a branch office and the renting of warehouse space. Local presence and experience together with advantageous market conditions usually lead to further expansion through winning new logistics customers in this regional market.

8 Conclusions

Russia is a large and attractive market. It is however characterised by many significant regional differences. The business environment here still differs from that of EU markets in many ways and faces specific challenges as to distribution strategies and supply chain design (Vanderhasselt and Van Esser 2009). As formal institutions are weak, Russian companies often rely upon a network-based strategy of growth, based on personal trust and informal agreements among managers. Russia's WTO accession on 22 August 2012 should help to change the country's reputation as a risky investment destination.

The Russian retail market, which demonstrated a very dynamic growth for more than 10 years, remains highly fragmented and dominated by traditional channels. Designing FMCG supply chains in Russia in the last decade was a mixture of novel elements combined with old hierarchical arrangements of previous relationships and existing organizations. This process became more complex given the large amount of suppliers, the expansion into the regions and mergers and acquisitions (Jahns et al. 2006). Huge territory, corruption, lack of transparency in government regulations, poor condition of transport infrastructure, shortage of warehouse facilities (class A and B) and inadequate professional logistics culture are the main barriers to the supply chain design process in Russia. The transport system is heavily Moscow-centred and rail-based in long-distance countrywide freight transport. Different transport modes as well as distribution strategies should be chosen for different regions.

The logistics market in Russia, not unlike that in other emerging countries, remains immature. Despite numerous limitations (political, social, economic, environmental), many of the best practices and solutions applied in supply chains in the EU countries can be used in the Russian market. The presented case study is an illustrative example for designing effective distribution strategies of FMCG supply chains in Russia. It is the result of 20 years of continuous development from the local distributor in Nizhny Novgorod to the fast developing Russia-based logistics provider. Connecting two core competencies (distribution and logistics services) also proved advantageous in times of economic downturn. However, ALIDI's

business case is only one of the possible models for designing supply chains in Russia.

Acknowledgments The author would like to thank Mikhail Miller, Logistic Services Sales Director in the ALIDI Group, for help with data collection and constructive discussions.

Questions for Review and Discussion

1. Which factors should be considered when designing a supply chain in Russia?
2. Which global retail chains are among the leaders in the Russian market?
3. What are the specific features of the Russian transport market?
4. At what stage of development is the logistics outsourcing in Russia in comparison to developed countries?
5. What are the risks involved in designing supply chains in Russia?
6. Which capabilities were critical to ALIDI's success?
7. Can ALIDI's business model be applied in another Big Emerging Market?
8. Is ALIDI's business model similar to the solutions used by logistics providers in developed countries? Give some examples.

References

ALIDI. (2011). Retrieved August 12, 2012, from http://www.alidi.ru

Belaya, V., & Hanf, J. H. (2011, September 28–30). Power and supply chain management – Insights from Russia. In *51st Annual Conference of German Association of Agricultural Economists (GEWISOLA)*, Halle. Retrieved December 21, 2012, from the AgEcon search Website: http://ageconsearch.umn.edu/bitstream/114483/2/belaya_hanf.pdf

Blazhenov, J. K. (2011). *Roznichnaya torgovlya v Rossii* (pp. 90–91). Moscow: INFRA-M.

Colliers International. (2012). *Annual Real Estate Review. Russia. Industrial market*. Research & Forecast Report, Moscow. Retrieved April 12, 2012, from http://www.colliers.com/~/media/Files/EMEA/emea/research/market-overview/2012-russia-real-estate-review.ashx

EALA. (2011). Retrieved August 9, 2012, from http://www.eala.ru

Elin, V. (2011). Kuda stremitsya logisticheskij autsorsing v Rosii. *Loginfo, 1–2*, 15–16.

Eskindarov, M. A., & Sil'vestrov, S. N. (2012). Rossijskaya ekonomika v 2010–2012 godah: tendencii, analiz, prognoz. Finansovyj universitet pri pravitel'stve Rossijskoj Federacii, SONAR, Moscow.

Euromonitor International. (2011, May). *Retailing in Russia*.

Freedom House. (2012). *Freedom in the world 2012: The Arab uprisings and their global repercussions*. Retrieved August 15, 2012, from http://www.freedomhouse.org/report/freedom-world/freedom-world-2012

GAIN. (2010). *Russian Federation. Retail foods. Russian retail food sector nears rebound*. GAIN Report RSATO1003: 18. Retrieved April 1, 2012, from http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Retail%20Foods_Moscow%20ATO_Russian%20Federation_8-30-2010.pdf

Germain, R., & Günter, A. (2012). *Contract logistics and outsourcing in Russia*. Report, Deutsche Bahn and Russian Railways Center for International Logistics and Supply Chain Management,

Saint-Petersburg, Graduate School of Management of Saint-Petersburg University. Retrieved December 21, 2012, from the DB Schenker Website: http://www.dbschenker.com/file/2847104/data/cl_in_russia.pdf

Gladkij, J. N., & Chistobaev, A. I. (1998). *Osnovy regionalnoj politiki* (pp. 198–225). Sankt Petersburg: Izdatelstvo Mihajlova V.A.

Hanf, J. H., Dautzenberg, K., & Pall, Z. (2009, August 16–22). *Making business with giants – Impact of retail internationalization in Central and Eastern Europe*. Contributed Paper prepared for presentation at the International Association of Agricultural Economists' 2009 Conference, Beijing, China. Retrieved December 21, 2012, from the AgEcon search Website: http://ageconsearch.umn.edu/bitstream/50074/IAAE20333HanfDautzenbergPall.pdf

INFOLine. (2011). *INFOLine&Retailer Russia Top-100*. Retrieved August 8, 2012, from http://infoline.spb.ru

Jahns, Ch., Darkow, I., & Weigl, T. (2006). *Dynamic supply chains in Russia: Industries, strategies, and logistics structures*. Hamburg: Deutscher Verkehrs-Verlag

Kearney, A. T. (2011a). *A 10-year retrospective. The Global Retail Development Index™: Lessons learned from a decade of retail expansion: 3*. Retrieved April 1, 2012, from http://www.atkearney.com/documents/10192/3c6eb3b2-dfe6-4cd0-9d7b-8ce37e9482fe

Kearney, A. T. (2011b). *Retail global expansion: A portfolio of opportunities. The 2011 A.T. Kearney Global Retail Development Index™: 17*. Retrieved April 1, 2012 from http://www.atkearney.com/documents/10192/3903b4b7-265c-484e-932c-50169e5aa2f3

Kearney, A. T. (2012). *Global retail expansion: Keeps on moving. 2012 Global Retail Development Index™: 16*. Retrieved August 15, 2012 from http://www.atkearney.com/documents/10192/4799f4e6-b20b-4605-9aa8-3ef451098f8a

Knight Frank. (2004). *The warehouse premises classification*. Retrieved December 21, 2012, from the Mobius Website: http://www.knightfrank.ru/on-line/files/+content/522F3AA6-FA40-4C0C-8451-EF6737862780/warehouses_classification_eng.pdf

Koshkin, P. (2012, April 6). *Russia reaches top 50 in Bloomberg ranking*. Retrieved April 12, 2012, from http://rbth.ru/articles/2012/04/06/russia_reaches_top_50_in_bloomberg_best_countries_for_business_ranki_15264.html

Kuczma, E. (2011, October 19). *The rise of Russian retail sales*. Retrieved April 1, 2012, from http://www.modernrussia.com/content/rise-russian-retail-sales

Kuzyk, B. N. (2006). *Rosiya i mir v XXI veke* (p. 118). Moscow: Institut ekonomicheskih strategij.

Lorentz, H., Hakkinen, L., & Hilmola, O. (2006). Analysis of the Russian retail sector: Prospects for cross-border M&A activity. *Baltic Journal of Management, 1*(2), 148–168.

Lorentz, H., & Hilmola, O. (2008). Supply chain management in emerging market economies: A review of the literature and analysis of the Russian grocery retail sector. *International Journal of Integrated Supply Management, 4*(2), 201–229.

Lorentz, H., & Lounela, J. (2011). Retailer supply chain capability assessment in Russia. *International Journal of Retail & Distribution Management, 39*(9), 682–701.

Lorentz, H., Wong, C. Y., & Hilmola, O. (2007). Emerging distribution systems in Central and Eastern Europe: Implications from two case studies. *International Journal of Physical Distribution & Logistics Management, 37*(8), 670–697.

Magnit. (2012, February 6). *Magnit press release. Krasnodar*. Retrieved April 1, 2012, from http://magnit-info.ru/upload/iblock/b07/b073805a174bb4dcca29bf88ac962619.pdf

Miller, T., Holmes, K. R., & Feulner, E. J. (2012). Index of economic freedom. Promoting economic opportunity and prosperity. *The Heritage Foundation, The Wall Street Journal*. Retrieved April 1, 2012, from http://www.heritage.org/index/pdf/2012/countries/russia.pdf

Monin, A. (2007). *Ritejl v Rossii. Osobennosti nacionalnoj roznicy* (pp. 19–25). Sankt Petersburg: Nevskij prospekt, Vektor.

PwC. (2012). *Doing business and investing in the Russian Federation 2012*. Retrieved August 15, 2012, from http://www.pwc.ru/en_RU/ru/doing-business-in-russia/assets/pwc-doing-business-and-investing-2012.pdf

Roberts, G. H. (2005). Auchan's entry into Russia: Prospects and research implications. *International Journal of Retail & Distribution Management, 33*(1), 49–68.

Rosstat. (2011). *Federal state statistics service*. Retrieved April 12, 2012, from http://www.gks.ru

Sanders, P. W. (2009). Foreign retail groups in Russia – The limits of development. In: Modernizaciya ekonomiki I globalizaciya, otv. red. E. G. Yasin, Kniga 3. Izd. dom GU VSE, Moscow: 25.

Schwab, K. (2012). *The Global Competitiveness Report 2012–2013*. Geneva: The World Economic Forum. Retrieved September 5, 2012, from http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2012-13.pdf

Sologubov, A. (2011). vybor logisticheskoj modeli dlya setevogo ritejla. *Loginfo, 3*, 56–64.

Storage vocabulary. Retrieved December 21, 2012, from the Mobius Website: http://www.mobius-sklad.ru/en/faq/storage-vocabulary/warehouse-classification-a-b-c-d/

The International Bank for Reconstruction and Development/The World Bank. (2012a). *Doing business 2012: Doing business in a more transparent world*. Economy Profile: Russian Federation. Retrieved April 12, 2012, from http://www.doingbusiness.org/~/media/fpdkm/doing%20business/documents/profiles/country/RUS.pdf

The International Bank for Reconstruction and Development/The World Bank. (2012b). *Connecting to compete 2012. Trade logistics in the global economy. The logistics performance index and its indicators*. Washington, DC: The World Bank. Retrieved August 15, 2012, from http://siteresources.worldbank.org/TRADE/Resources/239070-1336654966193/LPI_2012_final.pdf

Twardzik, K. (2011). *Russian retail market expected to exceed $800bn in 2013*. PMR, December: 3. Retrieved April 1, 2012, from http://www.russiaretail.com/wp_1003/Russian-retail-market-expected-to-grow-by-2013-December-2011.shtml

Vanderhasselt, E., & Van Esser, A. (2009). *Supply chain challenges in Russia*. MA thesis, Universiteit Gent, Faculteit Economie En Bedrijfskunde, Academiejaar 2008–2009: 57. Retrieved August 12, 2012, from http://lib.ugent.be/fulltxt/RUG01/001/392/238/RUG01-001392238_2010_0001_AC.pdf

X5 Retail Group. (2012, April 11). *X5 Retail Group Reports Q1 2012 trading results*. Amsterdam. Retrieved April 12, 2012, from http://www.x5.ru/common/img/uploaded/files/2012.05.17-X5_Q1_2012_PR_ENG.pdf

Maintaining Logistics Quality in Supply Chains to Developing Countries: The Case of Automotive Parts Supplies to Egypt

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Abstract Practitioners and academic researchers are following the pattern for tailoring an international supply chain depending on the different process partners and their capabilities along this chain. However, globalization forces the logistics chain to be precise and efficient anywhere and at any time. Hence the question arises as to whether a regional logistics approach is supporting a time- and cost-efficient supply. With the example of the international supply of automotive parts from Germany to Egypt, the different process partners are explained with a special view on the customs clearance process in Egypt. With the help of a six sigma project the cycle time was analyzed and finally improved. The necessary adaptations and the reasons for the supply chain parameters between high and low developed countries are explained, but still the question remains to what extent such parameter changes are acceptable and whether the strategic target should still be as efficient in at least some areas of Egypt as in Germany. Research should address this in order to develop such pockets of logistics efficiency and streamline all processes.

1 Introduction

Managing the supply of automotive parts across the world is not a recent phenomenon: More than 100 years ago the Henry Ford Motor Company created the first supply chains to distribute vehicles like the Model T within North America and also to certain developing countries like South Africa, India or Malaya (Wilkins and Hill 1964). Engineers designed crates and boxes to carry knocked down (KD) cars and the related parts to their different destinations. The transportation mode was mainly by rail/truck within the United States of America and Canada as well as by ship to other international destinations. Branches or selected workshops received the KD cars and were in charge to finalize the assembly and make the car ready to operate.

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W. Piotrowicz, R. Cuthbertson (eds.), *Supply Chain Design and Management for Emerging Markets*, DOI 10.1007/978-3-319-05765-1_8

By analyzing the entire international supply chain with regard to quality matters it has become apparent that in those days the customer claims were quite similar to nowadays: rusted or—if painted—scratched body parts, missing and wrong deliveries are examples for the past (n.a. 1913) and today. It looks like some challenges such as maintaining the logistics quality along the supply chain have remained in a steady state for a century. Hence the question arises as to how the quality of a logistics pipeline can reach zero defect with a particular focus for supply chains from a high industrialized region to a less developed one.

The following chapter presents the socio-economic situation and automotive industry in Egypt along with a literature review about supply chain quality. The case study of the Mercedes-Benz kit supply to Egypt provides the background for a discussion about supply chain adaptations to developing countries. Finally the conclusion indicates further research areas for the most significant results of the case study.

2 The Developing Country: Social-Economical Background in Egypt

During the Arab Spring in 2010/2011 Egypt was one of the first countries to topple its president. It was mainly the youth protesting against the arbitrary police control but this protest developed via the Internet within days to a massive demonstration against the political system—symbolized by President Mubarak. However, in its roots the protest was bringing to the surface the frustration in the young generation about their rather bleak perspectives regarding employment and an adequate salary (CIA 2012): By having a population of app. 85 million (July 2011, estimated) in Egypt and a median age of 24 years it becomes apparent that the major root cause of the early revolution days is justified: The unemployment rate is app. 25 % in total within the age range 15–24 with 17 % male and 48 % female as of July 2011. Looking at the economic situation, about 50 % of the population is working in the service sector, roughly 20 % in industry and 30 % in the agricultural sector and many of these employees live on less than 1 €/day.

Picking up work is concentrated along the river Nile and the Nile delta as well as some areas with natural resources like petroleum, natural gas, manganese, iron ore, lead or rare earth elements and the related industrial centers in Greater Cairo, Helwan, Alexandria and 6th of October City. Also, certain spots along the Mediterranean coastline and the Red Sea are preferred places to find work in the tourism sector. Hence there are industrial, agricultural and touristic places existing which have embedded logistical corridors to connect all the different places and ensure the in- and outbound goods flow as shown in Fig. 1.

In this spatial economy the population is compressed into large cities; mainly, Greater Cairo (app. 15 million inhabitants) and Alexandria (app. 5 million inhabitants) and about 80 % of the whole Egyptian population live in the Nile delta.

Fig. 1 Logistical corridors in Egypt

Consequently the transportation system for goods and inhabitants is very intense in these spots/areas. Despite the large investments in road infrastructure the high population growth of app. 1.9 % each year increasingly overloads the transport nodes and challenges efficient ways of transportation. With a sharp decline in Gross Domestic Product (GDP), falling from an average 5 % growth (2002–2010) to 1.8 % in 2011, the current financing of further infrastructure projects is limited since, also, many foreign currencies are used to subsidize large imports of wheat and petrol as well as pharmaceuticals and products of iron and steel. The partly high growth rates of up to 6 % and more until 2010 were triggered by the Euro-Mediterranean Agreement on 1st June 2004 between the European member States and the Arab Republic of Egypt. The Egyptian Government is taking a step towards stabilizing this growth by having a special trade relation with the European Union (European Council 2004). Within this context all import and export barriers are expected to dwindle until 2016 and in some instances until 2019 resulting in a free flow of goods/services as also targeted by the World Trade Organization (WTO).

In spite of all these revolutionary turbulences starting on 25th January 2011 Egypt is still a very attractive place with a large domestic market compared to other countries in the region. Also the tight links to the USA or Europe (e.g. Germany) are contributing to a favorable view on Egypt. In the next section a closer look is taken at one of those industries in favor: the automotive sector.

3 Automotive Business in Egypt

Following the pattern that the automotive industry is a key sector for industrialization on a worldwide scale (Kaplinsky 2005), many nations like, for example, South Africa, Tunisia, India, Malaysia and Korea are seeking their benefit in establishing motor industry development programs or other initiatives to stimulate national development of an automotive industry either in the manufacturing of cars or in the supply of components to the Original Equipment Manufacturers (OEM). In this way, also, Egypt has enforced the Industrial Development Agency (IDA) to provide incentives for the local (vehicle) industry resulting in a sheltered framework to develop selected industrial sectors into a competitive position in the Egyptian market and beyond.

These IDA measures are assisted by tariff (e.g. customs duties) or non-tariff (e.g. quotas or local content requirements) means to temporarily protect the Egyptian industry. In terms of the vehicle industry the customs duties are shown in Fig. 2 for European and Rest of World (RoW) imported KD car kits and completely built up units (CBU) cars. Based on the Euro-Mediterranean Agreement 2004, and enforced 2009, the import duties of Egypt are gradually reduced in accordance with an individual scheme depending on the product category. In the case of the automotive sector the reduction started in 2010, each year subtracting 13.5 % of the original value of 135 % (in 2009), as given in Table 1. Hence the vehicle industry has a 10-year period, until 2019, to become independent from this kind of protection. Despite this lifting of the tariff barrier the request for local content (LC) still remains at 45 %. In order to be regarded as part of this percentage, the following is required: either a local added value from supplier parts (e.g. wiring harnesses or seat assembly) or OEM processes (e.g. subassemblies like dashboard or axles and the manufacturing processes themselves), to be carried out within the Egyptian border accumulating to a total of 45 %.

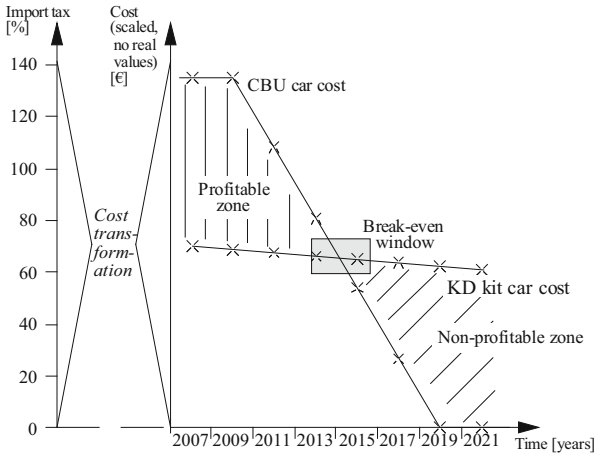

Fig. 2 Break-even window of European CBU car vs. KD kit car imports to Egypt

Table 1 Knocked down (KD) cars versus completely built up units (CBU) cars customs duties in Egypt

Year	CBU_{RoW} customs	CBU_{Europe} customs	KD customs	LC requirement
2007	135.0%	135.0%	10%	45%
2008	135.0%	135.0%		
2009	135.0%	135.0%		
2010	135.0%	121.5%		
2011	135.0%	108.0%		
2012	135.0%	94.5%		
2013	135.0%	81.0%		
2014	135.0%	67.5%		
2015	135.0%	54.0%		
2016	135.0%	40.5%		
2017	135.0%	27.0%		
2018	135.0%	13.5%		
2019	135.0%	0.0%		

LC local content

Expressed in cost terms the turning point for becoming a non-profitable local plant is even earlier than 2019: $Cost_{KD} - Cost_{CBU} = Import\ duty\ difference_{CBU/KD}$. If the paid import duty is more than the relevant cost difference between a CBU car and a KD kit car it is still beneficial to run a local KD-delivered manufacturing plant. The equation above indicates the break-even point as shown in Fig. 2 by having the following assumptions: (I) All calculations are only valid if the local content requirement of 45 % is met. Otherwise the company pays the CBU import duty even when car kits are imported. (II) Both CBU and KD (kit) cars are produced in plants with an annual cost saving due to continuous improvement measures. (III) Any price adjustment equally affects the CBU vehicles and KD kit cars and therefore is not taken into consideration in calculating the break-even point.

However, the break-even point is not a specific time point but a "window" to make the strategic decision to stay in the KD supply form or to opt out. When exactly to exit the KD manufacturing and substitute it by CBU imports depends on the contract conditions of the foreign company with its local counterpart (e.g. joint venture partner) and strategic-operational management decisions. Nevertheless, even though this scenario could be the final curtain for European car manufacturing in Egypt, the automotive industry in total is only affected in a very small scale. Large OEMs like Hyundai (Korea), General Motors (USA), Chery (China), Chrysler (USA) and Toyota (Japan) are contributing to local KD manufacturing with high production numbers of approx. 117,000 units in total in 2010 (AMIC 2011). However, BMW and Mercedes-Benz are still producing KD-based local vehicles. A supply chain management has been introduced to harmonize all related physical and information flows in order to get the kits to Egypt.

4 Automotive Supply Chain Quality

Supply chain management on an international scale has become extremely complex: Traditionally the logistical supply pattern is to deliver goods/services on time, in the right quantity, of the right quality and to the right place (Pfohl 2010) with a continuous information/material flow (Kuhn 1998). Due to an increased focus on lean manufacturing (Ohno 1988) the main area of logistics has been shifting to include value-adding activities like the sequencing of parts in creating kits for leaner processing of these delivered items downstream of the supply chain. By having this more complex coordination between physical and information logistics as well as the target of achieving a continuous goods flow (Crandall et al. 2010), the supply chain needs a professional orchestration (Christopher 2011) of all the networked process partners. Hence the different acting partners within one logistics chain from the delivering source to the receiving customer need a leading Logistics Service Provider (LSP) to fulfill such a "conductor" (=management) task. This orchestrated approach is particularly requested in an international supply chain that has many involved service providers and governmental institutions (e.g. customs). To avoid bullwhip effects and transport mode frictions along such a chain even a Fourth Party Logistics provider (4PL) is necessary: In contrast to the lead LSP the 4PL is managing the supply chain without any of its own resources whereas the LSP still has its own facilities and staff. Nevertheless recent market research gives evidence (Thonemann et al. 2003) that only a few 4PLs or lead LSPs do exist. Therefore many complex supply chains such as those in the global automotive industry are still managed by the OEM itself.

Looking at the automotive supply pipeline as a value-adding chain the essential targets of all logistical service processes are directed to supporting the value stream to manufacture vehicles with a minimum of waste (Ohno 1988). To ensure such an efficient production the movements of all workers, material and products are reduced to a minimum by continuous improvement measures (Imai 1986). However, in terms of logistics the valuable processes are related to movement and transportation (Pfohl 2010): in terms of transporting (movement on a large scale) a product is carried from one location A to another one B; in terms of movement (transportation on a small scale) the logistics added value is concentrated in one location (e.g. warehouse) but within this location the goods are cross-docked, packaged, commissioned or sequenced. The storage function is not related to value-adding except in some specific cases: the store will develop into a buffer area only with a minimum of waiting time until the material gets transferred to the next destination.

Hence transportation to a small or large scale extent has to be reduced to a minimum and the delivered material is ready for immediate use at a lean, but still with some embedded slack (Wefald et al. 2010), production line. Ensuring this logistical value furthermore requires either intra-organizational or firm centric supply chain quality management (Robinson and Malhotra 2005; Foster 2008). Looking into the firm the quality aspect is mainly linked to the product or its manufacturing process (Garvin 1988). A defect-free production (Garvin 1988) is

a condition sine qua non for realizing any Just-in-Time or Just-in-Sequence supply. Manufacturing initiatives like zero defect or Six Sigma are propelling this effort to make "lean-slack" logistics happen. An active supplier management is supporting these firm-centric optimizations with the OEM quality concept to be transferred upstream to all related parts suppliers (Robinson and Malhotra 2005; Foster 2008; Sila et al. 2006). When having such supply chain quality across several companies, top management commitment, supplier relationship management and customer focus need to be common practice in order to build up long-term supply chain quality (Talib et al. 2011). Shifting to intra-organizational supply chain quality (Sila et al. 2006), the focus is on the logistical process, itself consisting of five main process archetypes (Pfohl 2010):

1. Transportation
2. Storage
3. Cross-docking
4. Sequencing
5. Commissioning (kit creation)

Based on these generic processes the quality is measured either on product or performance (=service) level. With product quality there are four fault clusters which evaluate the delivery pipeline:

1. Wrong deliveries
2. Excess or shortage supplies
3. Damaged items
4. Functional defective parts

Focusing on logistical supply chain quality, only the first three fault clusters are relevant, the fourth one is linked to product (parts) quality.These main quality aspects are supported by the punctuality of the delivery and the service availability on demand. Whenever the supplies are made within a defined time frame (e.g. a 2-h time slot from 8 a.m. to 10 a.m.) the deliveries are accepted as being on-time. JIT and JIS are two methods representing this time-based supply control. With service availability the logistics pipeline is reacting to any kind of goods/service demand within the shortest time. Such short delivery cycles are commonly realized with stock on hand and/or a very agile manufacturing and logistics process (Christopher 2011). Service level is one of the most common quality measures for evaluating the supply chain performance. Other factors for determining the overall quality level are the appearance and responsiveness of the staff along the pipeline (Toepfer 1999). Professional communication and immediate response to any customer questions or order modifications (e.g. a new destination for a delivery) enable the supply chain quality to leave a more positive impression with the customer.

The next paragraph illustrates a particular supply chain to Egypt, with a brief overview of the research method used in the beginning.

5 Research Design and Methodology

Based on the research onion (Saunders et al. 2012) the main research strategy is quantitative. Looking at a total of 200 data sets of various CKD shipments from Germany to Egypt, the time differences were calculated and statistically presented. Embedded in a Six Sigma approach the research followed an already given theory about the implemented quality tools as for example the histogram, Gauss distribution curve or capability index c_{pK}. It is therefore a deductive approach to gain further experience about the use of quality tools within supply chain management. The project was conducted during 1 year representing snapshots of the customs processing time for very different imported vehicle parts (e.g. hazardous goods like airbags, theft relevant parts like the car keys, metal parts like an engine hood or "normal" parts like nuts and bolts). Hence the research is cross-sectional regarding the time horizon.

The collected data represents the import of vehicle parts in particular. For such an import there are certain regulations effective in Egypt. Therefore the data set serves as an example for the automotive industry but other industries like chemicals, food or pharmaceutical may have different customs times. The data collection was carried out during normal operating hours and without any political instability. Once any instability occurs it may change the customs cycle time. The research was also designed to express the "normal" working conditions ("business as usual") and does not include extraordinary measures affecting the customs processing time.

6 The Kit Supply Chain from Germany to Egypt

In this section the supply chain of Mercedes-Benz passenger car kits is explained with original data. This particular chain represents the industrial standard since the majority of process steps are very similar between several OEMs as a benchmark study has revealed.

The supply chain management for Mercedes-Benz passenger cars is carried out by an internal logistics provider (4PL). The orchestrated process chain for an international supply of car kits is given in nine steps—explained by the example of the Egyptian plant location of Mercedes-Benz passenger cars, the Egyptian German Automotive Co. Ltd. (EGA). These steps follow a standard pattern which exists for all other KD locations as well (India, Indonesia, Malaysia, Thailand and Vietnam), with the main processes written in italics as in Fig. 3.

1. *Determination of model mix* (model: C- or E-class, engine size: e.g. 2.0l or 2.5l total displacement, transmission: manual or automatic and the volume: amount of cars) by the local sales unit in cooperation with the KD-supplied manufacturing unit. Furthermore a *capacity check* is involved across all Mercedes-Benz plants and related suppliers to ensure that the car orders can be built and

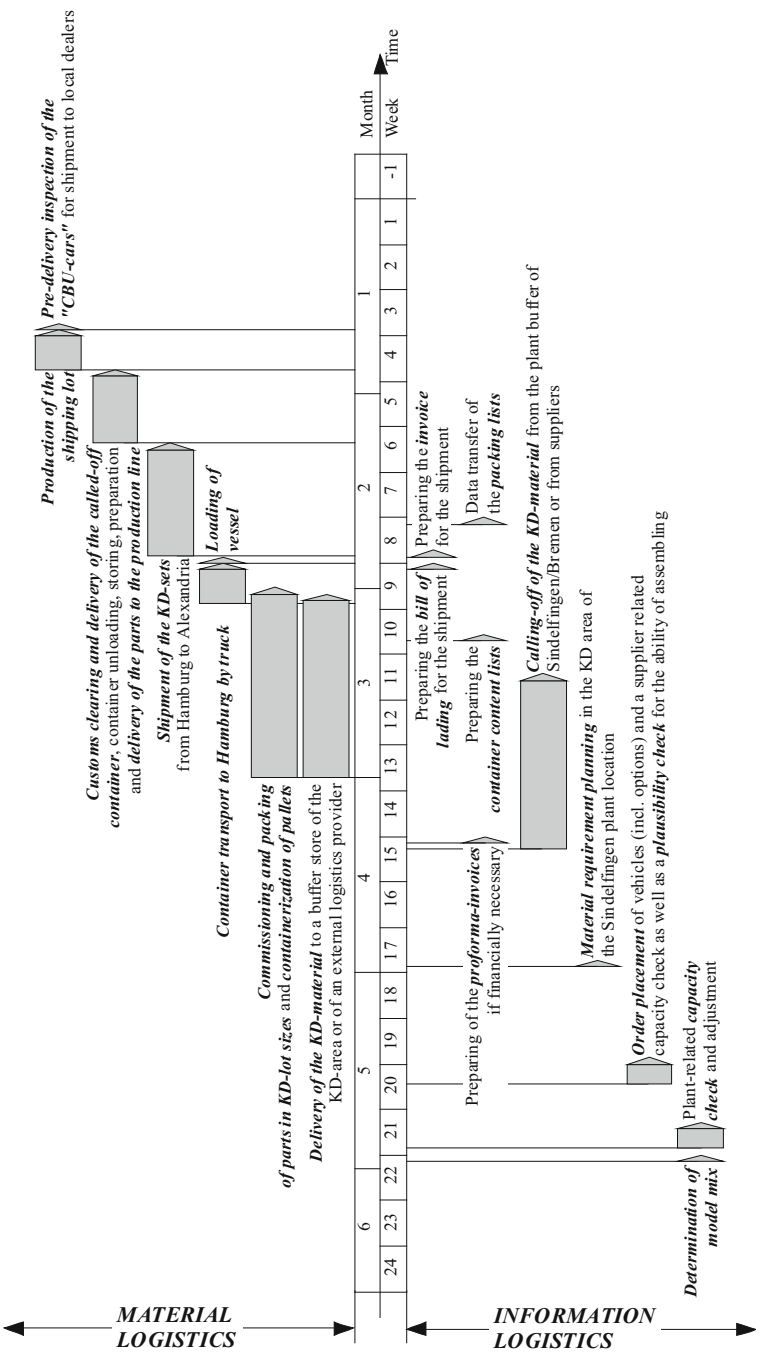

Fig. 3 Cycle time for international KD logistics in the automotive sector (Mercedes-Benz cars)

bottlenecks are avoided (e.g. in the engine production plant or in the parts delivery).
2. *Order placement* (including options) into the central order system of the Daimler sales organization and *plausibility check* as to whether the requested car can be assembled with all ordered features.
3. *Material requirement planning* (MRP I) in the KD area of the Sindelfingen plant location.
4. *Calling off of the KD-material from internal sources* (e.g. press parts) *and from suppliers* as well as *delivery of the parts to the buffer store* of the KD packing area.
5. Preparing of *packing lists*, labels for the boxes and EGA-related *commissioning and packing of parts in KD lot sizes* of six or multiples of it carried out by a KD-centre itself or an external logistics provider (=3PL) like the Bremer Lagerhaus Gesellschaft (BLG). Buffering of the pallets in the outbound KD-logistics area and *containerization of pallets*.
6. *Container transport to Bremerhaven* to the container storage of the Karl Gross shipping company *by truck*. Furthermore, *pro forma invoices*, the *bill of lading* and *container content lists* are prepared. After each shipment the *invoice* is also generated for customs purposes.
7. Container *loading of vessel* and *shipment of the KD-sets* to Egypt by the shipping line Karl Gross.
8. Arrival in the port of Alexandria, *customs clearing and delivery of the called-off container* to EGA. Inspection of the container content according to quantity (number of boxes) and quality (no visual damaged boxes). Storing of the different parts in the warehouse of EGA.
9. *Production of the shipping lot* and during that process *delivery of the requested parts to the production line*. Final inspection of the vehicle and *pre-delivery inspection of the* built up kit cars: *"CBU cars"* for shipment to the local dealers.

For evaluating this international automotive kit supply two key performance indicators (KPI) are monitored: In terms of quality the non-conformance cost per supplied car kit indicates the completeness of the kit lot size of six or multiples of it. Dating back to Henry Ford the lot size of six was introduced to their KD supply within the USA to optimize the freight volume (n.a. 1912; Boggess 2002). Until now it is a non-codified standard to send KD kits in a "six-pack". Being strictly counted each missing, wrong, damaged or not functioning part automatically generates a subsequent delivery.

These re-sent parts cause the following costs: (a) the part itself, (b) the packaging for only this item, (c) the freight, (d) the extra administration effort, (e) the additional customs duties abroad and (f) the special handling to move the part to the vehicle kit or to the semi-finished vehicle body to be assembled. All these activities with their related non-conformance cost as above are accumulated and divided by the number of kits.

$$\text{Non} - \text{conformance cost per kit} = \frac{\sum_{i=1}^{n} \frac{\text{cost of non} - \text{conformance}}{\text{kit i}}}{\sum_{i=1}^{n} \frac{\text{amount of supplied parts}}{\text{kit i}}}$$

with i being the number of supplied kits.

Based on the year 2005 (100 %) these KPI values are shown in Fig. 9 for the KD supplied plant in Egypt.

The second KPI is related to lead time. The great advantage of time-related key performance indicators is the worldwide uniform measuring and the worldwide acceptance of time as a metric (Kuhn 1998). Compared to cost and quality this global understanding makes time unique; cost is a matter of allocation and calculation methods as well as differentiation between long- and short-term perspectives. Quality depends on the consumer's perception of various quality facets like performance, durability, aesthetics or features. Hence both cost and quality are objects of interpretation whereas time is assigned an absolute character.

In the case of the kit supply to Egypt the value-adding time of a total of 26 process points (see Fig. 4) represents the whole chain whereas only one point is related to the production process itself. Hence the overall performance is very low with respect to the

$$\text{production value adding} = \frac{0.04 \text{ days } (= 20 \text{ minutes})}{70 \text{ days}}$$

resulting in approximately 99.99 % non-value adding production time. Referring to logistics as a function to deliver the right material in the right quantity, at the right time and of the right quality with a continuous material/information flow, the logistics added value shifts the viewpoint away from production; it is the continuous flow within the logistics pipeline characterizing valuable logistics (Pfohl 2010). Therefore the calculation as above is given a new direction with the

$$\text{logistics value adding} = \frac{21 \text{ days}}{70 \text{ days}}$$

resulting in 70 % non-value adding logistics time.

The common goal of international supply chains is to achieve a smooth and continuous flow. Empirical analysis in the Egyptian automotive sector verified that certain points along the logistical pipeline carry more risk of stopping this flow than others. The top three points for such a risk are

1. customs inbound,
2. material delivery for kit preparation and
3. inbound transport to the production plant.

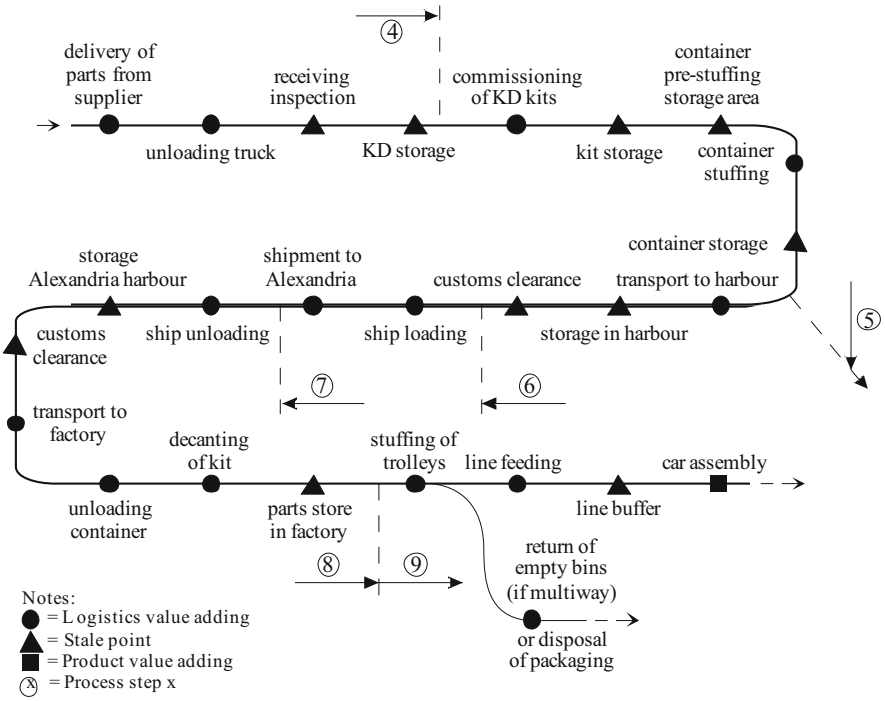

Fig. 4 Value stream in international supply chains

The actual situation for the customs process in Egypt is given in Fig. 5. The data analysis was based on a ½-year compilation of actual customs processing times and represented by a total of 100 cases. The data set was analysed with respect to its values forming a normal distribution curve under a hypothesis test: with a *p*-value of 0.017 the set fulfilled this test.

The customs process itself is defined from the point of arrival of the material at the port until its final release. The customs process needs some preparation by the importer before the official approach can be made to the customs body. These preparations are not calculated into the customs processing time.

The distribution of the customs cycle time (Fig. 5) gives evidence that a solid prediction for the processing time is not possible.

In the next section quality related aspects of a supply chain are introduced and, based on generic data, the Six sigma project results are explained to reduce and decrease the variance of the customs cycle time.

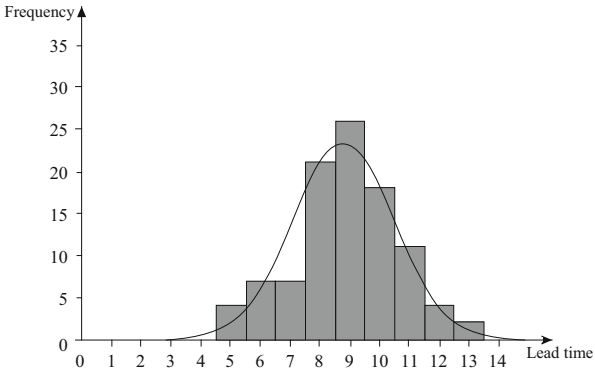

Fig. 5 Customs cycle time for Egypt

7 Supply Chain Quality Improvement

7.1 Quality Control Loop Design

Whenever delivery disturbances occur the management usually asks for the supply chain to be improved in order to avoid this negative effect again—the demand for a robust supply chain is crystallizing out. Solutions need to improve the supply chain performance in a very short time to bring back the actual values to the agreed range target.

When speaking of performance the lead time is one of the key targets in almost every agreement worldwide across many OEMs. Despite the sharp focus on lead time the international supply chain still bears a high risk for such a time deviation. However, these deviations only lead to management attention if the logistical line supply to manufacturing is not met and it comes to a line stoppage. Hence the final evaluation of a good or bad supply chain performance is triggered by the production performance. Therefore the design of a control system to monitor a supply chain is twofold as shown in Fig. 6.

The time-based control loop exposes any deviations regarding the actual and given logistics processing times. A difference indicates that extra effort was needed to fulfill a task and this may cascade further up the logistics pipeline—causing a possible time-delay in the final delivery. The quality-related control loop represents the customer's (production) evaluation. Only if the material is supplied in time and of the right quality will the feedback be positive—regardless of whatever actions the logistics pipeline was corrected once a time-based deviation had occurred. Hence the two control loops represent the result (production perspective) and the process (logistical perspective). To avoid any major disruptions the control cycle has to embed some thresholds in each chain element to prevent an upscaling effect along the remaining logistics chain.

In principle a time or material buffer can help to balance any disturbance (Harrison and van Hoek 2008). The size of that buffer depends on the risk involved. In developing countries this risk factor is high due to more unpredictable events in

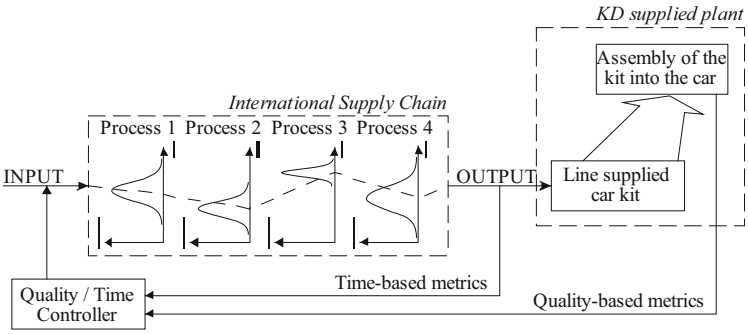

Fig. 6 Control loop for the supply chain evaluation

political, social or economical affairs (e.g. uncontrolled strike or political turmoil) along with missing or inefficient routines and procedures to settle disputes. Hence the stock on hand will increase in low developed countries (LDCs).

