

Sustainable Collaborative Supply Networks in the International Clothing Industry:

A Comparative Analysis of Two Retailers

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Abstract

Collaborative supply networks in the international clothing industry are of major economic significance in many countries, particularly in developing economies. The sector has gone through substantial changes in the last decade with the abolition of trade barriers and the increasingly dominant position of major retailers and brand owners in supply networks. The sustainability of clothing supply networks is subject to increasing public scrutiny. In this work, the characteristics and operation of collaborative clothing supply networks have been analyzed. Two contrasting supply networks – one for a major leading brand retailer and one for a major supermarket retailer - are analyzed and compared from a sustainability perspective. The challenges in assessing economic, social and environmental aspects of sustainability at a network level are highlighted. The results show a minimum compliance culture in the supermarket supply network, whereas the leading brand retailer demonstrates a much higher level of proactive and positive sustainability practices and actions across the network. The study highlights the benefits of a strongly collaborative network in helping to facilitate and enhance a sustainability agenda. The implications of the study are discussed for retailers, manufacturers and policy makers, as well as for the governance of collaborative supply networks more generally.

Keywords: Collaborative Networks, Sustainability, Clothing, Retailers.

1. Introduction

We live in a turbulent world. Major changes are affecting societies and businesses in many countries, including the rapid pace of technological development, the continuing globalization of trade and the occurrence of major socio-economic and political changes in many parts of the world. Camarinha-Matos and Afsarmanesh (2005) identify the different types of collaborative networks that have emerged to address the economic, societal and scientific challenges in the contemporary world. Within the discipline of collaborative networks, supply networks are identified as goal-driven (Camarinha-Matos and Afsarmanesh, 2006).

Supply networks for consumer products are of major economic significance. Price, quality, profit and employment continue to maintain their importance. However, consumers and societies more generally are also demanding greater levels of responsibility and transparency in the way goods are sourced, produced, distributed and sold. There is increasing pressure on companies and corporations to act responsibly and ethically in both the social and environmental spheres (McKinsey, 2008). In addition, there is increasing regulatory pressure and codes of conduct to encourage or enforce high standards (de Brito et al 2008; Seuring and Muller 2008). These issues give rise to the concept of sustainability in supply networks, a topic which has attracted the attention of both academic researchers and the business community.

Although there have been some studies on sustainable supply networks, many are theoretical, exploratory or normative in nature (Markley and Davis 2007, Carter and Rogers 2008). There is a continuing need to complement these with further empirical evidence of practice. This paper presents such a study of collaborative supply networks in the international clothing industry.

The characteristics of the international clothing industry make it a very suitable context to study the sustainability of supply networks. The industry is highly global in terms of markets and is dynamic in terms of the location and configuration of supply networks (Abernathy et al 2006). Clothing supply networks have been particularly affected by the much freer global trade in textiles and clothing that has resulted from the abolition of the Multi-Fiber Agreement (MFA) in 2005 (Martin 2007). This has influenced the location and mobility of the clothing supply base and has significantly affected several established clothing supplying regions (Palpacuer et al 2005, Abernathy et al 2006).

The industry has been subject to much public concern and scrutiny about practices within its supply base, probably more than most industries (de Brito et al 2008). These have focused on employment practices, wages and working conditions, and the negative effects on the environment. More positively, the industry has been viewed by many of the less developed countries as an important source of employment for unskilled and semi-skilled labor and an important stepping stone for industrial development (Palpacuer et al 2005). Consequently, issues around the sustainability of clothing supply networks are highly relevant. An important general question is how to ensure a sustainable clothing industry in the post-MFA era

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capable of meeting global demand economically whilst observing responsible practices, socially and environmentally.

A characteristic of clothing supply networks is that they are 'buyer-driven' (Gereffi 1999, Tyler et al 2006). Thus, major retailers and clothing brand owners are the most powerful entities in the network, irrespective of their degree of ownership of resources across the network. Indeed much of the attention on unsustainable practices has been laid at the door of retailers (de Brito et al 2008).