To design robust processes (Taguchi et al. 2005) the different logistical and production related process steps with their particular parameters need to be listed. The target for any process is to stay within a given logistical cycle time with a specified range $\pm$ z %. If the environment is influencing this processing time up to a management defined warning level then the given stock, worker flexibility, pre-packed (made-to-stock) KD kits—as a specific form of postponement in kit commissioning—or a rescheduled production program at the KD supplied plant are means to give robustness (Tang 2006). Only if these special measures are not balancing the complete logistics pipeline was the robust design not vigorous enough to level out the disturbance. The production is affected as shown in Fig. 7.

7.2 Six Sigma Project Results

If the process time shifts outside the upper and lower limits as indicated in Fig. 7 a management decision is necessary to avoid any further disruption in the logistical pipeline. For the example of customs processing in Egypt, a Six Sigma project was launched following these five steps (Eckes 2001):

1. Define: The voice of the customer defines the expectation regarding the product/service and this becomes the project target. In the Egyptian customs case the target was to reduce the lead time and the variation of the distribution curve. Also in this "define" step a process flow needs to be worked out.
2. Measure: After a measurement system analysis to assure the validity of the gathered data the relevant process data are retrieved and presented in a statistical distribution curve (e.g. a normal also called a Gaussian distribution) and the process capability c_{pK} is calculated. For the above example this distribution curve is shown in Fig. 5.

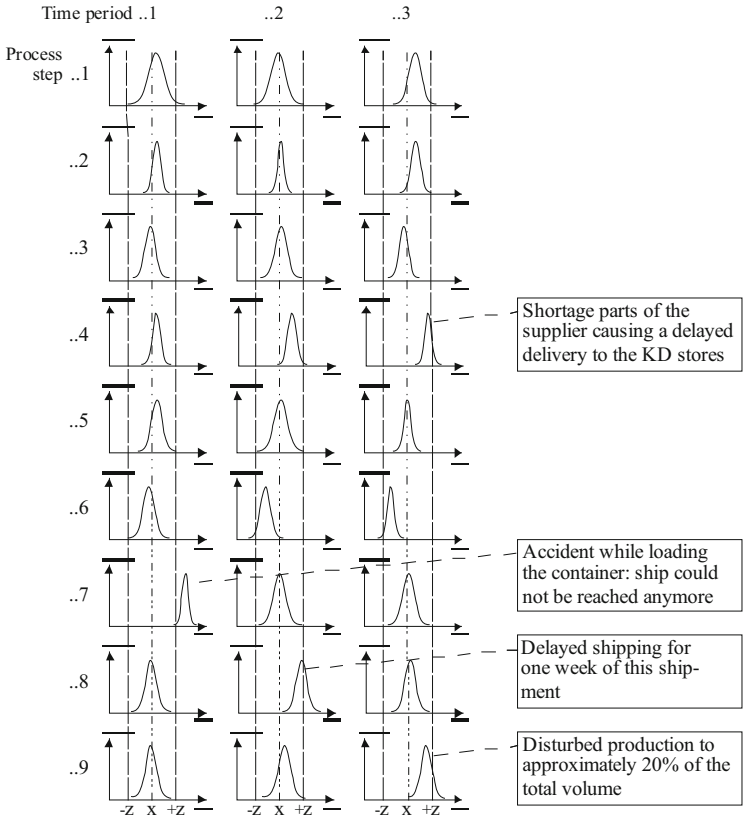

Fig. 7 Production disruption passed through by logistical disturbances

3. Analyze: In a root cause analysis all conceivable factors are investigated to see how they influence the output and finally the relevant parameters for the project. In terms of the customs process, proper preparation and a pre-announcement to customs were the main factors in determining the speed of getting the material out of customs.
4. Improve: In this phase all interdependencies are laid out and the key factors causing the process variations are identified, as shown in Fig. 7. A simulation and a real test are carried out with the modified key factors to move the result into an acceptable range from a customer point of view as indicated in Fig. 8 (the transparent histogram is before improvement as shown in Fig. 5).
5. Control: After implementing all the measures a sustainable process alignment is carried out to avoid falling back into the previous process pattern. The production control plan is amended to ensure the stability of the improvement. Regarding the Egyptian customs the necessary customs procedure was amended and all process partners accepted this new procedure.

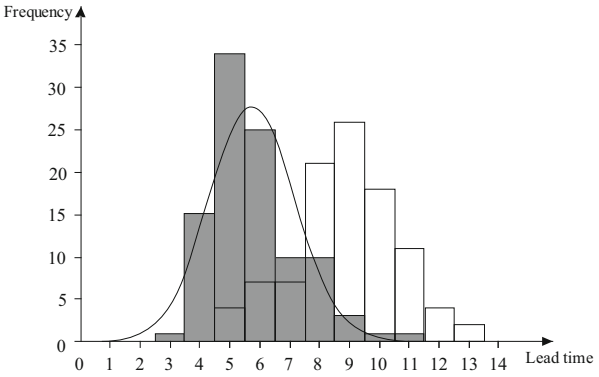

Fig. 8 Customs cycle time for Egypt after improvement

The process shifted more to the requested standard mean value of 5 days and extreme cases of long delays have still been avoided up until now with only a few exemptions.

Regarding the non-conformance cost per vehicle—representing the KPI for quality—Six Sigma projects as part of continuous improvement (CI) efforts were initiated. Before starting the projects, the different supplied kit parts were clustered into groups such as glass (e.g. front windshield), control units (e.g. engine control unit), theft-relevant parts (e.g. radio), bulk parts (e.g. nuts and bolts), body parts (e.g. fender), hazardous goods (e.g. airbags) and normal parts (e.g. bumper). A quarterly review was made with these clusters to identify the top three items claimed as a missing, wrong or damaged part. After completing the various CI/Six Sigma projects and a long-term follow-up of all measures, the cost curve shows the development from 2001 until 2011 as given in Fig. 9 based on normative values with 2005 being the base year (=100).

To complete the analysis for the supply chain optimization, not only are statistical valid measures relevant but also qualitative ones. The next section scrutinizes these from an LDC point of view.

7.3 Supply Chain Adaptations for Egypt

All six sigma activities have led to a positive outcome but progress is still lagging behind production locations of high developed countries (HDC) like the USA or Germany. On average these deliveries have about 10 % or less of the non-conformance cost compared to those of KD-supplied plants. The main influencing factors (Ishikawa 1990) are linked to man, machine, method and environment whereas the material is very standardized. All parts are manufactured due to the given engineering drawing; a worldwide guaranteed production parts approval process (PPAP) and a strongly monitored serial supply by the central quality department are guaranteeing these part standards. Looking closer to the

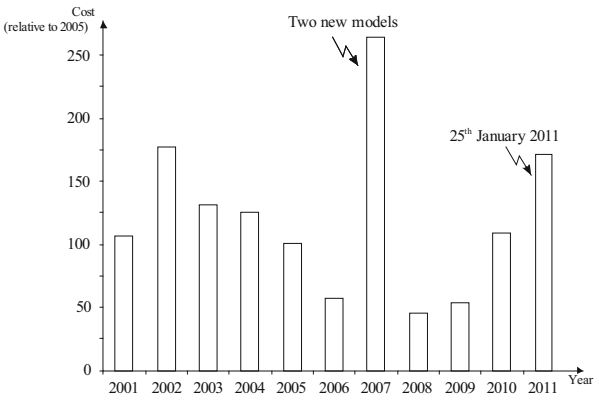

Fig. 9 Non-conformance cost development from 2001 to 2011

machine and man factor, the technological gap has a major impact on this cost difference. In low developed countries like Egypt, the average level of technology lags 2–3 generations behind the technology in HDC. Traditional technologies are well elaborated (Servatius 1985) and used machines are written off in the HDC areas and sold for a cheap price—being very attractive to LDC.

Since knowledge of this basic technology has spread quite well, the skills for using and maintaining these machines are available in LDC as well. One major source for this knowledge is the higher education in universities or colleges. In the Egyptian case this knowledge is accessible in a huge number of institutions—the fit between the engineering education and the available technology is given. But for stepping ahead the qualifying courses are not encapsulating all the latest engineering topics which are very rarely available in the educational sector. Also the expertise in software engineering and the latest technological developments are not represented well in the lectures. Therefore high end technologies embedded in a LDC area are at risk of failing: either the skill level or the environment has a misfit. If for example the machine technology requires special maintenance or an ad hoc repair in the case of a break-down the needed specialist has to be flown into the country. While repairing, the local engineers are learning very specifically by repairing only the missing essential part and trying to embed this practical experience into a broader knowledge about the tasks performed. Hence when another failure occurs the likelihood for requesting a foreign "expert" is high again. However, in all cases the lower skill level encapsulates the risk of wrongly produced subparts which have to be reordered from the German source again.

Also the environment plays a vital role because the infrastructure in Egypt is very fragile: power cuts and voltage changing from 110 V to 380 V in a 240 V network are only some examples causing machine break-downs. Hence the individual machine needs to be secured against these fluctuations in order to run smoothly with the electronic components not at risk. Otherwise, also, electronic parts failures will cause further subsequent deliveries since the machine operations are not running in a controlled and capable manner.

In relation to preventive maintenance, another environmental influence emerges as being one of the root causes for differences in supply chain management between HDC (Germany) and LDC (Egypt). With the traditional Islamic religion—especially in its fundamental form—all activities point to the here and now to fulfil the rules codified in the Holy Koran (Hofstede and Hofstede 2005). Anything planned for the future is based on these rules to fulfil the probation on earth in a God blessing manner when the final judgement has come (Ali; Koran 2:286). Finally all future plans are dependent on the will of Allah—"Insha Allah". This fatalism is blocking any long-term planning and the time gets sealed (Diner 2007; Lewis 1982). Any particular strategic plan is deemed to fail because the long-term thinking is not predominant in today's decision making. The cultural difference between a traditional Islamic-driven country and countries like Germany which went through the Reformation and Age of Enlightenment (Hofstede and Hofstede 2005) has a common reflection on managers of supply chains in Egypt: the success of any long-term orientated managerial plan is in the will of Allah and the executing manager excludes himself from the responsibility of major faults. In the end all activities are in the hands of God.

In a methodological view the delta in supply chain management between LDC and HDC becomes evident in the risk level which materializes in the stock level of the logistics pipeline. Following the rule that stocks help to minimise the risk, the storage of goods along a supply chain varies: in the risk-free chain elements of the HDC the turnover rate is quite high with a minimum of stock: the continuous flow with few stale points becomes visible; but once the supply chain enters the area of LDC the risk increases and accordingly the number of stale points and the stock level.

8 Conclusion

The presented approach to improving the supply chain by the six sigma (6σ) methodology challenges practitioners in two ways. First, it needs a thorough understanding of how to transfer the pure statistical approach into logistical processes. Product related specifications or manufacturing control limits are not in the limelight but logistical service processes. Secondly, the measured values for analysis are commonly time-based metrics like the lead time. It requires a solid time measurement and time-based controlling system to ensure valid data. Both aspects are explained in this article only to a certain degree. How to measure logistics service quality with relevant quantifiable measures and statistically evident performance control needs further scientific research as well as practical evidence. On the other hand, time-based controlling is still in its exploration phase to be as accepted as cost-orientated controlling. This shifting is accompanied by the hypothesis: "if processes are running in a time-efficient way the cost-efficiency will automatically follow". Some aspects of such a time focus are already explained (Stalk and Hout 1990; Kuhn 1996; Gregory and Rawling 1997; Dibrell et al. 2005; Blackburn 2012 Thomas 2008; Vachon and Klassen 2002) but the practical implications on daily

operations management have not yet been explored. Embedded in these questions is another research area: The chapter is written under the assumption that we need to adapt the supply chain to cover the differences between HDC and LDC logistics parameters. However, a hypothesis can be stated as follows: in LDC an advanced supply chain is feasible in allocated corridors only allowing to deliver goods/services with the same logistical parameter level like a pure HDC supply chain. The chapter was proving the opposite and further sources (Christopher 2011; Crandall et al. 2010; Harrison and van Hoek 2008; Mangan et al. 2012) suggest uni sono a local adaptation of the supply chain. In practice it means a deviation from an advanced logistics approach resulting in an extra cost burden. Hence the question arises as to whether it is possible to remain in a HDC environment in special spatial pockets of an LDC.

Nevertheless, nowadays all logistical activities are still tailored to the regional particularities but with some economical-political changes the logistical gaps between HDC and LDC can be reduced. Finally all efforts aim to maintain the quality and speed along the supply chain with one remaining question: Who is going to make the first step to change?

Questions for Review and Discussion

1. Which factors influence the foreign direct investment in a low developed country?
2. Why does quality serve as a strategic link between the various process partners of an international supply chain?
3. What similarities exist between six sigma programs and traditional quality management?
4. Why is the continuous flow within a supply chain of such importance?
5. Which obstacles are preventing a 4PL from becoming a reality for managing an international supply chain?
6. Why is a time-based strategy leading quasi-automatically to economic success and when is this time orientation touching its limits?
7. In an international logistics pipeline, how does the company's environment stimulate a just-in-time approach?
8. Which cultural limits are given for effective and efficient supply chain management?

References

Ali, A. (1975). (Koran) *The Holy Qurān*. Avon: The Islamic Foundation, The Bath Press.

Automotive Marketing Information Council (AMIC) in Egypt. (2011). *Annual Press Report December 2011*. Cairo, http://www.amicegypt.com

Blackburn, J. (2012). Valuing time in supply chains: Establishing limits of time-based competition. *Journal of Operations Management, 30*(5), 396–405.
Boggess, T. (2002). This Little Ford went to market. *Vintage Ford, 37*(2), 27–37.
Central Intelligence Agency (CIA). (2012). *The world factbook.* Accessed July 30, 2012, from https://www.cia.gov/library/publications/the-world-factbook/geos/eg.html
Christopher, M. (2011). *Logistics and supply chain management* (4th ed.). London: FT Publishing.
Crandall, R., Crandall, W., & Chen, C. (2010). *Principles of supply chain management*. Boca Raton, FL: CRC.
Dibrell, C., Davis, P., & Danskin, P. (2005). The influence of internationalization on time-based competition. *Management International Review, 45*(2), 173–196.
Diner, D. (2007). *Versiegelte Zeit [Sealed Time]*. Berlin: List Publishing.
Eckes, G. (2001). *The six sigma revolution*. New York: Wiley.
European Council. (2004). *2004/635/EC: Council decision of 21 April 2004 concerning the conclusion of a Euro-Mediterranean agreement*. Official Journal (OJ) L 304 of 30 September 2004, Brussels. http://ec.europa.eu/trade/creating-opportunities/bilateral-relations/agreements/#_mediterranean
Foster, T. (2008). Towards an understanding of supply chain quality management. *Journal of Operations Management, 26*(4), 461–467.
Garvin, D. (1988). *Managing quality*. New York: Free Press.
Gregory, I., & Rawling, S. (1997). *Profit from time*. Basingstoke: Macmillan Business.
Harrison, A., & van Hoek, R. (2008). *Logistics management and strategy* (3rd ed.). London: Prentice Hall.
Hofstede, G., & Hofstede, G.-J. (2005). *Cultures and organizations* (2nd ed.). New York: McGraw Hill.
Imai, M. (1986). *Kaizen*. New York: McGraw Hill.
Ishikawa, K. (1990). *Introduction to quality control*. London: Chapman & Hall.
Kaplinsky, R. (2005). *Globalization, poverty and inequality*. Cambridge: Polity Press.
Kuhn, J. (1996). *Das zeitgesteuerte Unternehmen [The Time Driven Company]*. Frankfurt am Main: Campus Publishing.
Kuhn, J. (1998). Die Ressource Zeit im Spannungsfeld der Logistik [The Resource Time in the Logistics Area]. *Zeitschrift fuer Betriebswirtschaft (ZfB), 68*(2), 131–146.
Lewis, B. (1982). *The muslim discovery of Europe*. London: Weidenfield and Nicholson.
Mangan, J., Lalwani, C., Butcher, T., & Javadpour, R. (2012). *Global logistics and supply chain management* (2nd ed.). New York: Wiley.
n.a. (1912). *Letter to all branches, dealers and sub-dealers*. The Henry Ford Company, 16th April 1912, Benson Ford Research Center, Dearborn (MI), Acc. 509, Box 1, FMC-Sales-Public Response, Dearborn.
n.a. (1913). *Letter to Mr. Henry Ford*. 4th February 1913, Benson Ford Research Center, Dearborn (MI), Acc. 1, Box 181, FMC Sales-Public Response, Dearborn.
Ohno, T. (1988). *Toyota production system*. Cambridge: Productivity Press.
Pfohl, H.-C. (2010). *Logistiksysteme [Logistics systems]* (8th ed.). Berlin: Springer.
Robinson, C., & Malhotra, M. (2005). Defining the concept of supply chain quality management and its relevance to academic and industrial practice. *International Journal of Production Economics, 96*(3), 315–337.
Saunders, M., Lewis, P., & Thornhill, A. (2012). *Research methods for business students* (6th ed.). Harlow: Pearson.
Servatius, H.-G. (1985). *Methodik des strategischen Technologie-Managements [Methodology for a strategic technology management]* (2nd ed.). Berlin: Erich Schmidt Publishing. 1986.
Sila, I., Ebrahimpour, M., & Birkholz, C. (2006). Quality in supply chains: An empirical analysis. *Supply Chain Management: An International Journal, 11*(6), 491–502.
Stalk, G., & Hout, T. (1990). *Competing against time*. New York: Free Press. 1990.
Taguchi, G., Chowdhury, S., & Wu, Y. (2005). *Taguchi's quality engineering handbook*. Hoboken, NJ: Wiley.

Talib, F., Rahman, Z., & Qureshi, M. (2011). A study of total quality management and supply chain management practices. *International Journal of Productivity and Performance Management, 60*(3), 268–288.

Tang, C. (2006). Robust strategies for mitigating supply chain disruptions. *International Journal of Logistics Research and Applications, 9*(1), 33–45.

Thomas, R. (2008). Exploring relational aspects of time-based competition. *International Journal of Physical Distribution & Logistics Management, 38*(7), 540–550.

Thonemann, U., Behrenbeck, K., Diederichs, R., Großpietsch, J., Küpper, J., & Leopoldseder, M. (2003). *Supply chain champions*. Wiesbaden: Gabler Publishing.

Toepfer, A. (1999). Qualitaetsmanagement von Dienstleistungen [Quality management of services]. In H. Corsten & H. Schneider (Eds.), *Wettbewerbsfaktor Dienstleistung* (pp. 189–211). Munich: Vahlen Publishing.

Vachon, S., & Klassen, R. (2002). An exploratory investigation of the effects of supply chain complexity on delivery performance. *IEEE Transactions on Engineering Management, 49*(3), 218–230.

Wefald, A., Katz, J., Downey, R., & Rust, K. (2010). Organizational slack, firm performance, and the role of industry. *Journal of Managerial Issues, 22*(1), 70–87.

Wilkins, M., & Hill, F.-E. (1964). *American business abroad–Ford on six continents*. Detroit, MI: Wayne State University Press.

Intermodal Transport-Based Supply Chain Developments in Turkish Automotive Industry: The Case of Ford Otosan

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Abstract Although the literature about supply chain management has mostly focused on developed economies with highly improved intermodal transport systems, there is a need for the investigation of newly emerging markets such as Turkey in terms of intermodal transport and supply chains. Turkey's strategic location, increasing international trade, especially following the Customs Union Agreement with EU, and the growing role of Turkey in trade with Central Asia, Middle East, Caucasus and Mediterranean regions make the focus on intermodal transport more profound for the companies operating in supply chains. Turkey has become a centre of global automotive production and a centre of excellence, and the automotive industry has become the country's leading export industry in recent years. As all over the world, the automotive supply chain in Turkey is global and requires complex processes.

This study attempts to explore the new intermodal logistics solution of the Ford Otosan supply chain. Ford Otosan ranks among Turkey's top ten exporting companies. Main activities of the company include the production assembly and distribution of trucks, pick-ups, mini-buses and cars under Ford license, as well as spare parts and accessories. This case study is focused on inbound logistics activities between the "Consolidation Centre" in Cologne (Germany) and Kocaeli plant (Turkey).

1 Introduction

Logistics and supply chain management are interrelated terms that commonly involve planning, flows of product, information and services. While logistics can be described as a framework that aims to create a single plan for the flow of product and information through a business, supply chain management builds upon this

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W. Piotrowicz, R. Cuthbertson (eds.), *Supply Chain Design and Management for Emerging Markets*, DOI 10.1007/978-3-319-05765-1_9

framework which includes the management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole (Christopher 2005). Two other concepts relating to the supply chain should also be considered as value chains and demand chains. Competitive advantage can be gained through the effective management of primary and support activities in the value chain. Demand chain is also mentioned in the literature, recognising the importance of providing value to the end customer (Hoover et al. 2001). Many different functions are needed within the supply chain system in order to manage the upstream and downstream relationships and the flows between suppliers and customers such as transport, inventory control, warehousing, order processing, materials handling, packaging/labelling etc. Since the main focus of this study is on the intermodal transport-based supply chain systems, transport function and intermodal transport within the supply chain structures will be discussed specifically.

This study is organized and divided into three main parts. The relationship between the intermodal transport and supply chain management is given in the following section. The second part of the study overviews Turkey as an emerging country, with the focus on the automotive industry. The third part of the study introduces the case study of intermodal transport-based solutions for the Ford Otosan supply chain system as one of the best practices. The last part of the study discusses the lessons to be learned from the case study.

2 Supply Chain and Intermodal Transport

Supply chain management is defined as an integrative approach dealing with the planning and control of the materials flow as well as information from suppliers to end-users (Jones and Riley 1985; Mangan et al. 2008). Transportation is mainly involved in the flow of materials. It is the movement of product from one location to another as it makes its way from the start of a supply chain system to the end customer. Transportation has a very important role in every supply chain since the products are rarely produced and consumed in the same location (Chopra and Meindl 2007). According to Mason and Lalwani (2004), integration of transportation can be considered as one area where reductions in costs and increases in quality and speed of operations can be achieved by streamlining cross-company processes. Transportation integration within the supply chain is of great importance to minimize total costs and maximize customer value (Morash and Clinton 1997).

While analysing intermodal transport some researchers focused on its process-related characteristics (Muller 1999); some defined it as an aspect of delivering value and creating competitive advantage and as a result providing a customer focused end-to-end service (Everett 2001). It is considered as a service rather than a technology (D'Este 1996). Different definitions reflect the multi dimensional characteristics of intermodal transport as well as its role in the supply chain. There has recently been an increasing awareness regarding the use of intermodal transport

both in political and operational levels. Intermodal transport has grown considerably with the developments taking place in the shipping and transport industry triggered by containerization and increasing global trade such as the improvements in the infrastructure (highways, railways, waterways, ports, terminals, distribution centres, inland clearance depots, airports etc.), the vehicles (cellular containerships, trucks, rail wagons, aircrafts) and specific equipment (gantry cranes, straddle carriers, other terminal equipment) (Hayuth 1987). A renewed focus on intermodal freight transportation driven by the changing requirements of global supply chains is considered to be the main need in the supply chains and the growth of intermodal freight transportation will be driven and challenged by four main factors (DeWitt and Clinger 1999): Hypercompetition, customer requirements, information and communication technology (ICT) and management and integration of infrastructure and resources.

"Hypercompetition" is characterized by "*intense and rapid competitive moves, in which competitors must move quickly to build new advantages and erode the advantages of their rivals*" (D'Aveni 1994, pp. 217–218). Hypercompetition in supply chains is the worldwide competition between global supply chains in a global marketplace (DeWitt and Clinger 1999). Globalization has become the main driver for the emergence of global supply chains as well as the fierce competition of supply chains. Due to globalization of the industry, increasing focus on understanding the needs of the customers, changing requirements of the customers and reductions in the product life cycles, many companies have realized the importance of adjusting their supply chain designs and structures according to the needs of the market in order to remain competitive and obtain optimum cost levels. The main motive for gaining competitive advantage in the supply chains can be the recognition of companies' own capabilities and competencies (Stalk et al. 1992). One of the capabilities that is mainly considered as a very important driver for success is the management of inbound and outbound logistics (Christopher 2005). In the light of these, intermodal transport can be suggested as an alternative that aims to manage inbound and outbound logistics processes of companies in an integrated way by providing competitively priced and reliable transport solutions. Since globalization also lengthens supply chains so that companies tend to expand their production patterns offshore or source from more distant locations (Christopher 2005), the use of intermodal transport can provide cost effective solutions for long distance transport needs of the supply chains for the movement of raw materials, semi-finished or finished products.

Increasing Customer Requirements in the supply chain operations has led to the consideration of value and the demand concepts. As stated by Christopher (2005), as more markets are involved in the effect of commodity markets, where little technical difference between competitors is perceived by the customers, there is an increasing need for creating competitive advantage through added value. Since products do not have any value until they are in the hands of customers at the required time and place, main competitive advantages can be obtained by the use of effective transport systems. There is an increasing need to reliably and flexibly

respond to changing customer requirements with seamless and integrated co-ordination of freight and equipment flows through various modes. Agility which is basically defined as "*being responsive and flexible in the market place*" (Christopher et al. 2006, p. 281), is an important concept that the providers of transport services should consider when determining the needs of their customers. According to Henstra et al. (2007), changing trends in transportation systems mainly emerge from increasing customer requirements which are translated into shippers' demands. The supply of transport is lagging behind, and the unimodal modes of transport that only aim to optimize flows as they occur from station to station are not able to cope with these increasing requirements. In this case, intermodal transport should be customer-oriented and intermodal transport operators should provide high quality services by integrating demand-sensitive aspects such as an integrated tariff based on transparent pricing and full liability.

Advances and Developments in Information and Communication Technology (ICT) have played an important role in the successful implementation of the intermodal transport system within supply chains. With regards to supply chain systems, availability of visibility and the use of related technologies within the supply chain promote the real-time supply chain information transparency inside and outside the enterprise. According to the research conducted by IBM (2009), smarter supply chains use RFID tags, sensors and smart devices to track and optimize the movement of materials from suppliers to receiving docks and throughout the assembly. Intermodal transport systems can be adjusted into such visible supply chain systems by using the real time data obtained from various transport systems utilised in the chain. Although there are many benefits of using intermodal transport, some problems concerning the organisational interfaces and technical incompatibilities between the various companies and systems are existent in transport operations. Some tools such as cargo handling technologies, communication links and various coordination measures can be employed for bridging the gaps in intermodal transport (Bask et al. 2001).

Intermodal technologies not only include physical movement and terminal handling technologies but also cover the information and communication technologies required for coordination. Cargo handling technologies, communication and information links are important tools that can be used for bridging the gaps in intermodal transport. Vehicle and cargo tracking technologies such as Global Positioning System (GPS) enable any delays or problems to be monitored and provide feedback about the location of the cargo and the vehicles. Muller (1999) highlighted main developments in terms of information and communications technology such as Advanced Intelligent Transport Systems and Electronic Data Interchange (EDI) systems. Advanced Intelligent Transport Systems allow shippers and carriers to identify main points of congestion along certain routes and make changes to meet ever-tighter schedules (Muller 1999). Electronic Data Interchange (EDI) is also an important system that helps companies and government institutions, specifically customs departments, cope with a complex and integrated transport system (Rodrigue et al. 2006). Together with these technologies, many communications

systems can be connected to the customer's own information network which allows more flexible and time-sensitive communication regarding planning, booking and the status of shipments (Muller 1999).

Management and Integration of Infrastructure and Resources have facilitated seamless intermodal transportation within the supply chains. Main issues that should be considered in this case are the constraints and co-ordination of infrastructure capacity such as policy and regulatory issues, effective management of existing infrastructure, and the related considerations regarding future investment in new infrastructure (DeWitt and Clinger 1999). The demand for improved and frequent services in intermodal transport triggers the need for more investment in infrastructure development (Stank and Roath 1998). In the case of intermodal transport, this becomes a more critical issue due to the existence of different transport modes, infrastructures and the increasing need for integrated as well as standardized transport units or vehicles. Providers of intermodal transport services should evaluate their performance levels and take corrective actions in order to eliminate some barriers in the system. The main barriers for intermodal transport can be classified under three general categories: infrastructure bottlenecks, regulatory bottlenecks, and supply chain dysfunctions (Prentice 2003). Infrastructure problems can be chronic or temporary in nature. Chronic infrastructure bottlenecks can be due to climate and physical barriers or due to underinvestment. There are also temporary infrastructure bottlenecks that may arise from weather disruptions, market perturbations (e.g. temporary surge in demand), and disinvestments (i.e. when parts of infrastructure are abandoned or when the related infrastructure is provided at a lower level of efficiency). Regulatory bottlenecks are defined as unintended consequences of some other policy objective and these could be direct effects (e.g. safety/quality inspections and security measures) and indirect effects (e.g. cabotage restrictions). Lastly, supply chain dysfunctions may occur when participants fail to act in the common interest. One of the bottlenecks caused by supply chain dysfunctions can be mentioned as the labour work rules and work stoppages which restrict the seamless flow of cargoes and information in the intermodal system. Another bottleneck is the information incompatibility between various parties in the intermodal system. Since interoperability of communication systems requires all parties in the supply chain to adopt common information standards (Prentice 2003), any failure to implement an integrated communication system may result in decreased service levels.

As mode-specific transport solutions have become increasingly less able to satisfy the needs of shippers and manufacturers, intermodalism has transformed the freight transport systems servicing international supply chains (OECD 2001). Considering the main benefits that intermodal transport options may bring to the actors in the logistics chain, transport service providers and the countries where they operate have started to evaluate the alternatives which may emerge and the use of these alternatives in the country's domestic and foreign trade (Denktas Sakar 2010). The growth in inter-regional and international trade has attracted the interest of the transport industry and this has triggered the development of intermodal

transportation and logistics facilities that are designed to handle new traffic (Stank and Roath 1998). As intermodal transport industry has been continuing to evolve, the main actors have been trying to become more and more integrated with the supply chain management. Considering the advantages and benefits provided by the use of intermodal transport the promotion of the system has been mainly highlighted under three main headings in the literature: cost effective solutions, integrated customer services (Hayuth 1992) and environmental sustainability (Lowe 2006).

Cost Effectiveness can be considered as one of the advantages of intermodal transport (Hayuth 1992). As Lowe (2006) mentioned, lower transit costs over long journeys can be considered as the principal benefit of an intermodal transport system. Intermodal transport has also reduced costs by enabling shippers to select combinations of transport modes that offer lower cost services and compel carriers to reduce rates and improve service (Muller 1999). Therefore, intermodal transport should be adjusted to the supply chains to utilize the inherent capabilities of multiple modes to control cost and fulfil customer requirements. All in all, intermodal systems may help companies to optimize transport networks between various facilities along the supply chain.

Integrated Customer Services in Supply Chains are considered crucial in intermodal transportation systems. Considering the competitive pressures within the supply chains of customers, the main transport-related needs of the customers should be met by the use of integrated systems such as intermodal transport. In the light of this, customers expect the intermodal transportation systems supporting supply chains to be focused on speed, flexibility, variance elimination, and relationships with other members of the supply chains that permit profit potential for all (DeWitt and Clinger 1999).

Intermodal Transport as an Environment Friendly Option for Sustainable Mobility is promoted in the transportation policies of most countries. These policies mainly suggest that rail and sea transport integration should be considered as an option for relieving congestion problems experienced at road transportation as well as noise and environment pollution problems. Intermodal freight transport by road and rail or road and ship has important potential to decrease the negative environmental impact in terms of carbon dioxide and other hazardous gas emissions (Taniguchi and Nemoto 2008). Since different transport modes have different impacts on the environment in terms of emissions, energy efficiency, noise and land-take, development and integration of more environmentally friendly transport modes in the transport market should be promoted (CORDIS 1997). Some negative impacts of unimodal transport modes such as accidents, noise and air pollution, congestion, fuel consumption and climate change have directed the policy makers in many countries to implement some action plans regarding the more balanced use of different transport modes (Lowe 2006).

Innovative intermodal solutions in Turkey could be observed generally in maritime transport with regard to Ro-Ro services. In addition to Ro-Ro, Ro-La

intermodal solutions have also been introduced; however, such attempts have not worked properly and eventually the pilot Ro-La operation stopped in 2006 owing to the uncertainty of the commercial viability of Ro-La services to and from Turkey. Ro-Ro transport has been developed under a road transport chain, through the initiative of road transport hauliers and their associations. Cooperation schemes between road operators, other rail or maritime operators and users of the system are limited. This is probably one of the reasons why other intermodal solutions, such as the transport of swap bodies, or the inland transport of maritime containers, have not been sufficiently developed in Turkey (OECD/ITF 2009).

3 Turkey as an Emerging Country in Automotive Industry

Turkey with a total area of 814,578 km^2 and 8,333 km of coastal line lies in the main traffic artery between Asia and Europe having borders with Bulgaria, Greece, Iran, Iraq, Syria, Georgia, and Armenia. Surrounded by the Black Sea on the north and the Mediterranean Sea on the south, it connects the Balkans to the Middle East, Central Asia to the Caucasus and the Black Sea countries with the Mediterranean countries. Turkey enjoys a strategic location, with the potential to play a pivotal role in regional and global integration. The important energy, trade and transport networks which connect west to east and north to south are keys to unleashing this potential (OECD/ITF 2009, p. 11). Recent economic and political developments throughout neighbouring regions have further emphasized Turkey's role. Turkey is defined as an emerging market economy by the IMF (2012). The Turkish economy has shown remarkable performance with its steady growth over the last 10 years. A sound macroeconomic strategy in combination with prudent fiscal policies and major structural reforms in effect since 2002, has integrated the economy into the globalized world, while transforming the country into one of the major recipients of foreign direct investment in the region. According to the UNCTAD (2012), foreign direct investments (FDI) to Turkey in 2011 rose to USD 15.9 billion from USD 9 billion the year before, an increase of 75.5 %. Turkey became the 23rd out of 211 countries in terms of FDI. Turkey has the fastest growing economy in Europe, enjoying an expansion of 8.5 % in 2011 (İyigün 2012). As the GDP levels more than tripled to USD 736 billion in 2010, up from USD 231 billion in 2002, GDP per capita increased to USD 10,079, up from USD 3,500 in the given period (TURKSTAT-Turkish Statistical Institute 2011). The visible improvements in the Turkish economy have also boosted foreign trade, while exports reached USD 114 billion by the end of 2010, up from USD 36 billion in 2002. Turkey aims to be among the top ten economies in the world and plans to increase exports to USD 500 billion and foreign trade volume to USD 1 trillion in 2023 (TEA-Turkish Exporters Assembly 2012). Significant improvements in such a short period of time have registered Turkey on the world economic scale as an exceptional emerging economy, the 16th largest economy in the world and the 6th largest economy when compared with the EU countries, according to GDP figures

(at PPP-purchasing power parity) in 2009 (ISPAT 2012). Turkey's regional and global role has grown recently. Turkey has set out to strengthen relations with countries in the region, broadening its engagement with the Middle East and increasing its presence in Africa, the Balkans, the Caucasus, and Central Asia.

Despite the economic growth, the country is still facing several economic and political problems. While the Turkish economy is growing, income inequality may be seen as a major problem. In 2011, the richest 20 % of Turkey's population (74 million) accounted for almost half of national income and the poorest 20 % just 6 %. Turkey ranks third on a scale of income inequality among 34 countries in the OECD (İyigün 2012). An unbalanced growth in favour of the western part of Turkey should be added to this overall inequality. In other words, there is an inequality (unfair allocation) between the east and the west of the country in terms of economic development, investment opportunities, infrastructure and skilled staff. Turkey suffers from relatively high rising energy prices imposed in the country regardless of global practices. Up to 90 % of its oil and 97 % of its gas resources are imported (PWC 2011). Turkey has recently been faced with public sector financing problems. Besides, payments for large scale infrastructure investments and the smaller ratio of the government revenues to GNP have resulted in larger public sector borrowing (KPMG 2012). The country's current account deficit has been large and financed by foreign direct investment in recent years. In addition to such critical developments, Turkey is located in a geographical region in which political instability has been likely. This likelihood of instability combined with the recent conflicts encountered in the Middle-East Region contributes to the economic, political, and financial risks in Turkey.

The Turkish automotive industry is one of the economy's pioneering industries. Its foundation dates back to the late 1950s and early 1960s. The industry transformed itself from assembly-based partnerships to a full-fledged industry and to having a massive production capacity during the rapid industrialization and development period. Over recent decades, the Turkish automotive industry has grown substantially, owing to two main factors (Deloitte 2010): the first factor is the growth in the size of the domestic market where individual consumers gained increasing purchasing power as the economy developed. The second factor is related to the enormous development of international trade especially following the Customs Union Agreement with the EU in 1996. The Turkish automotive industry has a total capacity of 1,561 million vehicles, of which 86 % is for light vehicles (passenger cars, minibuses and pick-ups) (Sönmez 2011). Total production increased with a CAGR (Compound Annual Growth Rate) of 14.3 % from 2002 to 2009 and reached 1,189,131 units in 2011, which is a record for the Turkish automotive industry (OSD 2012; Aksongur 2012). Currently, Turkey is the biggest bus manufacturer and the third largest light commercial manufacturer in Europe (Sönmez 2011). Table 1 shows the automotive production in Turkey between 2005 and 2011. The growth in the production of passenger cars and pick-ups between 2005 and 2011 can be attributed to the increase in local demand due to the development of the country and rises in GDP levels.

Table 1 Automotive production in Turkey (Units) (2005–2010)

Type of vehicle	2005	2006	2007	2008	2009	2010	2011
Passenger car	**453,663**	**545,682**	**634,883**	**621,567**	**510,931**	**603,394**	**639,734**
Commercial vehicle	**425,789**	**441,898**	**464,531**	**525,543**	**358,674**	**491,163**	**549,397**
Truck	37,227	37,026	34,544	36,800	8,246	23,671	37,396
Pick-up	349,885	369,862	391,737	449,434	330,044	442,408	479,110
Bus	5,406	6,019	6,946	7,526	5,931	5,268	6,907
Minibus	26,162	20,728	21,999	21,123	11,829	16,978	22,475
Midibus	7,109	8,263	9,305	10,660	2,624	2,658	3,509
Total	**879,452**	**987,580**	**1,099,414**	**1,147,110**	**869,605**	**1,094,557**	**1,189,131**

Source: OSD (2012); Sönmez (2011); Aksongur (2012)

There has been a substantial amount of foreign investment in the automotive industry in Turkey. Three out of those four main manufacturers, Ford Otosan, Oyak-Renault, and Tofaş-Fiat, are in partnership with Turkish and foreign car-makers, while Toyota, the other main producer, is now wholly Japanese-owned. More recently, the Customs Union Agreement with the EU and increasing demand in the 1990s attracted investments from Far Eastern producers such as Toyota, Hyundai, and Honda, which sought to establish a low cost base to supply the local market and from which to export to Europe (Deloitte 2010). The units produced in 2011 (excluding tractors) reached 1,094,557, with over 85 % of this figure by four main manufacturers alone (OSD 2011). Turkey has become a centre of global automotive production in recent years in terms of research and development, design and technology management, intellectual and industrial property (Kaya 2010; Tezer 2012). The low cost and high skilled labour force, the central location of the country in Europe, the production quality of international standards, and the high quality components of suppliers trading at competitive prices, have been the main factors that have attracted the attention of global players, most of whom consider Turkey as a production centre for their new models. The Turkish automotive industry is highly international; around 67 % of domestic production was exported (790,966), mainly to Europe, in 2011. Meanwhile around 56 % of motor vehicle sales in Turkey during 2009, and 59.1 % in 2011, were of imported vehicles. The automotive industry including motor vehicles, parts and accessories has become the Turkey's leading export industry in recent years, with total exports of 20.4 billion dollars in 2011; this constituted around a 15.2 % share in Turkey's overall exports revenues (Aksongur 2011). Table 2 presents the automotive export and import figures between 2008 and 2011.

There has been an increase in both the import and export of vehicles as the major global manufacturers have integrated their Turkish plants into their global production planning: increasingly, specific models are produced in Turkey for global or regional sales, while other vehicles that are not manufactured locally are imported. The main export markets of Turkey in automotive industry are France, Italy, Germany, the United Kingdom, Spain, the Russian Federation and Israel (Sönmez 2011; TEA 2011).

Table 2 Automotive exports from/imports to Turkey

	2008	2009	2010	2011
Production	1,147,110	869,605	1,094,557	1,189,131
Domestic retail sales (unit)	526,544	575,869	793,172	910,867
Import (unit)	306,087	313,921	465,408	538,532
Import (USD)	16,935,093,653	12,464,414,431	15,018,691,961	17,183,799
Export (unit)	910,270	628,970	754,469	790,966
Export (USD)[a]	24,750,723	15,043,181	17,375,504	20,400,776

Source: TURKSTAT (2011); OSD (2011); TEA (2011)
[a]Total exports including components

Currently in Turkey 13 companies are manufacturing various types of vehicles including passenger cars, buses, trucks, pickups, mini and midi-buses and trailers. Five companies (Tofaş-Fiat, Honda, Hyundai, Oyak-Renault and Toyota) are producing passenger cars, nine companies (Anadolu Isuzu, BMC, Ford Otosan, Hyundai, Karsan, Mercedes-Benz, Otokar, Temsa and Tofas) are manufacturing pick-ups and trucks, and nine companies (BMC, Ford, Hyundai, Anadolu Isuzu, Karsan, Man, Mercedes-Benz, Otokar and Temsa) are producing buses and mini buses. These manufacturers, together with the spare part producers, employ more than 265,000 people, ranking in the top ten globally (Deloitte 2010). The locations of the automotive manufacturers are presented in Fig. 1. Most of the automotive manufacturers are located in the Marmara Region of Turkey.

The logistics and transportation market in Turkey is growing rapidly due to both local dynamics such as the increase in international trade and external dynamics such as foreign investments and EU integration process. Turkey has been considered as a logistics center by the companies involved in trading and investment (Saatcioglu et al. 2009). Turkey's evident growth as a logistics center also parallels the increasing volume of inward foreign direct investment (FDI) in recent years in the transportation sector (Ozdemir 2010). There are already several studies focused on the supply chain and logistics in Turkey. A snapshot of how companies in Turkey plan, manage and implement their logistics processes was given by Ulengin and Uray (1999) through a research survey in order to understand the organizational, financial and managerial significance of logistics activities. It was argued that although Turkish firms surveyed in the study recognized the importance of logistics activities, effective logistics management has not been at the desired level compared to the figures in developed countries. Top management's insufficient education in logistics as well as his/her inability to overcome this lack of education

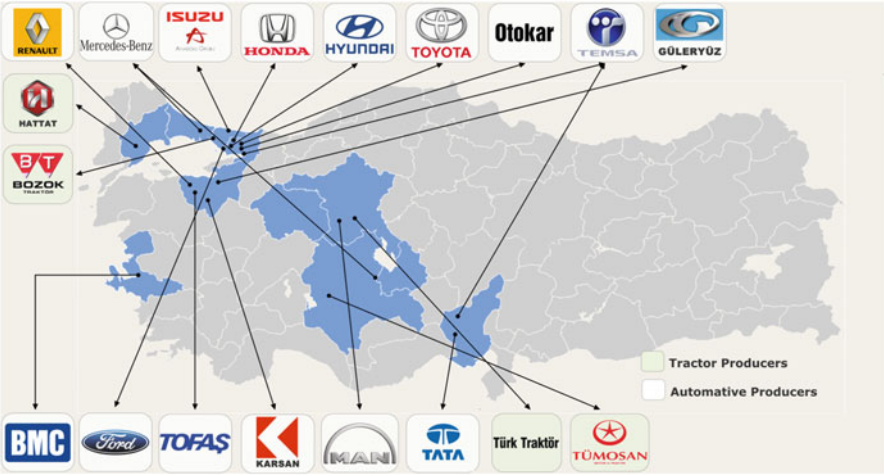

Fig. 1 The current positioning map of automotive manufacturers in Turkey. *Source*: Adapted from Deloitte (2010, p. 14)

due to poor motivation and problem-solving skills was considered to be an important limiting factor in the successful implementation of logistics improvement.

Ulusoy (2003) assessed supply chain and innovation management in the manufacturing industries (automotive, cement, electronics, appliances part and component) in Turkey. It was claimed that Turkish manufacturers aiming to be part of the global supply chains needed to overcome the additional cost of being far from the production bases and uncertainties related to delivery over long distances. The adoption of lean production in order to solve the location problem by reducing disruptions to the supply chain and improvement of supplier relations were considered as important strategies for the development of supply chain activities and innovation in selected Turkish industries. Cetindamar et al. (2005) focused on the supply chain collaboration concept by investigating an innovative example of collaboration in the Turkish textile dyeing and finishing industry. Supply chain collaboration among both small and large firms was considered a successful tool for creating and diffusing innovation especially in the case of developing countries such as Turkey. It was highlighted in this study that it is increasingly important to have trust and collaboration mechanisms and partners in collaboration to solve problems of confidence in other companies in order to prevent any issues related to the reluctance to share information.

Manufacturing SMEs operating in the manufacture of fabricated metal and general purpose machinery in Istanbul, Turkey were surveyed by Koh et al. (2007) in order to examine the relationships among supply chain practices, operational performance and supply chain management-related organizational performance. Bayraktar et al. (2009) in their survey study of Turkish SMEs, identified the causal links among supply chain management and information systems practices. Both supply chain management and information systems practices have been found to influence the operational performance of Turkish SMEs positively and significantly. Authors divided supply chain practices into two groups: outsourcing and multi-suppliers (OMS) and strategic collaboration and lean practices (SCLP) based on exploratory factor analysis. While SCLP and OMS were found to have a positive and significant impact on operational performance, both SCLP and OMS do not have a significant and direct impact on supply chain management-related organizational performance. Kozan et al. (2006) surveyed the Turkish automotive industry with regard to conflict management in buyer–supplier relationships. The study found differences between buyers and suppliers. Buyers resorted more to problem solving than suppliers, a style that embodies both assertiveness and cooperation. In comparison, suppliers used more accommodation and avoidance, both of which factor low in assertiveness. It is concluded that, the traditional buyer-supplier relations, characterized by buyer dominance, still prevail in the Turkish automotive industry.

Recent literature on supply chain management and logistics regarding Turkey relied heavily on the green perspective. Erol et al. (2010) conducted exploratory research regarding the reverse supply chain management activities of the Turkish automotive, white goods, electronics and furniture industries. Within the scope of the automotive industry, it was mentioned that the outsourcing of reverse supply

chain management activities is mainly motivated by factors such as "a tendency to focus on core competencies", "the cost of reverse supply chain management", "variety of products", "returns volume" and "collaboration between the companies on reverse supply chains". Moreover, the main barriers for the implementation of reverse supply chain management were listed as the lack of legislation and economic incentives that led to hesitation and reluctance of manufacturers which in turn reduced their investment in infrastructure and technology. Sarıdogan (2012) investigated the cost reduction through green supply chain management practices and implemented a survey including the environmental management representative or the logistics representative of ISO 14001 certified organizations in Turkey. Findings of the study revealed that green supply chain management encompasses potential to achieve cost saving in transportation. Through the use of formulae of fuel consumption & maintenance and repairing expenditure (FCMRE), the study proved the existence of a relationship between FCMRE and green supply chain management as well as transport cost reduction in Turkey.

4 Methodology

Ford Otosan has been selected as the unit of analysis due to its success in the intermodal transportation of swap bodies (standard freight container for road and rail transport) from Cologne (Germany) to Kocaeli (Turkey) by using mainly railway transportation and integration of this system with its supply chain. Needless to say, this success is mainly dependent on the long term cooperation of Ford Otosan with the logistics and transport operators and its long term commitment to the railway transportation in terms of reducing costs and CO_2 emissions. In addition to this, the Ford Otosan intermodal project has received 1 million euros from the EU Marco Polo Fund for its contributions to reducing road congestion and promoting intermodal transport (OECD/ITF 2009).

Although the intermodal transportation operations are being conducted by a third party logistics company, all data has been collected from Ford Otosan as the main user and supporter of this service. Ford Otosan has also been involved in the process of developing the new service. Data collection has been realized via personal interviews and available documentary information. The "Logistics Manager" of Ford Otosan has been used as the interface in collecting the raw data from all related parties within the company. Data collection has taken 3 months. Due to the limitation of company records, results are given within the period of 2004–2008 only. In addition to the intermodal system, other supply chain dimensions have also been analyzed within the framework of the international inbound logistics activities of the Kocaeli Manufacturing Plant. Considering the objective of the study, outbound logistics strategies have been excluded. Findings from this case study are specific to Otosan and its supply chain, nevertheless the solution could be used as an example of successful design of an intermodal supply chain.

To present the country profile and automotive industry in Turkey, publicly available sources such as reports and researches on the Turkish economy and transport (IMF 2012; TEA 2012; ISPAT 2012; TIBA 2007; TURKSTAT 2011; UNCTAD 2012; PWC 2011; KPMG 2012) and the Turkish automotive industry (Deloitte 2010; OECD/ITF 2009; OSD 2012; Aksongur 2012) were analyzed.

5 Case Study: Intermodal Transport-Based Supply Chain Solution for Ford Otosan

As in the world over, the automotive supply chain in Turkey is global and requires complex processes. The complex supply chain in the industry runs on corporate management of cost, quality, logistics, design, and R&D in highly competitive markets. The automotive industry's complex supply systems pose a particular challenge and require expertise in information design, process planning and operations efficiency. This is because the delivery of components from numerous companies in different countries must be carefully coordinated to ensure a smooth manufacturing and assembly process. Therefore it is crucial that there is provision of transportation and logistics services that enable automotive companies to optimize their supply chains, meet tighter production schedules, and operate on the basis of lean production principles. To ensure that such complex supply systems run smoothly, automotive manufacturers have searched for innovative logistics solutions and in response to demands from automotive shippers, intermodal transport operators have developed and implemented finely tuned intermodal solutions with the use of integrated road, rail, and ocean freight services for automotive manufacturers.

Ford Otosan is the Turkish joint venture owned by Ford Motor Company and Turkish Koç Holding. Otosan currently achieves USD 3 billion in export revenue annually, making it one of Turkey's leading export businesses. Ford Otosan's main activities include the production assembly and distribution of trucks, pick-ups, mini-buses and cars under Ford license, as well as spare parts and accessories. It operates two production facilities in Kocaeli and Eskisehir (İnönü), and has a spare parts distribution centre in Istanbul (Kartal). 'Full-size' Transit van/cab-chassis models and the Transit Connect range are manufactured/assembled in the Kocaeli plant, whereas Ford Cargo trucks and their engines are manufactured in the Eskisehir plant. The capacities of Kocaeli plant and Eskisehir plant are 330,000 commercial vehicles and 65,000 engines successively (Ford 2012).

Turkish national transport is mainly dominated by road transport. However, reliance on road transport in an international context can create problems for Turkish companies such as: delays occurring from bureaucracy at the borders, road restrictions on the routes of crossing European countries, empty truck imbalances between Turkey and European countries, interruptions in road transportation due to weather conditions in the winter time and heavy traffic on the roads

especially in the summer time (OECD/ITF 2009). Needless to say, those problems could create a risk of **"unstable road transportation costs"** and **"unstable transit times"**. Without stable costs and stable lead times/transit times, supply chains can face bottlenecks resulting in poor customer service and high total costs. Considering this fact, Ford Otosan has established an intermodal transport-based supply chain system in order to create stable and continuous material flow from the suppliers located in Europe for its Kocaeli production facility.

Sarıdogan (2012) investigated cost reduction through green supply chain management practices and implemented a survey including the environmental management representative and/or the logistics representative of ISO 14001-certified organizations in Turkey. Findings of the study revealed that green supply chain management encompasses potential to achieve cost savings in transportation. Shifting from road to rail can reduce green gas emissions to a remarkable degree and is one of the main priorities listed in the White Paper of the European Union (EU White Paper 2011). Ford Otosan has also committed to environmental issues by establishing its intermodal transport-based supply chain system.

It can be stated that Ford Otosan has set forth an appreciable practice in Turkey and has gained competitiveness as a result of using innovative, cost effective, and environment friendly intermodal system integrated with its global supply chain. The next section presents the case study of Ford Otosan in terms of the intermodal transport-based supply chain considering the "cost effectiveness", "integrated customer service" and "environment" issues.

5.1 Ford Otosan Supply Chain Structure

Supply chain structure is determined by strategic decisions. Strategic supply chain decisions made by companies include whether to outsource or perform a logistics function in-house, the location and capacities of production and warehousing facilities, the products to be manufactured or stored at various locations, the modes of transportation to be made available along different shipping legs, and the type of information system to be utilized (Chopra and Meindl 2007). The Ford Otosan supply chain structure will be discussed considering the "outsourced activities", "facilities and nodal points", "management and coordination", and "modal integration".

5.1.1 Outsourced Activities

The overall management and coordination of the intermodal transport system require a degree of coordination among the actors. Apart from multimodal/intermodal transport operators, transport service providers in individual transport modes such as liner shipping companies, freight forwarders, rail and road transport companies, intermodal transport companies, third and fourth party logistics service

providers can be mentioned as the main players in the system. They have an increasing degree of involvement in intermodal operations (Slack 2001). Increasing awareness regarding the intermodal transport services by the freight forwarders and the third party logistics service providers was observed in Turkey (Denktas Sakar 2010). In terms of outsourcing, in a survey conducted by Agaran et al. (2011), transportation was found to be the area with the highest share of total logistics expenditure in Turkey as well as the area which was mostly outsourced by Turkish companies. In addition, the findings of the study revealed that the automotive industry experienced increasing outsourcing activities again with transportation being the most important outsourced activity within different industries in Turkey.

The intermodal transport service of Ford Otosan is organized on the basis of outsourcing by Omfesa which is a joint company founded by the largest Turkish logistics company Omsan Logistics and the Spanish Transfesa. Transfesa is a pan-European player and has the resources and organisation to offer the integrated management of the customer's supply chain. In order to promote this intermodality, the operator owns a major fleet of cranable swap-bodies of different types as well as trucks and semi-trailers for road consignments (Savelsberg 2008). Omsan is a leading forwarder/logistics service provider in Turkey. The scope of Omsan's services and business volume expanded rapidly in line with emerging concepts such as "integrated logistic services" and "supply chain management".

The other outsourcing activity occurred within the sourcing process in Europe. All consolidation and delivery activities are conducted by a LLP (Lead Logistics Provider) on a 4PL (fourth Party Logistics) basis in order to optimize the transit times and cube utilizations. A fourth party logistics company is an integrator that assembles the resources, capabilities and technology of its own organisation and other organisations to design, build and run comprehensive supply chain solutions.

5.1.2 Inventory and Transport: Facilities and Nodal Points

The inventory and the transport function are closely interrelated in a supply chain in that having inventory positioned and available for delivery is not enough if it cannot be delivered, when and where needed, in a cost-efficient manner (Fox 1992). This is also related to the inventory levels that the company needs to maintain. Various trade-offs should be identified and appropriate mode(s) of transportation should be selected that are compatible with the supply chain strategy of the company. Transportation service capability, capacity and costs also influence decisions regarding the number and location of supply chain facilities (Coyle et al. 2009). Storing the finished goods close to the customer can be suggested in order to prevent out-of-stock problems and to achieve responsiveness. On the other hand, there should be some investment in warehouses in terms of set-ups and operations so that a trade-off can be made in terms of locating the warehouse away from the customer and close to the source of raw materials and more should be spent on transportation to get the product to or from the warehouse. This could be accomplished well in the case of automotive supply chains that include the movement of

raw materials as well as the semi-finished or finished products, and the various nodes within the supply chain can be managed by the use of intermodal transport solutions as discussed in the case study.

Facilities are the actual physical locations in the supply chain network where inventory is stored, assembled, or fabricated. Two major types of facilities are production sites and storage sites (Chopra and Meindl 2007).

Major Facilities in the Ford Otosan Supply Chain within this case are given as below:

- **Pre-Consolidation Centres:** Before the consolidation in Cologne there are some pre-consolidation centres at various places called ODC (Origin Distribution Centre) located in Europe in order to consolidate material in order to have better cube utilization and cost efficiency.
- **Cologne Niehl Consolidation Centre:** The materials from the suppliers are being consolidated in the consolidation centre located in Cologne (Germany) Niehl Intermodal Terminal by using the Ford network within Europe.
- **Production Facility:** the Ford Otosan production facility, which is located in Kocaeli (Turkey), has the logistic advantages of being very close to the supplier industry and having its own loading port.

In addition to the above listed facilities, nodal points are used in this transportation process. **These nodal points in the Ford Otosan supply chain** are as follows;

- **Cologne Niehl Intermodal Terminal:** Niehl (Germany) Terminal is operated by CTS Container-Terminal GmbH. Road, rail and barge services are given in this terminal. Ford Otosan currently uses the railway transportation service of this terminal.
- **Railway Terminals:** Due to the passage of Istanbul Strait by train Ferry, Ford Otosan also uses the railway terminals in Haydarpaşa (Turkey-Asia) and Sirkeci (Turkey-Europe) operated by TCDD (Turkish State Railways).
- **Kosekoy Intermodal Terminal:** Omfesa has rented from TCDD (Turkish State Railways) 13,000 m^2 of terminal space at Kosekoy (Turkey) for storage, handling and customs clearance procedures.

5.1.3 Management and Coordination

Management and coordination is another component of an intermodal transport-based supply chain where intensive cooperation and coordination among transport modes are essential (Hayuth 1987). Collaboration between the different actors within the intermodal transport enables the coordinated and effective flow of cargo and information. Extensive information exchange and sharing and close collaboration creates flexible operating systems that are characterised by coordinated operations and they provide shorter channel cycle times and inventory levels. As D'Este (1996) highlighted, successful intermodal transport requires a conducive

and administrative legal environment, and the management of administrative flows and liabilities by the use of through rates and billing is an important characteristic of intermodal transport. This is mainly achieved through the use of a specific party, namely a multimodal/intermodal transport operator within the system. This party is liable for the whole process from the point of origin to the point of destination by issuing one transport document which includes an invoice for freight charges, and also a guarantee for the transit time.

The Planning Structure of Ford Otosan is based on a system developed by the company's logistics team entitled "Logistics Oriented Backward Planning (LOBP)". LOBP system controls the whole supply chain structure including the material flow, production and distribution. In the LOBP system, vehicle orders are submitted by customers **35** days before their shipment. Import parts are shipped from European Suppliers to the Cologne Niehl Consolidation Centre in **2** days and from the Consolidation Centre to the Kocaeli Production Facility in **8** days prior. All domestic parts are shipped **2** days prior to vehicle shipment date. This vehicle is offlined from the assembly line **1** day prior to the shipment to support quality checks and customs works. All planning activities are triggered by the calling date of the vessel on which the vehicle will be loaded (See Fig. 2). Main problems arising due to the lack of co-ordination at the various intermodal transfer points, causing delays, can be eliminated by the existence of a single document and an operator that provides shorter delivery, and more reliable transport, enabling a greater control of costs and schedules.

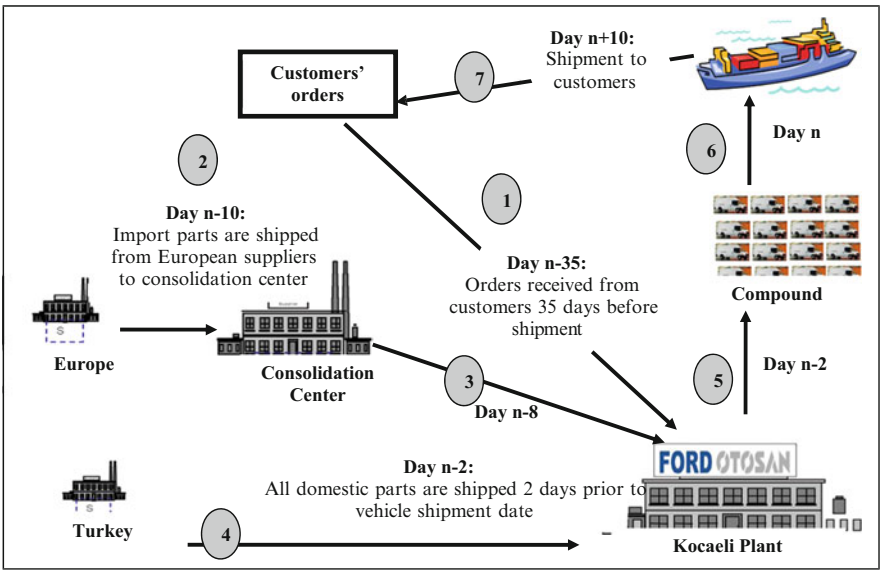

Fig. 2 Logistics oriented backward planning (LOBP) in Ford Otosan (**n** represents shipment). *Source*: Ford Otosan internal documents

5.1.4 Modal Integration: Intermodal Transportation System

Modal integration is the main dimension of the intermodal transportation system. The basis of intermodal transportation is in the development of systems that integrate the various characteristics of the five modes of transportation such as road, rail, sea, air and pipeline transport (Denktas Sakar 2010). Shifting freight at interchange points between modes may be considered inefficient and time-consuming but the increased reach and combined service advantages offered by intermodal transportation can offset these issues (Coyle et al. 2009). Greater accessibility is created by linking the individual modes. Although the use of road transportation is inevitable in the first and the last leg of the transport chain in most cases (Banomyong and Beresford 2001), there are some negative externalities of road transport including increasing pollution, accidents and related social costs such as traffic congestion in and between urban areas (Button 1990). Rail transport as an important alternative mode of transportation is added to the agenda of decision makers due to its main advantages. They can be listed as increased per-shipment volume and its effect on reducing terminal costs which result in some substantial economies of scale, that is lower per-unit costs for increased per-shipment volume and safe and reliable transit times (Hayuth 1987; Ballou 1999).

Integration of sea and rail transport options may provide many cost and service related advantages to the companies at different stages of the supply chain activities of the companies. As Stölzle et al. (2009) stated, more and more companies tend to integrate sea and rail transport and slow down their supply chains, and this increases the use of intermodal transport options in supply chain structures by increasing the use of environmentally-friendly modes.

5.1.4.1 Collection in Consolidation Centre

There are approximately 450 suppliers located all over the Europe. Currently, 35 % of total imported materials for Ford Otosan are shipped from the UK and the remaining 65 % are delivered from the Continent.

Sourcing from European suppliers to the consolidation centre in Cologne is conducted by a logistics company using the Ford Global Network. The Ford European System has 10 Pre-Consolidation Centres (ODC) and one consolidation centre. Four different delivery methods are used (See Fig. 2). These methods are;

- **Single Destination Trucks (Type 1):** In this system, only Ford Otosan materials are collected from the suppliers either by using a milk run system calling up to three suppliers or by direct FTL (Full Truck Load) shipment from a single supplier. All shipments are directed to the Cologne Consolidation Centre.
- **Multiple Destination Trucks (Type 2):** In this system, Ford Otosan and Ford Global materials are collected from the suppliers either by using a milk run system calling up to three suppliers or by direct FTL shipment from a single

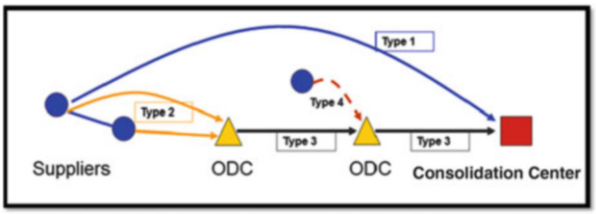

Fig. 3 Ford global network sourcing process in Europe. *Source*: Ford Otosan internal documents

supplier. All shipments are directed to the ODC (Origin Distribution Centre). Ford Otosan materials are consolidated with the other Ford Otosan materials in order to be delivered to the Cologne Consolidation Centre.

- **Origin Distribution Centre (ODC)-Origin Distribution Centre (ODC) Distribution (Type 3):** In this system, Ford Otosan and Ford Global materials are delivered from one ODC to another ODC as a FTL shipment within the Ford Global Network.
- **Collection of Less Container Load (LCL) Shipments in Origin Distribution Centre (ODC) (Type 4):** In this system, Ford Otosan and Ford Global materials are collected in an Origin Distribution Centre (ODC).

All materials collected and consolidated in the Cologne Consolidation Centre are delivered to the Cologne Intermodal Terminal in order to be delivered to the Kocaeli Production Plant in Turkey (Fig. 3).

5.1.4.2 Intermodal Transport Operations: Cologne-Kocaeli Production Facility

In the case of the integration of transport modes, the use of some specific modes of transportation in appropriate stages of the supply chain movement is suggested. Intermodal transportation combines the use of two or more basic modes to move freight from its origin to its destination. Ford Otosan has developed its intermodal system mainly on the railway transportation mode. However, sea transportation (strait passage) and road transportation (from Kosekoy to Kocaeli Production Plant) are also used in the system.

Swap bodies are loaded directly onto the wagons at the Consolidation Centre in Cologne and transferred to the intermodal terminal. The system depends on swap bodies instead of using shipping containers as the protective package instrument. Swap bodies often have the same external width of corner fittings as shipping containers, so that they can be placed on the same kinds of trucks, trailers and railroad cars designed for shipping containers.

High cube swap-bodies (Mega Combis of 13.6 m in length), being the means for door-to-door transport, are handled by mobile or gantry cranes from road to rail and vice versa in the terminals at both ends of the intermodal train route. For road transport, the swap bodies are put on skeletal trailers (chassis) being towed by tractor units. For rail transport, special double-platform wagons are used. Specific

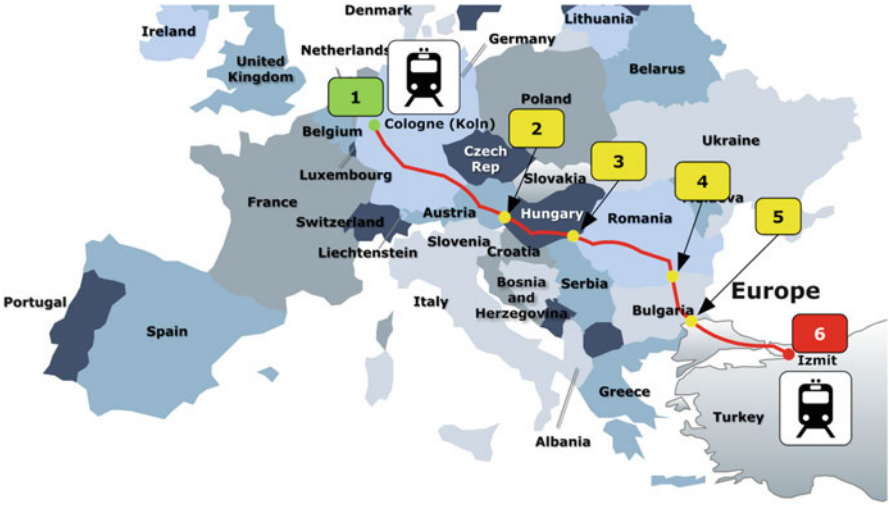

Fig. 4 The current map of intermodal transport corridor between Cologno and Kocaeli (Izmit) production plant of Ford Otosan. *Source*: Figure by authors composition

swapbodies and wagons are dedicated to this project and not circulated in an open system (Savelsberg 2008). This service, covering a distance of 2,754 km, operates 3–5 weekly block trains in both directions between Cologne (Germany) and Kosekoy on the Asian side of Turkey, using the rail ferry across the Istanbul Strait. It uses one of the Pan-European corridors (Corridor 10) passing through Germany, Austria, Hungary, Romania and Bulgaria to reach Istanbul (See Fig. 4).

The frequency of the block trains is determined by Ford Otosan. Ford Otosan also commits to filling 1/3 of the volume of each return journey to Cologne. Ford Otosan ships empty cases and some materials for the return journey. Each block train carries 30 swap bodies (internal dimensions: height 2.98 m; length 13.39 m and width 2.41 m) loaded on special low-loader rail wagons. In block train operation, there is no shunting (the process of sorting items of rolling stock into complete train sets or consists, or the reverse) and re-grouping on the route. However, operations of block trains are achieved by the local railway operators in each country during the journey. As a result, locomotives and drivers are changed in each country. After passing the Istanbul Strait by ferry, block trains reach the Kosekoy Terminal and at this point the swap bodies are transferred onto trucks by the 3PL Omfesa in order to achieve the delivery into the Kocaeli Production Plant (See Fig. 5).

5.1.4.3 Use of Information Technologies in Intermodal Operations

The use of advanced information technologies may help the customers and other parties to clearly define the services they require and integrate their operations with

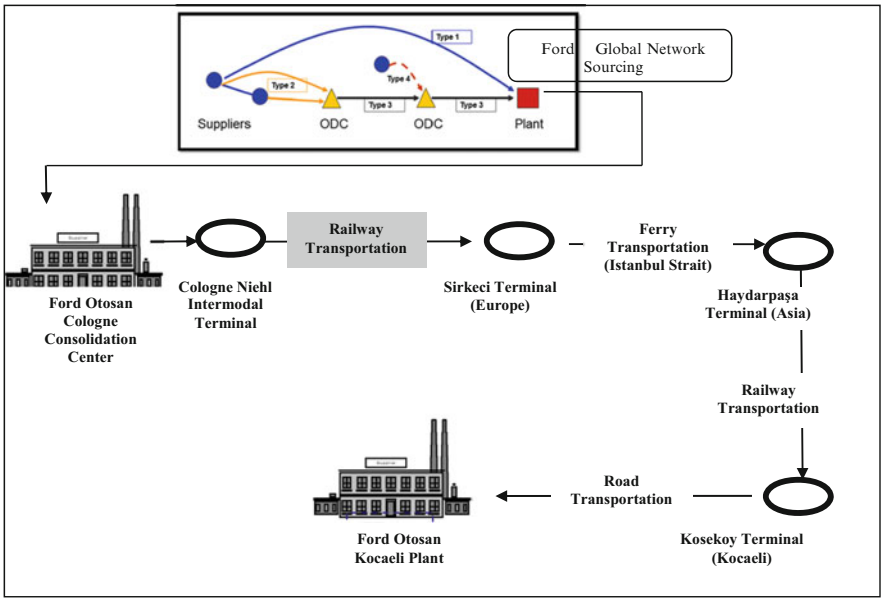

Fig. 5 Ford Otosan's components of intermodal system

the transport system. As a result, the users of intermodal transport system will be actively involved in closely-managed logistics chains, where customer decisions derive supply decisions relating to quantities, location and delivery times (OECD 2002). Since intermodal transportation not only depends on the physical interface but also upon an electronic interface to send the information necessary for moving cargo from its origin to its destination (OECD 2002), it is important to invest in technology for maximising the capacity of the entire intermodal transportation chain. Shipment monitoring and tracing tools are installed which allow global positioning in intermodal transport operation. Transfesa Online Information System (TOIS2) is used as the IT structure in order to track and search swapbodies, wagons, transport documentation, and chassis numbers during the intermodal process.

5.2 *Advantages of the Intermodal Transport-Based Supply Chain of Ford Otosan*

Advantages of the intermodal transport-based supply chain system of Ford Otosan can be analyzed in terms of environmental issues, reliable and stable transit times, and stability of transportation costs.

5.2.1 Environmental Issues and Advantages

One of the important contributions of the intermodal transport-based supply chain system is the elimination of harmful gases such as carbon monoxide, nitro oxide etc. Ford Otosan has developed a system in order to measure the eliminated harmful gases in 1 year. The system is based on the calculation of the harmful gases emitted by a truck during the journey between Cologne and Kosekoy. This journey is assumed to take approximately 44 h (average speed 40 km/h for the 2,754 km journey). Considering the shift of 11,000 trucks to intermodal operation in 2008, it can be concluded that Ford Otosan has eliminated 233,722 kg of carbon monoxide and 556,600 kg of nitro oxides in 1 year (See Table 3). The Intermodal transport-based supply chain system is also socially attractive to relieve congested traffic areas in Europe. Cologne, Frankfurt, Graz, Zagreb, Belgrade, Sofia, Zagreb and north of the river Davra as a nature protection area, are positively affected as a result of the modal shift from truck to rail (Savelsberg 2008).

5.2.2 Reliable and Stable Transit Times

Reliable and stable transit times of the transportation system are very important for Ford Otosan in order to achieve efficient customer service. Considering this objective, the contribution of the intermodal transport-based supply chain system is paramount. Average transit times during 2004–2008 can be observed in Fig. 6.

5.2.3 Stable Transportation Costs

Without stable costs, Ford Otosan could not control the total costs in its supply chain operations. The contribution of the intermodal-based supply chain system is remarkable in terms of achieving stable costs in 1 year. The success of this system is based on a yearly contract between the third party provider and Ford Otosan (Fig. 7).

Table 3 Elimination of harmful gases

Harmful gases	Per voyage[a]	1 year[b]
CO (carbon monoxide)	483 g/h × 44 h = 21.25 kg	233,772 kg
HC (hydro carbon)	152 g/h × 44 h = 6.69 kg	73,568 kg
NOx (nitro oxide)	1,150 g/h × 44 h = 50.60 kg	556,600 kg
PM (particular)	23 g/h × 44 h = 1.01 kg	11,132 kg

[a]Per voyage is assumed as 44 h
[b]Calculation of 11,000 voyages

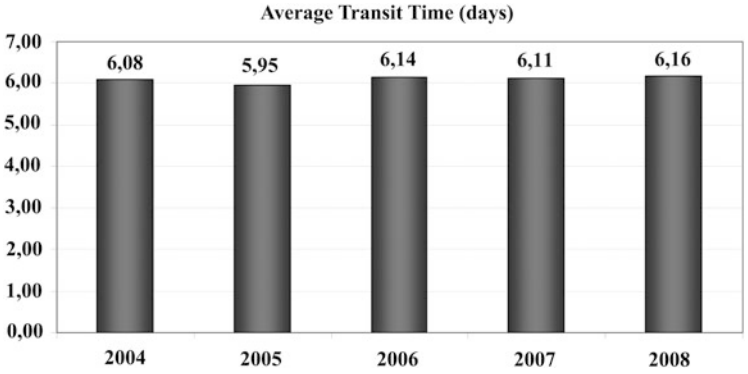

Fig. 6 Average transit time of the intermodal operation (2004–2008). *Source*: Ford Otosan internal documents

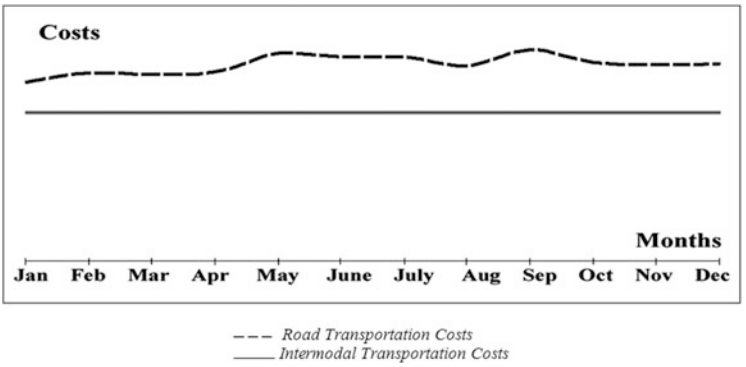

Fig. 7 Monthly comparison of transportation costs (2008). *Source*: Ford Otosan internal documents. *Dashed line*—road transportation costs. *Solid line*—intermodal transportation costs

5.3 Problems and Challenges of the System

Although there are crucial advantages of the intermodal-based supply chain system of Ford Otosan, there have been several problems and challenges of the system. Needless to say, those areas need to be improved. These areas have been assessed as: "wagon detachments" and "transit time deviations from the plan".

5.3.1 Wagon Detachments

The reasons for wagon detachments can be analyzed in four major groups: "technical", "load shift", "documentation", and "force major" (See Fig. 8). It can be stated that Ford Otosan has achieved a remarkable decline in technical problems.

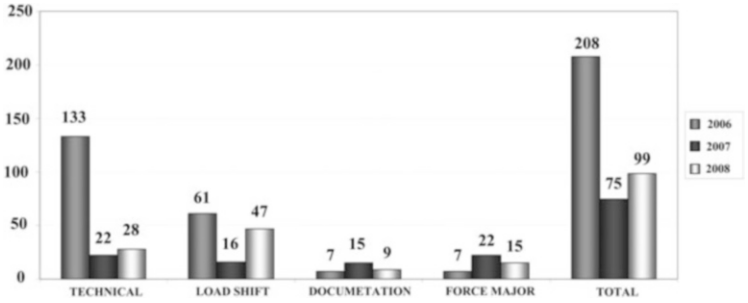

Fig. 8 Reasons of wagon detachments. *Source*: Ford Otosan documents

Table 4 Transit time analysis of the system

Route	2.754 km
Average speed	40 km/h
Actual driving time (ADT)	2.80 days
Average transit time (ATT)	6.10 days
Inefficiency (ADT-ATT)	6.10 – 2.80 = 3.30 days

Table 5 Analysis of the inefficiency

Insufficient locomotive capacity of railways	1.50 days
Customs procedures	0.80 days
Time loss at Cologne terminal due to time gap between last shunt and departure time (service provider problem)	0.50 days
Physical control	0.25 days
Unexpected maintenance works	0.25 days
Inefficiency in the supply chain	**3.30 days**

On the other hand, "load shift" and "documentation" are still observed as variables that need to be improved in order to increase the efficiency of the intermodal transport system.

5.3.2 Transit Time Deviations from the Plan

Transit time analysis of the intermodal transport service is given in Table 4. Although the actual driving time is calculated as 2.80 days, average transit time is 6.10 days. 3.30 days is considered as the inefficiency.

Ford Otosan has explored the reasons of inefficiency such as "insufficient locomotive capacity of railways", "custom procedures", "time loss at Cologne Terminal", "physical control" and "unexpected maintenance works" (See Table 5).

Needless to say, all of these reasons need more analysis in order to increase the efficiency of the system. “Insufficient locomotive capacity of railways” and “custom procedures” are related to the countries within the intermodal transport corridor. Considering this fact, those reasons are regarded as external problems that can’t be controlled by the Otosan very easily. However, the company can focus on long term solutions for those problems. On the other hand, “time loss at Cologne Terminal” can be solved by working with the logistics service provider. “Physical control” and “unexpected maintenance work” can also be solved by working with the logistics service provider.

6 Discussion

The transport function within supply chain systems has been discussed in the relevant literature and considered as a very important function that provides critical connections in the supply chain. This integration is of great importance to minimize total costs and maximize customer value in the supply chains. As mode-specific conventional transport solutions have become less able to satisfy the needs of the supply chain members, intermodal transport has emerged and transformed the freight transport systems servicing international supply chains. In the light of this, intermodal transport aims to manage inbound and outbound supply chains and logistics processes of companies in an integrated way by providing reliable, safe and environmentally friendly transport solutions.

Road transport remains the dominant mode (92 %) of national transport in Turkey. This dependence on road transport creates vulnerabilities such as congestion, environmental downsides, border crossing problems, road taxation, restrictions on road traffic, permit shortages and customs constraints. In order to overcome such undesired effects and become more sustainable, Turkey needs to develop intermodal transport solutions that can solve the transportation problems of supply chains. The unique geographic location of Turkey offers important intermodal transport opportunities for the supply chains in manufacturing industries such as the automotive industry.

The case study reveals how important the effective management of four main factors mentioned in the literature is: “hypercompetition”, “customer requirements”, “information and telecommunication technology (ICT)” and “management and integration of infrastructure and resources”. Drivers and challenges of these factors have been discussed within the Ford Otosan Case in terms of intermodal transportation.

As for **hypercompetition**, Ford Otosan has managed to control its inbound logistics activities in terms of decreasing costs. When intermodal transport is the case, successful integration of different transport modes as well as reliable delivery times should also meet expectations regarding cost issues. On the other hand, intermodal transport is not only the integration of different modes of transport. Integration of different transport operators, integration of administrative flows and

liabilities, and integration with the whole of the supply chain activities must be considered. Cost effectiveness and **customer requirements** in supply chains are considered crucial in intermodal transportation systems. Ford Otosan has achieved cost effectiveness and customer service efficiency in its supply chain operations. The success of the system is based on a yearly contract between the third party provider and Ford Otosan. As a result of this, Ford Otosan has achieved stable costs in its logistics operations.

Intermodal technologies not only include physical movement and terminal handling technologies but also cover the **advanced information and communication technologies** required for coordination. Transportation capabilities must align with the company's supply chain strategy. This means that intermodal transport-based supply chain systems must also be compatible with other supply chain activities. The supply chain planning structure developed by Ford Otosan and entitled "Logistics Oriented Backward Planning (LOBP)" has achieved that alignment to a high level. LOBP system controls the whole supply chain structure including the material flow, production and distribution. LOBP also allows administrative flows and liabilities within the system.

Management and integration of infrastructure and resources have facilitated seamless intermodal transportation within supply chains. The main issues that should be considered in this case are the constraints and co-ordination of infrastructure capacity such as policy and regulatory issues, effective management of existing infrastructure, and related considerations regarding future investment in new infrastructures.

Management and integration of infrastructure and resources is a facilitator for the seamless intermodal transportation within the supply chains. Ford Otosan has used the nodal points in the system effectively thanks to the third party logistics provider. It can be concluded that Ford Otosan has adapted to the international context by implementing an innovative solution which combines road, rail and sea. Intermodal transport serves as a cost-effective, environment-friendly and time-saving alternative for both national and international freight operations for the Ford Otosan supply chain.

The Ford Otosan case can be considered as a "success story" in many dimensions. First of all, the intermodal-based supply chain system of Ford Otosan has been operating since 2004 without any interruption. Needless to say that sustainability has been created through "integration of different transport operators". The Turkish logistics company Omsan and the Spanish Transfesa have been collaborating within the framework of a joint company titled Omfesa since 2004. On the other hand, the contribution of the local railway operators in the given transport corridor and TCDD is paramount. In addition to that integration, Ford Otosan has also supported this intermodal service by promising to shift its cargo from road transport to rail transport.

7 Conclusion

The automotive sector has become the locomotive of the Turkish economy and is expanding rapidly. Turkey has become one of the leading European countries in terms of automotive exports and logistics. Those who manage their supply chain in the automotive industry in today's globalised world will be one step ahead of their competitors. Turkey lies between Asia and Europe serving as a bridge geographically, culturally and economically. Its location on two continents is a major advantage in terms of intermodal transport opportunities in serving the markets of Europe, the Middle East and North Africa for the automotive supply chains. Turkey has become the investment base of the World's biggest automotive companies and their subsidiaries. It is vital for the Turkish automotive companies to remain competitive in order to survive in this constantly growing market. Today, it is not possible for automotive companies to remain competitive simply by launching new models onto market on time. These companies should strive for competitiveness by keeping their costs as low as possible while developing more advanced products through improved supply chain and logistics processes.

This study described Ford Otosan's supply chain across Europe, and how the company's "backward planning" enabled it to maintain an efficient intermodal transport network with the use of consolidation centres. The company has also been able to increase its inbound rail transport usage considerably by means of intermodal transport systems. The findings of the study prove that using intermodal transport in the automotive industry provides opportunities for the sustainability, efficiency and competitiveness of automotive supply chains. The case study also reveals how the intermodal transport-based supply chain systems of Ford Otosan have met the policy of the European Union to shift considerable amounts of cargo traffic from road to rail or sea and thus to relieve congested traffic areas and to be compatible with environmental issues. Ford Otosan with 70 % railway, 33 % road, and 2 % sea transportation modes usage from European shipping, seems to be the leader in using alternative transportation modes and intermodal transport systems in Turkey.