Different types of retailer operate in the clothing sector (Brun and Castelli 2008; Barnes and Lea-Greenwood 2006; Bruce and Daly 2006). However the different types have not been precisely defined. Brun and Castelli (2008) identify two types – luxury and diffusion – the former associated with high service levels and uniqueness and the latter associated with high volume. Barnes and Lea-Greenwood (2006) note three types of retailer - luxury brands, value brands and supermarket brands- although value brands have not been clearly distinguished from supermarket brands. Here we study two distinct types of clothing retailer – established major brand retailers (e.g. Marks & Spencer, Next, Victoria Secret) and supermarket brand retailers (e.g. Tesco, Asda, Wal-Mart). The latter type accounts for an increasing market share in a number of countries (Barnes and Lea-Greenwood 2006). We use case study evidence to examine whether or not the network configurations and supply chain practices of the two types of retailer are different and whether or not each gives the same priority to sustainability issues in their supply networks.

The paper first reviews literature on collaborative supply networks and the sustainability of such networks. The characteristics of retailer-driven clothing supply networks are then described. The methodology for the study is presented, highlighting the challenges in assessing sustainability. A collaborative supply network of a major brand retailer and a major supermarket retailer are described and assessed with respect to sustainable practices. The differences identified between the different types of retailer are then discussed. The implications of the study are discussed for retailers, manufacturers and policy makers and the relevance of the study for the governance of collaborative supply networks more generally is noted. The limitations of the study and potential avenues for further work are noted in the concluding section.

2 Literature review

2.1 Supply networks in the discipline of Collaborative Networks

Camarinha- Matos and Afsarmanesh (2006) describe collaborative networks as 'consisting of a variety of entities (eg: organizations and people) that are largely autonomous, geographically distributed, and heterogeneous in terms of their operating environment, culture, social capital, and goals, but that collaborate to better achieve common or compatible goals, and whose interactions are supported by a computer network'. Camarinha-Matos and Afsarmanesh (2005) describe the different types of collaborative networks that have emerged to face the challenges in the business and social environment, including virtual enterprises, virtual organizations, dynamic virtual organizations, extended enterprises,

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virtual organizational breeding environments, professional virtual communities, e-Science and collaborative virtual laboratories. They argue the case for considering collaborative networks as a scientific discipline, within which supply networks are goal-oriented collaborative networks (Camarinha-Matos and Afsarmanesh 2005, 2006).

The supply network literature also discusses several types of collaborative networks e.g. 'vertical networks' (Hinterhuber and Levin 1994; Achrol & Kotler 1999; and Verwaal and Hesselms 2004), and 'virtual networks' (Cravens et al 1996). Chen and Paulraj (2004), in discussing theories and constructs in supply chain management, highlight the dominance of the collaborative paradigm in the supply chain literature and the collaborative advantage that underpins supply chain networks. This perspective takes the view that organizations operate within a network of inter-dependent relationships developed and fostered through strategic integration, which targets mostly core operational activities or products (Vachon and Klassen 2006). However, as the buyer-supplier relationships evolve and mature over time such relationships eventually include environmental-related activities (non-core activities). In order to link these two aspects – core activities and non-core activities - the scope of the collaborative paradigm needs to be expanded. Vachon and Klassen (2006) argue that the boundaries of supply chain management can be widened by considering it within the broader context of sustainable development, capturing the three dimensions of economic, social and environmental performance.

2.2 Sustainability in Supply Networks

Sustainability has become a subject of growing importance for the business and academic research communities. McKinsey (2008) note some of the issues facing senior business executives globally, e.g. the demands for: healthier, safer and ethically produced products, human rights standards, healthy workplace conditions, more investments in developing countries and affordable products for poor consumers. The need for the business community to develop strategies to see these issues not just as risks but as potential opportunities is stressed (McKinsey 2008). Vachon and Klassen (2006) highlight environmental issues in supply networks, including preventing pollution before it is generated, recycling waste and spent products, extracting resources and raw materials, and capturing harmful pollutants followed by proper disposal. UNEP (2009), the United Nations Sustainability Programme, highlights the importance of an integrated approach capturing environmental, social and economic criteria in the sustainability assessment of products.

A significant body of academic research on sustainability has appeared in recent years from a range of business and management disciplines. Operations Management research has started to link boundary-spanning activities such as procurement to environmental management in operations (Klassen and Vachon 2003). Carter and Rogers (2008) and Seuring and Mueller (2008) note that the Operations and

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Supply Chain Management literature has most often considered sustainability from an ecological perspective without explicit incorporation of the social aspects of sustainability.