Therefore, areas to be researched in the future regarding the intermodal-based supply chain mainly concern technical, operational and managerial problems encountered by the members of the automotive supply chain. Widespread use of advanced information and communication technology between the automotive supply chain members and the logistics service provider is to help solving such problems.

Questions for Review and Discussion

1. How does the collection procedure in the consolidation centre work in Ford Otosan? What are the major contributions of this system?

2. What is the role of the intermodal transport system in terms of decreasing costs and increasing customer service?
3. What are the contributions of the current system in terms of environmental practices?
4. What are the main advantages achieved through the use of intermodal transportation in global supply chains?
5. What are the main impacts of recent developments in information and communication technologies on intermodal transport systems?
6. What are the main bottlenecks experienced in the case of automotive supply chains considering country-specific factors?
7. Discuss the advantages of the intermodal based supply chain system of Ford Otosan.
8. Discuss the opportunities and challenges of Turkey in terms of foreign direct investments in the automotive industry considering the economic, social, political and geographical factors specific to Turkey.
9. What are the lessons to be learned from the management of the Ford Otosan automotive supply chain system based on intermodal transport?

References

Agaran, B., Ulengin, F., Onsel, S., & Aktas, E. (2011). *What Turkey expects from logistics outsourcing*. 9th International Logistics and Supply Chain Congress: International Retail Logistics in the Value Era, Izmir, Turkey (October 1–17, 27–29).

Aksongur, G. (2011). *Turkish automotive industry*. Turkey: TSKB Research.

Aksongur, G. (2012). *Turkish automotive industry*. Turkey: TSKB Research.

Ballou, R. (1999). *Business logistics management-planning, organizing and controlling the supply chain*. Upper Saddle River, NJ: Prentice Hall.

Banomyong, R., & Beresford, A. (2001). Multimodal transport: The case of Laotian garment exporters. *International Journal of Physical Distribution and Logistics Management, 31*(9), 663–685.

Bask, A. H., Juga, J., & Laine, J. (2001). *Problems and prospects for intermodal transport: Theoretical tools for practical breakthroughs?* (pp. 1–23). Proceedings of 17th IMP (Industrial Marketing and Purchasing Group)-Conference, Oslo, Norway.

Bayraktar, E., Demirbag, M., Koh, S. C. L., Tatoglu, E., & Zaim, H. (2009). A casual analysis of the impact of information systems and supply chain management practices on operations performance: Evidences from manufacturing SMEs in Turkey. *International Journal of Production Economics, 122*(1), 133–149.

Button, K. (1990). Environmental externalities and transport policy. *Oxford Review of Economic Policy, 6*(2), 61–75.

Cetindamar, D., Catay, B., & Basmaci, O. S. (2005). Competition through collaboration: Insights from an initiative in the Turkish textile supply chain. *Supply Chain Management: An International Journal, 10*(4), 238–240.

Chopra, S., & Meindl, P. (2007). *Supply chain management: Strategy, planning and operations*. Upper Saddle River, NJ: Prentice Hall.

Christopher, M. (2005). *Logistics and supply chain management* (3rd ed.). London: Pearson Education.

Christopher, M., Peck, H., & Towill, D. (2006). A taxonomy for selecting global supply chain strategies. *International Journal of Logistics Management, 17*(3), 277–287.

CORDIS. (1997). *Intermodality and intermodal freight transport in the Euroepan Union*. Accessed March 24, 2012, from http://cordis.europa.eu/transport/src/taskforce/src/comift.htm

Coyle, J. J., Langley, C. J., Gibson, B. J., Novack, R. A., & Bardi, E. J. (2009). *Supply chain management: A logistics perspective*. Mason, OH: South Western.

D'Aveni, R. A. (1994). *Hypercompetition: Managing the dynamics of strategic manoeuvring*. New York: The Free Press.

D'Este, G. (1996). An event-based approach to modelling intermodal transport systems. *International Journal of Physical Distribution and Logistics Management, 26*(6), 4–15.

Deloitte. (2010). *Turkish automotive industry report*. Turkey: Republic of Turkey prime ministry investment support and promotion agency of Turkey.

Denktas Sakar, G. (2010). *Transport mode choice decisions and multimodal transport: A triangulated approach*. Izmir: Dokuz Eylul University Publications.

DeWitt, W., & Clinger, J. (1999). *Intermodal freight transportation. Transportation research board*. Accessed February 17, 2012, from http://onlinepubs.trb.org/onlinepubs/millennium/00061.pdf

Erol, I., Velioglu, M. N., Serifoglu, F. S., Buyukozkan, G., Aras, N., Demircan Cakar, N., & Korugan, A. (2010). Exploring reverse supply chain management practices in Turkey. *Supply Chain Management: An International Journal, 15*(1), 43–54.

EU. (2011). *White paper: Roadmap to a single European transport area-towards a competitive and resource efficient transport system*. Accessed June 3, 2012, from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri = COM:2011:0144:FIN:EN:PDF

Everett, S. (2001, July 18–21). *Deregulation, competitive pressures and the emergence of intermodalism* (pp. 31–40). Proceedings of International Association of Maritime Economists (IAME) annual conference, Hong Kong.

Ford Otosan. (2012). Accessed June 3, 2012, from http://ford.com.tr

Fox, M. L. (1992). The role of transportation planning in supply chain integration. *APICS–The Performance Advantage, 2*(12), 18–19.

Hayuth, Y. (1987). *Intermodality: Concept and practice*. London: Lloyd's of London Press.

Hayuth, Y. (1992). Multimodal freight transport. In B. S. Hoyle & R. D. Knowles (Eds.), *Modern transport geography* (pp. 199–214). London: Belhaven Press.

Henstra, D., Ruijork, C., & Tavasszy, L. (2007). Globalised trade, logistics and intermodality: European perspectives. In T. R. Leinbach & C. Capineri (Eds.), *Globalised freight transport, intermodality, e-commerce, logistics and sustainability* (pp. 135–163). Cheltenham: Edward Elgar.

Hoover, W. E., Eloranta, E., Holmström, J., & Huttuen, K. (2001). *Managing the demand-supply chain-value innovations for customer satisfaction*. New York: Wiley.

IBM. (2009). *The smarter supply chain of the future*. Automotive industry edition. IBM Corporation. Accessed March 1, 2012, from http://www-304.ibm.com/easyaccess/fileserve?contentid=177557

IMF. (2012, May 11). Turkey's economy: Reforms to strengthen economic stability will help Turkey's growth and jobs. *IMF Survey Magazine*.

ISPAT (Investment Support and Promotion Agency of Turkey). (2012). *Economic outlook. Turkey*. Accessed July 9, 2012, from http://www.invest.gov.tr

Iyigün, S. (2012, November 28). As Turkey's economy booms, deep inequality persists. *Reuters*.

Jones, T. C., & Riley, D. W. (1985). Using inventory for competitive advantage through supply chain management. *International Journal of Physical Distribution and Materials Management, 15*(5), 16–26.

Kaya, C. (2010). Power of Turkish automotive supply industry. *Turkish Automotive Industry, 12*(54), 22–24.

Koh, S. C. L., Demirbag, M., Bayraktar, E., Tatoglu, E., & Zaim, H. (2007). *Industrial Management & Data Systems, 107*(1), 103–124.

Kozan, K. M., Wasti, N. S., & Kuman, A. (2006). Management of buyer-supplier conflict: The case of the Turkish automotive industry. *Journal of Business Research, 59*, 662–670.

KPMG. (2012). *Invest in Turkey*. *İstanbul*. Accessed July 26, 2012, from www.kpmg.com.tr
Lowe, D. (2006). *Intermodal freight transport*. Oxford: Elsevier.
Mangan, J., Lalwani, C., & Butcher, T. (2008). *Global logistics and supply chain management*. London: Wiley.
Mason, R. J., & Lalwani, C. (2004, September 9–10). *Integrating transport into supply chain to improve supply chain performance* (pp. 565–578). Proceedings of 9th Logistics Research Network conference, Dublin, Ireland.
Morash, E. A., & Clinton, S. R. (1997). The role of transport capabilities in international supply chain management. *Transportation Journal, 36*(3), 5–17.
Muller, G. (1999). *Intermodal freight transportation*. Washington, DC: Eno Transportation Foundation.
OECD. (2001). *Intermodal freight transport: Institutional aspects*. Paris: OECD.
OECD. (2002). *Transport logistics: Shared solutions to common challenges*. Paris: OECD.
OECD/ITF. (2009). *Intermodal transport, national peer review*. Turkey: OECD.
OSD (Automotive Manufacturers Association). (2011, December). Automotive industry monthly report.
OSD (Automotive Manufacturers Association). (2012, February). Automotive industry monthly report.
Ozdemir, D. (2010). Strategic choice for Istanbul: A domestic or international orientation for logistics? *Cities, 27*, 154–163.
Prentice, B. E. (2003). *Importance of intermodal connectivity and bottleneck elimination*. Canadian Transportation Research Forum (CTRF) 38th Annual Conference, 1–10.
PWC Turkey. (2011). *Doing business in Turkey*. *İstanbul*. Accessed July 26, 2012, from www.pwc.com/tr
Rodrigue, J., Comtois, C., & Slack, B. (2006). *The geography of transport systems*. New York: Routledge.
Saatcioglu, O. Y., Deveci, D. A., & Cerit, A. G. (2009). Logistics and transportation information systems in Turkey: e-Government perspectives. *Transforming Government: People, Process and Policy, 3*(2), 144–162.
Sarıdogan, M. (2012). The impact of green supply chain management on transportation cost reduction in Turkey. *International Review of Management and Marketing, 2*(2), 112–121.
Savelsberg, E. (2008). *Innovation in European freight transportation: Basic, methodology and case studies for the European Markets*. Berlin: Springer.
Slack, B. (2001). Intermodal transportation. In A. M. Brewer, K. J. Button, & D. A. Hensher (Eds.), *Handbook of logistics and supply chain management* (pp. 141–154). London: Pergamon.
Sönmez, A. E. (2011). *Automotive and autoparts industries in Turkey*. Turkey: Export Promotion Center of Turkey.
Stalk, G., Evans, P., & Shulmn, L. E. (1992). Competing on capabilities: The new rule of corporate strategy. *Harvard Business Review, 70*, 57–69.
Stank, T., & Roath, A. (1998). Some propositions on intermodal transportation and logistics facility development: Shipper's perspective. *Transportation Journal, 37*(3), 13–24.
Stölzle, W., Bendul, J., & Kudla, N. (2009). *Intermodal transport and supply chains: Moving the global economy*. Transport for a Global Economy Forum 2009. Accessed March 11, 2012, from http://www.internationaltransportforum.org/2009/workshops/pdf/ws1-Stolzle.pdf
Taniguchi, E., & Nemoto, T. (2008). Intermodal freight transport in urban areas in Japan. In R. Konings, H. Priemus, & P. Nijkamp (Eds.), *The future of intermodal freight transport* (pp. 58–65). New York: Edward Elgar Publishing.
TEA (Turkish Exporters Assembly). (2011). *Export figures*. Turkey: TİM. Accessed August 9, 2012, from http://www.tim.org.tr/tr/ihracat-ihracat-rakamlari-tablolar.html
TEA (Turkish Exporters Assembly). (2012). *The export road map is now a state document*. Turkey: TIM. Accessed August 9, 2012, from http://www.economy.gov.tr/upload/strategy/strategy2023.pdf

Tezer, E. (2012). *The automotive industry in Turkey "Clustering"*. Turkey: Automotive Manufacturers Association.

TIBA (Turkish Industrialists and Businessmen's Association). (2007). *Transportation industry by its institutional structure, legal framework and indicators*. Istanbul: TIBA-T/2007-02/431.

TURKSTAT (Turkish Statistical Institute). (2011). *Economic indicators, Turkey*. Accessed August 9, 2012, from http://www.tuik.gov.tr

Ulengin, F., & Uray, N. (1999). Current perspectives in logistics: Turkey as a case study. *International Journal of Physical Distribution & Logistics Management, 29*(1), 22–49.

Ulusoy, G. (2003). An assessment of supply chain and innovation management practices in the manufacturing industries in Turkey. *International Journal of Production Economics, 86*(3), 251–270.

UNCTAD. (2012). *World Investment Report 2012: Towards a new generation of investment policies*. New York: United Nations.

Arafa Holding

Supply Chain Design and Operations for Luxury Men's Wear Made in Egypt

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Abstract Labor intensive industries, such as apparel, tend to migrate from developed countries to developing countries in search of cheap labor. For Egypt, a country with a population of 84 million, the apparel industry, in addition to providing new job opportunities for low to medium skilled laborers, represents a good starting point for an export-driven industrial development. Egypt offers a good migration option for apparel companies due to the relative competitive advantages of operating from Egypt: low cost of production, access to major markets (e.g., USA, and EU) through many trade agreements, industry base, and good support from the government. The government prior to 25 January 2011 revolution had a focused reform program aiming at increasing the base of exporters and promoting backward integration. As a result of that, during the period from 2006 to 2008, Egypt witnessed major investments in apparel and textiles, local companies were expanding their capacities and many foreign investors (Turkish and South Asian) were starting new investments in Egypt, and buying offices for major retailers or brands starting to source out of Egypt.

Operating from a developing country, such as Egypt, poses a set of challenges that might be different than operating in a developed country. Despite operating in a less-than-favorable environment, some apparel and textile companies from developing counties have managed to compete effectively through innovative business models for operations and supply chain design. In this paper we present a case study on such a company operating in Egypt, Arafa Holding. We study and analyze the core operational competencies that Arafa Holding has developed and the supply chain strategies that they have followed to grow from a family-owned business to a vertically integrated group with retail distribution channels in the USA and Europe, and to flourish in tough market conditions and under the current non-conducive environment in Egypt. Some of those strategies and core competencies developed include a focused operation on tailored men's wear, vertical integration and in particular forward integration into retail groups in Europe, proper management of financial risk resulting from global operations, and the human factor. We will also discuss practices that Arafa Holding has adopted to manage the knowledge

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accumulated through partnerships and joint ventures with many premium brand owners. New challenges were brought by the 25 January 2011 revolution, including security, the shortages in fuel, and labor strikes. We will discuss how Arafa holding has dealt with those challenges. We conclude by discussing the outlook for the company.

1 Introduction

The textile and apparel industry is a major contributor to the economies of many developing countries (Dicken 2007). Due to its low fixed costs and labor-intensive nature, apparel production is usually a suitable starting point for national development and export-oriented industrialization (Gereffi and Frederick 2010). In the post-quota world of textile/apparel trade, after January 2005, buyers from the USA and Europe are streamlining their supply chains to become more consolidated and rationalized. The trend is for buyers to deal with fewer, larger, and more capable suppliers in long-term strategic partnerships. Under this new environment, manufacturers are under pressure to make multiple products in small runs with shorter lead times, while abiding by high social and environmental standards. This mandates tighter coordination and integrated linkages among all parts of the supply chain, an increased supply chain transparency regarding social and environmental practices, and explicit management of the tacit knowledge accumulated through those partnerships (Gereffi and Frederick 2010).

Before the January 25th, 2011 revolution in Egypt, the textiles and apparel industry was a focal point of many government initiatives. Apparel represents one of the major employment channels for low skilled labor in a country such as Egypt, with a population of 84 million and abundant cheap labor (CIA-The World Fact Book 2012). Furthermore, the textiles and apparel industry is one of Egypt's largest manufacturing and exporting sectors, accounting for 14 % of non-Petroleum exports in 2009 (Central Bank of Egypt 2010). The Industrial Modernization Center (IMC), a governmental program for upgrading Egyptian industrial companies, launched many projects to assess the export readiness of apparel companies (Awni and Shafie 2012), and to offer specialized services to upgrade companies in this sector (IMC 2012). Furthermore, the government signed many trade agreements to provide access to major global export markets, such as Europe and the USA (Ministry of Foreign Trade and Industry 2012). The main motivation for all those agreements was to enhance the competitiveness of the Egyptian apparel exporters in the post-quota world of the Textile/Apparel trade (Birnbaum 2005).

The Egyptian apparel and textile industry managed to survive two major crises in the apparel global value chain: the MFA/quota phase-out in 2005, and the economic crises of 2008 and its impact on global apparel supply and demand. Egypt's overall export market share increased steadily since the early 1990s; the

market share remained, however, smaller than what is expected (Gereffi and Frederick 2010). As Magder (2005, p. 6) indicated:

> "While the Egyptian textile and apparel industry has some relative advantages, Egyptian companies have not fully succeeded in leveraging the country's natural resources into building a superior manufacturing industry. Furthermore, putting its exports in a global context, while the textile and apparel industry is clearly very important to Egypt, on a global level, Egyptian textile and apparel exports each accounted for only approximately 0.3 % of all global trade in each sector. Thus, while the textile and apparel industry in Egypt appears to be one of the strongest candidates for driving growth through global supply chains, the industry faces significant challenges in growing into international markets."

One of the most significant factors affecting the competitiveness of the apparel industry in Egypt is low productivity. The major reasons for this are inadequate training of managers and workers, and high labor turnover and absenteeism (Marello et al. 2009).

As the Head of the QIZ Unit at the Ministry of Trade and Industry Government of Egypt, an organizational entity created to manage and maximize the benefits of a USA market access agreement, the first author had firsthand interactions with many of the Egyptian Apparel exporters. Almost all Egyptian apparel exporters are small to medium family-owned businesses that are not open to dealing with new management concepts or technologies. The performance of those companies is very sensitive to the mindset of the owner(s). Many of those companies produced basic garments for mass market retailers, and as a result of the financial crisis and competition from cheaper countries saw their export share decrease after 2008, or had to settle for working on subcontracted orders from large companies which left little room for upgrading their supply chain management capabilities.

Few Egyptian companies managed to compete effectively in the international apparel market. Among those companies Arafa Holding stands out; the company is one of the few apparel companies in Egypt that went public with an initial public offering in 2006; the company managed to forward integrate into retail channels in Europe, and to forge strong focused partnerships with Italian branded men's apparel owners.

The purpose of this paper is to explore the operations and supply chain strategies and tactics that Arafa Holding has adopted to compete globally in the premium men's wear, never mind escaping from the traps that most apparel companies in developing countries fall for.

In the next section the research methodology is overviewed; this is followed by a brief literature survey on the critical success factors in supply chain management. In Sect. 4 we present a brief background on Egypt. In Sect. 5 we present the company background of Arafa Holding. In Sect. 6 we elaborate on the key points that enabled the company to compete effectively in the global apparel arena; viz., focused operations, vertical integration, managing of financial risks, effective IT support of supply chain operations, human resources, and knowledge management. Section 7 discusses some of the challenges that Arafa has to deal with. Finally we conclude with the outlook and the way forward.

2 Methodology

In our research we adopt a case study approach based on structured interviews of the top management of Arafa Holding (seven executives and top managers in total) and five of the buying offices that source from it. The interviews were conducted between February 2010 and March 2012. In the process we used selected Arafa Holding's press releases and investors' relations presentations. Additional materials such as government reports and press releases related to Egypt were analysed. Publicly available sources about the country were reviewed: BBC News–Egypt country profile (2012); CIA-The World Fact Book (2012) and US Department of State, Bureau of Near Eastern Affairs (2012).

The top management of Arafa Holding are frequent industry guest speakers at operations strategy MBA courses at The American University in Cairo. Arafa Holding proved to be an exemplary case for illustrating the implementation of many of the operations strategy concepts taught in the course in real life and in an Egyptian context. Discussions with the five main buying offices that source from Arafa confirmed our analysis of the main contributing factors for the success of Arafa Holding from the operations & supply chain perspective.

3 Critical Success Factors in Supply Chain Management: Literature Review

It is well recognized that supply chain management (SCM) plays a critical role in the success of companies (Christopher 2010). Using data from Gartner's supply chain top 25 rankings, Ellinger et al. (2011, 2012) show that SCM plays a major role in creating or destroying the shareholder's value of a company by directly influencing three major drivers of its financial performance: revenue, operating costs, and working capital. Furthermore, firms recognized by peers and experts for their superior SCM competency exhibit higher levels of customer satisfaction and shareholder value than their respective industry averages. It is therefore imperative to identify critical success factors for well-managed supply chains. The strategic supply chain fit, a supply chain design that is consistent with the supply and demand uncertainty in the sense of Fisher (1997): an efficient supply chain for low uncertainty in demand and supply, and an agile/responsive supply chain for high uncertainty in demand and supply, is critical for the financial performance of the company (Wagner et al. 2012). Pal and Torstensson (2011) take it a step further and discuss the critical role that concurrent designing of products, processes and supply chains plays in synthesizing and sustaining critical success factors for organizations.

Agile companies are customer focused with intensive involvement of suppliers in the process of meeting changing and dynamic customer requirements; on the other hand "less agile" companies tend to be more focused on internal operations

outcomes (Power et al. 2001). Suppliers should, in addition to supporting productivity and process improvement, promote customer satisfaction. Frohlich and Westbrook (2001) provide evidence to the direct connection between strong supplier and customer integration and improved operations and supply chain performance. Results of the analysis of a large survey of senior managers representing large organizations show that internal SCM conditions, specifically information technology and human resources, are the major drivers for improving the total level of SCM execution (Teller et al. 2012). Based on literature review, Chin et al. (2004) identified five critical strategic success factors that companies should focus on in developing and implementing supply chain strategies: building customer supplier relationships, implementing information and communication technology, re-engineering material flows, creating corporate culture, and identifying performance measurements. They conducted a survey of Hong Kong manufacturing companies to examine the extent to which those strategies were practiced. Results indicate that implementation of SCM is immature and the SCM initiatives are not fully recognized in Hong Kong manufacturing companies. The same framework was used in a case-study involving managers at a large Midwestern consumer and building products company (Tummala et al. 2006). The responses indicate that not enough resources were allocated to implement and support SCM initiatives. Managers indicated that resources could be allocated in a better way in the areas of information systems, increased training, more personnel, and aligning SCM initiatives with current priorities and resource commitments. Developing partnerships is one of the most important strategic steps in building and maintaining customer-supplier relationships, and it requires considerable resources and may involve significant risks.

In a study to analyze supply chain strategies in the luxury industry, Caniato et al. (2011) conducted a case study on 15 Italian Luxury companies from different industrial sectors. The sample contained two apparel companies that fall under the high volume low complexity quadrant that the authors used to cluster the companies, based on sales volume and product complexity. The supply chain has to be efficient in the production phase and flexible during the replenishment phase in order to follow a demand pattern that is unpredictable both in terms of volume and content. The relatively high volumes and the presence of longer life cycle products allow these companies to adopt some supply chain practices that partly resemble mass-production, such as make-to-stock, production off-shoring, or the use of MRP or ERP systems as adapted to the luxury context. The requirements to protect the unique resources and to ensure top quality product create the need for tight control over the sourcing network.

4 Egypt

Egypt is located in the northeastern corner of Africa. The total area of the country, 1,001,450 km^2, is mainly a desert plateau terrain that is interrupted by the Nile valley and delta. The climate is mainly dry with hot summers and moderate winters. Egypt is the most populous Arab country and the second-most populous in Africa. Nearly all of the country's 84 million people live in Cairo, Alexandria, and major cities on the banks of the Nile or the Nile delta (CIA-The World Fact Book 2012). The official language is Arabic, and 90 % of the population is Muslim (mostly Sunni), 10 % is Christian (mostly Coptic). Egypt existed as a unified state for over 5,000 years. The country has a rich history that extends from the times of the Pharaohs. The global image of the country is still around the Pharaonic antiquities such as the pyramids of Giza. The country has a rich culture. Many attribute Egypt's subtle influence throughout the Middle East to the influence of its movies, songs and literature in the whole region.

The GDP of Egypt in 2011 was $235.7 billion, or $525.6 billion adjusted for purchasing power parity. Agriculture contributed to 14.5 % of the GDP, while industry contributed to 37.6 % and services contributed to 47.6 %. The major industries are food processing, textiles, tourism, chemicals, petrochemicals, construction, light manufacturing, iron and steel products, aluminum, cement and military equipment In 2012 exports were $27.96 billion, mainly of crude oil and petroleum products, cotton, textiles, metal products, chemicals, processed food, the major markets being the EU, US, and Middle East. Imports were $57.41 billion, mainly of machinery and equipment, foodstuffs, chemicals, wood products, fuels, the major suppliers being the EU, US and China. To support export-led growth, the government signed many trade agreements intended to provide Egyptian exporters with free market access to critical markets, thus enhancing their competitive advantage. Such trade agreements include Egypt-EU Partnership Agreement, the Pan Arab Free Trade Area (PAFTA), Common Market for Eastern and Southern Africa (COMESA), Egypt-Turkey Free Trade Area, and the Qualified Industrial Zones (QIZ) for the USA (Ministry of Foreign Trade and Industry 2012).

The Egyptian economy relies heavily on tourism, oil and gas exports, and Suez Canal revenues, much of which is either controlled by the public sector or is vulnerable to outside factors. Furthermore, the economy is dragged down by substantial food, housing, and energy subsidies. In 2004 the Government of Egypt embarked on a reform initiative to improve Egypt's competitiveness, attract foreign investments and facilitate GDP growth. Between 2005 and 2008 the Egyptian economy experienced steady GDP growth rates of around 7 %. This growth dropped to slightly below 5 % during the global economic crisis. Many improvements have been made to the business and regulatory environment, but there is still much room for improvement.

With a workforce size of 27.74 million, median age of 24.6 years and unemployment rate of 12.2 % (data for 2011 from US Department of State and CIA World Fact Book), the main challenge of the government is creating jobs. Despite

the improvements that followed the reforms, the living conditions for the average Egyptian remained poor and 20 % of the total population remained below the poverty line. This contributed to wide public discontent and wide spread non-violent demonstration that started on 25 January 2011 and led to the eventual resignation of President Hosni Mubarak on 11 February 2011. The national leadership was assumed by a Supreme Council of Armed Forces (SCAF). Presidential elections held in May and June 2012 brought in the Muslim Brotherhood candidate Mohammed Morsi as president.

Egypt's industry, tourism and foreign direct investments all suffered a major blow as a result of the revolution on 25 January 2011. Egypt's economy, in addition to contracting since the revolution of January 25, 2011, suffered from high inflation, low consumer confidence, and labor unrest; and the slow recovery is highly vulnerable to perceptions about Egypt's internal political stability and security. Most of the experts agree that Egypt's generous subsidies on food and fuel are unsustainable. The government has a hard choice regarding its support of the Egyptian Pound, and pegging the exchange rate versus the US Dollar. Continuing the support will result in very unfavorable conditions for exporters, with the rising cost of local production associated with rising inflation rates, which are hovering around 10 % (Monthly Inflation Note, Central Bank of Egypt, August 2012). On the other hand, a weaker pound will lead to higher prices for imported food and fuel, putting an extra burden on the country's tight budget and may force an abrupt drop in subsidies (WSJ 2012). Furthermore, Egypt now imports about 40 % of what it consumes of petroleum and fuel products each year. With the rising global prices of fuel, public expenditure on energy is likely to increase by 25 % (Ahram online 2012).

With a low average individual income, most Egyptian consumers are very price sensitive. This has resulted in supply chain operations that are focused mainly on cost reduction initiatives that are to a large extent internally focused. There are few papers on world class manufacturing initiatives in Egypt, such as lean or six sigma implementations—refer for example to Salahedin (2005) and Eid (2009). There is an obvious dearth of literature on supply chain strategy in the Egyptian context. This research attempts to address this issue by studying an exemplary Egyptian company, Arafa Holding, from the perspective of supply chain and operations strategy.

5 Company Background

Arafa Holding has its roots in the fabric retailing business in the Nile Delta region in the early 1900s. The family business was nationalized during the Gamal Abdel Nasser reign in 1956. In 1974 the family business was re-launched again, and was expanded later to include operations in textile and apparel production. The Group, which went public in 2006, has been following an aggressive course of growth-by-acquisition focused on retail operations to complement its organic growth in

manufacturing operations. Today the Group is the largest textile/apparel business in Egypt and accounts for 11 % of the total country's exports of ready-made-garments, most of which are men's formal wear, retailed in both mainstream and upmarket chains in Europe and the USA. At the retailing end Arafa enjoys a prominent position in Europe. Arafa controls 12 % of the UK suite market through a majority stake in the Baird Group. According to the Financial Times (2010): "if you are browsing the formal men's wear section of a UK department store, the chances are that you will find yourself looking at suits made or distributed by Arafa Holding." The Wall Street Journal (2005) reported that Arafa is "making $1,300 men's suits for Valentino, one of the most storied names in Italian Luxury." In the Egyptian retail scene, the Group has been increasing its presence through the "Concrete" brand stores, which had reached 47 retail stores by end of 2011.

Even after the turmoil that followed the Egyptian revolution of 25 January 2011, the Group remains resilient and its export numbers seem to be unaffected. Planned joined ventures with leading European brands continued; the Group announced on 5 September 2011, a 50:50 Joint Venture agreement with Emenegildo Zegna, a leading Luxury men's wear group, to establish a shirt manufacturing company, CAMEGIT for Garment Manufacturing, in Beni Sweif, a governorate in Upper Egypt, to produce luxury Egyptian cotton shirts (Arafa Holding Press Release 2011). Arafa made great progress from its beginnings as a traditional family company to a well-managed group of companies with proper corporate governance mechanisms. Along with the IPO, in late 2006, Arafa took steps to separate management from ownership and professional staff were recruited or groomed from within to fill top executive positions. The IPO also enabled Arafa Holding to secure the funds necessary to pursue their growth by acquisition strategy.

As illustrated Fig. 1, Arafa's operations are divided into three main operational segments: Textiles, Apparel & Tailoring, and Retail. Subsidiaries from each of these segments are conceptually grouped together to form three stand-alone fully integrated business lines, each of which caters to a particular market sector; the Luxury sector, the Formal sector, and the Casual sector. The local and international subsidiaries are consolidated under Arafa Holding, with companies in each segment being grouped under a sub-holding company. All UK subsidiaries have been restructured under the "Baird Group", 79.4 % owned by Arafa. Moreover the company holds a 35 % stake in Gruppo Forall, the Italian company owning the prestigious brand PAL ZILERI.

Arafa acknowledges its social responsibility and strives to be a good corporate citizen. A CSR Officer was recently appointed with two major focus areas: people and environment. A new employee who joins one of the Arafa Holding companies is given a thorough orientation on the company's code of business conduct, Health, Safety & Environment, human rights, and labor law. Arafa have implemented measures and processes for gender equality. The Swiss Garment Company (SGC), a subsidiary of Arafa Holding, was classified as one of the top five role models in Egypt in gender equality by the Commercial International Bank and UNFEM. SGC is CTPAT (Custom Trade Partnership against Terrorism) certified through an authorized third party. Furthermore, SGC is ISO 14001 certified.

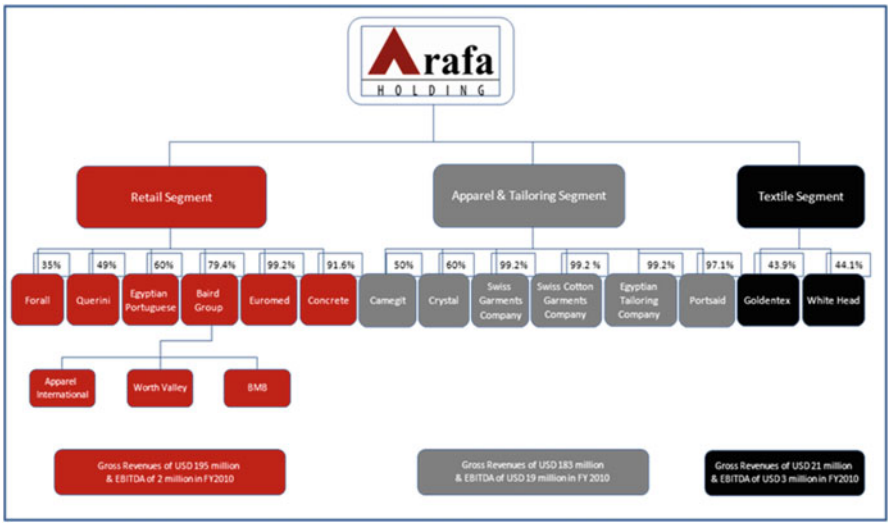

Fig. 1 Arafa Holding corporate structure. (courtesy of Arafa Holding)

Arafa Holding contributes to many philanthropic activities, such as the Arafa Charity Hospital in Menofia, and the Yahia Arafa Charity foundation for orphans in Heliopolis.

6 Operations and Supply Chain Strategy

Based on analysis of the information obtained from interviews with the top management of Arafa Holding and buying offices in Egypt that source from it, we found six critical factors that have contributed to the firm's success. Those factors are:

1. focused operations
2. vertical integration business model
3. management of financial risks
4. effective IT support to SC operations
5. human resources
6. knowledge management

We will discuss each point in further detail in this section.

6.1 Focused Operations

Arafa Holding's vision, "to be a global market player and a European market leader in men's wear" (Arafa Holding 2012), uncovers a clear aspiration on the global level, but underscores a clear intended focus on men's wear. Focused operations result when required competencies are restricted to a narrow set of the competency space of cost, variety, speed and quality, Van Miegham (2008). This allows the company to tailor its system of operations and resources required to provide this narrow set of competencies, resulting in efficiencies and improved learning.

Arafa focuses on tailored men's apparel, in the formal, casual and luxury sectors. This segment of the garment industry is relatively stable compared to women's wear. This choice ensures that most of the training for direct labor and supervisors, and the design of the production process, as well as the types of fabrics they need in production will not need drastic changes. This allows for fine-tuning the operations to the needs of this specific market segment, resulting in high customer satisfaction and efficient operations. Furthermore, the focus on formal wear, which is more profitable than the average profit of the apparel segment in general, enabled Arafa to get expertise from Europe to enhance and upgrade its production capabilities, to pay higher salaries for top management and high-skilled labor, and to invest in its growth by acquisition. In the future, the focus on the luxury market, which proved to be resilient during the slow economic times, in addition to boosting the company's profitability, is expected to intensify.

Still under this limited portfolio, Arafa Holding's tailoring segment makes a wide assortment of men's apparel including casual and formal wear, full canvas and half canvas suits. Arafa needs to manage its different product lines in different ways; the level of skills of the direct workers and the type of supervision required vary from one product to another, and there are high turnover rates associated with the lower level of skills. Arafa gains more economies of scale and improved learning through dedicating a subsidiary to each sector of the business, and dividing their production facilities, as suggested by Skinner (1974), to focus on a specific class of products or processes. Huckman (2009) shows that it is essential to have narrowly defined objectives for each of these units, and to know to what degree best practices, skills and knowledge should be shared between these different units. This seems to be followed by Arafa, as shown below.

- The Port Said Garment Company owns 50 % of the Middle East Tailoring Company (METCO), a joint venture with Bagir. METCO exclusively manufactures formal trousers and formal jackets for Marks & Spencer. Besides offering only very narrow product lines, the single client who is served by the company calls not only for similar quality levels but also similar packaging processes, and stable future delivery schedules.
- The Egyptian Tailoring Company (ETC) focuses on formal suits, including luxury formal trousers and jackets, for an assortment of customers such as Querini, with brands such as Valentino, the local retailer chain of Concrete, and dedicated production lines for Hugo Boss and PAL ZILERI. Here the focus

could not be decided based on client, since the volume of orders per client is apparently below the capacity level of an entire manufacturing facility. Not all of these clients are international, and this means that ETC will take care of both exports and domestic logistics from the same outlet. However, the dimension of the focus here is still the group of products, namely formal wear. Only narrow differences between the skill levels exist and the supervisors can be exchanged between the lines to make up for absenteeism or urgent workloads.

- SGC, the Swiss garment company, SGC, produces both casual and formal wear including half as well as full canvas suits, mainly for export to leading retailers in the USA and BMB in the UK. The variety of products made in SGC is apparently the most challenging thing for the focused strategy. The way Arafa has managed to implement focused operations here is by building small factories inside the big factory. There is almost complete separation between the shop floors that deal with different product lines. It is merely the premises and the management system that are still shared between the small factories.
- The determination of SGC to become more focused was evident when this company inaugurated the new facility in Beni Sweif for Swiss Cotton Garment which focuses on a much narrower line of products, mostly casual trousers. Beni Sweif also hosts the facility for Crystal, focusing on casual shirts, and CAMGIT, focusing on luxury shirts.

6.2 Supply Chain Strategy: Vertical Integration

Vertical integration is expanding the company's set of activities backward towards its sources of supply, or forward towards the final customer. If done properly this will afford the company improved market and technological intelligence, control over relevant aspects of the company's environment, and provision of low-cost opportunities, Hill (2000). In a vertically integrated supply chain, one party has influence over parts of the supply chain. The main advantage of vertical integration is control, visibility, and ease of collaboration and synchronization of materials and information flow across the supply chain (Bowersox et al. 2010). Vertical integration can be achieved either through internal growth, or through mergers and acquisitions of organizations. Many companies that must operate fast supply chains design their supply chains with some element of vertical integration. Zara and IKEA for example, have limited ownership of production capacity, but they own warehouses in addition to their retail outlets (Jonsson 2008). The ownership of the production facility helps secure availability of capacity, which is critical for a quick response. Vertical integration has its perils. It is usually very costly to implement the strategy, and it is very hard to undo vertical integration decisions. Stuckey and White (1993) provide an approach to help managers decide when to integrate and when not to.

Arafa adopted a vertically integrated model to provide a rapid response supply to its customers, to allow for better cost management and economies of scale, and to

mitigate operational risks. The Group started by selling fabric and apparel in the local market, added production of fabric and apparel, and eventually through targeted acquisitions went into retail focused on Europe. Arafa aims to acquire a controlling stake of the targeted retail group (around 30 %, and sometimes with an option to buy the remaining shares). This strategy enables Arafa to influence the retailer buying decisions towards its manufacturing operations in Egypt and to gain access to valuable retail market information—all without disruption to the target retail group. This strategy of expanding into retail has a significant impact on guaranteeing a minimum level of utilization of manufacturing capacity in Egypt and mitigating the risk of underutilization.

Arafa focuses on partnerships/Joint Ventures in the apparel and textile segment, with the potential to attract top notch Italian and European manufacturers to Egypt, with selective expansion in the retail segment locally and internationally. Arafa also relies on a global distribution network for the marketing and distribution of its products.

Arafa follows a "quasi" vertical integration business model, where each affiliated company is allowed to operate freely and competitively in its own market. This model is used to ensure efficient supply chain management and to result in economies of scale in their entire set of operations. To gain more insight about what is really meant by quasi vertical integration, we can take the example of the Swiss Garment Company (SGC), the Arafa Holding's member firm specializing in the tailoring of casual and formal men's wear. One of the orders SGC receives is for producing a quantity of 300,000 formal trousers for the UK retailer, BMB, according to a pre-specified schedule over a period of 4 months. The fabric required to make these trousers can be sourced from a number of local and international suppliers, one of which is Goldentex, one of Arafa's member firms, that produces quality wool fabrics and exports almost 60 % of its production. In order to source from Goldentex, SGC and Goldentex must first agree on the contractual terms that are acceptable to both of them, otherwise neither of them is forced to take the deal. At the same time, another member company under the textile segment of the Group, White Head, produces certain types of wool yarns, some of which are also produced by Goldentex. In case a deal between Goldentex and SGC is made, Goldentex has the option to source certain quantities of yarns from White Head if it makes economical sense to do so. Arafa Holding does not normally have to be involved in those business decisions. It is left to the retailers, the manufacturing companies, as well as the raw material producers, to make their own decisions.

Figure 2 shows the vertically integrated business model of the Group. Arafa Holding is interested in targeting 75 % of the sales to BMB, the UK retail subsidiary, to be sourced from the member manufacturing firms. The main reason they believe this 75 % target is achievable is not that Arafa Holding owns 79.4 % of the Baird Group, the owners of BMB; it is the quasi integration model which has allowed the Apparel and Tailoring segment to be more competitive, thus to qualify for more orders from both external customers and group retail members. Since the early 1990s Arafa Holding has been using this model of integration and aiming at a very selective acquisition path for the purpose of reaping the resultant synergy

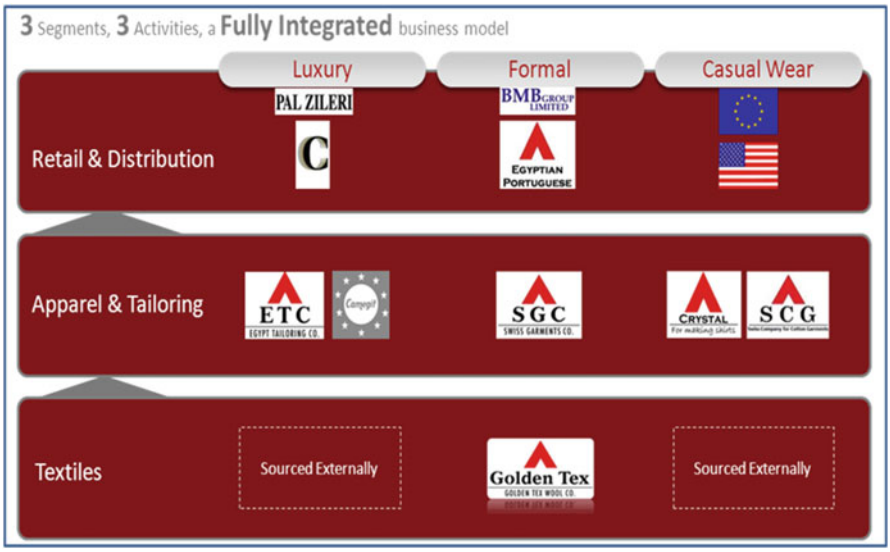

Fig. 2 Arafa Holding's vertically integrated business model. (courtesy of Arafa Holding)

(Arafa Holding Investor's presentation 2010). This strategy of expanding into retail has a significant impact on guaranteeing a minimum level of utilization of the manufacturing capacity in Egypt and mitigating the risk of underutilization. It affords Arafa's apparel and tailoring sector better information on the shape of future demand. This business model also allows for better cost management, economies of scale, and helps to minimize operational risks. The financial structure of the different owned entities still allows Arafa to intervene and support one entity that is suffering from severe difficulties. This happened during the latest global recession wave that befell most of the local apparel producers in late 2008 and most of 2009. During that time, the rules of the game were changed as the sovereignty of the firms was moderately diluted for the sake of saving SGC from severe underutilization. The holding company influenced the UK retail group BMB to absorb a certain volume of production that helped keep the machines of SGC running. Once these months of downturn were over, corporate control over the member firms retracted to its normal level, giving the control back to each subsidiary.