The concept of sustainability has been defined and applied inconsistently in different disciplines. An often quoted definition originates from the World Commission on Environment and Development (1987) – 'development that meets the needs of the present without compromising the ability of future generations to meet their needs' (Camarinha- Matos et al 2010; Carter and Rogers 2008, de Brito et al 2008). However, as noted by Carter and Rogers (2008), such a broad definition is difficult to apply and provides little guidance on how organizations might identify the present and future needs and how to fulfill them, or how to balance the organizational responsibility for multiple stakeholders.

The concept of the 'Triple Bottom Line' (Markley and Davis, 2007) or 3BL that seeks to integrate economic, social and environmental performance has been widely advocated in considering the sustainability of organizations and supply chains. Carter and Rogers (2008) define sustainable supply chain management as "the strategic, transparent integration and achievement of an organization's social, environmental, and economic goals in the systemic coordination of key inter-organizational business processes for improving the long-term economic performance of the individual company and its supply chains". Camarinha- Matos et al (2010) specify the three pillars in 3BL more concretely:

- Environmental – a stable base of resources, ecosystems, and biodiversity, fresh water, recycling, low carbon.
- Economic – efficiency, jobs and wealth creation, producing goods and services, prosperity.
- Social – social services, inclusion, equity, accountability, culture, groups, places and participation.

Some network related studies have addressed sustainability in terms of 3BL, highlighting the collaborative paradigm explicitly or implicitly. Vachon and Klassen (2006) and Camarinha-Matos et al (2010) highlight the need for additional research and empirical evidence linking the fields of collaborative networks and sustainability. However, assessing sustainability using 3BL is challenging and the difficulties should not be underestimated. The 3BL perspective is not without its critics (Norman and McDonald 2004). These issues are discussed further in the methodology section.

2.3 The international clothing industry

The international clothing industry is a very significant contributor to the world economy. It is significant in terms of international trade (EMCC 2008), representing about seven percent of world exports in 2000 (Allwood et al 2006). The textile and apparel industries are also very significant in terms of employment (EMCC 2008, Nordas 2004) with over 2 million workers employed in the EU in 2006 (EMCC 2008), over four hundred thousand in the US in 2008 (USDL), and over 70 million employed across the leading apparel exporting countries in 2008 (Gereffi and Frederick 2010). It is also an important contributor to

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foreign income (Norads 2004) and a main source for some developing countries, e.g. over 70% for Bangladesh and over 40% for Sri Lanka in 2008 (Gereffi and Frederick 2010).

Trade liberalization, particularly the abolition of the Multi Fiber Agreement in 2005, has had significant effects in terms of the location and mobility of clothing supply networks (Martin 2007). Several established clothing supply countries have been affected with some of the less developed countries losing market share (Nordas 2004, Abernathy et al 2006, Audet, 2007). The combination of short product life cycles, high levels of impulse buying, fashion influences in all product categories, increases in product variety, continual in-season refreshment and the requirements for quick response place pressure on suppliers in developing nations. Palpacuer et al (2005) noted that 'global clothing value chains are now reaching a level of maturity that imposes new limits on the opportunities they provide for developing countries'.

Significant environmental issues - high energy usage, the use of toxic chemicals, the release of chemicals in waste water, solid waste arising, and the disposal of large volumes of used clothing - and significant social issues - the use of child labor, the abuse of labor and poor remuneration have been discussed with regard to the contemporary and future textiles and clothing industries (Allwood et al 2006 & 2008; Labendahn Wood et al 2010, Niinimaki and Hassi 2011). These studies often adopt a lifecycle perspective (from extraction through to end-of-life). Although the lifecycle perspective is important in sustainability in general, the focus of this paper is very much at the supply network level and the comparison of practices adopted by the principal players in these networks. This complements a product-oriented lifecycle perspective.

In contrast to 'producer-driven' networks in industries such as automotive, clothing supply networks are principally 'buyer-driven' (Gereffi 1999; Tyler et al 2006). Major retailers and clothing brand owners exercise significant power across their supply networks. In general, retailers work with a prime manufacturer in a clothing supply region for the supply of a particular class of garments. The prime manufacturer will have extensive manufacturing resources for the types of garments in which it specializes. The prime manufacturer may have the majority of its production facilities in one region or country but it may also have an international presence in more than one country. Such production facilities may be wholly owned, jointly owned or operated under a long-term collaborative agreement. The prime manufacturer may also utilize the services of smaller companies as sub-contractors to expand production capacity as needed and to do specialized operations. It will also use the services of dyeing, printing or finishing companies that it may or may not own.