6.3 Global Operations Risk: Managing Foreign Currency Exposure

Great risks for companies operating globally stem from currency exchange rates. Financial hedging tools are used extensively to manage risks associated with global sourcing and selling in different currencies (See Dornier et al. 1998). With a global

operation that sources from Asia, produces in Egypt, and sells in Europe and the US, Arafa is exposed to the fluctuations of five different currencies. Therefore, it was essential to manage foreign currency exposure in order to guarantee a healthy profitable growth. The chief financial officer along with the top management must be quite alert to any term in the contract that might affect their exposure to foreign currency fluctuations. One typical example is given here. A well-known European branded apparel placed a sizeable order for ETC to produce 5 million euros' worth of formal suits. For ETC to fulfil their requirements of raw materials, they need to have 1.5 million dollars' worth of supplementary high quality inputs from an Asian producer. So throughout the schedule of this order, which is 6 months, ETC would have built up account receivables of 5 million euros, account payables of 1.5 million dollars, in addition to the account payables in Egyptian pounds that reflects the total cost of production Arafa would have accrued. However, over the same period of 6 months, the exchange rates of both the Egyptian pounds and Euros against the dollar can never be guaranteed, and the profit margin is very likely to be jeopardized. Given the already slim profit margin of the ready-made garment industry, some slight increase in the Dollar/Euro rate can eat up the entire profit. International firms are well accustomed to doing their utmost to protect themselves from these kinds of risks, thanks to the abundance of sophisticated financial services that provide varieties of future contracts and hedging derivatives. Arafa tries to manage such exposure using "natural hedging" of the income statement without resorting to complicated derivatives. Simply, they try to negotiate the payment terms of both account payables and receivables to be made in the same currency and to be due around the same time. In this way the exposure becomes a minimum and the cost of hedging is saved. If natural hedging is not possible then Arafa would resort to financial services that provide varieties of future contracts and hedging derivatives.

6.4 IT Support for Supply Chain Integration

IT enables the integration of the supply chain logistics activities, planning, execution, and communication necessary for operating a large supply chain. It provides the infrastructure required to electronically manage the order-to-delivery information and to streamline the required financial transactions. EDI, XML and RFID enable quicker and more reliable communication between supply chain partners, Bowersox et al. (2010) and Stadler and Kilger (2005). ERP remains the most common planning and execution system. Most ERP systems now provide specialized functionality that used to be provided by specialized systems, such as Advanced Planning Systems (APS), Transportation Management Systems (TMS), or Warehouse Management Systems (WMS). The data communications and identification systems and tools to provide ERP with the required data include EDI and RFID.

IT plays a critical role at Arafa Holding in streamlining operations and improving the exchange of information within the group and with its partners, suppliers

and vendors. Arafa Holding has implemented Microsoft Dynamics AX, an ERP system with specific modules/functionality for apparel and textile companies. The system links and integrates all the different departments and supply chain partners together. The system enforces a single number point that is accessible by all functions of the organization. This results in less data errors, and hence improved operational planning and execution of the supply chain. The order entry process is streamlined from the creation of the order, design, procurement of required raw materials, delivery of raw materials to the warehouse, production, inventory of finished goods, and delivery to the customer. Relevant information is shared with all supply chain partners: suppliers and customers. Information about demand, plans and inventory are shared in real time, which improves supply chain visibility. Customers can track the status of their orders from the production schedule, amount produced, and delivery progress in real time.

The system provides real-time data starting from sales orders. The system uses the Bill of Materials (BOM) associated with each order to calculate all required materials and create a Purchase Order (PO) for raw materials that is submitted to suppliers. Material delivered to the warehouse is marked as Goods Received in the ERP, so production planning can schedule the production plan for the order. The warehouse releases the materials based on the production plan and BOM. Furthermore, the system follows up on the daily production progress, and sends update reports to production, factory managers and some of the customers such as Pal Zileri. After the production order is completed, the finished goods are sent to the finished goods warehouse, and corresponding shipping orders and invoices are created. This ERP system is also integrated with EDI systems for some customers so that when goods are ready for shipping, a notice is send to the customer system which generates pick and pack shipping orders to be sent directly to customer's retailers.

6.5 The Human Resources: The Main Asset for Operations Strategy

According to Gattorna (2012, p. 121) supposedly the best organizations in the world "failed to grasp the fundamental reality that what really drives supply chains is people and their behavior—not technology or infrastructure, or assets, or anything else—those are just enablers at best." To achieve any measure of supply chain success, three critical elements must be kept in balance, people, processes and technology, Quinn (2004). Furthermore, Van Hoek et al. (2002) stress the importance of having managers with the right capabilities to achieve supply chain success. Upton (1995) conducted research to answer the question: "what makes factories flexible?" He concluded that a cross-trained workforce, not technology, is the main attribute for flexible factories.

Buyers and investors will follow value, not cheap labor cost. The capacity of any apparel company to generate value is primarily determined by the quality of its workers, including top management. Arafa appreciates the critical role their human capital can play in the healthy future of the company and in supporting their supply chain strategies and initiatives. The Group has spared no efforts in recruiting and retaining needed talent both at the management level and at the factory workforce level. Professional staff are recruited or groomed from within to fill top and middle management positions.

The majority of apparel factories rely heavily on the people element for their success. Due to the complexity and variety of the apparel products, no machine is capable of replacing the human element completely from the assembly of woven products, Bheda (2003). Two key factors that can affect overall productivity are skill level and work methods. With the breakup of each task into smaller sub-tasks that are performed by workers in assembly-like operations, the skill level requirements of the operations have been reduced. An average person can master his task after some initial training.

Even though developing countries with an abundance of cheap labor, such as Egypt, have a great economic advantage when it comes to labor-intensive industries such as apparel, this does not mean that managing labor-intensive operations in Egypt is an easy job. The phenomenon of high turnover is a natural consequence of the dependency on low-skilled cheap labor in this industry, with its severe negative effect on productivity. High turnover puts the company under excessive burden of being in a continuous state of training and recruitment to compensate for lost labor, which negatively affects the actual productive time. To compensate for the effect of turnover and absenteeism, Arafa employs a practice of using multi-skilled individuals, referred to as "jokers," who can perform many tasks to balance lines that might be affected by turnover or absenteeism of some of its workers.

The Swiss Garment Company, a subsidiary of the Group, conducts exit interviews with factory workers leaving the firm. Furthermore, to reach potential labor recruits living in the countryside and in remote villages, Arafa has invested heavily in building a network of strong relationships with the mayors of villages where they can recruit from. In an attempt to facilitate workers' access to manufacturing facilities, Arafa not only provides transportation facilities to workers, but also provides homes for some of the workers in the 10th of Ramadan Factory.

6.6 Knowledge Management

According to Mangon et al. (2012) there is a multitude of data and information in any contemporary global supply chain about the management of operations; and knowledge is gained through the internalization and understanding of this information. Knowledge is either explicit, i.e. available and stored in information systems or any other knowledge repository, or tacit (implicit), i.e. held in the heads of employees. Knowledge management is concerned with the effective design and

management of processes for acquiring knowledge, retaining it, and disseminating it within the corporation. This is a critical enabler to gaining competitive advantage, as indicated by Danskin et al. (2005). Knowledge creation is essential for creating new products or for implementing new processes for managing the logistics and supply chain operations. The knowledge created at any point in the supply chain should be accessible across the supply chain, Mangon et al. (2012).

Arafa managed through its partnerships to transfer know-how from top Italian manufacturers and design houses to its plants in Egypt. This resulted in the upgrading of workforce skills and developing of knowledge that can be used for other clients and markets. Those partnerships were used in the past to develop knowledge pertaining to suits, trousers and jackets. The same approach is used, through a joint venture with Zegna, to develop knowledge pertaining to shirt making, a new product for Arafa that complements their product portfolio nicely.

Italian technical staff, providing needed expertise for supervision, quality assurance, or work methods design, are shadowed by Egyptian technical staff who speak Italian fluently at the joint venture facilities or the dedicated production lines. Those Egyptian staff are used to translate between the Italian technical staff and the other workers, and are also a vehicle for knowledge transfer from the JV partner to Arafa. The knowledge captured through partnership with leading brand owners is disseminated throughout the company through systematic training conducted at all levels of the organization.

We will show an example of retaining the knowledge, through the training library, an example of creating knowledge through partnership with Pal Zileri, and disseminating the knowledge through training.

6.6.1 The Training Library

In the early 1990s, training at Arafa was conducted through the conventional way which relied on bringing foreign experts to teach the direct workers how to do the tasks. Both lectures and on-the-job training formats were used. The results of such conventional training were quite humble and according to the analysis, the reasons were mainly due to language barriers that were prohibitive, significant frictions that usually arose between the instructors and the trainees due to cultural disparities, and the common tendency of many trainees to avoid the embarrassment of exposing their lower rate of learning. Supplementary training material was then initiated for the purpose of minimizing those issues.

In 2000, Arafa holding sent a whole team to a famous apparel factory in Italy to learn the knowhow of different manufacturing processes. The team recorded all manufacturing processes on videotapes capturing the entire processes in fine details. Some complicated steps were even recorded from two or three angles to make it very clear for the viewer to see the fine details of each task of the process. With all those fine details available, a huge volume of very useful contents was composed which was later called the “Training Library.” Thanks to this library, the need for foreign trainers was cut to a minimum and the effectiveness of the training

was boosted. This initiative was really a transformational step in the success of Arafa. The average training period required to prepare a worker for a certain new task is about 10 days, after which he/she can take his slot in the line, and start working.

6.6.2 Partnership with Pal Zileri

When Pal Zileri first came to the Egyptian Tailoring Company (ETC) factory, they did not have any major concerns about the current production steps. They requested some minor modifications to suit their style. They had initial production orders with relatively low capacities to test ETC. They had an in house representative to witness all production steps. In 2008 Arafa holding built a new factory, ETC2, for Pal Zileri orders. Nowadays orders have increased by more than 500 %, with two Pal Zileri representatives to witness the cutting and production steps. ETC2 also have two Italian experts who are working fully for ETC2 to ensure that quality levels up to their standards are maintained and to promote new methods as well. Due to the unique type of orders from Pal Zileri, an order could consist of three pieces while normal orders could reach 2000 pieces. The documentation and specification of each piece are transferred from Pal Zileri to ETC2 to maximize quality and eliminate errors. New branded apparel customers are now dealing with ETC2 such as Zegna. Some minor modifications had to be made to production processes again to best fit each brand style.

6.6.3 Skill Upgrading: Training

Arafa prefers to hire new shop floor workers with no previous similar work experience, to avoid any bad work habits, and to train them according to their own work methods and corporate culture. A standardized process of training, consisting of different stages with dedicated resources, is employed. This has enabled Arafa to cut the training lead time and to improve the quality of the training thus mitigating the impact of the rising turnover rates. Arafa Holding also provide educational assistance to high potential employees who are interested in continuing studying in fields that benefit both the employee and the organization, such as an MBA or diplomas.

7 Arafa's Response to Major Challenges

Apparel is a labor-intensive industry, and as such labor management poses a major challenge. One of the most significant factors affecting the competitiveness of the apparel industry in Egypt is low productivity (Marello et al. 2009). The main reasons for the low productivity are inadequate training and supervision, which

are typically internal factors within a company, and high turnover and long commute of labor, which are external factors. We discussed the role of training and supervision earlier. Here we will focus on the external factors of high turnover and the long commute. The total cost of labor includes, in addition to the straight salaries and benefits of the workers, the transportation cost of workers and costs associated with turnover and absenteeism.

Arafa Holding, as any company operating from Egypt, is currently experiencing tremendous challenges in the aftermath of the 25 January 2011 revolution. These challenges stem from the security situation, the shortages in fuel, and the labor strikes.

We will show how Arafa Holding has dealt with both types of challenges, the labor challenges and the aftermath of the 25 January revolution. We will first describe the challenges and then discuss how Arafa Holding responded to those challenges.

7.1 Solving Labor Challenges

The apparel industry in Egypt, and in most developing countries, is marred with high turnover at the shop floor level. One of the main reasons for high turnover is due to the nature of this industry; it attracts many females, who work for a few years to financially support their marriage, and then after they get married and as soon as they have children they stop working to take care of their family. Furthermore, with the growth in the export-led apparel industry in Egypt between 2005 and 2010, many companies started offering higher salaries to lure experienced workers away from their competitors, which aggravated the already high turnover even more.

Arafa tries to recruit from areas where other competing factories do not; relying on their large fleet of buses which other factories do not have. They rely on their efficient training system to speed up the learning curve. In this place, a newcomer can get introduced to the work environment, complete the employment paper work, and get adequately trained in only 5 days. After those 5 days, he/she can start working under some supervision by an experienced colleague, and become normally productive at his/her own pace.

For already hired staff, Arafa Holding tackles the high turnover issue by adopting a wide variety of measures to retain employees. A crucial retaining tool is the excellent working conditions at the factories. Their direct workers love the factories because most areas are air-conditioned. All factories have restaurants for all workers and managers and which provide hot meals, sandwiches and soft drinks at subsidized prices; the facility is given to the service provider for free in return for good prices. The factories have an onsite clinic with a contracted physician who is available during working hours to provide regular medical treatment for all staff.

To overcome the challenges faced by many of their female workers in taking care of their children, Arafa factories contracted professional nurseries at 10th of Ramadan city, and nursery buses to transport the mothers and their children, who

would come from home using the workers' bus at regular working hours, from the factory to the nursery where they would leave their children and return back to begin working 30 min later than normal working hours. Then 30 min before their shift ends, they would leave again in the nursery bus to the nursery to pick up their children and return back to the factory to take the regular bus back home. Arafa finances this whole process and pays a full wage to the working mothers. Another method adopted is to provide housing in an area close to the four factories in 10th of Ramadan city. Arafa has two housing categories: one for single workers and another for married workers. One requirement in providing housing for married workers is for both husband and wife to work at the Arafa factory. The buildings are not limited to basic living facilities; they contain recreation facilities and a small shopping area that contains a grocery store and traditional food restaurants where Arafa Holding subsidizes the service prices in favor of the worker by renting out the facility for free while in return the service providers provide their services at lower prices.

Arafa Holding overcomes the high turnover rate through different measures. First, they keep a buffer at the training school ready to fill in the gap resulting from workers leaving. The SGC School trains workers for four different factories, all located in 10th of Ramadan city, and keeps a buffer of 100 workers per month. Arafa develops multi-skilled workers, "jokers," to utilize them in areas of shortage. Furthermore, Arafa holds regular employment fairs in different governorates around Egypt, and they also have hiring offices in a few governorates that contribute to most of the workers in the Arafa factories. In those governorates, Arafa keeps excellent relations with mayors in different villages who help them to locate and hire workers. Another interesting recruiting approach adopt is distributing employment brochures through bus drivers and workers. Arafa relies on good word of mouth among current workers in their villages to recruit more workers.

In an attempt to bring the factory closer to the workers, Arafa has acquired a total area of 153,000 m^2 of land in Beni Sweif, which is approximately 130 km to the south of Cairo, to take advantage of the abundant supply of workers in Upper Egypt. This move is expected to result in major savings that will result not only from lower salary levels in Upper Egypt, but also promises more manageable rates of turnover, reduced transportation costs, as well as higher efficiency gained through being able to manage extra times more selectively due to the close proximity between the worker and the factory.

Phase I of the project witnessed the utilization of approximately 25 km^2 of land upon which a total of approximately 2,100 m^2 of built up area has been constructed for the Swiss Cotton Garment Company. This facility will eventually host all of Arafa's casual wear production. Arafa Holding has recently inaugurated two shirt factories in Beni Sweif; Crystal for casual wear shirts and Camgit, a joint venture with Zegna for luxury high quality fine Egyptian cotton shirts.

7.2 Dealing with the After Math of the January 25th Revolution in 2011

The current situation (early 2013) in Egypt is characterized by security unrest, labor strikes (that affected some ports and factories), and the constant depletion of national foreign currency reserves in the Central Bank of Egypt, affecting customers and investors' confidence of the ability of Egyptian companies to work, produce and deliver on time.

According to Dr. Alaa Arafa, the Chairman of Arafa Holding, they have managed to mitigate the risk largely due to the holding company's solid relations with customers, their subsidiaries in Europe, and the excellent leadership of the top management. Arafa's biggest asset was its solid relations with its customers, who were very supportive to Arafa in these rough times. Even though many of them closed their buying offices in Egypt, those customers still kept a large percentage of their orders with Arafa Holding. Arafa reciprocated by respecting every order they had, and delivered on time, even by Air freight, which affected their profitability. In order to keep the workers satisfied and immune to the labor unrest that marred other factories, Arafa increased the labor wage. The increase was linked to an increase in productivity and quality. They basically reduced their head count by 10 % and increased wages by the same percentage. Investing over the last 10 years in forward integrating into retail and sales and marketing channels in Europe proved worthy in those rough times. The Group depended on its sales and marketing subsidiary companies in Europe to provide assurance to its customers.

The very capable management staff and the organizational and HR policies adopted after the IPO enabled Arafa to handle the challenges they faced on a daily basis due to security issues or governmental policies. Arafa's recipe for keeping the institutional morale high is "by being with them, close to them, and by talking to them." The Finance team did an excellent job in maintaining a good cash position. Arafa managed to pay all suppliers on time, thus earning their good reputation under severe and unfavorable conditions. Banks were very supportive to Arafa, as they were a real source for hard currency.

8 Outlook and Way Forward

In the aftermath of the revolution, Arafa managed to complete two joint ventures with two Italian companies to produce high quality shirts from Egyptian long staple fine cotton. Still some other investors and partners have chosen to freeze their projects until the situation improves in Egypt.

Despite the less than favorable overall situation in Egypt in the short term, the prognosis for the medium to long term is promising once a president is elected and the security situation is improved. For many Egyptian companies that are doing a

great job in keeping afloat, and are actually performing well against a non-conducive environment, such as Arafa Holding, the future is positive.

It is clear from the Arafa Holding case that a solid supply chain strategy, that includes a robust organizational design coupled with having the right people within the firm and the right relations with suppliers and brand owners, is the best guard against global and local turbulences. Arafa Holding adopted its supply chain and operations strategy well ahead of the global recession of 2008, and the 25 January 2011 revolution in Egypt, which provided Arafa with many options that were put to good use during non-conducive times.

Acknowledgement The authors wish to extend their appreciation to Dr. Alaa Arafa, CEO of Arafa Holding, for all his support during the course of writing this paper. Appreciation is also extended to Ms. Hala Hashem, CEO of Arafa Apparel and Tailoring Company. We also would like to thank all the dedicated staff we interviewed at Arafa Holding.

Questions for Review and Discussion

1. What are the advantages and challenges of the vertical integration business model that Arafa Holding is adopting? Can the current supply chain design be easily adjusted for changes in the environment, e.g., to mitigate the risk of the current recession in Europe, or to take advantage of the rise of affluent retail in developing economies such as India and China?
2. Manufacturers typically integrate backward (upstream) into their suppliers. Arafa Holding opted for integration forward (downstream) by acquiring retail distributors in Europe. Can this model work in the case of developing countries, mainly China or India, where the retail distribution structure is less developed? How can Arafa adapt this model for potential new markets?
3. Arafa is expanding its foot print into shirt manufacturing. Do you see this as a dilution of their focused operations model? Would that compromise the efficiencies that they benefited from?
4. In Italy, labor for luxury apparel is usually highly skilled with very low turnover, which is not the case in most developing countries, and Egypt in particular, where labor is low skilled and there is a high turnover rate. How did Arafa handle this issue? Do you have any suggestions for improvement?
5. As indicated in the 2005 Wall Street Journal, the appeal of the brand "made in Italy" is very strong in the luxury apparel. This is a fact in operating in this vertical that Arafa had to deal with. How did they handle this issue? What is missing?
6. The aftermath of the January 2011 revolution and the current unrest brings many new challenges for operating from Egypt. Would Arafa holding still be able to attract potential joint ventures and partners to operate or source from Egypt? What would Arafa Holding need to do to respond to these challenges?

7. Arafa Holding depended on its supply chain design, and in particular the network of partnerships and acquisitions, to develop a resilient operation that was able to withstand the current turbulence in Egypt. What are the lessons that could be applied in the international context?
8. The choice of luxury tailored men's apparel and the strong export orientation of Arafa Holding afford it to pay higher salaries to its workforce. This might be a very critical sustainability factor in the aftermath of the January 2011 revolution and the higher demands of the labor force. What would Arafa need to do to prevent potential erosion of profitability? Is it possible to improve the productivity of the workforce? Any other suggestions?

References

Ahram Online. (2012, September 23). Shaking up Egypt's energy subsidies a tough proposition. *Ahram Online* and *Reuters*, Sunday. http://english.ahram.org.eg/NewsContent/3/12/53629/Business/Economy/Shaking-up-Egypts-energy-subsidies-a-tough-proposi.aspx

Arafa Holding's Investor Relations Presentation. (2010, September). Accessed June 2012, from http://www.arafaholding.com/filestore/quicklinks_Arafa_Investor_Relation_December_2010.pdf

Arafa Holding's Press Release. (2011, August 18). *New joint venture*.

ArafaHolding.com. Accessed March 11, 2012.

Awni, A., & Shafie, K. (2012). Beyond duty-free access: Export-readiness assessment for qualifying industrial zones (QIZ) apparel companies. *Measuring Business Excellence, 16*(3), 3–16.

BBC News–Egypt country profile. (2012). Accessed July 2012, from http://www.bbc.co.uk/news/world-africa-13313370

Bheda, R. (2003). *Managing productivity in the apparel industry*. New Delhi, India: CBS Publishing & Distributors.

Birnbaum, D. (2005). Sourcing: A must for clothing suppliers. *International Trade Forum, 2005* (3), 5.

Bowersox, D., Closs, D., & Cooper, M. B. (2010). *Supply chain logistics management* (3rd ed.). New York: McGraw-Hill.

Bureau of Near Eastern Affairs. (2012). Accessed June 2012, from http://www.state.gov/r/pa/ei/bgn/5309.htm

Caniato, F., Caridi, M., Castelli, C., & Golini, R. (2011). Supply Chain Management in the luxury industry: A first classification of companies and their strategies. *International Journal of Production Economics, 133*, 622–633.

Central Bank of Egypt. (2010). *Monthly statistical bulletin*. Cairo: Research, Development, and Publishing.

Central Bank of Egypt. (2012, August). *Monthly inflation note*. Cairo, Egypt.

Chin, K., Tummala, V., Leung, J., & Tang, X. (2004). A study on supply chain management practices: The Hong Kong manufacturing perspective. *International Journal of Physical Distribution & Logistics Management, 34*(6), 505–524.

Christopher, M. (2010). *Logistics and supply chain management* (4th ed.). Upper Saddle River, NJ: FT Press.

CIA-The World Fact Book. (2012, March 19). Accessed June 2012, from https://www.cia.gov/library/publications/the-world-factbook/geos/eg.html. Department of State, US Government.

Danskin, P., English, B., Solomon, M., Goldsmith, M., & Davey, J. (2005). Knowledge management as competitive advantage: Lessons from the textile and apparel value chain. *Journal of Knowledge Management, 9*(2), 91–102.

Dicken, P. (2007). *Global shift: Mapping the changing contours of the world economy* (5th ed.). New York: The Guilford.

Dornier, P., Ernst, R., Fender, M., & Kouvelis, P. (1998). *Global operations and logistics, text and cases*. New York: Wiley.

Eid, R. (2009). Factors affecting the success of world class manufacturing deployment in less developed countries: The case of Egypt. *Journal of Manufacturing Technology Management, 20*(7), 989–1008.

Ellinger, A., Natarajarathinam, M., Adams, F., Gray, J., Hofman, D., & O'Marah, K. (2011). Supply chain management competency and firm financial success. *Journal of Business Logistics, 32*(3), 214–226.

Ellinger, A., Shin, H., Northington, W., Adams, F., Hofman, D., & O'Marah, K. (2012). The influence of supply chain management competency on customer satisfaction and shareholder value. *Supply Chain Management: An International Journal, 17*(3), 249–262.

Financial Times. (2010, December 15). *Arafa textiles: Men's wear from Cairo targets the luxury sector*.

Fisher, M. (1997). What is the right supply chain for your product. *Harvard Business Review, 75*, 83–93.

Frohlich, M., & Westbrook, R. (2001). Arcs of integration: An international study of supply chain strategies. *Journal of Operations Management, 19*, 185–200.

Gattorna, J. (2012). People powering contemporary supply chains. In D. Waters (Ed.), *Global logistics: New directions in supply chain management* (6th ed., pp. 121–141). London: Kogan Page.

Gereffi, G., & Frederick, S. (2010). *The global apparel value chain: Trade and the crisis–Challenges and opportunities for developing countries*. Policy research working paper 5281, The World Bank, Development Research Group, Trade and Integration Team.

Hill, T. (2000). *Manufacturing strategy: Text and cases* (2nd ed.). Basingstoke: Palgrave.

Huckman, R. (2009). Are you having trouble keeping your operations focused? *Harvard Business Review, 87*, 90–95.

IMC. (2012). Accessed June 20, 2012, from http://www.imc-egypt.org

Jonsson, P. (2008). *Logistics and supply chain management*. London: McGraw-Hill.

Magder, D. (2005, August 5–8). *Egypt after the multi-fiber arrangement: Global apparel and textile supply chains as a route for industrial upgrading*. Institute for International Economics, Working Paper, N U M B E R W P 0.

Mangon, J., Lalwani, C., Butcher, T., & Javadpour, R. (2012). *Global logistics and supply chain management* (2nd ed.). London: Wiley.

Marello, G., O'Dell, J., & Salinger, L. (2009, May). *Improving productivity in Egypt's ready-made garments sector*. Trip Report Prepared for the Qualifying Industrial Zones Unit of Egypt's Ministry of Trade and Industry, Technical Assistance for Policy Reform II, United States Agency for International Development (USAID).

Ministry of Foreign Trade and Industry. (2012). *Government of Egypt, Trade agreements*. Accessed June 20, 2012, from http://mfti.gov.eg/English/agreements.htm

Pal, R., & Torstensson, H. (2011). Aligning critical success factors to organizational design: A study of Swedish textile and clothing firms. *Business Process Management Journal, 17*(3), 403–436.

Power, D., Sohal, A., & Rahman, S. (2001). Critical success factors in agile supply chain management–An empirical study. *International Journal of Physical Distribution & Logistics Management, 31*(4), 247–265.

Quinn, F. (2004). People, process, technology. *Supply Chain Review, January/February*, 3.

Salahedin, S. (2005). JIT deployment in Egyptian manufacturing firms: Some empirical evidence. *International Journal of Operations & Production Management, 25*(4), 354–370.

Skinner, W. (1974). The focused factory. *Harvard Business Review, 52*, 113–130.

Stadler, M., & Kilger, C. (Eds.). (2005). *Supply chain and advanced planning: Concepts, methods, software and case studies*. Berlin: Springer.

Stuckey, J., & White, D. (1993). When and when not to vertically integrate. *MIT Sloan Management Review, 13*, 71–83.

Teller, C., Kotzab, H., & Grant, D. (2012). Improving the execution of supply chain management in organizations. *International Journal of Production Economics, 140*, 713–720.

The Wall Street Journal. (2005, September 27). Breaking a taboo, high fashion starts making goods overseas, Euro's rise, low-cost rivals, labor costs spur gamble; Not Always 'Made in Italy' Egyptians Suit Valentino.

The Wall Street Journal. (2012, March 22). Egypt's brewing crisis: Subsidies.

Tummala, V., Phillips, C., & Johnson, M. (2006). Assessing supply chain management success factors: A case study. *Supply Chain Management: An International Journal, 11*(2), 179–192.

Upton, D. (1995). What really makes factories flexible. *Harvard Business Review, 73*(4), 74–84.

Van Hoek, R., Chatham, R., & Wilding, R. (2002). Managers in supply chain management, the critical dimension. *Supply Chain Management: An International Journal, 7*(3), 119–125.

Van Miegham, J. (2008). *Operations strategy*. Belmont, MA: Dynamic Ideas.

Wagner, S., Grosse-Ruykena, P., & Erhun, F. (2012). The link between supply chain fit and financial performance of the firm. *Journal of Operations Management, 30*, 340–353.

Supply Chain Development Under Conflict Conditions: Case of Nepal

Raj Kumar Bhattarai

Abstract This chapter examines a supply chain development under conflict conditions and lays out the management strategy and tactics of an integrated set of Nepalese firms that has emerged as the market leader. The supply chain problems of a decentralised and scattered activity of poultry-keeping as it moves from a form of backyard farming to an industrialised factory farming form in a highly constrained contextual setting have been discussed. A comprehensive longitudinal case study accompanying focused group discussions, on-the-site observations, and in-depth interviews with the executives found a sustainable model of the supply chain and lessons for its management.

Thorough analysis of supply chain management practices along with routine activities of the executives of the Valley Group of companies and analysis of the business operational circumstances found that a very small firm selling 13 kg of broilers' meat in 1981 became the market leader one and a half decades later, and continuously enjoyed this leader status even in the context of political insurgency, economic turmoil, and social unrest.

Contextual factors like geography and demography, political movement and change, culture and customer tolerance, technology transfer and transport infrastructure are examined and overviewed. In addition, market and industry, quality standards and actors' awareness as well as regulatory requirements, critical issues and challenges for managing supply chains in the Nepalese poultry industry are analysed. The longitudinal case study also looks at the application of the selected supply chain theories in the context of the developing country.

Objectives

- To examine the supply chain problems of a decentralised and scattered poultry-farm as it moves from a form of backyard farming to the form of industrialized factory farming;
- To examine the development of a sustainable supply chain under conflict conditions; and

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W. Piotrowicz, R. Cuthbertson (eds.), *Supply Chain Design and Management for Emerging Markets*, DOI 10.1007/978-3-319-05765-1_11

- To lay out the guiding principles of the supply chain management of an integrated set of firms that has emerged as the market leader.

After reading this chapter, the reader will:

- Develop an understanding of the business environment in difficult situations of political insurgency and turmoil;
- Comprehend the issues and challenges in the development of a sustainable supply chain under conflict conditions; and
- Understand the supply chain management principles and practices that transformed an ordinary firm into the market leader.

1 Introduction

Poultry keeping in Nepal evolved from a form of backyard farming to industrialized factory farming over the last 50 years. The business, with a very low and scattered demand and supply, passed through conflict conditions of political insurgency and social unrest more specifically in the last two decades. The country's landlocked and mountainous terrain, limited transportation facilities, political instability, business insecurity, power outage in addition to the irregular supply of chicks, feeds, and medicine also affected the supply chain severely. The chain actors concentrated more on the short term benefits of quick returns within days or weeks which could not strengthen the supply chain. This chapter focuses on the contextual setting impacting the poultry market in Nepal and examines the local poultry market and the supply chain management practices by drawing a timeline of the Valley Group of companies. The discussion concentrates on the issues and challenges to the poultry supply chain under conflict conditions and attempts to derive a few lessons based on the practices at the Group. In addition, the application of the supply chain theories in the context of a developed country is briefly discussed.

1.1 Supply Chain

The Association for Operations Management Dictionary defines the supply chain as the global network used to deliver products and services from raw materials to end customers through an engineered flow of information, physical distribution, and cash (Blackstone 2008). The chains are mechanisms by which products move from the raw materials stage through a series of transformative processes to the ultimate consumer (Crandall et al. 2010).

Some customers do not enquire about the development process of a product; they look at the attributes of the final product whereas others also verify the process as well as the product's components or parts at the time of its purchase. For instance, *KFC* looks at the bird's supply chain and ensures that the growing,

catching, transporting, holding, stunning, slaughtering and delivering have met its standard specifications (KFC 2011) for the meat purchase.

Interdependence between the actors (such as producers, transport companies, distributors, retailers and customers) in a supply chain forms a network. Management of the network is a process of integrating and sustaining the actors' interdependence that interlocks the actors together and ensures the continuity of the chain. The literal meaning of Supply Chain Management (SCM) encompasses all the activities involved in sourcing and procurement, conversion, and the entire logistical activities. It also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers (CSCMP 2011). SCM integrates supply and demand management within and across the companies. As long as the integrated interdependence continues in an industry, the entire supply chain remains functional in an order made up of different businesses.

The actors' resources or capabilities permit it to enjoy a sustained competitive advantage of low cost as well. "A sustainable competitive advantage is achieved when firms implement a value-creating strategy that is grounded in their own unique resources, capabilities, and core competencies" (Hitt et al. 2001, p. 97); other companies may be unable to duplicate the competency or find it too costly to imitate. A single specific advantage does not guarantee sustainability, but a system of linked activities, relationships and competencies throughout the components and parts of its operations provide a basis of sustainability (Johnson et al. 2008). The firm with a strong supply chain looks capable of availing value-added products in all situations.

SCM today has become a set of complex processes. A firm looks like a very small part in a broad picture—the global economy. The most challenging task is to find a reliable way of integrating the actors together. The complexity in product design, development, and delivery has increased the significance of SCM. Integration of the technology life-cycle, product life-cycle, and actor life-cycle has become a primary concern while designing and managing supply chains.

Profit variability among the actors further increases its significance. The actors are business entities looking for profit, and the profit equation varies significantly across the supply chain. One actor's high profitability does not compensate for the low profitability of the other actor(s). An actor with low profitability may leave the chain or seek low quality products or services in view of minimizing costs.

The increasing attention on risk management in the supply chain context (Colicchia and Strozzi 2012) in recent years emphasizes the significance of SCM in the perspective of globalization. Managing a supply chain has became an issue for the 1990s and onwards because companies have become more specialized and have started to search for compatible suppliers in terms of cost, delivery time, and entire quality.

The growth of e-business like e-commerce, e-procurement, and e-collaboration is impacting on the patterns of SCM (Johnson and Whang 2002) more specifically in the areas of cost, time, and quality. The greatest potential of the Internet is being realized by speeding up communication between customers and their suppliers

(Lancioni et al. 2000). The role of information sharing between the actors in a supply chain is increasing. Achieving information accuracy has become a challenge especially in economies like Nepal. SCM research methods need to concentrate on the best practices on the one hand and on the grounded organizational theories on the other.

1.2 Research Methodology

This study began with the scrutiny of organizational theories that could be applied to analyse supply chain strategy and operations in conflict conditions. An intensive effort of searching a successful organisation, which could be used for a case study, identified the Valley Group of companies as a role model in the poultry industry. A special arrangement was made with the Group for the purpose of conducting a comprehensive study over its entire management practices.

A timeline from 1981 to 2012 was drawn especially focusing on the conflict period of 1996–2006 and onwards. General stocktaking on the major decisions and actions over the period was completed in order to understand the evolutionary process of the Group. In-depth interviews with the executives, a series of discussions with its supply chain actors and customers along with onsite observations over an interval of about 6 months were completed during the study.

Background information about the executive partners and their decisions including perception, culture, family values, and socio-cultural taboos were obtained just before the interviews. The poultry market, competitive environment, actor behaviour, industry structure, technology transfer, quality standards as well as the entire business operational circumstances were focused upon while in discussions with the actors through the lens of supply chain management. The information, tactics, and clues obtained as such were recorded in the form of research notes. Analysis of the information identified SCM issues and challenges. The best practices were adopted by the Group while addressing the issues and challenges and were set as lessons learned and as guiding principles. The author analysed also to what extent established management theories, applied in the developed countries, could be used in a new context such as Nepal.

The entire research was completed in Nepal and confined to the broiler's supply chain. Limited access to the leading literature on SCM and organizational theories remained a constraint to the researcher. Unavailability of industry information, absence of SCM researches in a local context, and poor habits of documentation among the actors were other difficulties. The supply chain management practices adopted by the Group of firms under this study could not be compared with the practices of other firms involved in the poultry industry in Nepal, because of the unavailability of suitable supply chain(s) for comparison in the country.

2 Nepal

Nepal is known as the land of Mt. Everest and the birthplace of Lord Buddha. She is world famous for her natural beauty, mighty Himalayas, the cheerful face of her people, and her enriched bio-diversity.

2.1 Geography and Transportation

Nepal occupies an area of 147,181 km^2 between China and India (Fig. 1). This mountainous country falls in the southern lap of the Himalayas ranging from 70 m above the sea level to the highest point on earth, Mt. Everest at 8,848 m. The hills in the middle and the flat land on the south, both are climatically the most suitable for poultry farming compared to the Himalayan high land on the north.

Being a landlocked country, the transport sector is dominated by land and air transportation facilities (Table 1). Road transport moves the entire poultry products with a few air transport exceptions.

2.2 Demography

The demographic settlement pattern in Nepal is highly scattered in villages and in small towns. The entire country has been occupied by the people of multiple castes, religions, and languages. In the year 2011, the country's total population was recorded as 26.6 million. 7 % of people were living in the northern mountain region, 43 % in the hilly region in the middle, and the remaining 50 % in the southern flat land. The population was growing at the rate of 1.4 % per annum, and its density was 181 persons/km^2 (1,380 and 153 in urban and rural areas respectively, 35 in the mountain region, 187 in the hill region and 392 in the flat region) of the country. The number of absentees in the population reached 1.9 million. The

Fig. 1 Map of Nepal

Table 1 Transport infrastructure

Indicators	Data	Unit
Roads	21,093	km
Black topped	6,669	
Gravelled	5,007	
Fair-weather	9,417	
Source: Economic Survey 2011, Ministry of Finance, Nepal		
Vehicles	1,178,911	nos.
Bus/truck/crane	83,030	
Car/van/pick up	141,376	
Motorcycles	883,634	
Tractor/others	70,871	
Railways	59	km
Source: Department of Transport Management, Nepal		
Airports	15	nos.
International	1	
Domestic (regular)	14	
Airlines	37	nos.
Domestic	10	
International	27	
Aircraft movement	91,892	nos.
Domestic	76,191	
International	15,701	

Source: Civil Aviation Report 2009/2010, Civil Aviation Authority Nepal

proportion of the population distribution in urban and rural areas was 17 % and 83 % respectively (Census 2011).

About 70 % of the people were engaged in traditional agriculture (CBS 2010). Farming people have an inherited knowledge of livestock and poultry keeping. The urban people and family members of foreign-employed youths were found spending more on poultry products compared to the rural and unemployed people. The migration of people from rural to urban areas has been increasing year on year. As of mid February 2012 there were more than 2.3 million unemployed youth had left the country in search of employment (DOFE 2012).

2.3 Culture and Tradition

Nepalese society is multi-cultured, multi-ethnic, and multilingual and is composed of Hindus, Buddhist, Christians, Muslim, and other religions. The majority of society is Hindu—about 82 % of the total population. As per traditional classification, Hindus comprise *Brahmins, Kshatriyas, Vaishyas* and *Shudras*. A *Brahmin* is typically engaged in academic and advisory activities; a *Kshatriya* is involved in ruling and safeguarding the society; a *Vaishya* is engaged in agriculture and

business and *Shudras* are traditionally smiths, technicians and helpers (Bhalla 2005).

In a Hindu society some people are vegetarian because of their religion, while others are non-vegetarian. Typically, *Brahmins* and *Kshatriyas* cannot eat even chicken. Special *halal*[1] treatment is required for meat eaten by Muslims or institutions influenced by them. However, these taboos are less effective these days, especially in urban areas.

The business of livestock slaughtering and meat selling was not suitable for those who were not *Shudras*. It was the traditional business of *Kasahi*.[2] The case is different today in that there is entry of other caste people individually or institutionally in this business; that is why this business is gaining respect in society.

The growth of small families consisting of 3–5 members each rather than conventional big families, and the increase in the number of working couples are some of the major changes in cities, especially in the Kathmandu valley which is occupied by 2.5 million people (Sharma 2011). Working couples usually go to hotels, restaurants and fast food centres for their lunch and dinner. Ordinary people also prefer to go out for meals. A trend of organizing parties, conferences, workshops and seminars in such places is increasing these days.

Poultry keeping in Nepal especially in rural areas is not limited to meat and eggs. Chickens [local breed] are sacrificed to Gods on religious occasions; chickens are slaughtered in temples and holy places and offered to the Gods and eaten afterwards.

2.4 Conflicts and Security

Political movements were adversely affecting the mobility of persons and commodities in Nepal (Bhattarai 2010). The country tolerated five major movements in 45 years from 1951 to 1996. All were for political system changes. The political insurgency declared by the Nepal Communist Party (Maoist) in the year 1996 continued for a decade to 2006 with thousands of casualties. The resulting peace agreements could not resolve the conflicts but further stimulated it in other ways than before. The insurgency increased the insecurity and instability throughout the country. The insurgents, as well as ordinary criminals were threatening, kidnapping and assassinating entrepreneurs for cash or goods.

The lack of stability resulted in increasing prices, interruption and shortages of basic commodities, adulteration and black marketing, commodity hoarding and

[1] *Halal* is a process where an animal is killed according to Muslim Law. Only a Muslim is suitable to do the job of *halal*. Therefore, non-Muslims must have a provision for *halal* if they have to sell meat to Muslims.