A critical part of the clothing supply network is fabric supply. Fabric production facilities may be owned by the prime manufacturer in some cases but much more commonly, fabric is supplied by an independent company, often located in a different region or country to the prime producer. Also of importance are trims and garment accessory suppliers. Important players in supply networks are the retailers' Buying

offices and/or the agents used by retailers in the country in which the prime manufacturer is located. Logistics and freight companies also play an important role in the networks.

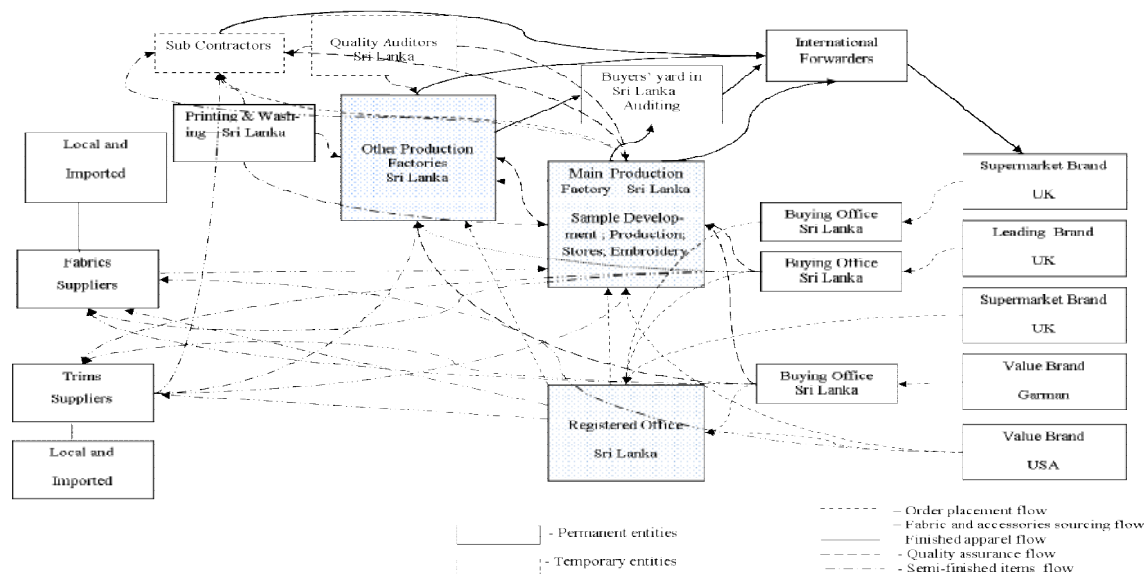


Figure 1: Illustration of a clothing supply network

Figure 1 illustrates in overview a clothing supply network involving one of the largest clothing producers in Sri Lanka (a major clothing supply nation), and major retailers it supplies in the UK, mainland Europe and the US. The network shows order placement flow, fabric and accessory (trims) flow and finished apparel flow. It also shows quality assurance activities. Further description and analysis of this type of network is discussed later.

As noted in section 1, different types of retailer operate in the clothing industry. Thus, the network in Figure 1 actually contains a number of collaborative networks between the prime manufacturer and different retailers that may operate in different ways. In this study we compare the practices of two distinct types of retailer – established major brand retailers and supermarket brand retailers.

As dominant players in many consumer product supply networks, the strategies adopted by retailers affect suppliers (Humphrey and Schmitz 2000; Dolan and Tewari 2001; Humphrey and Schmitz 2001). High pressure placed on suppliers has resulted in unethical practices in apparel production. As demonstrated by public backlash to 'sweatshop' issues in apparel manufacture, consumers have taken an increasing interest in sustainability issues in the industry, though their enthusiasm and commitment is often mixed (Markley and Davis 2007). de Brito et al (2008) undertook an exploratory survey of different stakeholders in different parts of the industry and found a diversity of perspectives and attitudes to sustainability issues and what could and should be done about them. Allwood et al (2006, 2008) have examined potential future scenarios for the sector.