[2] *Kashahi* is a cast in Nepal whose traditional profession is slaughtering livestock and selling meats. The term also refers to the cruel behaviour of a person in symbolic language in Nepal.

cartelling (an unfair business practice of forming a consortium of independent firms to limit competition by controlling the price, production and distribution of a product or service; it prevents fair competition) and frequent market closures. Lockouts, general strikes, security lapses, and shortages of utilities in different aspects of society worsen the supply chain year on year. Unstable government and weak bureaucracy, the increasing rate of crime and corruption, insecure industrial and commercial establishments, absence of law and order were other consequences of the insurgency movements.

3 Organisational Theories and the Poultry Supply Chain in Nepal

The literature review covers theories used to explain supply chain development. SCM is relatively new and several disciplines claim ownership of the field (Burgess et al. 2006). Strategic management, logistics, economics, engineering, institutional sociology, marketing, organizational behavior, relationships/partnerships, and best practices are the principal component bodies of it (Croom et al. 2000). This field of study has gained popularity since 1980s when companies saw the benefits of collaborative relationships with and beyond their organization (Lummus and Vokurka 1999). Categorization of literature under organizational theories provides opportunities to address both the objectives of understanding where the field currently stands and identifying research opportunities and directions (Sarkis et al. 2010). This paper categorizes SCM literature under 11 organizational theories that were identified as potentially relevant to the case study. In the following part theories are overviewed and their relevance to the poultry chain is discussed, focusing on the Nepalese context.

Complexity Theory indicates that as complexity increases, the actors in the poultry supply chain find it more difficult to plan and predict their future activities. It is necessary for the regulation of firms to be sensitive and responsive to their environments with co-evolution and interdependencies (Crozier and Theoenig 1976). The literature relates to the purchasing and supply activities of manufacturers, transportation and logistics functions of the merchants and retailers, and the value-adding activities from the raw materials extractor to the end users (Tan 2001). The boundary of supply chain management needs to be defined and expanded (Cooper et al. 1997) so as to increase its predictability.

Contingency Theory assumes that things are more variable and unpredictable under conflict conditions like Nepal and one actors' decisions and actions are contingent on and influence the decisions and actions of other actor(s) in the supply chain. Synergy, considered as a contingent, exists between a culture of competitiveness and knowledge development, and actors who are confident about the level of market turbulence they will face can use this sense to decide whether to

emphasize developing either a culture of competitiveness or of knowledge development in their supply chains (Hult et al. 2007).

Eco-Innovation Theory is also known as ecological modernization theory. The poultry industry is agriculture based and impacts the ecology. A sustainable poultry supply chain with environmental protection is achieved jointly through innovation and technology development. The practice of green supply chain management is consistent with the concept of environmental innovation from the viewpoint of eco-innovation or ecological modernization theory (Zhu et al. 2012). There are surveys and anecdotes about the largest global companies that are adopting 'green' concept and practices, especially in the light of sustainable global supply chains (Wu et al. 2012).

Information Theory assumes that information is not symmetrically distributed across the hatcheries, farmers, feed producers, and butchers. Unequal information exists between/among the market actors. Information flow and accuracy among the actors significantly impacts the operations. The actors are more likely to certify their practices such as ISO 14001 certification when information asymmetries with their customers and suppliers are high (Jiang and Bansal 2003). Closer ties throughout levels of the supply chain is necessary, therefore, similar voices of the actors contributes significantly to the competitive advantage of them. But, the actors have not yet fully operationalized the concept of supply chain management (Spekman et al. 1998).

Institutional Theory examines how consumers' forums, environmentalists' forums, and similar other institutional pressures influence the actors' decisions and actions in a poultry supply chain. There are different institutions influencing supply chain actors in a variety of ways. For instance, coercive pressures from the government (Kilboume et al. 2002), normative pressure from consumers (Ball and Craig 2010), and imitation (Aerts et al. 2006) or mimetic pressures from competitors all affect the SCM.

Organizational Learning Theory assumes that firms can engage in both exploitative and exploratory learning (March 1991). Alliances among the poultry farmers, breeding farms, butchers, and other supply partners serve as potential learning opportunities. The alliance members provide knowledge that can be shared by all in the supply chain in order to build dynamic capabilities (Hitt 2011). There is increasing attention of the producers/manufacturers and suppliers to built-to-order supply chain management (Gunasekaran and Ngai 2005).

Resource Based View/Theory indicates that competitive advantage may be sustained by harnessing resources that are valuable, rare, imperfectly imitable, and non-substitutable (Barney 1991). The interlocking of firms in the supply chain of the Group has become a source of competitive advantage as it is unbreakable and hard to replicate. The actors do not want to leave the supply chain; they want to continue with it. It suggests that purchasing and supply chain

management will often have attributes that can enable them to be sources of sustained competitive advantage (Barney 2012).

Resource Dependence Theory suggests that farmers depend on hatcheries for chicks, feed factories depend on the farmers for food grain and remains, butchers depend on the farmers for live broilers. Actors in the poultry supply chain cannot be self-sufficient for survival; therefore, they should be interdependent and collaborate to seek higher performance gain especially under conflict conditions. Customer and supplier relationships are important linkages for actors to reduce the uncertainty surrounding their operating environment. Buyer-vendor coordination, production-distribution coordination and inventory-distribution coordination are the three categories of operational coordination (Thomas and Griffin 1996). The coordinated efforts smooth the flow of products, services, information, financial resources, demand, and forecasts between the firm and its buyers and suppliers (Mentzer et al. 2001).

Social Network Theory assumes organizational outcomes as a function of the social relationships between organizations or individuals in an organization (Jones et al. 1997). Buyer-supplier relationships for performance improvement can be explained or constructed around using a social network theory lens (Seyfang 2006). The stronger the relationship between the actors the greater the embeddedness of the actors that exists in that relationship. Network theory can be used to analyze and understand the structure of supply chain relationships among the actors operating within an industry (Hitt 2011).

System Theory believes that interdependent and interrelated parts or components (sub-systems) work together to form a whole. The supply chain is also considered as a system of various interrelated organizations or actors. The broiler's meat is an outcome of different actors in the process starting from genetic engineering to the farmer's farm land to the slaughter houses. The integration of all key business processes across the supply chain is necessary in its management (Cooper et al. 1997). Successful SCM requires cross-functional integration (Lambert and Cooper 2000) and coordinated effort is a must while integrating and managing the supply chain network structure, business process, and management components. The internal supply chain, the dyadic relationship, the external supply chain and the inter-business networks are considered as system levels of SCM (Harland 1996).

Transaction Cost Economics focuses on how much effort and cost is required for buyer and seller to complete an activity (Williamson 1981). An increase in customer expectations in terms of cost and services has put a premium on effective supply chain reengineering (Swaminathan et al. 1998). When firms make decisions about whether or not to form an alliance with a supplier, they are based on the costs of the initial and ongoing transactions between the firms and that supplier (Hitt 2011). The effort of researchers, farmers, butchers, and other supporters constitute the value of the broilers.

It is worth noting that there is very limited research focused on the supply chain in Nepal, which indicates a clear gap in knowledge. Publications related to Nepalese SCM practices are focused on some sectors of economy, namely dairy development (Acharya and Basnet 2009), integrated pest management (Gyawali et al. 2008), non-timber forest products (Maraseni et al. 2006), orthodox tea (USAID 2011) and biomass (Kapali 2011). These literature and practices are primarily based on buyer-seller relationships and do not cover SCM practices in local contexts.

4 The Poultry Market in Nepal

Poultry refers to domesticated birds like broilers, layers, turkeys, ducks, geese and traditional local breed chickens that are especially grown for the purpose of producing eggs and meats. Among the birds, the broiler is more popular in the Nepalese market with a high significance of commercial and nutritional values.

Broiler's meat is the best source of protein, however, it is not considered an item of necessity, and instead it has become a luxurious meal item especially for poor people. Nevertheless, poor people can also obtain it at any cost if they have to meet the demand of their social rituals and special events.

A shift in culture, a change in food habit, and an increase in consumer income are fuelling the growth of the poultry market these days. The substantial presence of chicken items in the menus of hotels, restaurants, catering houses, and fast food centres indicates the consumer preference in their meals. The import records of the Fiscal Year 2009/2010 of 783,180 broiler chicks, 787,661 parent stocks, and 125.79 Mega Tonnes (MT) frozen chicken (DOLS 2010) also indicate an attractive demand over supply in the country.

Looking at the market potential, an effort to hatch and distribute commercial breeds of chicken began five decades earlier but remained ineffective in transforming the form of backyard keeping into a form of industrialised factory farming. The government encouraged the private sector to make poultry-farming a major component of agriculture, but it was confined to the policy papers. However, chicken meat production crossed 16,527 MT in the fiscal year 2009/2010, which was equivalent to 6.65 % of the country's total meat production (MOAC 2010). Also, the quantity of chicken meat production in Nepal is nominal if compared with the world production statistics of 72,293,000 MT of the world's broiler meat production in 2009 (US Census Bureau 2011).

4.1 Poultry Industry

Backyard poultry keeping has a historical root and therefore this industry is hoped to be an important vehicle of the socio-economic development of the country. Two

breeds known as local and commercial (broiler/layer) are available in Nepal. The local breed has been in practice from time immemorial but commercial poultry production started in the early 1960s (Upreti et al. 2005).

The farmers have now preferred to keep small poultry farms in an organized way despite the heavy closure of poultry farms in the past. It was estimated that about 70 % of small scale poultry farms [keeping 200–2,000 birds per farm] in Chitwan and Makawanpur districts were closed at the beginning of the 2000s. However, there was substantial growth during the last decade. The compound annual growth rate of commercial chicken eggs and meat production was estimated to be 3.20 % and 3.17 % respectively until fiscal year 2009/2010 (MOAC 2010).

Common problems in the industry were reported as being high priced low quality feed, lack of resources to reinvest among the farmers, price determination from the associations and butchers, and ineffective regulatory mechanisms, in addition to the political insurgency. Similarly, obstacles in the supply of quality assured day-old chicks, limited knowledge of farmers on farm and hatchery management, limited facilities to disease diagnosis and laboratory services, and poor marketing information systems were reported as other problems in the industry.

4.2 Competition

Market competition has been quite unique in nature. In the case of price, associations of actors like hatcheries, farmers, and butchers set the price of their products at different stages of the supply chain. However, practices of unfair competition in terms of price and quality were reported, and resulted in some business closures, personal rivalries, and the exchange of threats of using rivals or gangs against each other.

Entry into the industry and exit from it was very common in this sector and more specifically in farming. Sometimes, the 2 months' cycle of growing broilers attracted farmers and sometimes it did not. If there was a possibility of good profit, then the farmers intended to grow it. This kind of irregular practice of the farmers was only inviting fluctuations in the supply of the broilers.

The market was composed of proprietorship, partnership, and private limited companies. A vast amount of actors, mostly the farmers and butchers, were doing small scale business under proprietorship in a scattered way. Hotels, restaurants, fast food centres, and catering houses were major institutional buyers.

4.3 Actors in the Market

Table 2 reflects the composition of major actors in the market. The breeding farms and hatcheries supply commercial chicks to the farmers and poultry farms. The feed producers supply feed to the farmers and poultry farms. The farmers and poultry

Table 2 Actors in the market

Major actors in the poultry industry (case study's tentative estimate, 2011)	
Egg producers	150
Feed mills/factories	157
Breeding farms and hatcheries	76
Integrated poultry/broiler firms	32
Meat processing firms	8
Bone meal firms	7
Medicine/premixes	6
Packaging firms	6
Tray producers	2

firms supply live broilers to the slaughter houses and butchers. Farmers also supply food grain and remains to the feed producers. The transporters move the products.

The actors were not regular in their supplies. The risk of no sales or partial sales and too much fluctuation in price were the major reasons for their irregularities. The irregular supply of live broilers not only affected the farmers but directly affected the business of slaughter houses and butchers. Ultimately, it affected the business and reputation of the catering houses, hotels, restaurants, fast food chains, and other individuals too.

4.4 Quality Standards

Quality can have two meanings in its technical usage—one is the characteristics of a product or service that bear on its ability to satisfy stated or implied needs, and the other is a product or service which is free of deficiencies (ASQ 2012). The product or service attributes and expectations of the buyers are inseparable from the quality. The customer specific requirements are not uniform and therefore quality varies as product or service capability varies in meeting the requirements.

Australia categorizes the standards into ten different parts for the chicken meat industry. The standards are: (1) planning and contingencies; (2) maintenance and design of sheds, facilities and equipment; (3) bird handling competency and training; (4) general bird management; (5) humane destruction; (6) egg management; (7) chick management and hatchery; (8) bird pick-up and transport; (9) transport of chicks; and (10) processing. These standards provide guidelines in numerous actions and programmes in order to ensure the quality of chicken meats (NAWS 2008).

Similarly, Hazard Analysis and Critical Control Points (HACCP) is a systematic preventive approach to food safety that addresses physical, chemical, and biological hazards as a means of preventive rather than finished product inspection. The HACCP's seven principles include: (1) conduct a hazard analysis; (2) identify critical control points; (3) establish critical limits for each critical control point;

(4) monitor critical control points; (5) establish corrective actions; (6) establish procedures for verification; and (7) establish record keeping procedures (UNL 2005).

There were no specific quality standards for poultry products in Nepal. The standard specifications for meat quality were beyond the imagination of the ordinary customer. Most of the customers believed that if the bird was slaughtered in front of them and sold on the spot then the meat was of high quality.

Most of the feed industries were computing the poultry diet by a trial and error method which was inevitably going to turn out incorrect. The feed quality problem was also compounded by the supply of inconsistent ingredients to be used by the feed producers. With a few exceptions, the feed producers had no laboratory facilities capable of analyzing even approximate values.

4.5 Technology Transfer

Technologically the local breed is sustainable in the case of production and reproduction because the birds are capable of reproducing by a natural process whereas the transferred technology (the broiler) is not self-sustaining because the birds cannot reproduce by a natural process. The local hen lays eggs and hatches chicks and helps them to grow; but the broiler cannot go through this process and it needs parents, grandparents, great grandparents, and research and genetic engineering as well. However, the local breed is in a critical stage and at high risk of disappearing. The monetary benefit of the broilers/layers is shifting the farmers' attraction towards it in recent years.

Technology on research and genetic engineering is not transferrable to the country for the production and reproduction of the parents. The entire industry is dependent on one or two particular multinational companies that have the technology. There is little progress in the technology transfer for growing, handling and processing the birds.

The government seems ineffective in bringing technological change and development to emerging economies like Nepal. If it was effective enough, the case of supply chain management would be quite comfortable in the industry. The people's familiarity with indigenous technology on the one hand and the attractiveness of transferred technology on the other are two aspects to be considered when designing a supply chain.

4.6 Regulatory Requirements

The Ministry of Agriculture and Cooperatives is the principal regulator in the poultry industry in Nepal. A 20-year Livestock Master Plan was prepared in 1993 to provide a framework for formulating an appropriate livestock development action plan. The adoption of international standards for export promotion and

import substitution are major parts of the plan. The establishment and strengthening of the poultry market information system, the development of a separate market with adequate infrastructure, and the construction of store houses in different potential areas in order to regularize the demand and supply of the products are some of the priorities of the plan.

Nepal is also a member of the World Trade Organization. The provisions, especially the Agreement on Agriculture, Agreements on Sanitary and Phytosanitary Measures, and Technical Barriers to Trade, are more important in the context of the poultry industry. The government of Nepal has taken initiatives to regularize the industry by introducing Laws in order to ensure the meat quality.

5 Valley Group: Case Study

The executive partners of the Valley Group of companies in Kathmandu realized the significance of the poultry industry as one of the most appropriate businesses in the context of Nepal. About one third of the country's population was suffering from a vicious cycle of poverty; however, poultry was not considered as a viable alternative to their poverty and people had no interest in this business for multiple reasons including cultural taboos. Even if some people were found to be interested, they had no money even to buy chicks and feed.

Acknowledging the ground reality like the local context and the poultry market position as mentioned earlier, the partners intended to avail themselves of an opportunity for getting chicks and feed free of cost to those farmers who were unable to pay for them in order to ensure the regularity of broilers in the market. They established one company after another—vertically and horizontally—in order to strengthen the supply chain.

Gradually, the Group started to enjoy the benefits of a strong supply chain. They became the market leader in the production and distribution of broiler meat in Nepal and remained the leader continuously even in the situations of political insurgency. The unbreakable supply chain helped the Group to sell about 1,300 MT of chicken meats in the year 2011 alone. The quantity was approximately 8 % of total chicken meat production in the country. It was reported that its nearest competitor was unable to sell even 300 MT of chicken meat in the same year!

There were 87 personnel working in the slaughtering and portioning processes of the birds in the year 2011. Besides this, there were 125 other employees directly involved in different companies of the Group. More than 3,000 individuals were indirectly involved in its operations as dealers, transporters, farmers and facilitators. This amount of employment opportunity was really substantial in the case of a private firm involved in the poultry industry in Nepal.

5.1 Timeline: Development of the Group

The executive partners SP Ghimire and H Rawal were employees in two different poultry firms and S Bindukar was running his own poultry business. In 1981 they decided to establish a *Cold Store*, later renamed as "Valley Cold Store". A very negligible amount of local currency equivalent to some hundreds of US dollars as an initial capital, a small rented space of less than 100 m^2 for its operations, 3 + 2 personnel (three executive partners and two employees), and locally available ordinary materials and tools were the only resources they had. They sold 13 kg of broiler meats on the first day of operations.

The Store was not only selling chicken meats but it was sending out a message of cultural change as well. A business in slaughtering livestock and selling meat was against the religious and cultural values of the partners. Family members, friends and relatives were tending to look down on all the partners because they were involved in a business which was traditionally the profession of low caste people, *Kasahi*—the butcher. Along with the cultural obstacles and hurdles, the partners experienced threats asking them to close down the business for the *Kasahi* who were dominating the entire business of selling meats and slaughtering livestock. However, they managed to continue the business by tolerating a number of such barriers.

The Store had no alternative than to '*wait and see*' for the first 3 years. There was a general tendency of people to do business in the areas of quick return, but the tendency remained invalid in the case of the Store. "*If you want to continue your business for a long period, you must have patience*" says SP Ghimire.

Gradually, the then competitors of the Store were losing their market position mainly because of (1) irregularity in the supply of the chicken meats; (2) dysfunctional conflicts in the absence of patience; and (3) a poor supply chain. On the other hand, the Store was gaining year on year by ensuring regularity in its supplies and the 'supply regularity' became the major point of customer attraction to the Store.

The customer attraction inspired them to add machines and tools in order to meet the increasing demand. It installed three de-feathering machines to replace the job of manual de-feathering in the year 1985. The machines were capable of taking off the feathers of more than 1,000 birds/h.

The routine activities of the partners realized the need for quality feed for quality birds. Farmers of the Store were relying on the feed available in the market. It was very hard to ensure quality meat with the already available feed. They decided to run a feed factory in order to overcome the deficiency of quality feeds in the value addition process. Consequently, the Valley Feed Industry was established in the year 1989. Since then it has been producing quality feed continuously.

In the year 1999, the firm constructed one international standard prefabricated cold room to store meats for a long period. The storage capacity helped substantially to compensate for the fluctuating supply of the live birds, but could not balance the market demand and supply. The fluctuating supply of the birds still remained a major problem for them.

The Store adopted a policy of developing and strengthening a network of reciprocal interdependence, and started to extend full support to the farmers by providing training, chicks, feed, medicine and vaccines on a post-payment basis. The Store also guaranteed the farmers to buy their birds at market price irrespective of the number of birds. This strategy inspired farmers by reducing the risk of no sales of their birds even in difficult situations. In this regard, they decided to establish a poultry firm in order to give continuity to this policy.

The executive partners were not adequately educated to look after all the technical aspects of the Store, Feed, and the proposed poultry firm. There was a general tendency in Nepalese family based businesses that the key positions need not be filled by outsiders who are not investors or their close relatives. This could be a reason why they talked to KB Bohra, a veterinary doctor, and in the year 1999 established Valley Poultry in which Dr. Bohra works as a partner In-charge. The firm began operating in the year 2001 for the production and distribution of day-old commercial chicks.

Gradually, the firms started to be recognised as the Valley Group of companies. The Group started to expand its infrastructure as well. It acquired land of about 3,000 m^2 in the city centre over which it has constructed two commercial buildings of about 2,000 m^2 floor area altogether. The major construction work of the buildings was completed in the year 2003. During the last couple of years, the Group has acquired about 35,000 m^2 of land in a nearby area.

Valley Mart became functional in the later part of the 2000s. A semi-automated slaughter house started operating from the beginning of the year 2012. Construction of a Pallet Feed factory in Hetauda, about 200 km away from Kathmandu, was almost ready to operate.

The Group has taken a number of initiatives such as imparting training, funding poor farmers, joint-venturing with national and international actors, and so on in terms of breeding, feeding, farming, transporting, slaughtering, storing, and distributing. Environmental protection, water management, actor relationships, employee well-being, and hygienic working conditions are other areas of its priority.

5.2 The Poultry Supply Chain

The poultry development process begins with high-tech Research & Development (R&D) on genetic engineering (Fig. 2). The primary breeder company makes a heavy investment, spends significant time and effort in upgrading gene pools that would be used to develop fast growing as well as more efficient birds. This stage of high-tech is highly controlled and the secrecy of the specific gene pool information is strictly maintained.

The primary breeder developed from the foundation stock/great grandparent produces the breeder eggs. The hatcheries take these eggs and hatch the same into the basic breeder chicks which are grown to the breeder known as parent

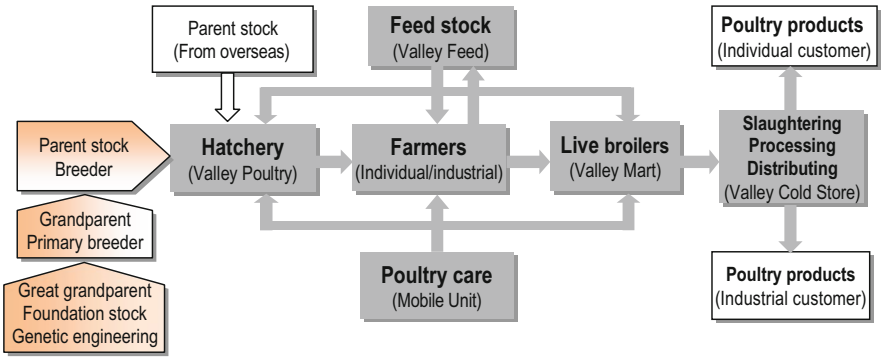

Fig. 2 The supply chain within road distance of about 200 km from Kathmandu

stock. The breeder produces eggs that are hatched into the broiler chicks known as commercial birds. The chicks are raised to live broilers that are processed and made ready to deliver to the market.

The task of breeder development is carried out in advanced countries abroad. However, the Group and some local partners were going to establish a grandparent stock breeding farm and hatchery named as *Cobb Nepal Private Limited* under the technical assistance of Cobb-vantress, USA. At present, the parent stock—also known as parent day old chicks—are imported mostly from the Philippines, Australia, Thailand, and Malaysia.

Valley Poultry imports parent stocks from overseas. The primary function of this company is to produce quality commercial broiler chicks and make them available to the farmers. The primary concern of this firm is to ensure regularity in the supply of the chicks. In this regard, it has formed a network with the farmers, dealers, suppliers, and retailers as well.

The Valley Group has two feed industries—*Valley Feed* and *Valley Pallet Feed*—for mash feed and pallet feed respectively. These industries are necessary in order to ensure regularity in the supply of quality feed. The industries provide feed to the farmers of its supply chain under special arrangements—feed to the farmers and food grains or remains from the farmers. The factories sell the remaining feed to the outsiders in the normal way in the market.

A mobile *Poultry Care* unit provides veterinary services to the birds and training to the farmers, dealers, suppliers and retailers in order to make the feed and chicks available to the farmers, live broilers and materials to the Group, and the poultry products to the customers.

Valley Mart buys (back) the broilers at market price and sells them to the Store and other slaughter houses as well. It makes accounts adjustments with the farmers in the case of the chicks, feed, medicine and vaccine supplied on a post-payment basis.

Live broilers supplied to *Valley Cold Store* are sorted, slaughtered, portioned and further processed according to the demand in the market. The products such as whole chicken, parts and processed items are supplied to individual and industrial

Table 3 Major actors in the supply chain

Major Items	Major actors in the supply chain of the Valley Group					
	Breeding farm	Valley Poultry	Farmers	Valley Feed	Valley Mart	Valley Cold Store
Input	Primary breeder Feed Medicine and vaccine	Breeder chicks Feed Medicine and vaccine	Chicks Feed Medicine and vaccine	Food grains and remains Other items	Live broiler Feed	Live broilers
Output	Breeder eggs Breeder chicks	Eggs Chicks	Live broilers Food grains Remains	Feed for poultry and cattle	Live broilers	Poultry: whole chicken, parts, and processed items

customers. A semi-automated slaughter machine has become instrumental in this process.

The *distribution network* of the Group is confined to urban and semi-urban areas. Only road transportation, with trucks and delivery vans, has been used in order to transport the products. The storage facility, which would be sufficient to regularize the demand of about a couple of weeks, for the live broilers and its meats is available within the Group.

Direct channels of distribution, with some exceptions, have been adopted in order to provide chicks, feed, medicine and vaccines to the farmers and get back the grown broilers, food grains and remains from the farmers (Table 3). Sometimes the Group gets live broilers from other farmers or suppliers as well. It sells almost all its products directly to the customers plus also to a few retailers or supermarkets.

Normally, customers visit the sales outlets of the Store to buy whole, portioned or parts of chicken, and processed items like mince and sausages. Industrial/institutional buyers normally buy in large volume directly but some of them prefer to buy through quotations/tenders. There would be competitive bidding as well in which the buyers select the suppliers. Quality, quantity, price, and consistency in supplies are major criteria for the supplier selection in case of industrial/institutional customers. The firm sells a substantial amount of its products through quotations or competitive bidding.

Information exchanges through telephone and personal visits are very common in the Group. Executive meetings, collaborative goal setting, a collective action plan, periodic reviews, and mutual consultations are major instruments of coordination. There are regular communication exchanges with customers, farmers, and suppliers as well.

6 Discussion

This unique and strong supply chain of the Group has made the business sustainable even in difficult situations. The Group did not exercise generic strategies like cost minimization, product differentiation, and focus/quick response in such contexts. In fact, the conditions under conflict are highly unpredictable and vulnerable too. Suppliers have difficulty in meeting the predetermined price, quality, and delivery schedule due to unavoidable circumstances emerging out of the insurgency; that is why they do not want to make big promises. The ultimate buyers are not getting the products and services available at the time of their requirement, therefore, they are compelled to buy as and when they find the products/services. Similarly, the suppliers are unable to get their inputs in order to regularize their supplies, therefore, they prefer to regularize their supplies first instead of minimizing the cost, differentiating the products, and focusing on a particular part. Irregularity in demand and supply is regular in conflict conditions, although demand is seen more than supply in most cases. Both suppliers and buyers are unable to find a viable situation to apply generic strategies in order to ensure regularity in demands and supplies. Customers also are unable to find alternatives to the products/services they need in such conditions emerging out of insurgency.

The company has to respond to the socio-economic context in Nepal, which is fundamentally different than in other countries, especially in developed ones. Supply chain design is influenced by local conditions as well. What works best in one setting does not necessarily work best in another setting, thus, context-specific SCM practices are required.

As far as practicable, the supply chain actors are not changing their network under the conflict conditions but are maintaining their existing relationships. The trust and confidence between actors as well as continuity in their transactions are more significant determinants of remaining intact in the network in such situations.

The government's presence as a regulator looks ineffective in comparison with the regulators in developed economies, therefore, the actors in developing economies are not as optimistic as the actors in developed economies. An understanding of the local settings develops an insight into the actors' problems and possibilities. This study concludes with the identification of contextual issues and challenges as well as best practices/lessons and guiding principles in managing a supply chain under conflict conditions.

6.1 Issues and Challenges

The issues and challenges discussed hereunder constantly affected the SCM practices. Firms that were failing to address such issues had been forced either to withdraw from the market or compelled to serve only a small segment of it. The

Group formed a network of reciprocal interdependence as mentioned earlier and became successful in addressing the issues and challenges.

Availability of Resources In the absence of technology absorption, the firms in developing economies depend heavily on imported materials and parts including hardware, software, and brainware as well. Importing from overseas is too costly in terms of money, effort, and time. Furthermore, it is very hard to integrate the supply chain with supporting industries like medicine and transportations; it could be easier in the advanced economies. The supply chains of inputs to/outputs of the firms are highly vulnerable, and it becomes a major challenge for the managers to ensure the availability of inputs of all types including short term and long term funding.

Ensuring Product Quality Standards Product quality can be achieved when the suppliers of inputs to the firm are meeting the desired level of quality. The hatcheries, farmers, feed producers, transporters, and so on can bring down the quality of poultry products. The level of commitment of the actors to national and international quality standards is also significant in ensuring quality. It is a challenge for a firm to find actors in its supply chain who remain committed to the quality standards.

Meeting the Product Delivery Schedule Transportation and warehousing facilities, utilities and supplies as well as labour disputes are major factors affecting the product delivery schedules. Similarly, the availability of power/energy, money, raw materials, component parts as well as administrative and support services are also issues. These issues are more severe in developing economies especially under conflict conditions. Advancing in these sectors towards the smooth flow of inputs and outputs throughout the market is the next challenge for a firm.

Getting the Support Services Technical, legal, and administrative services are the three major services facilitating the supply chain. The imported technology also demands imported services that may include the basic ideas, methods, and procedures of generating, maintaining, and delivering the value with quality certifications. Technical services in breeding farms/hatcheries, poultry farm/sheds, slaughter/processing houses as well as feed factories are very significant in order to maintain the supply chain. Regularity in services like the development of poultry products, maintenance of plant and machinery, composition of components and ingredients, training and vaccinating is the next challenge.

Product/Service Ownership The actors in a poultry supply chain in developing economies are quite unaware of how to, or are unable to get, ownership over the copyrights, patent, design, trademark, and branding. The actors in the supply chain and supporting industries are doing business in the absence of registration for ownership of their products or services. The technology suppliers are not transferring the ownership in general. The poultry product/service designs are not registered. Recognizing and adhering to the intellectual property rights have become serious issues in developing economies like Nepal.

Recognizing the Added Value The added value in the poultry supply chain is evaluated by the buyers or consumers at the time of its purchase or consumption. There is general tendency of the customers to recognize only the monetary value with the help of its price. The roles of genetic engineering, breeding, feeding, growing, handling, and processing are ignored as value contributors. The product price varies significantly with the roles of value contributors i.e. the better the engineering, breeding and so on, the better the hygienic value of the products.

Exercising Law and Orders Compliance to law and order in a developing country especially under conflict conditions is surprisingly poor. The entire system is deteriorating to a dysfunctional level. Crime and corruption becomes a regular phenomenon. Quality standards and social orders are violated for personal benefit. Legal action against the culprit is almost impossible. Anarchy and illegal strikes are adversely affecting the supply chain.

6.2 Main Lessons from the Case Study

The following principles worked best under conflict conditions as discussed in this chapter. The principles are exclusively based on and derived from the case study, on-site observations, interviews, and discussion with the market actors. Free translation from the Nepali language to English has been done in order to preserve the meaning of the responses.

Do Not Attempt to Win over the Competitors; Do Not Attempt to Push Anybody Down; and Do Not Attempt to Take Revenge When a company adopts the strategy of defeating competitors or suppressing others or taking revenge, this means that the company is failing to concentrate on the betterment of its own products/services. Rivalry and revenge is a huge cost to the firm.

Proceed with the Time and Change The pace of change does not wait for the parties fighting each other in revenge or rivalry. The change is inevitable and it benefits that firm which can better understand it and be ready to proceed accordingly.

Attempt to Break Latest Performance Records It would be wise and quite comfortable to set manageably high targets just above the latest performance of one's own firm. This does not need heavy investment or much more effort either. It would be a sustainable move, not a laudable one. An aggressive performance target demands much more resources and advanced technology on the one hand and heavily reshuffles the existing facilities, personnel, and technology on the other.

Assume the Price of a Product is a Relative Term There is no absolutely high and low price in any real sense. When one firm determines its product's price just below the price of similar products of others, it will be a low price; instead, if the

firm charges slightly higher than the price of others, it will be a high price in the mind of the buyers.

Presume the Quality of Supply Chain Actors as Your Quality The quality of a product means the quality of its parts and components. Any one actor who fails to meet the quality standard(s) at any stage in a supply chain affects the quality of the final product as well.

Seek Consensus in Decision-Making The majority win scheme of decision-making does not work best especially in critical circumstances. The person (s) opposing the decision is(are) working against the decision or s/he does not wish to contribute positively towards the effectiveness of the decision.

Focus on Preventive Measures The mechanism of insurgency-related alert systems becomes instrumental in exercising preventive measures in order to minimize the risks of losses and damages to the person and property.

Develop Networks of Reciprocal Interdependence There would be a high chance of joining and leaving the supply chain by the actors in the absence of reciprocal interdependence between them. In order to strengthen the interdependence, *do not take undue advantage from the suppliers and customers but help and support them*. It would not be sustainable to bargain unnecessarily with the suppliers, charge unreasonable prices to the customers, not comply with quality standards, and adopt unethical practices at others' expense.

The contribution of both employees and associates is equally important as that of others in a supply chain. Therefore, *treat every employee and associate as a partner*. Employees are not only salaried people; therefore one has to acknowledge that their decisions and actions could shape the entire future of the firm. The actors/associates are integrating their business with the firm's business by giving life to the supply chain. A *clean atmosphere in and around the workplace* of the actors/associates reduces work stress on the one hand and increases work performance as well as meat quality on the other.

Additionally, there is a requirement these days in developing economies to capacitate the actors, especially the farmers, in the supply chain, so as to maintain regularity and quality standards. Viable schemes for capacitating could be Business Development Services (BDS), Business Incubation (BI), Quality Certification (QC), and training and networking. The design of short supply chains with few intermediaries would best serve the farmers and entrepreneurs in such economies.

7 Conclusion

Generic strategies like low cost, differentiation in product features, and quick response or focus seem to be irrelevant in the poultry industry, especially during a period of political insurgency and turmoil. When there is the presence of issues

and challenges such as those mentioned above along with irregularity or shortage in supplies of chicks/broilers, then buyers become more determined to get the products/services rather than seeking low cost or high quality items. A product differentiation strategy cannot work best because there are no alternative varieties of the chicks/broilers. Finding the products/services is more important than a faster delivery or a quick response.

Considering the significance of SCM, business schools in Nepal are paying insufficient attention to research and education in this field. There are too few researches to contribute to the literary field on the one hand or to strengthen the business schools' curriculums on the other. The situation is worsening further in the absence of a strong link between academics and SCM practitioners.

Authors in higher-ranked schools engage mostly in collaboration within their own institutions; they practice less external and international collaboration (Maloni et al. 2012). The best known researchers concentrate mostly on the supply chains of advanced companies in advanced economies. It is obvious that the business contexts in the least developed economies are different than in the advanced economies, more specifically in those that are under conflict conditions. What works best in one context that does not work best in another context, therefore, context-specific research is necessary in order to enrich SCM by identifying best practices around the globe.

Questions for Review and Discussion

1. Interdependence in business has made the various actors in an economy to be like the subsystems and the entire supply chain to be as the main system. Discuss.
2. These days, global interdependence has become a priority of a firm on the one hand and the management of the firm may not be capable of influencing all of the actors in the supply chain on the other hand. In this context, what would be the viable ways of ensuring regularity in the quality and quantity of the supplies?
3. Make an assessment of the business context of the Group/country and find another context (firm/country) of your choice. Discuss the contextual similarities and differences and their impact on supply chain management.
4. Arrange the guiding principles adopted by the Group in managing its supply chain in an order from most applicable to the least applicable in other contexts on the basis of your personal judgment. List out the principles adopted in other contexts and make a comparative analysis.
5. What are the factors shaping the scope and contents of the modern day supply chain? What are your suggestions to a practicing manager of a poultry firm doing business in emerging economies? Provide at least three tips that a manager must follow in managing the supply chain in the twenty-first century.
6. What type of supply chain would you develop if you had to compete with the Valley Group of companies? Justify your opinion.

7. Make a contextual assessment of the supply chain management issues and challenges emerging under conflict conditions and prepare a prescription for sustaining a poultry business.
8. Would you consider applying generic business strategies like cost leadership, differentiation, and focus in the context of political insurgency as in Nepal? Justify your answer.

References

Acharya, B. H., & Basnet, M. B. (2009). *Supply chain challenges in dairy development corporation Nepal*. Dissertation, Molde University College.

Aerts, W., Cormier, D., & Magnan, M. (2006). Intra-industry imitation in corporate environmental reporting: An international perspective. *Journal of Accounting and Public Policy, 25*(3), 299–331.

ASQ. (2012). Quality grocery. In: *The global voice of quality*. Assessed February 27, 2012, from http://asq.org/glossary/q.html

Ball, A., & Craig, R. (2010). Using neo-institutionalism to advance social and environmental accounting. *Critical Perspective in Accounting, 21*(4), 283–293.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99–120.

Barney, J. (2012). Purchasing, supply chain management and sustained competitive advantage: Relevance of resource based theory. *Journal of Supply Chain Management, 48*(2), 3–6.

Bhalla, P. P. (2005). *Hindu rites, rituals, customs and traditions*. New Delhi: Pustak Mahal.

Bhattarai, R. K. (2010). Case study – what worked best in the context of political insurgency and turmoil in Nepal? *PACE The Journal of Business and Management, 2*(1), 119–134.

Blackstone, J. (2008). *APICS Dictionary*. Chicago: The Association for Operation Management.

Burgess, K., Singh, P. J., & Koroglu, R. (2006). Supply chain management: A structured literature review and implications for future research. *International Journal of Operation and Production Management, 26*(7), 703–729.

CBS. (2010). *Nepal in figures*. Kathmandu: Central Bureau of Statistics, National Planning Commission Secretariat.

Census. (2011). Preliminary result of national population census. In: *National population and housing census*. Assessed January 2, 2012, from http://census.gov.np

Colicchia, C., & Strozzi, F. (2012). Supply chain management: A new methodology for a systematic literature review. *Supply Chain Management: An International Journal, 17*(4), 403–418.

Cooper, M. C., Lambert, D. M., & Pagh, J. D. (1997). Supply chain management: More than a new name for logistics. *International Journal of Logistics Management, 8*, 1–14.

Crandall, R. E., Crandall, W. R., & Chen, C. C. (2010). *Principles of supply chain management*. New Delhi: CRC Press.

Croom, S., Romano, P., & Giannakis, M. (2000). Supply chain management: An analytical framework for critical literature review. *European Journal of Purchasing and Supply Management, 6*, 67–83.

Crozier, M., & Theoenig, J. (1976). The regulation of complex organized systems. *Administrative Science Quarterly, 21*, 547–570.

CSCMP. (2011). *Supply chain management definitions*. Available via Council of Supply Chain Management Professionals. Assessed June 9, 2012, from http://cscmp.org/aboutcscmp/definitions.asp

DOFE. (2012). *Progress report*. Available via Department of Foreign Employment, Ministry of Labor and Transportation, Nepal. Assessed February 25, 2012, from http://www.dofe.gov.np/progress-report-magh-43-np.html

DOLS. (2010). *Livestock statistics of Nepal*. Available via Department of Livestock Services, Ministry of Agriculture and Cooperatives, Nepal. Assessed January 9, 2012, from http://www.dls.gov.np/publications.php

Gunasekaran, A., & Ngai, E. (2005). Build-to-order supply chain management: A literature review and framework for development. *Journal of Operations Management, 23*, 423–451.

Gyawali, B., Colavito, L., Shrestha, R., et al. (2008). Poster presented at the IPM CRSP Workshop, Manilla. Assessed Jun 11, 2012, from http://www.oired.vt.edu/ipmcrsp/Publications/Meetings&Workshops/IPMAnnualMeet2008/Program%20Book.pdf

Harland, C. (1996). Supply chain management: Relationships, chains and networks. *British Academy of Management, 7*, S63–S80.

Hitt, M. A. (2011). Relevance of strategic management theory and research for supply chain management. *Journal of Supply Chain Management, 47*(1), 9–13.

Hitt, M. A., Ireland, R. D., & Hoskisson, R. E. (2001). *Strategic management: Competitiveness and globalization*. Singapore: Thomson Asia Pte, Ltd.

Hult, G. T., Ketchen, D. J., Jr., & Arrfelt, M. (2007). Strategic supply chain management: Improving performance through a culture of competitiveness and knowledge development. *Strategic Management Journal, 28*, 1035–1052.

Jiang, R., & Bansal, P. (2003). Seeing the need for ISO 14001. *Journal of Management Studies, 40*(4), 1047–1067.

Johnson, G., Scholes, K. & Whittington, R (2008). *Exploring corporate strategy*. Delhi: Pearson Education.

Johnson, M. E., & Whang, S. (2002). e-Business and supply chain management: An overview and framework. *Production and Operation Management, 11*(4), 413–423.

Jones, C., Hesterly, W., & Borgatti, S. (1997). A general theory of network governance: Exchange conditions and social mechanisms. *Academy of Management Review, 22*(4), 911–945.

Kapali, S. P. (2011). *Supply of biomass stoves in Nepal*. Assessed June 11, 2012, from http://www.pisces.or.ke

KFC. (2011). KFC poultry welfare guidelines. In: *Animal welfare program*. Assessed February 21, 2012, from http://www.kfc.com/about/animalwelfare_guidelines.asp

Kilboume, W., Beckmann, S., & Thelen, E. (2002). The role of the dominant social paradigm in environmental attitudes: A multinational examination. *Journal of Business Research, 55*(3), 193–204.

Lambert, D. M., & Cooper, M. C. (2000). Issues in supply chain management. *Industrial Marketing Management, 29*(1), 65–83.

Lancioni, R. A., Smith, M. F., & Oliva, T. A. (2000). The role of internet in supply chain management. *Industrial Marketing Management, 29*, 45–56.

Lummus, R. R., & Vokurka, R. J. (1999). Defining supply chain management: A historical perspective and practical guidelines. *Industrial Management and Data Systems, 99*(1), 11–17.

Maloni, M., Carter, C. R., & Kaufmann, L. (2012). Author affiliation in supply chain management logistics journals: 2008–2010. *International Journal of Physical Distribution and Logistics Management, 42*(1), 83–101.

Maraseni, T. N., Shivakoti, G. P., Cockfield, G., et al. (2006). Nepalese non-timber forest products: An analysis of the equitability of profit distribution across a supply chain to India. *Small-scale forest Economics, Management and Policy, 5*(2), 191–206.

March, J. (1991). Exploitation and exploration in organizational learning. *Organization Science, 2*, 71–87.

Mentzer, J. T., DeWitt, W., Keebler, J. S., et al. (2001). Defining supply chain management. *Journal of Business Logistics, 22*(2), 1–25.

MOAC. (2010). Livestock products of Nepal. In: *Statistical information year book*. Assessed January 9, 2012, from http://www.moac.gov.np/content.php?id=234

NAWS. (2008). *National Animal Welfare Standards for the chicken meat industry*. Armidale, New South Wales Australian Poultry CRC Pty.

Sarkis, J., Zhu, Q., & Lai, K. (2010). *An organizational theoretic review of green supply chain management*. Assessed June 22, 2012, from http://www.sciencedirect.com/science/article/pii/S0925527310004391

Seyfang, G. (2006). Ecological citizenship and sustainable consumption: Examining local organic food networks. *Journal of Rural Studies, 22*(4), 383–395.

Sharma, N. (2011). Census 2011: Country's population 26.6 m. *The Kathmandu post*. Assessed June 6, 2012, from http://www.ekantipur.com/the-kathmandu-post/2011/09/27/top-story/census-201

Spekman, R. E., Kamauff, J. W., Jr., & Myhr, N. (1998). An empirical investigation into supply chain management: A perspective on partnerships. *International Journal of Physical Distribution & Logistics Management, 28*(8), 630–650.

Swaminathan, J. M., Smith, S. F., & Sadeh, N. M. (1998). Modeling supply chain dynamics: A multiagent approach. *Decision Sciences, 29*(3), 607–632.

Tan, K. C. (2001). Framework of supply chain management literature. *European Journal of Purchasing and Supply Management, 7*, 39–48.

Thomas, D. J., & Griffin, P. M. (1996). Coordinated supply chain management. *European Journal of Operational Research, 94*, 1–15.

UNL. (2005). The seven principles of HACCP. In: *Food safety*. Assessed June 22, 2012, from http://foodsafety.unl.edu/haccp/start/7principles.html

Upreti, C., Shrestha, S., & Shrestha, B. (2005). *Poultry nutrition research and opportunity* (pp. 13–16). Proceeding: Technical seminar and workshop. National Poultry Expo, Nepal.

US Census Bureau. (2011). *International statistics*. Assessed January 10, 2012, from The 2012 Statistical Abstract: http://www.census.gov/compendia/statab/cats/international_statistics.html

USAID. (2011). *Value chain/market analysis of the orthodox tea sub-sector in Nepal*. Assessed June 22, 2012, from http://nepal.usaid.gov/downloads/all-downloads/category/4-economic-growth-education.html

Williamson, O. (1981). The economics of organization: The transaction cost approach. *American Journal of Sociology, 87*(3), 548–577.

Wu, J., Dunn, S., & Forman, H. (2012). Study on green supply chain management practices among large global corporations. *Journal of Supply Chain Operations Management, 10*(1), 182–194.

Zhu, Q., Sarkis, J., & Lai, K. (2012). Green supply chain management innovation diffusion and its relationship to organizational improvement: An ecological modernization perspective. *Journal of Engineering and Technology Management, 29*(1), 168–185.

Companies' Approach to Reverse Flows Management: The Case of the Czech Republic

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Abstract Over the last two decades reverse flows have become a recognized part of supply chain management. It is primarily the material flow that moves in the supply chain in the opposite direction from the material processed into the form of the final product from suppliers to customers into their processes of consumption. In this chapter the answers to the fundamental questions of the management of reverse flows using the example of the Czech Republic are presented, namely on the basis of collected data and information from the long-term empirical research carried out between managers of 150 Czech companies. The first question is why reverse flows are generated, and why do companies pay or not pay attention to them. Furthermore, who carries out the processes associated with these flows and how they are realized, whereas part of this question is, how the performance of these processes and their economic consequences for businesses are monitored. Three accompanying mini-case studies contribute to a better understanding of the present knowledge targeted at reverse logistics management practices.

The basic finding is that the view of the Czech enterprises is somewhat polarized; reverse flows represent "a necessity that must be addressed" for 61 % of enterprises. The remaining 39 % of companies see reverse flows as a source of value, but not an essential one.

1 Introduction

Reverse flows constitute a rather important (and specifically in sectors such as retail and e-commerce that are still growing) part of the flows of products, materials, components, raw materials, and packaging, as well as information and financial flows. There are many sources of reverse flows: waste, reusable or recyclable packaging, unsold products, end-of-life products, scrap, by-products, recalls, damaged products, commercial agreements enabling returns etc. These diverse forms of

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W. Piotrowicz, R. Cuthbertson (eds.), *Supply Chain Design and Management for Emerging Markets*, DOI 10.1007/978-3-319-05765-1_12

reverse flows have different impacts on managerial issues and tasks concerning reverse flows and reverse logistics.

Both forward and reverse flows represent the conjunction of different links or entities both in the internal environment of the company (within the value-creation process), as well as with suppliers and customers, distributors, and other stakeholders (an exhaustive review of supply chain stakeholders is offered by Cetinkaya et al. (2011)). These stakeholders are directly involved in the creation of forward and reverse flows, or else they require these flows or to some extent affect them. They can also shape the environment in which it is possible and necessary to manage both types of flows.

According to existing empirical findings, the management of reverse flows varies very widely across companies—from reactive to proactive management, from ad hoc management to the involvement of reverse flows in strategic planning, from following the goal of simple cost minimization to value capturing and creation, from the perception of reverse flows management as a necessity to the perception of gaining (sustainable) competitive advantages (Amini and Retzlaff-Roberts 1999; Stock 2001).

However many companies still consider reverse flows and reverse logistics as the most neglected part of supply chain management practices (Norek 2002), and some authors even view reverse flows as an expensive and recurring headache (Trebilcock 2001, both authors cited in Richey et al. 2005). The potential value of effective reverse flows is often overlooked, as Richey et al. stated. A proactive approach to reverse flows is taken mostly by companies that have become conscious of the value that can be obtained from these flows (De Brito and Dekker 2003).

The question of engagement, and the practices enterprises apply in the management of reverse flows in the Czech Republic, is at the core of this research, some findings of which are presented in this chapter. Only a small amount of information concerning empirical knowledge of practices in this field has been published in the Czech Republic so far, which is quite surprising. The Czech Republic is a highly industrialized economy located in Central Europe with many affiliations to big multinational companies that are among the top corporations worldwide, with very well-developed logistic and supply chain management knowledge and practice as well as logistics providers (Kia, Toyota, Volkswagen, Procter&Gamble, DHL, Nestlé, Ikea, PPL, Honeywell, Benq, Tesco, Metro, etc.). Its geographical position on the European continent and its well-developed logistics infrastructure offer many opportunities not only for logistics providers, but also for other business that is more or less connected with reverse flow tasks.

Although to the best of the authors' knowledge no special survey (empirical research) exists dealing with the relation between the level of reverse flows management/reverse logistics and the level of supply chain management,[1] or

[1] By the level of management the authors understand the level of knowledge, quality and competence of management.

even dealing with their relation to the national economy, it is possible to hypothesize that companies from countries with developed logistics and supply chains, with dense transport networks, warehouses, cross-docking centres, retail and wholesale networks, with higher foreign trade intensity and more industrialized countries would be more engaged in managing reverse flows. Higher engagement can be expressed in different terms: by a more proactive and more conscious attitude by managers, or through value-seeking managerial behaviour among other things.

Thus the subsequent text contributes to the discussion about the quality and the extent of reverse flows management in relation to the economic development of countries in the way that it focuses on one country, which certainly belongs to the group of economically as well as technologically advanced countries of the world.

2 Reverse Logistics Management: Literature Review

2.1 Definition of Reverse Flows Management

Reverse flows are characterised for instance by Gonçalves-Dias et al. (2006, p. 2) as "*. . .flows in the opposite direction to the direct chain, where the disposable products after consumption face the adding of different types of values through the reintegration of their components or materials to the productive and business cycles. . .*". Nevertheless, to this definition it is necessary to add that the chain of reverse flows need not copy the structure of the forward flows chain, i.e. it need not be direct, value need not be only added as it is described in definition, but it can also be created by processes other than the reintegration of used components and materials; new components and materials can be employed as well.

Reverse flows occur both in the internal environment of a company, and between and among companies or companies and organizations, or—in the broader scope—among customers (consumers), companies and organizations. These are the basic "supplier-buyer's" relationships between the supplier and the customer, within which the exchange and transactions are realized, and value should or could be created. With some restrictions, it is possible to say that the management of reverse flows represents part of Supply Chain Management, in which it is necessary to take into account not only the interests of the company, but also the interests of the other partners.

The management of reverse flows (precisely introduced as returns management) is also defined by Rogers et al. (2002, p. 5) as "*that part of supply chain management that includes all activities associated with returns, reverse logistics, gatekeeping and avoidance*". This definition shows that reverse logistics is a narrower concept than the management of reverse flows, but it does not involve the aspect of value and value creation, and it does not clarify what is meant by management.[2]

[2] Although it can be deduced that the authors have in mind activities presenting the content of management.

Value creation that can be considered as the pivotal goal of the management (not only) of reverse flows is captured in the definition of reverse logistics offered by Rogers and Tibben-Lembke (1998): "*The process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal*." (Rogers and Tibben-Lembke 1998, p. 2).

For the purpose of research targeted at reverse flows and reverse logistics management in the Czech environment, this definition does not fully correspond with the need to cover various elements of reverse flows management in the supply chain. Reverse flows can have a different direction compared to forward flows (as was mentioned above); they can engage some or wholly different companies and organizations, and they can encompass different nodes within which the production and business cycles take place differently. They also need not originate at the end of the chain, but at any link backwards from it. Sometimes value is not recaptured; instead totally new value can be created, recapturing only a very small part; sometimes much of the value must simply be destroyed. In many cases the flows do not flow back from the point of consumption—e.g. in the case of transport handling—and management involves other functions besides planning, implementing and controlling. These are all reasons for another definition to be used in this research:

> *Management of reverse flows is the process of realization of all managerial functions for the purpose of recapturing or creating new value from values flowing backward, with the aim of retaining or increasing sustainable performance by all partners in a supply chain or network.*

Managerial functions include planning, organizing, decision making, commanding, coordinating, monitoring, keeping records and reporting, analysing and budgeting, measurement and assessment of results, integrating, communicating, staff ensuring motivating and leadership (Klapalová 2007).

Basic issues of the operation and management of reverse flows were defined by the team dealing with a research project called the REVLOG (the European Group of Reverse Logistics). These basic questions are: why, what, how, and who; or, more specifically:

- WHY reverse flows originate, or more narrowly, why products (and other elements of these flows) return (in other words, what are the driving forces and the reasons for the emergence of reverse flows and activities associated with them, and together with this also a clarification of whether these reasons can be regarded as barriers or weaknesses in the management of forward flows, or as opportunities worthy of the attention of management);
- WHAT returns (i.e. what is the subject or the content of reverse flows, and in the narrower perspective what are the types and characteristics of the products moving in reverse flows). This topic has already been addressed above;
- HOW are the reverse flows realized (processes) and who is engaged in the reverse flows (actors)—inside (hierarchies and organization of the company)

and outside the company (the involvement of the other partners, outsourcing, etc.). But also with HOW can we answer the question of how reverse flows occur—thus this question supplements the question of why (de Brito 2003).

Nevertheless these questions do not cover all the important aspects of the management of reverse flows. It is therefore appropriate to answer the additional questions: WHEN, WHERE and once more WHAT. The first two flesh out the above-mentioned questions and WHEN also helps to recognize the time-conditional context of reverse flows (in certain sectors this may be very significant; moreover, for the management of processes the question of time is very often critical). Besides the actors also the place of origin and place of reverse flow realization, among other things in order to optimize the management of reverse flows and remove bottlenecks—WHERE—can be analysed in terms of life-cycle stages (of the product but also the process, the stage development of the company, or—from the macro-economic point of view—things such as the country's level of development) (Klapalová and Škapa 2008). The second WHAT stands for answering the question of what arises from or within reverse flows. In other words, what values (positive and negative) it is possible to get and/or create. The positive ones as in support for interest of reverse flows, the negative one—in addition to the interest—the possibility of finding the locations and causes of such values. Also this question must be answered in regard to the place of origin—WHERE, with the reason for the origin—WHY, with persons participating in the acquisition, creation and then utilization and/or consumption—so WHO and FOR WHOM, of course the question of WHY as well—why such a value, why not a different value, etc. and the question of HOW—for example if it led to innovation, optimisation of processes, etc.

2.2 Reasons for Reverse Flows Management

Scarcity of resources is still more and more the actual motive for reverse flows management, together with growing pressure for efficiency and effectiveness, and the growing impact of environmental sustainability issues which lead to so-called extended product responsibility (Gonçalves-Dias et al. 2006). The list of major reasons for being interested in managing not just forward but reverse flows as well can be added to: take-back legal enforcement (mostly in the form of reuse and recycling quotas), increasing recognition of the potential economic value stemming from returns (De Koster et al. 2002), rising landfill costs (De Brito and Dekker 2002) and growing return rates of catalogue and online shopping (De Brito 2003).

The strategic role of returns was also examined by Rogers and Tibben-Lembke (1998). The majority of companies in their survey—64.9 %—mentioned various competitive reasons—the effort to maintain or increase customer satisfaction and loyalty (which leads companies to a more liberal policy when returning products). The second most frequent reason (33.1 %) was "cleaning up channels" (meaning that companies help their customers with oversupply and replenishment and

motivate them in this way to buy new products). The third most frequently given reason (29.3 %) concerns legal disposal issues (mostly waste and its disposal).

Bernon et al. (2004) discovered 12 drivers of reverse flows management within which value creation can be managed: forecast accuracy and demand variability, high on-shelf availability, purchasing policies, product and safety stock policy, logistics trade-offs, liberal returns policy, customer "no fault found", cash flow management, new product development and product life cycle, legislative factors, trading terms and promotional activity. Ever more companies consider reverse flows to be of strategic importance (Krikke et al. 2005) to provide a competitive advantage, or as leading to sustainable competitiveness (Mollenkopf and Closs 2005) or as a source of differentiation (Richey et al. 2005 cited Stock 2001). Jayaraman and Luo (2007) made their own distinction of the effects of appropriate reverse logistics programs. They emphasize the role of reverse logistics as a source of feedback. Analysis of return reasons can help identify difficulties in the production process, in distribution, and to foster changes in trade policy or product design. Jayaraman and Luo (2007) also added that the interest of companies in reverse flows and their management is related to the concept of "corporate citizenship", when firms seek to act as "good" citizens.

Actions positively perceived by the public include not only environmental protection but also philanthropy, which in relation to reverse flows means the supplying of functional (though used or reclaimed and repaired) goods for charitable purposes.

A number of reasons (WHY) laid to formulation of the first research question:

Research Question (RQ) 1 What are the reasons that lead businesses to the management of reverse flows, what are the objectives that companies pursue within the framework of reverse flows, and what driving forces impact the management of reverse flows?

As well as the reasons found, we also need to consider WHAT flows back from forward processes in various forms. Much of these reasons are rooted in the impact of human resources, nevertheless for capturing a variety of possibilities we decided to use an open research question as follows:

RQ 2 What are the causes of the emergence of reverse flows?

An important indicator of interest in recoveries is their presence in the system of corporate planning. Zhiqiang Lu in dissertation (citied in Bostel et al. 2005) distinguishes among reverse logistics tasks according to their strategic, tactical and operational significance. Decisions that companies must make at the strategic level concern the question of the objectives of a reverse logistics system, and also the involvement of other stakeholders in reverse logistics including the definition of their roles. However, Mollenkopf et al. (2007) identified a discrepancy between the scheduling of reverse flows at the strategic and operational level. In their long-term objectives companies focus on reverse flows issues, but most often as part of other objectives which have a greater priority internally, for instance customer satisfaction and loyalty. At operational level, there is no or only weak coherence with

strategic plans. But potential achievements in the process of reverse flows processing can occur despite the low priority given to reverse flows management.

This discussion leads to the next research question:

RQ 3 Are reverse flows managed at all levels, i.e. strategic, tactical and operational?

2.3 Barriers to Reverse Flows Management

In the context of the conclusions of Gecker and Vigoroso (2006) about dissatisfaction with the status of reverse logistics in enterprises, the question arises, what are the reasons and what are the "barriers" that restrict the development or improvement of reverse flows and reverse logistics management. Several research projects have sought an answer. The most frequently-mentioned obstacle to reverse logistics is the relative unimportance attributed to reverse flows, a lack of interest. The other frequently-cited barrier concerns the incompatibility of reverse flow management with existing organisational and company focus and positioning, the lack of reverse flows strategic planning, financial barriers, and problems with the quality of products (Rogers and Tibben-Lembke 1998; Chan and Chan 2008 or Ravi and Shankar 2005; Erol et al. 2010).

A more detailed, comprehensive list of barriers is offered by Janse et al. (2009): in the first place it is the lack of a clear policy for the solution of reverse flows. Other barriers include: the fact that reverse logistics is not viewed as a factor that creates competitive advantage; the absence of an appropriate system to monitor the performance of reverse logistics; inadequate support for reverse logistics by IT, and limited options for forecasting and planning.

Therefore the fourth research question targets finding out the perceived barriers or obstacles:

RQ 4 Are there any barriers/obstacles to the management of re-verse flows?

Most of the reported barriers have an internal character (Walker et al. 2008), and they are overcome more often due to the previous decisions of senior management than by external circumstances. It is therefore possible to assume that the status of reverse flows management can be strongly related to the attitudes of managers towards reverse flows, as shown for example by Alvarez-Gil et al. (2007), who identified a strong (and statistically reliable) relationship between a progressive attitude by managers and the likelihood that the company will establish programmes for the development of reverse logistics. If managers do not consider reverse flows as a potential source of value, they avoid proactive management. One of the managerial functions is measurement of its value (or, as mentioned above, performance). According to the results of empirical research, many companies still regard reverse flows as costly and only tending to cause problems (Trebilcock 2001,

stated in Richey et al. 2005). Norek found that managers often do not take the existence of reverse flows into account (Norek 2002, cited in Richey et al. 2005).

These findings represent the grounding for the following research question:

RQ 5 How are reverse flows perceived by management?

If we employ the definition of value as the ratio between the benefits/gains or profits and costs/losses or sacrifices, the value can be increased in two ways—by improving the benefits/gains or reducing the costs/losses (Monroe and Chapman 1987). The current practice in reverse flows has yet to speak in favour of the second approach. Inter alia, Mollenkopf and Closs (2005) point to the fact that businesses are more concentrated on the cost of reversing flows than on revenue/income/benefits or gains. This is understandable—cost is relatively easier to trace and measure (at least direct costs) than revenues/benefits; and reverse flows are considered more expensive than forward flows, in particular due to greater uncertainty about the further use of the subject matter of these flows, and also due to smaller quantities, which prevents the achievement of economies of scale. In addition, the management of reverse flows is for many enterprises a relatively new issue involving new processes which involve higher initial costs. Generally large companies are able to gain greater value from reverse flows than small and medium enterprises. But the costs of reverse logistics for large enterprises are higher as well, and these companies are usually more liberal in their complaints policy (Mollenkopf and Closs 2005). The volume of reverse flows is also larger, and therefore they need more attention; finally, measuring their performance may be more important for large enterprises than small companies, at least from a certain point of view.

One of the last examples of the potential retrieval of value from reverse flows points to the revenue aspect. Stock and Mulki, in their survey of 200 American enterprises carried out in 2009, found that companies are able to regain a relatively high proportion of the value of returned items, and this in various ways, whereas wholesalers and retailers achieve higher percentages of recovered value: up to 61 % for wholesalers, 76 % for retailers (probably because they can offer products in practically unchanged form on the market), better than the manufacturers, who regain 38.3 % of the value. As companies should earn a profit, they must be able to know the monetary side of value in the reverse flows; for this knowledge they should use metrics for measurement. The survey also showed that firms make use of specific criteria for the measurement of reverse flows, although their application in practice is on average low. Again, the retailers are the most active in this area and the producers are the least active; specifically 29 % of retailers, 21.4 % of wholesalers, and 11 % of manufacturers use some kind of metrics (Stock and Mulki 2009). Apart from this, the results from the survey of the Aberdeen Group, comparing the best and average companies, show a big difference between the two groups of companies with regard to financial results. A third of surveyed companies did not know how much reverse logistics costs amount to, or what percentage of the original value of these activities companies make back (Gecker and Vigoroso 2006).

Table 1 Summary of reasons and barriers to development of reverse flows management (based on Blumberg 2005; Gobbi 2008 and Fernández 2004)

Reasons (enablers)	Barriers
Reverse flows as a source of a sustainable competitive advantage (e.g. through differentiation) Maintenance or increase of customer satisfaction and loyalty Reverse flows as a source of feedback Cleaning up distribution channels Pressure for efficiency and effectiveness (scarcity of resources, rising landfill costs, . . .) Increasing recognition of the economic value stemming from reverse flows (value recapturing, assets recovery, margin protection) Growing return rates of catalogue and online shopping Impact of environmental sustainability issues and corporate citizenship Legal requirements of disposal and protection against penalties Take-back legal enforcement	Relative unimportance of reverse flows Reverse logistics not viewed as a factor that creates competitive advantage Incompatibility of reverse flow management with organisational focus The lack of reverse flow strategic planning Financial barriers Lack of a clear policy of solution of reverse flows Problems with the quality of products The absence of the performance measurement system for reverse logistics Inadequate support by IT Limited options for forecasting and planning Reverse flows regarded as costly Managers often do not take the existence of reverse flows into account The focus on the cost of reverse flows rather than on their revenue/benefits side

Therefore the sixth and the last research questions address the area of financial management of reverse flows:

RQ 6 What is the economic context of reverse flows management? Do reverse flows increase/reduce profit? What percentage of the total cost of logistics are the costs of reverse logistics? Do companies measure the performance of their reverse flows management systems? If so, how?

RQ 7 Do companies recognize the value (or potential) of reverse flows?

All potential reasons and driving forces as well as barriers are summarized in the Table 1.

2.4 Czech Republic: Geographical, Social, Political and Economic Environment

The Czech Republic lies in the middle of Europe. It is a country with a very rich history, which is typical for middle European countries. As an independent state (formed of two main regions—Bohemia and Moravia) it was established on 1 January 1993 as one of two successor countries of the former Czechoslovak state that was established in 1918. The history of the Czech state dates back to the tenth century, and is connected with the economy and cultural development, interrupted by wars and power conflicts. From the sixteenth century Bohemia and Moravia constituted part of

the Austro-Hungarian Empire, and the two regions represented the empire's industrial heartland (Čornej et al. 2001). Nearly 70 % of the monarchy's industrial production was concentrated in the Czech Lands. The industrial tradition continued after the establishment of an independent Czechoslovak Republic in 1918, and prior to the Second World War this country was among the most economically and industrially advanced countries in Europe and the world. This development was interrupted by the Second World War, and then again in 1948, when Czechoslovakia became part of the so-called Soviet bloc, with a state central planning economy. In 1989, after the so-called Velvet Revolution, the processes of gradual removal of the consequences of an undemocratic government began and the transition to a market economy. In 2004, the Czech Republic became a member of the European Union. The process of accession, together with EU directives and regulations implementation, had a positive impact on business environment reform in the Czech Republic.

Today the Czech Republic's economy is one of the most developed and industrialized economies in Central and Eastern Europe. It also became the first post-communist country to receive an investment-grade credit rating from international credit institutions (U.S. Department of State 2011). Although a relatively small but very open economy, economic growth is strongly influenced by and dependent upon the demand for Czech exports and flows of foreign direct investment (FDI). For instance, according to the 2014 DHL Global Connectedness Index, which assesses the extent of countries' involvement in the global environment with the help of 10 hard indicators, the Czech Republic ranks 29th position among 140 countries worldwide (Ghemawat and Altman 2014). Similarly, according to Ernst & Young's Globalization Index 2012 the Czech Republic ranks 18th position among 60 countries according to the level of globalisation (Ernst and Young 2012). Czech foreign trade has long been focused on European markets, in particular the markets of neighbouring countries (Germany, 28.8 %, Slovakia 7 %, Poland 6.3 %, and Austria 4.1 %); together their share was 46.2 % (data for 2010). Among other major trade partners are China (6.4 %) and France (4.4 %) (Czechtrade 2011). The leading industries are motor vehicles, machine-building, iron and steel production, metal-working, chemicals, electronics, transportation equipment, glass, brewing, and pharmaceuticals. (U.S. Department of State 2011).

After experiencing robust growth of around 6 % during 2005–2007, the Czech economy—like those of a number of other countries—was affected, although relatively slightly, by the global economic slowdown in 2009. A positive picture of the economy is given by the Czech financial system, which remained relatively healthy during the global economic slowdown. The Czech Republic is reportedly one of only a handful of Organization for Economic Cooperation and Development (OECD) countries not to have had to recapitalize its banking system (U.S. Department of State 2011). Nevertheless, the year 2012 and forecast for at least the next year are less positive. High dependency on the demand of Western European countries together with the stagnating Czech households' consumption affected mostly by the government's tax policy will probably have a negative impact on the volumes of industrial production and sales. The figures for production in year-to-year terms as at June 2012 show a 2.2 % decrease; the percentage showing a decline from 2011 for the construction industry is 8.4 % and the total

road transport of goods in tonnes continued to fall, registering a 8.9 drop in the first quarter of 2012 (the drop for railway transport being 6.5 %). Also the prognosis for export for the next period probably makes the situation even worse (Sip 2012). Except for tax policy "the bad mood" is influenced also by other political decisions or by the avoidance of solutions. Trust in governance by investors (and foreign investors), entrepreneurs and consumers is not as much robust as needed.

According to the OECD notes to the Czech Republic economy published in 2011 there are several barriers that restrain the development. The existence of strict employment protection legislation especially discourages business and there are many barriers to business entry and inefficient public local government (OECD 2011). Nevertheless, according the report "EY Rapid-Growht Markets Forecast" (Ernst and Young 2014) the future is more optimistic with the growth of economy by around 3% during the period of 2014 to 2017.

2.5 Supply Chain and Reverse Logistics Management in the Czech Republic

The Czech Republic as a member country of the European Union is obliged to implement in its legal system legislative measures relating to the reverse flows of selected products and waste in landfill. Most of the regulations cover the idea of so called Integrated Product Policy that can be described as the initiative and the complex of tools and instruments aimed at reducing the environmental impact of products and services throughout their whole life cycle. Table 2 summarizes the impact of EU regulations on the reverse flows of some materials and products (EURLEX 2012).

Information on the management of reverse flows in Czech companies is very sparse. With the exception of works published by Škapa (2004, 2011), Klapalová (2009), and Klapalová and Škapa (2010) and Škapa and Klapalová (2012), there is a lack of research in the Czech environment that would map reverse logistics from either a comprehensive or a narrow view (except for some case studies focused on the practices of individual enterprises mostly as the results of surveys made within diploma theses).

Nevertheless, we can conclude the same about knowledge of supply chain management. There are only a few research results that provide conceptual information about managerial aspects of supply chains or networks. The majority of published knowledge (and that published in professional journals for practitioners) on supply chain management has the character of case studies (not scientifically processed), where attention is focused on some elements of the logistics management (storage, transport and transport, ICT applications in the enterprise, etc.), but does not deal with the issues of supply chain management beyond the boundaries of the company (and where it does, then it is mostly to show compliance with the needs of customers).

One of the latest studies conducted in 2007 among 240 manufacturing companies investigated logistics management in general. It revealed that some

Table 2 EU regulations and reverse flows

Legal document	Effects on reverse flows
Packaging and packaging waste Directive 94/62/EC	The aim is to limit the production of packaging waste covering all packaging and packaging waste placed on the European market and to promote recycling, re-use and other forms of waste recovery.
Landfill Directive 1999/31/EC on the landfill of waste	The primary purpose is the prevention or reduction of adverse effects of all types of landfills of waste (of different categories) on the environment.
End of life vehicles (ELV) Directive 2000/53/EC	The aim is to decrease the quantity of waste arising from all life cycles of vehicles and their components and materials produced at and imported into the EU by limiting the use of hazardous substances in new vehicles, by integration of recycled materials into vehicles in their design and production.
WEEE Directive 2002/96/EC (Waste Electronic and Electrical Equipment)	The purpose is the prevention of waste concerning electrical and electronic equipment and the reuse, recycling and other forms of recovery of such wastes with the main goal of reduces the disposal of waste together with the improvement of the environmental performance of all parties involved in the life cycle of such equipment.
Directive 2005/64/EC on the type-approval of motor vehicles with regard to their re-usability, recyclability and recoverability	"*The Directive helps facilitate the recycling and recovery of component parts of end-of-life vehicles by obliging manufacturers to incorporate recycling from the vehicle design stage onwards. Manufacturers must design vehicles from the viewpoint of dismantling and recycling them, for example by using a large proportion of materials which are potentially able to be recycled and recovered" (citation from the text of Directive).*
Battery and accumulators Directive 2006/66/EC (batteries and accumulators and waste batteries and accumulators)	The aim is to prohibit the placing on the market of certain types of batteries and accumulators with a proportional mercury or cadmium content above a fixed threshold, to promote a higher rate of collection and recycling of such waste batteries and accumulators and to improve the environmental performance of all actors involved in the life-cycle of these products, including their recycling and disposal and thereby to cut the amount of hazardous substances by reducing the use of these substances and by treating and re-using the amounts that are used.

(continued)

Table 2 (continued)

Legal document	Effects on reverse flows
RoHS Directive 2002/95/EC (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment)	The purpose is to restrict the use of hazardous substances in electrical and electronic equipment and thereby to contribute to the protection of human health and the environmentally sound recovery and disposal of such equipment.
Regulation (EC) No 1013/2006 on shipments of waste	The primary aim is to reduce the risk of waste shipments between Member States, within the European Union (EU) or by transit through third countries, imported into the EU from and exported from the EU into third countries otherwise not being controlled to improve environmental protection.
Waste framework Directive 2008/98/EC	The purpose is to establish a "general" legal framework for the treatment of waste within the EU and help to prevent the harmful effects of waste generation and waste management.
Directive 2011/83/EU on consumer rights	The amendment of the directive from 2008 extends the rights of consumers to return products bought at distance and of their right to be refunded within 14 days of the withdrawal.

weaknesses are probably related to the lower competence and scope of processes and activities within the logistics management of Czech logistics managers. The majority of respondents whose companies had a special logistics department (or working positions of logistics managers and workers) dealt with transportation, warehousing and expedition only. Logistics as a means for supply chain effectiveness improvement was important predominantly to the large and foreign-owned companies, 56.5 % of the total number of enterprises. Only 17 % of the companies dealt with optimization of value creation within the framework of logistics management, and only 8 % of logistics departments participated in the development of products. For about 75 % of respondents, of which the majority were represented by large companies, logistics is a component of strategic planning, where the planning a priori focuses on the choice of supply and marketing channels. Less than 60 % of companies monitor the costs associated with logistics activities; customer satisfaction is monitored in general by around 70 % of enterprises. One of the important conclusions of this research was that enterprises are focused not on the supply chain which they are part of, but on the internal affairs of the logistics management of the company (Pernica and Toman 2008). This may allow us to presume that the general situation in reverse logistics is similar. The results of the survey on the impact of the crisis on logistics management of Czech enterprises (on the same sample) carried out in 2010 by the staff of the Department of Logistics, University of Economics in Prague, showed that a special department of logistics still exists only in about 60 % of enterprises (as in 2007). Not even the decline in sales has led to a search for alternative areas of resources, or reduced logistics costs (which have

stagnated or even increased), and over 60 % of the contacted companies did not intend to change their logistic strategies, which were primarily directed towards management of transport and storage and reducing costs within the framework of these two activities. However, at the same time this study is the only one existing that points to increased interest of companies in green logistics, including reverse flows, but only as very brief information (Toman 2010).

The above facts about logistics management and supply chain management in the Czech Republic also refer to reverse logistics. This lack of information about supply chain management and reverse logistics is surprising if we consider the relative maturity of the logistics market, where logistics represents the fourth most important sector in terms of contribution to GDP. The Czech Republic is a European and to a certain extent world crossroads for the flows of goods and European logistics know-how. In 2009, about 4,000 companies dealt with goods transport and logistics, but this number has declined due to the recession. According to the President of the Logistics Club of the Association of Forwarding and Logistics Czech Republic, and the commerce and marketing director of Dachser Czech Republic Jan Polter, this country can be ranked among the most important for European logistics. On the other hand Polter points out that logistics is not perceived by managers as a source of competitive advantage, only as a source of costs (Toman 2011), although also here a small shift caqn be found towards the perception of logistics as the means for costs reduction (Toman 2013). This view is supplemented by the results of a survey among 46 logistics experts realized in 2011, where logistics processes were appraised as value-creating only by 36.6 % of respondents, while the rest of the respondents see them as merely necessary for processes that produce waste (Jirsák and Holman 2011). The Czech Republic is, due to its location and other factors, a suitable destination for the distribution activity of multinational companies active in e-commerce over the entire Central European region. Despite some problems in road infrastructure (quality of some of the roads), the country's prime logistics centres (category A) and their capacity, equipment, localization, and competitive labour costs give it an advantage (Urbánková 2011).

To complete the picture of reverse flow management in the Czech Republic, two points can be added. First, statistical data in many aspects of reverse flows are nearly non-existent, and no hard data (except for the amount of waste and some of recycling) about either the volume or the value of returns is available. Only separate data for several commodities or products (e.g. cars, electrical equipment or packaging) is collected, where EU legislative requirements concerning the environment are in effect. Second, an analysis of the curricula at Czech universities highlights another issue that can be related to managers' perception of reverse flows' importance. Reverse logistics is almost completely absent in their business studies programs, and if it is mentioned at all, it comes up as a marginal topic in logistics courses. For that reason there is no commonly accepted Czech terminology of reverse logistics concepts; Czech managers and employees dealing with reverse flows simply learn it as they go along.

The situation in the Czech Republic can be also described using a quality indicator of the logistics environment—the so called Logistics Performance Index

(LPI), which is the weighted average of the country's scores on the six dimensions, based on soft data. Among 160 countries in the year 2014, the Czech Republic ranked in 32nd position, with a relatively good level concerning the dimension "ease of arranging competitively priced shipments" and in the dimension "the frequency with which shipments reach the consignee within the scheduled or expected time". On the contrary, it has worse rankings for the indicator "competence and quality of logistics services" and the "quality of trade and transport-related infrastructure" (The World Bank 2014).

Until the fall of the Communist regime logistics was a forbidden concept and as such a forbidden field of study. The economic encyclopaedia published in the 1980s by the Economic Institute (a part of Academy of Science) stated that logistics is a method for the exploitation of working people. Toman mentioned that despite this attitude and belief, the first enthusiasts began to study logistics during this time. Under the codename "the rationalisation of circulation processes" they tried to address, in particular, the application of logistics management in national economy planning (Toman 2005). Nevertheless, the truth is little bit different. Issues of operations management together with the majority of logistics knowledge were taught in universities at least from the 1960s onward.

An indirect indicator of the development of reverse flow management in Czech enterprises may be the development of the indicator of material intensity of GDP. In the Czech Republic this indicator declined after 1998, most notably in the period after the year 2004. In the period 2000–2009 material intensity decreased by 26.7 %. This positive trend indicates the increasing efficiency of conversion of material flows to economic ones. It should however be noted that the indicator is influenced by other factors, for example by shifting to a less material-demanding industry. However, in the Czech Republic this indicator has had significantly higher values than the EU average (Cenia 2011).

In 2011 results of a survey of competencies of managers of branches of multinational companies were published (Filippov and Duysters 2011). According to the results, which include Czech enterprises, competences in supply chain management in Czech subsidiaries are derived more from everyday practice, and not by know-how transfer from headquarters. It also became clear that the growth of functional competences was very different compared to other business function competencies in the area of logistics (but also purchasing and distribution), which were accumulated more slowly (Filippov and Duysters 2011).

The priorities of the investments of Czech enterprises in informatics are targeted more towards hardware and ERP systems. Far less attention is paid to software associated with the management of logistics chains. The electronic sharing of information between enterprises is less frequent (12.8 %) in comparison with the EU average (14.5) (Lhotan and Pour 2011).

3 Empirical Research

3.1 Methodology and Data Collection

The above-mentioned gaps in knowledge about reverse flows and reverse logistics management in the Czech Republic are partially filled by this exploratory research, with includes some features of descriptive survey. It is based on data from 150 Czech companies collected during the autumn and the inter 2009 and the spring 2010. The companies were chosen on the basis of the authors' personal contacts with the executive management of particular companies. The convenient nature of sampling limits the generalizability of the study finding, which is—however—in harmony with the exploratory character of the research. Another factor limiting the reliability is a sectorial structure of research sample and "softness" of data used (the opinions of managers). Although the findings can be generalized only with a great degree of caution, the presented answers to research questions offer some insight into the reverse flows and reverse logistics practices of managers managing businesses in this country.

The structured questionnaire contained 22 questions (closed, multiple response, open and scale) covering various issues of reverse flow management. The missing data were excluded on a pairwise principle; therefore the number of missing cases (or number of responses) is indicated in each piece of analysis.

In this chapter only answers to crucial questions showing levels and selected facets of reverse flows and reverse logistics management are introduced.

The objectives of the research were formulated in the form of the following research questions:

- *Research question (RQ) 1: What are the reasons that lead businesses to the management of reverse flows, what are the objectives that companies pursue within the framework of reverse flows, and what driving forces impact the management of reverse flows?*
- *RQ 2: What are the causes of the emergence of reflows?*
- *RQ 3: Are reverse flows managed at all levels,* i.e. *strategic, tactical and operational?*
- *RQ 4: Are there any barriers/obstacles to the management of reverse flows?*
- *RQ 5: How are reverse flows perceived by management?*
- *RQ 6: Do companies recognize the value (or potential) of reverse flows?*
- *RQ 7: What is the economic context of reverse flows management? Do reverse flows increase/reduce profit? What percentage of the total cost of logistics are the costs of reverse logistics? Do companies measure the performance of their reverse flows management systems? If so, how?*

The data were collected through personal interviews with representatives of companies. The selection of companies was made on the basis of direct and arranged personal contacts with company representatives, i.e., using so-called convenience sampling (e.g. Hair et al. 2006). The data obtained have a largely

subjective character. These essentially soft data, albeit in a few cases transferred to numbers (e.g. using scales), have been processed quantitatively. Using the terminology of authors Smith and Fletcher (2004), we applied quantitative methods of data collection, which we subsequently processed in the so-called quantitative mode, and to a lesser extent the qualitative mode as well. The evaluation was carried out using descriptive statistics—mostly frequency analysis, cross-tabulation, central tendency, and variability of the data. The data obtained were transferred and encoded into about 270 variables and analysed using statistical software SPSS 19.

Three short descriptive case studies enrich the view on reverse flows management in the country. Their texts were extracted from two bachelor and one diploma theses elaborated and defended in the years 2006 and 2010 at Masaryk University Brno, Faculty of Economics and Business Administration. The authors of this chapter acted as the supervisors. The aim of the theses was to analyse a concrete situation and managerial problem of the specific company in the context of reverse flows management.

3.2 Characteristics of the Research Sample

Managers from 150 companies from all over the Czech Republic participated in the survey. Respondents were representatives of the senior and middle management who were competent (on the basis of the content of their work) to provide the relevant information on the management of reverse flows in their company. Since none of the surveyed companies have any specialized function for reverse flows in logistics management, the survey represented mostly managers from the areas of logistics, purchasing, sales, strategic management, etc. Representatives of small (35 %), medium (38 %) and large (27 %) enterprises took part in the survey. The biggest share of companies came from the engineering industry (29.3 %) and commerce (28.7 %). A significantly smaller number of companies represented the chemical and food industries. A large group consisted of companies from other sectors, which were so heterogeneous that it was not reasonable to segment them; they made up the category of "other companies" (27.3 %).

3.3 Analysis of Results

3.3.1 Reasons and Objectives for the Management of Reverse Flows: RQ 1

Various reasons and objectives combine to produce interest in both the passive and proactive management of reverse flows. These have been measured through a single question. Answers in percentage of total responses are given Table 3.

Table 3 Reasons for interest in reverse flows management

Reasons	Yes	in %	No	in %	No. of missing values
Cost reduction	113	89.7	13	10.3	24
Customer satisfaction	102	82.3	22	17.7	26
Competitive reasons	88	69.3	39	30.7	23
Customer service	88	78.6	24	21.4	38
Customer demand/pressure	77	69.4	34	30.6	39
Value retrieval	73	61.9	45	38.1	32
Environmental issues	68	59.6	46	40.4	36
Productivity increase	65	63.1	38	36.9	47
Margin protection	47	47.5	52	52.5	51
Asset recovery	45	45	55	55	50
Fulfilling legislative requirements	45	42.5	61	57.5	44
Flow acceleration in supply chain	32	30.8	72	69.2	46

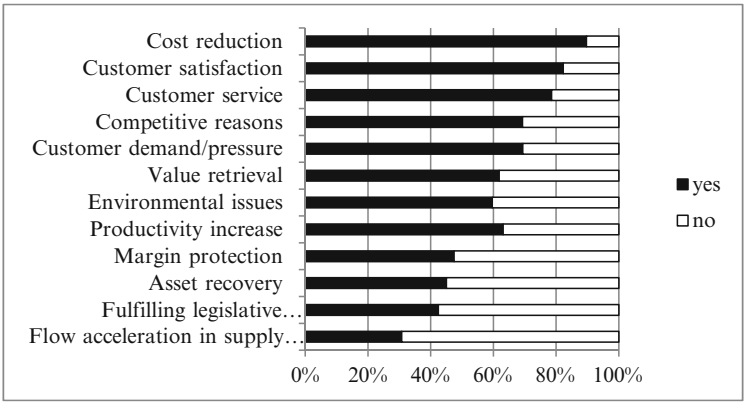

Fig. 1 Reasons for interest in reverse flows management

A sum of the frequency of "Yes" and "No" responses less than 150 means that some of the respondents did not respond to the question. Percentages are calculated from the number of responses to the question.

The responses show that the dominant reason for interest is the customer: his/her satisfaction, services, as well as power and position are among the most frequently mentioned reasons for interest in reverse flows. Two other factors that affect the importance of reverse flows are the objective of reducing costs, and maintaining competitiveness.

In the context of theoretical background, special attention must be paid to the factor of value retrieval, cited by 61.9 % of enterprises. From this result it is possible to suggest that management regards reverse flows as a source of value (see below). The least significant factor is "to comply with the requirements of the government" and the acceleration of the flow in the distribution channel. Surprisingly, environmental protection ranked somewhere in the middle (Fig. 1).

Table 4 Reasons for reverse flow emergence

Reasons for emergence	Freq.	Average share on whole company's RF (%)	No. of responses
Packaging	54	29.4	57
Defected products	96	23.9	103
Human factors	77	14.47	65
Seasonal variation in demand	46	11.55	84
Defect in processed materials (production inputs)	58	10.02	62
Excess inventory	45	8.09	85
Low-quality of delivery conditions	43	6.73	80
Unsellable products	40	6.07	84

3.3.2 Reasons for the Emergence of Reverse Flows: RQ 2

Respondents were surveyed on the reasons for the emergence of reverse flows (in other words, on factors that cause the existence of reverse flows) and their percentage. The question was worded as semi-open. The most frequently stated reasons were product defects, human factor, defects of material inputs, and flows of packaging materials (see Table 4). Considering the range of flows that arise due to the stated reasons, we find that about one-third of reverse flows arise in relation to packaging, a quarter in relation to defective products, and 15 % arise as a consequence of the human factor. Answers in the category "other" related to quality of transport, substitution of products, substitution of requirements on quantity, and low quality of services. Significant variation in a number of responses can be attributed to an imprecise indication of the "zero" share of a particular reason by respondents that resulted in missing data and caused the distortion of results.

3.3.3 Reverse Flows as Part of Corporate Planning and Responsibility: RQ 3

This question examined to what extent reverse flows are considered strategically important in terms of the planning process. In other words, whether the companies regard them as important enough to incorporate them into the strategic plans of the whole company, on the functional level, etc., or whether they are dealt with only when needed, and therefore are not planned. Ignoring reverse flows in strategic planning is the primary symptom of ignoring their potential. And just such a result can be found in foreign empirical studies. The results of the survey are given in Table 5.

The results of the survey showed that almost half of companies considered reverse flows important enough to be part of the strategic plans of the enterprise; this answer was given by 46.5 % of respondents. A similar percentage of respondents incorporated reverse flows into strategic plans at the level of corporate

Table 5 Reverse flows planning

	Reverse flows are part of strategic plans		Reverse flows are part of strategic plans at dept. level		Reverse flows are part of tactical plans		Reverse flows are part of operative plans		Reverse flows are organized ad hoc	
Total	144		143		142		143		134	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	67	77	68	75	65	77	99	44	50	84
in %	46.5	53.5	47.6	52.4	45.8	54.2	69.2	30.8	37.3	62.7

Table 6 Department (function) involvement in reverse logistics

Department/function	Freq.	in %
Logistics	100	66.7
Production	95	63.3
Sales	83	55.3
Quality management	83	55.3
Finance	83	55.3
Purchasing	80	53.3
Strategic management	51	34.0
Research and development	40	26.7
Legal services	22	14.7
Marketing	13	8.7

functions (mostly service companies), and also in tactical planning (large companies). As expected, almost 70 % of respondents planned reverse flows at the operational level. 37.3 % of respondents, however, addressed reverse flows ad hoc. This finding, that more than a third of the enterprises dealt with reverse flows on an ad hoc basis, corresponds with the results (presented in the next part of chapter) referring to the perceived unimportance of reverse flows.

In the next question, respondents were interviewed about the actors within the company who participate in the management of various activities concerning reverse flows. Most often these actors work in the areas of logistics (66.7 %) and production (63.3 %). Less often they work in the departments of sales, quality management, or finance and purchasing, which are involved in the management of reverse flows in approximately of 55 % cases (see Table 6).

Respondents were also asked to specify the activities which individual departments carried out in relation to reverse flows. It was pointless to quantify the results due to the relatively small frequency of responses; therefore, the list of activities referred to in Table 7 has a mainly illustrative importance.

The following case study shows how one of the multinational foreign subsidiaries localized in the Czech Republic manages waste in a complex framework based on strategic planning covering the whole business operations of the company together with the processes of supply forward and backward chain partners.

Table 7 Typical activities of departments in involved in reverse flows

Department/ function	Description of operations and processes
Logistics	Packaging control, reverse flow transportation, redistribution, input quality inspection of reverse flows
Production	Reprocessing and reuse of waste, waste record keeping; repair, disassembly, remanufacturing and reduction of waste
Sales	Warranty (returned products) reprocessing, disposal and resale of returned products, supervision of contractual condition, returnable packaging—setting the rules towards customers
Quality management	Quality control in the whole production process, inquiring into the reasons for product returns and a validity of warranty redemption
Finance	Calculation, planning and updating of the reverse logistics budget, cost monitoring
Purchasing	Warranty redemption towards suppliers, returnable packaging, arranging of reverse flows transportation
Strategic management	Definition of strategic aims for reverse logistics, evaluation of goal fulfillment
Research and development	Inquiring into reasons for product returns for the purpose of product design modification or modification of production technology
Legal services	Surveys on customer satisfaction with warranty redemption process

Case Study of Kimberley Clark

Kimberley Clark is a multinational company, and one of the world's biggest producers of paper products, with production plants in more than 40 countries; its products are sold in more than 150 countries worldwide. In 1996 Kimberley Clark entered the Czech market with the acquisition of an existing factory producing nappies. Nowadays this subsidiary is its second-largest production branch in Europe, producing a range of paper products (nappies, sanitary towels, paper incontinence products) in two plants, in which about 700 employees are employed. More than 80 % of production is exported to the middle- and eastern-European markets.

This type of production is connected with the need to deal with waste. In 2004 the company was able to reclaim value from more than 60 % of waste, mostly by recycling, utilizing waste for energy production, or by reuse in production. Great emphasis is laid on waste separation. All employees are trained regularly in the issues of waste disposal, and besides the compulsory documentation required by local legislation, managers also formulate strategic plans for waste management.

Although the growth of production is followed by the rising of costs for waste (about 15 % yearly on average), earnings from waste management grow substantially more (approx. 175 % yearly increase).

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The strategic planning of waste management was introduced in 2000 in a special program called Vision 2000. The main reason was the growing amount of waste, and the existence of only two means of waste disposal—landfill and incineration; however both ways resulted in the regular growth of costs for the company. Waste management is closely linked with production process design and with the effective purchasing of inputs, in pursuit of the general goals of yield optimisation of (raw) material and energy, and effective utilization of equipment. Another part of strategic waste management is the identification and evaluation of companies reprocessing the waste. Kimberley Clark does not outsource individual activities, but has instead implemented the outsourcing of complex services (Havlová 2006).

3.3.4 Barriers to Reverse Flow Development: RQ 4

In the last group of questions, barriers to reverse flows management were conceived separately for the internal and external environment. A semi-open question was used—in addition to the enumeration of eight internal and six external barriers, the respondents could mention other options. The results shown are in Tables 8 and 9.

In comparison with foreign research, the Czech results do not offer any fundamental surprises. The low priority or unrecognized importance of reverse flows ("Failing to see a reason for reverse flows compared to other activities", 46 %) is the main barrier in the companies. The same conclusion can be found for example in the research from the U.S.A. (Rogers and Tibben-Lembke 1998) or Hong Kong (Chan and Chan 2008).

The second barrier is the lack of systematic management (36 %). This suggests that reverse flows are often managed ad hoc, which corresponds with the above findings that in 37.3 % of Czech companies reverse flows are managed in this way (Research question 3). The third barrier, staff resources (27.3 %), is logically linked to the first two barriers, but also to the last one—the lack of know-how. It is therefore unclear why companies do not see know-how as a major obstacle. A

Table 8 Internal barriers in reverse flow management

Barriers	Freq.	in %
Failing to see a reason for reverse flows compared to other activities	69	46.0
Lack of systematic management	54	36.0
Staff resources (unskilled personnel)	41	27.3
Internal financial resources	28	18.7
Product nature	27	18.0
Missing consultancy for the field of reverse flows	27	18.0
Missing strategy/corporate policy	14	9.3
Lack of know-how	13	8.6
Other	19	12.6

Table 9 External barriers to reverse flow management

Barriers	Freq.	in %
Customer	37	39.8
Supplier	28	30.1
Financial resources	25	26.9
Legislation	24	25.8
Distributors	17	18.3
Policy/interest of government	14	15.1
Other	32	34.4

barrier related to product is typically due to seasonal demand, and quality of materials and components. The category "other" consists mostly of statements explaining that it is not possible or effective to develop the system of reverse flows management due to the nature of a product or production. In other words, it is a statement that there are no barriers in the company.

Analysis of answers to open questions enables us to conclude that the main external barriers are the customers (39.8 %), due to their negligent and inexpert treatment of products and packaging, and their pressure on the sales price. Other barriers cited are incorrect handling of packaging and their low duality as the problem of suppliers (30.1 %). The impossibility of obtaining additional financial resources for the management of reverse flows from external bodies (26.9 %) is the third most important external barrier. It is interesting that in foreign studies this barrier is much less noticeable. According to the (relative) frequencies of responses it cannot be declared that companies see more barriers in the internal or external environment. Nevertheless, additional analysis of the data does not provide statistically conclusive evidence to indicate the differences in the perception of barriers across enterprises. For example, it cannot be argued that companies that report their reverse logistics as profitable or loss-making define the barriers differently.

The next case study is an example of the existence of a bundle of barriers emerging from and causing the existence of reverse flows.

Case Study of H&Plast Ltd

H&Plast Ltd was established in 1996. It is a small Czech company (about 15 employees) producing custom-tailored plastic pressed parts, of weights ranging from 0.5 g to 300 g. Its main customers include furniture producers, and producers of electrical appliances and illuminating equipment. The company was urged (because of pressure by one important customer of H&Plast) to implement ISO 9001 and acquire the certification for this norm. For this reason the quality manager became a member of senior management. The company keeps records of customer warranties and of defective work. The share of less than perfect orders on all orders varies by around 1.4 %, which is more than the required level set by the CEO of 0.5 %.

(continued)

The process of warranty acceptance lacks clear and unified rules; on the contrary—it is managed ad hoc. A large portion of warranties are redeemed not at the level of the quality manager (or the delegated co-worker) and not in a standard way, but a large number of warranties for defective products are redeemed (by phone-call or by email) directly at CEO level; the CEO also gets most of the customer orders. A problem occurs when the CEO doesn't forward information about the warranty immediately to responsible co-workers, the quality manager and production manager, who are responsible for production planning and scheduling and for material requirements planning. As a result, the time of the warranty-reprocessing is extended, which makes the customer unsatisfied, and sometimes results in lost customers. Moreover, the company faces an additional cost if the warranty is not resolved in time. The customers' production processes are dependent on the timely delivery of new parts (in place of defective ones), thus if the warranty is not reprocessed quickly the customers are forced to postpone the delivery times of their products, and typically they pay a penalty to their customers—in the end it is H&Plast that pays this money. It is a case of supply chain disruption.

Some returned parts can be re-sold after sorting out the defective parts from the whole returned shipment. The sorting and re-selling is done by the company itself; however no separate statistics about revenues from re-sold parts are kept. Thus corporate management does not know whether or how much the sorting and re-selling is effective for the company; it only assumes that the revenues are worthwhile for the company.

Crushed plastic waste is a by-product of the production process, and is also the output of the reprocessing of returned defective parts. Crushed plastic waste can be further reprocessed in three ways—it can be used as a raw material in production to a certain extent (up to 50 % of production inputs depending on the type of crushed plastic); it can be sold and disposed of in landfill. The latter option (physical disposal in landfill) is just a consequence of deficient management of this kind of (reverse) material flow, because all crushed plastic can be sold. The company, however, neglects the management of this reverse flow and is careless in this field. The first condition for proper management is material separation (by chemical composition), which is not done precisely. Crushed plastic is contained in bags, which the setters regularly forget to label; so nobody knows what kind of waste is inside a particular bag.

It is not possible to identify the material without analysis, and the company does not possess the equipment for chemical and physical analysis. As a result crushed plastic, which could be reused or sold, ends up in landfill. The landfill fees are as high as 140 euros/ton; however the revenue of 1 ton of crushed plastic comes to 400 euros. The volume of plastic waste disposed of in landfill

(continued)

is approx. 3 tons/year, which implies that the potential revenue would be relatively small. But H&Plast Ltd. is a small enterprise with turnover measured in hundreds of thousands of euros. In the light of this such additional revenue would not be negligible (Zahoran 2009).

3.3.5 Senior Management's Perception of Reverse Flows and Attitudes Toward Reverse Flows: RQ 5

Approaches by management to reverse flows also reflects senior management's perception of the importance or potential of reverse flows. This perception was surveyed with a second round of questions, for which the results are presented in Table 10. Respondents can choose more than one answer, or give their own ideas, which is why combinations of responses are also analysed.

A majority of the responses show reverse flows being perceived as a necessity by management (labelled as C); this needs to be addressed. Specifically this was the answer of 61.2 % of respondents. If we also count the instances where this answer was combined with other statements (i.e. A or B), reverse flows are perceived as a "necessity" by 76.3 % of enterprises.

Only 20.1 % of enterprises consider the management of reverse flows to be a major contribution to competitiveness (A); it is 34.5 % if we take into account all the occurrences of this reply. The management of reverse flows as a significant source of value (B) likewise is not a widespread perception among management—this answer was given by only 4.3 % of the enterprises, which is a really good point for discussion or more in-depth examination, especially in relation to the previous research question involving acquisition of value as the reason for interest in management of reverse flows (re the 61.9 % on Research question 1). Possible explanations for the discrepancy lie in the formulation of the questions, or in the word "significant" (source); i.e. that companies reckon reverse flows to be a source of value, but not a significant one.

Using this interpretation of results there is no fundamental difference in perception of the value of reverse flows in research question 1.

Table 10 Top management perception of reverse flows

Top management perceptions of reverse flows (RF)	Freq.	in %
A—RF are an important benefit for company's competitiveness	28	20.1
B—RF are an important source of value	6	4.3
C—RF are a necessity the management must deal with	85	61.2
A + C—important benefit and necessity	12	8.6
B + C—important source of value and necessity	4	2.9
A + B—important benefit and important source of value	3	2.2
A + B + C—important benefit and important source of value and necessity	1	0.7
Total	139	100.0

3.3.6 Value Resulting from Reverse Flows: RQ 6

134 enterprises (89.3 %) answered the question of what form (or character) values gained from reverse flows take. This question was open, as the authors were trying to obtain a wide range of possible responses, and also determine the extent to which companies are aware of the different options for obtaining value. Respondents usually checked more than one statement. Except for seven responses, which were something like "we don't know, we don't keep track", the remaining responses can be classified into the following categories, presented in Table 11.

Two forms of value that companies receive from reverse flows relate to cost savings and customer satisfaction. "Elimination of losses and cost savings" and "increasing customer satisfaction" were the most frequently-reported positive values: 28 and 27 respondents replied with these answers, which corresponds to 21 %. The effect of learning on reverse flows ("Information acquisition") was cited by 16 companies.

Since companies could include multiple responses, it was possible to analyse most checked combinations. The most common combination was "growth of costs and reduction of profit", together with "eliminations of loss", "customer satisfaction" and "the increase in turnover and profit", with the most commonly quoted positive values. In particular, statements that emphasize on the one hand the increase in costs and at the same time the growth in turnover and profit point to the vague idea of the overall effect of reverse flows on business.

Table 11 Perceived value from reverse flows

Character of value	Freq.
Positive value	
Elimination of losses and cost savings	28
Customer satisfaction (i.e. value for customer and loyalty) assurance or increase	27
Increase of turnover and profit	22
Goodwill protection or support for it	18
Information acquisition for management (planning, strategy making, improvement, experience) of forward flows	16
Protection of environment by means of reverse flows and related tax relief	13
Quality improvement	10
Competitive advantage	10
Fulfilling legislative requirements	3
Beneficial impact on employees	2
Negative value	
Cost increase and decrease of profit	35

3.3.7 The Economic Context of the Management of Reverse Flows: RQ 7

A few questions examined whether reverse flows and their management ultimately reduce or increase the profit of the company, and by how much (in per cent). Respondents were also asked to rate the percentage of total logistics costs that they attributed to return flows. In all cases it was an expert opinion; but in many cases this estimation was not even based on knowledge of the approximate (hard) data, because 40.2 % of the respondents said that the impact of reverse flows on profitability was not measured at all. The results are given in Tables 12 and 13.

The question of reverse flows' impact on company profitability was answered by only 69 % of respondents, and from the answers cited a negative impact prevailed (64.4 %), meaning that reverse flows reduce profits. On the other hand, a positive effect on profit was reported by 35.6 % of enterprises. Surprisingly, this result corresponds to the data on the perception of reverse flows by management, where it was found that one-third of enterprises see positive effects associated with reverse

Table 12 Extent of economic impact of reverse flows

	Decrease in profit due to RF (%)	Increase in profit due to RF (%)	Cost of RF as a share of company's total logistics costs%
Average	4.65	10.63	6.22
Median	3	5	4
Std. deviation	5.42	16.45	9.16
Coefficient of variation	1.17	1.55	1.47
Min.	0	0	0
Max.	20	80	50
No. of responses	58	33	89

Table 13 Methods and tools applied to measure the effectiveness of RF management

Method/tool	Freq.	in %
RL performance is measured by the cost principle	27	24.8
Number of product returns	22	20.2
Maintaining the RL cost limit	20	18.3
Performance is measured by customer satisfaction	13	11.9
Tools of financial analysis	13	11.9
Benchmarking	9	8.3
Revenues from waste sold and from repaired products	8	7.3
Keeping of internal norms on repair operations	4	3.7
Activity-based costing	4	3.7
Special function in corporate information system/specialized software	2	1.8

flows. Data on the extent and impact of reverse flows on profitability are shown in Table 12.

The average estimation of profit decrease as a result of reverse flows was 4.65 %, and the median of the obtained data was 3 %. The highest value that the respondents pointed out was a decrease of 20 %. The results relating to increased profits are less consistent, which is suggested by both maximum values, but also by the coefficient of variation—1.55 (with profit decrease it was only 1.17). The average size of the increase in profit is 10.63 % and the median 5 %. A few very high values, for example even 80 %, are very surprising. This value cannot be considered as erroneous or unreliable. Rather, it refers to the fact that the company is engaged in specific activities in which reverse flows play a vital role. In this specific case it was a commercial company.

The average share of reverse logistics costs out of total logistics costs was 6.22 %. There is a high variability of responses. For example the highest value was 50 %, which was stated by one trading company. The most often-stated values ranged between 1 % and 8 % (the upper and lower quartile).

For a more accurate description of reality more information should be added. In other words, it is necessary to examine whether and how the companies monitor these costs and, where appropriate, their effectiveness. For this purpose the questionnaire contained a question on applied indicators, metrics, and methods for measuring the performance and results of activities related to reverse flows. The question was answered by 109 companies, which corresponds to 72.7 % of the sample. This number can also be seen as a statement of how many enterprises actually measure and/or monitor performance, regardless of the accuracy of this monitoring. The question was very general, and the replies of respondents very diverse; therefore it was necessary to make a content analysis, where the answers were encoded into more general categories. These categories are not mutually disjunctive, because the answers given contained different levels of detail. At the same time the purpose of the question was to explore the various approaches by the enterprises, and not to provide an exact description and systematisation. Because respondents were able to give multiple responses, the total exceeds 100 % (see Table 13).

The resulting frequencies show that enterprises will primarily focus on the cost of reverse flows—on the monitoring of the various types of costs associated with reverse logistics management—for compliance with given budget or the cost limits for different operations, or even directly for the volume of flows (number of product returns). Indicators that demonstrate the benefits of reverse flows for the business, such as customer satisfaction or additional revenues (from waste sold and from repaired products), are used by only a small percentage of enterprises. Companies which specifically stated that they do not monitor the performance of reverse flows, attributed this to the unimportance or the impossibility of affecting the reverse flow system, for example due to legislation. According to respondents, in both cases the costs invested in the monitoring of performance would not bring the company appropriate value, and ultimately costs would increase.

The last case study is a very concise illustration of solving the problem of reverse flows of packaging for special use in the wider context of environmental and managerial pressure and interest in solving the existing problem.

Case Study of Volvo Auto Czech

Volvo Auto Czech was established in 1995 as an authorised representative for Volvo in the Czech Republic. Its main activity is the sale of Volvo passenger cars and providing customer service in this country. The network of dealers totals 20 outlets. Guaranteeing spare parts is a prominent component of customer service. Spare parts are imported as day-to-day orders from a distribution centre in Austria (the parts are delivered the next morning) or from the central distribution centre in Sweden (the delivery time is 1 week on average, urgent delivery 2.5 days).

The increasing sales of Volvo cars in the Czech market has resulted in increased sales of spare parts as well. Since 2009 spare parts have been delivered in returnable transit packaging—in wooden folding boxes (until 2009 a one-way carton package was used). Beside the returnable packaging, Volvo's reverse flow system deals with returned spare parts, unsold parts, parts (within the warranty period) sent for technical analysis, and reusable parts for remanufacturing. The one-way cartons were replaced by reusable boxes for two reasons: environmental protection, and an expected reduction in the cost of transporting the package (regular purchasing and disposal). Early experience with this new system of reused packaging shows some weak aspects in calculating the capacity and frequency of shipments and package return. The coordination of forward and reverse flows is actually rather complicated, and this is why management and optimization of capacity utilization of boxes, and transporting the returned boxes by truck, is so difficult (Lülei 2010).

4 Discussion

The findings from the survey show that the majority of results do not differ from similar empirical surveys from other countries—which are more or less developed and which have a more or less analogous economy and maturity of reverse flow management. In comparison to the newest existing studies, fewer companies in the Czech Republic manage reverse flows at strategic level and they are less able to recover and/or recapture value (and express it in figures or percentages) although more than 60 % are conscious of such potential. Nevertheless if we compare the numbers of those who consider reverse flows management a necessity and of those who believe that value retrieval belongs to the driving forces of reverse flows management the results are nearly the same (around 60 %). This is quite an

interesting finding which can serve as evidence of reactive and not proactive management.

What is a little bit surprising is the managers' consideration of customers and suppliers as the primary external barrier for reverse flows management. Such findings have not been found in other surveys (according to the authors' knowledge) and it can imply a feeling of higher closeness or independency of the Czech companies or their managers toward partners in the supply chains. This is a negative result and it is to some extent in contradiction to a much more positive recognition of customers when asking for the reasons and driving forces of reverse flows management (see research question 1).

Another interesting finding is the failure to perceive the importance of reverse flows in comparison to other activities (almost half of respondents). This answer is worthy of more in-depth interviews to gain a more complex understanding of that situation. It may be just hypothetical reasoning that the pressure put on performance is very high in the Czech companies (more than half of the companies questioned are subsidiaries of multinational corporations) and the focus on forward flows and outputs is very dominant. Another hypothetical reason may lie in the fact that apart from two companies in the survey there is no specialised function of the reverse flows manager and these flows are managed by managers whose interests are in other areas.

5 Conclusions and Summary

The Czech survey shows that reverse flows are part of any company's life—voluntarily, but also involuntarily. Their view is somewhat polarized; the basic opinion of 61 % of enterprises is that reverse flows represent "a necessity that must be addressed", i.e. "a necessary evil". On the other hand, 39 % of Czech companies see reverse flows as a source of value, but not an essential one.

The importance of reverse flows is reflected in the way they are planned—ie in the research sample almost half the companies planned reverse flows at the strategic level. However, the most common planning takes place at the operational level. About a third of businesses do not plan reverse flows at all, and deal with tasks associated with them as they occur.

The economic consequences of reverse flow management are monitored by 72.7 % of companies; what is important is that the levels of accuracy and detail of monitoring are very different. Estimates of reduced or increased profits due to reverse flows were similar to those of international surveys.

The reverse flows' influence on cost, profit, and revenue is monitored (at very different levels of accuracy and detail) by 72.7 % of the companies in the sample. This is about the same result that can be found in international studies.

In Czech enterprises the cost perspective predominates, ie management measures the performance of reverse flows only from the perspective of cost. Only a small percentage of enterprises monitor the quality or scope of the "output" of the

system in the form of customer satisfaction, or additional sales. The authors failed to find a foreign study devoted to this subject; therefore it can only be estimated whether Czech companies are different from those abroad. Pilot research on corporate performance monitoring systems in the Czech Republic (i.e. not only of reverse flows) (see Šiška and Matýska 2007) does not show fundamental differences with foreign countries. Thus it can be assumed that the findings concerning the cost perspective on the management of reverse flows may apply to foreign practice.

The management of reverse flows is affected by both external and internal factors. The most frequently-mentioned barrier in the internal environment is the lack of perceived importance of reverse flows, or a lack of systematic management—the results are again similar to foreign studies. The only significant difference is the higher importance of barriers connected with a lack of funding for the development of reverse logistics, and the inability to obtain it from external sources. External barrier number one is the customer, followed by the suppliers.

A detailed analysis of the content of communication with these entities involving the supplier-customer relationship provided us with an important finding, which implies an interesting conclusion: Businesses control reverse flows at the level of the company itself, and do not try to optimize them within their supply chain, or at least within its parts.

It should be noted that the research took place at the time of the economic crisis (late 2009/2010), while the foreign research is from the period before the crisis, which may skew the results.

Both the chosen research design and its methodology (i.e. the exploratory-descriptive nature of the research, the limited size of the research sample and its sectorial structure, and the "softness" of data used (the opinions of managers) mean that the findings can be generalized only with a great degree of caution. Nevertheless, it offers some insight into the reverse flows and reverse logistics practices of managers managing businesses in this country.

The findings also enable us to formulate several recommendations for academia and practice. Firstly there is an evident necessity to incorporate the curriculum of reverse logistics or several topics on reverse logistics into existing courses of study and to offer more educational programmes and training for practitioners to improve the level of knowledge and recognition of the importance and principles, methods and tools of reverse logistics or reverse flows management. Secondly, more promotion of reverse flows management among Czech academia and companies managers is needed in journals, magazines, books, through conventions, lectures, seminars etc. This proactive behaviour can be assigned to such bodies as the Czech Logistics Association or other Associations, Confederations, Chambers of commerce as well as to Universities and specialised press and editors.

Reverse flows management is a very complex issue, highly specific, and with individual organisational solutions. But what usually works is to discover and learn from successful practices. It means that many more good practices should be published to a wide audience—and not solely in the Czech Republic but everywhere.

Questions for Review and Discussion

1. What could be the reasons for the gap between the level of the real-life management of supply chains and reverse logistics (in practice) and the level of theoretical knowledge gained under formal education in schools?
2. Why is performance measurement of reverse logistics considered difficult?
3. Which issues of reverse logistics should be planned at the corporate level and function at the strategic, tactical and operational level?
4. Why do managers often not perceive reverse flows as an important consideration for management?
5. Reverse flows can serve as one source for information acquisition for the management (planning, strategy making, improvement, experience) of forward flows, specifically for strategy making, planning, and improvement of various processes etc. But in reality this opportunity is not used to such extent as it could be. What are the barriers with this issue?
6. Why do defective products represent the majority of reverse flows despite the fact that companies are usually intensively involved in quality management?
7. What can the lack of systematic management of reverse flows mean in practice? What makes management systematic and is there some specificity of reverse flows that leads to problems with systematic management?
8. The most frequently mentioned drivers for the management of reverse flows are related to customers (customers' satisfaction, service for customers, customers' demand). Nevertheless, measures of performance more often concern financial indicators like, for instance, cost. Why do companies not measure soft performance criteria as well?

References

Alvarez-Gil, M. J., Berrone, P., Husillos, J., & Lado, N. (2007). Reverse logistics, stakeholders' influence, organizational slack, and managers' posture. *Journal of Business Research, 60*(5), 463–473.

Amini, M. M., & Retzlaff-Roberts, D. (1999). A reverse logistics process reengineering: Improving customer service quality. *Cycle Time Research Journal, 5*(1), 31–42.

Bernon, M., Cullen, J., & Rowat, C. H. (2004). *Efficiency of reverse logistics*. Cranfield School of Management, Sheffield Hallam University, The Chartered Institute of Logistics and Transport.

Blumberg, D. (2005). *Introduction to management of reverse logistics and closed loop supply chain processes*. Boca Raton, FL: CRC Press.

Bostel, N., Dejax, P., & Lu, Z. (2005). The design, planning, and optimization of reverse logistics network. In A. Langevin & D. Riopel (Eds.), *Logistics systems: Design and optimization*. Boston: Springer.

Cenia. (2011). *Dochází ke zvyšování efektivity přeměny materiálů na ekonomický výstup?* Accessed February 5, 2012, from http://issar.cenia.cz/issar/page.php?id=1620

Cetinkaya, B., Cuthbertson, R., Ewer, G., Klaas-Wissing, T., Piotrowicz, W., & Tyssen, C. (2011). *Sustainable supply chain management–Practical ideas for moving towards best practice*. Heidelberg: Springer.

Chan, F. T. S., & Chan, H. K. (2008). A survey on reverse logistics system of mobile phone industry in Hong Kong. *Management Decision, 46*(5), 702–708.

Čornej, P. (2001). *Kdy, kde, proč a jak se to stalo v českých dějinách (in Czech)*. Praha: Reader's Digest Výběr.

Czechtrade. (2011). *Foreign trade of the Czech Republic in Prague in the year 2010*. Accessed February 5, 2012, from www.czechtrade.cz/d/documents/01/7-infoservis/analyzy-zo-cr/Zahranini_obchod_za_rok_2010.pdf

De Brito, M. P. (2003). *Managing reverse logistics or reversing logistics management*. ERIM Ph.D. Series Research in Management, 35, Rotterdam: Erasmus University Rotterdam.

De Brito, M. P., & Dekker, R. (2002). *Reverse logistics–A framework*. Econometric Institute Report EI 2002-38. Erasmus University Rotterdam, Econometric Institute. Accessed December 5, 2011, from http://repub.eur.nl/res/pub/543/feweco20021018095304.pdf

De Brito, M. P., & Dekker, R. (2003). *A framework for reverse logistics*. Econometric Institute Report EI 2003-045. ERIM Report Series Research in Management. Erasmus Universteit Rotterdam. Accessed December 5, 2011, from http://repub.eur.nl/res/pub/354/ERS-2003-045-LIS.pdf

De Koster, R. B. M., De Brito, M. P., & Van De Vendel, M. A. (2002). Return handling: An exploratory study with nine retailer warehouses. *International Journal of Retail and Distribution Management, 30*(8/9), 407–421.

Erol, I., Velioglu, M. N., Serifoglu, F. S., Büyüközkan, G., Aras, N., Cakar, N. D., & Korugan, A. (2010). Exploring reverse supply chain management practices in Turkey. *Supply Chain Management: An International Journal, 15*(1), 43–54.

Ernst and Young (EY). (2012). *Globalization index*. Accessed February 5, 2012, from http://www.ey.com/GL/en/Issues/Driving-growth/Globalization—Looking-beyond-the-obvious—2012-Index

Ernst and Young (EY). (2014). *EY rapid-growth forecast*. Accessed January 10, 2015, from http://www.ey.com/Publication/vwLUAssets/EY-rapid-growth-markets-february-2014/$FILE/EY-rapid-growth-markets-february-2014.pdf

EURLEX. (2012). Accessed June 2, 2002, from http://eur-lex.europa.eu/en/index.htm

Fernández, I. (2004). *Reverse logistics implementation in manufacturing companies*. Doctoral thesis, Lund University, Lund.

Filippov, S., & Duysters, G. (2011). Competence-building in foreign subsidiaries: The case of new EU member states. *Journal for East European Management Studies, 16*(4), 286–314.

Gecker, R., & Vigoroso, M. W. (2006). *Revisiting reverse logistics in the customer-centric service chain. Benchmark report*. Boston: Aberdeen Group.

Ghemawat, P., & Altman, S. A. (2014). *DHL Global Connectedness Index 2014*. Accessed February 5, 2015, from http://www.dhl.com/content/dam/Campaigns/gci2014/downloads/dhl_gci_2014_study_high.pdf

Gobbi, C. (2008). *The reverse supply chain: Configuration, integration and profitability: Considerations derived from a qualitative case study investigation*. Ph.D. thesis, Technical University of Denmark, Lyngby.

Gonçalves-Dias, S. L. F., Souza, P. F. A., & Santos, M. C. L. (2006). *Reflections on design, sustainability and reverse logistics: PET packaging recycling in Brazil*. 1st International Design Management Symposium–Design to Business, Shanghai. Accessed December 6, 2011, from http://www.closchiavo.pro.br/site/pdfs/reflections_on_design.pdf

Hair, J. F., Bush, R. P., & Ortinau, D. J. (2006). *Marketing research: Within a changing information environment*. Boston: McGraw-Hill.

Havlová, A. (2006). *Řízení zpětných toků v materiálových dodavatelských řetězcích*. Master thesis, Masaryk University, Brno. Accessed April 12, 2012, from http://is.muni.cz/th/136953/esf_m/

Janse, B., Schuur, P., & Brito, M. P. (2009). A reverse logistics diagnostic tool: The case of the consumer electronics industry. *International Journal of Advanced Manufacturing Technology, 47*(5–8), 495–514.

Jayaraman, V., & Luo, Y. (2007). Creating competitive advantages through new value creation: A reverse logistics perspective. *Academy of Management Perspectives, 21*(2), 56–73.

Jirsák, P., & Holman, D. (2011). Známe naše hodnototvorné logistické procesy? *Reliant logistics news*, *8*(12). Accessed February 5, 2012, form www.logisticnews.cz/cz/2011

Klapalová, A. (2007). *The e-business effect on value creation in chains and network (in Czech)*. Dissertation theses, Masarykova univerzita, Brno, 254 p.

Klapalová, A. (2009). Value creation in the reverse flows on B2B markets (in Czech). In *Vývojové tendence podniků V*. Brno: Masarykova univerzita.

Klapalová, A., & Škapa, R. (2008). Value creation in the reverse flows at B2B markets (in Czech). In *Vývojové tendence podniků IV*. Brno: Masarykova univerzita.

Klapalová, A., & Škapa, R. (2010). Managing reverse flows in the Czech Republic. In *An enterprise odyssey: From crisis to prosperity–Challenges for government and business*. Opatija: University of Zagreb.

Krikke, H., van Nune, J. A. E. E., Zuidwijk, R., & Kuik, R. (2005). E-business and circular supply chains: Increased business opportunities by IT-based customer oriented return-flow management. *Distribution Logistics. Lecture Notes in Economics and Mathematical Systems, 544*, 221–239.

Lhotan, P., & Pour, J. (2011). Podniková ekonomika v řízení dodavatelských řetězců. *Ekonomické listy, 2011*(1), 44–58.

Lülei, L. (2010). *Tvorba hodnoty vezpětných tocích.* Bachelor thesis, Masaryk University, Brno. Accessed April 12, 2012, from http://is.muni.cz/th/253865/esf_b/

Monroe, K. B., & Chapman, J. D. (1987). Framing effects on buyers′ subjective product evaluations. http?//www.acrwebsite.org/search/view-conference-proceedings.aspx?Id=6684. Accessed March 2015

Mollenkopf, D. A., & Closs, D. J. (2005). The hidden value in reverse logistics. *Supply Chain Management Review*, *7*(8). Accessed November 15, 2011, from http://www.scmr.com

Mollenkopf, D., Russo, I., & Frankel, R. (2007). The returns management process in supply chain strategy. *International Journal of Physical Distribution & Logistics Management, 37*(7), 568–592.

Norek, C. D. (2002). Returns management: Making order out of chaos. *Supply Chain Management Review, 6*(3), 34–42.

OECD Country Notes. (2011). *Czech Republic*. http://www.oecd.org/czech/47469488.pdf

Pernica, P., & Toman, P. (2008). Průzkum ukázal aktuální stav české logistiky. *Dopravní noviny, 23*. Accessed February 5, 2012, from http://www.dnoviny.cz/logistika-spedice/pruzkum-ukazal-aktualni-stav-ceske-logistiky-3684

Ravi, V., & Shankar, R. (2005). Analysis of interactions among the barriers of reverse logistics. *Technological Forecasting and Social Change, 72*(8), 1011–1029.

Richey, R. G., Stefan, E. G., & Patricia, J. D. (2005). The role of resource commitment and innovation in reverse logistics performance. *International Journal of Physical Distribution & Logistics Management, 35*(4), 233–257.

Rogers, D. S., Lambert, D. M., Croxton, K. L., & Garcia-Dastugue, S. J. (2002). The returns management process. *The International Journal of Logistics Management, 13*(2), 1–18.

Rogers, D. S., & Tibben-Lembke, R. (1998). *Going backwards: Reverse logistics trends and practices*. Reno: University of Nevada.

Sip, E. (2012, October 15). Bad mood in the Czech economy. *Prague Leaders Magazine*. http://www.leadersmagazine.cz/2012/10/15/bad-mood-in-the-czech-economy/

Šiška, L., & Matýska, M. (2007). Instruments for enterprise performance measurement. In L. Blažek (Ed.), *The development trends of businesses III* (pp. 753–884). Brno: Masaryk University Brno.

Škapa, R. (2011). Reverse logistics in the Czech Republic: Barriers to development. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, LIX*(4), 363–369.

Škapa R. (2004). *Reverse logistics in the concept of SCM (in Czech).* Doctoral dissertation, Masarykova univerzita, Brno.

Škapa, R., & Klapalová, A. (2012). Reverse logistics in Czech companies: Increasing interest in performance measurement. *Management Research Review, 35*(8), 676–692.

Smith, D. V. L., & Fletcher, J. H. (2004). *The art & science of interpreting market research evidence*. New York: Wiley.

Stock, J. R. (2001). *Reverse logistics in supply chain management*. Transport and logistics. Accessed March 3, 2012, from www.revistavirtualpro.com/files/TIE03_200702.pdf

Stock, J. R., & Mulki, J. (2009). Product returns processing: An examination of practices of manufacturers, wholesalers/distributors, and retailers. *Journal of Business Logistics, 30*(1), 33–63.

The World Bank. (2014). *Connecting to compete 2014, Trade logistics in the global economy*. Accessed February 5, 2015, from http://www.worldbank.org/content/dam/Worldbank/document/Trade/LPI2014.pdf

Toman, P. (2005). Až do pádu komunistického režimu byla logistika zakazovaným oborem. *Dopravní noviny*. Accessed February 5, 2012, from www.dnoviny.cz/logistika-spedice/prof-ing-vladimir-svoboda-csc-cvut-pro-dn20

Toman, P. (2010). Až do pádu komunistického režimu byla logistika zakazovaným oborem. *Dopravní noviny*. Accessed February 5, 2012, from www.dnoviny.cz/logistika-spedice/prijemne-mne-prekvapuje-rostouci-seriozni-zajem-o-zelenou-logistiku

Toman, P. (2011). Krize vytvořila nový prostor pro partnerství v logistice. *Dopravní noviny*. Accessed February 5, 2012, from www.dnoviny.cz/logistika-spedice/krize-vytvorila-novy-prostor-pro-partnerstvi-v-logistice

Toman, P. (2013). Význam logistiky se rychle zvyšuje i v dosud netradičních odvětvích. *Dopravní noviny*. Accessed February 5, 2015, from http://www.dnoviny.cz/logistika-spedice/vyznam-logistiky-se-rychle-zvysuje-i-v-dosud-netradicnich-odvetvich

Trebilcock, B. (2001). Why are returns so tough? *Modern Materials Handling, 56*(11), 45–51.

U.S. Department of State. (2011). *Background note: Czech Republic*. Accessed December 5, 2011, from www.state.gov/r/pa/ei/bgn/3237.htm

Urbánková, P. (2011). Vos (CTP): Česká logistika má mnoho příležitostí. Accessed February 5, 2012, from www.cianews.cz/rozhovory-cianews/vos-ctp-ceska-logistika-ma-mnoho-prilezitosti

Walker, H., Di Sisto, L., & McBain, D. (2008). Drivers and barriers of environmental supply chain practices: Lessons from the public and private sectors. *Journal of Purchasing and Supply Management, 14*(1), 69–85.

Zahoran, P. (2009). *Tvorba hodnoty ve zpětných tocích*. Bachelor thesis, Masaryk University, Brno. Accessed April 12, 2012, from http://is.muni.cz/th/254071/esf_b/

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