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Several initiatives have been undertaken to enhance sustainability in the international clothing industry. In particular, legal and non-legal standards and consumer debates have influenced leading retailers to improve the production and working standards of their suppliers and to sign up to codes of conduct (Humphrey and Schmitz 2001). The International Labor Organization (ILO) conventions have also influenced some retailers and prime manufacturers to ensure socially acceptable employment and remuneration practices in their supply networks. There have also been several government initiatives such as 'Garments without Guilt' in Sri Lanka and 'Better Factories Cambodia: ILO Project' (Gereffi and Frederick 2010) that seek to enhance overall standards in the industry in their countries.

The dominant position of retailers places them in a key position to influence and enhance the sustainability of collaborative clothing supply networks. Here we consider whether or not different types of retailer give similar priority to sustainability issues. Specifically, we investigate clothing supply networks of two different types of retailer – a major brand retailer and a supermarket retailer – to consider the questions on sustainability.

3. Methodology

The study is designed to investigate the supply networks of different types of retailers. The unit of analysis is a clothing supply network that includes the retailer, agents working on behalf of the retailer and/or manufacturer, the prime manufacturer and their extensive manufacturing bases, the fabric and accessory suppliers that feed into the network and the logistics partners that handle downstream warehousing and shipping. The study is exploratory and is principally qualitative in nature. Several data collection instruments and research methods have been used. The study has been conducted from February 2009 until February 2011.

3.1 The supply networks studied

A large number of supply networks of different clothing retailers and brand owners operating with prime manufacturers in Sri Lanka have been studied to examine their configuration, operation and management. The Sri Lankan Clothing Industry is a major contributor to its economy (CBARSL 2010). Sri Lankan apparel manufacturers often supply high quality value-added garments to leading retailers in the EU and USA, including many well known international brands such as Gap, Liz, Claiborne, Next, Tommy Hilfiger, Victoria Secrets, Nike, and M&S (UNCTAD 2005). They also supply garments for supermarket major brands such as Asda, Tesco, and Wal-Mart.

Since the abolition of the MFA in 2005, Sri Lanka has faced severe competition in the global market. In order to compete, the business community and government authorities have implemented industrial policies for the sector. Large apparel manufacturers have streamlined their supply networks in collaboration with some leading retailers. With government initiation, the 'Garments without Guilt' initiative has been implemented to assure the industry's commitment to ethical working practices. It gives

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certified companies the ability to promote themselves internationally as responsible businesses and helps to re-assure buyers about working conditions in Sri Lanka (CBARSL 2009, 2010; SLA-GWG). Thus, clothing supply networks with prime manufacturers located in Sri Lanka provide a valuable context in which to examine sustainability issues.

The analysis presented here focuses on comparing two specific networks – that of an established major brand retailer and that of a major supermarket retailer. Entities and partners in the network are anonymized to protect confidentiality. The same methodology has been applied in researching each network.

In-depth interviews have been carried out with all the key supply chain players including prime manufacturers, retail agents and buying offices. These have been conducted at both strategic and operational levels to gain detailed information on the structure and management of the two retailer supply networks. In addition, observations made by the researchers, relevant secondary data sources from prime manufacturers, retailers and retail agents, interviews, reports and publications from the industry and government bodies complement the primary data. The use of multiple methods and sources, including in-depth interviews, company documents and publications, government publications and observations, have enabled triangulation of research findings to increase validity and reliability.

In the analysis the two different retailer supply networks are first described and examined in terms of their structure, operational strategies and management. The sustainability elements of each of the networks are then assessed using the three perspectives - economic, social and environmental.

3.2 Assessing sustainable practices in a supply network

There is no single or optimal measure for assessing sustainability (de Brito et al 2008). Although 3BL is the most commonly discussed approach, clear and agreed measurement criteria to assess a supply network under each sustainability heading have not been presented in the literature. Seuring and Muller (2008) note that social and environmental dimensions have been given comparatively higher importance than economic aspects in sustainable supply chain related studies. This is partly because the assessment of the economic aspects of sustainability is by far the most difficult issue. A further complication is that some sustainability criteria may not be exclusive to one of the 3BL headings. For instance, enforcement of minimum wage standards may be viewed primarily as an ethical/social contribution but may also be considered a desirable economic benefit. Similarly the employment opportunities provided by the existence of a network have immediate economic and social benefits as well as longer term economic benefits in the acquisition of skills at an individual level and in enhancing the ability to compete at a firm or network level. Enhancements in environmental or ecological conditions may have wider social and economic benefits. Allwood et al (2008) note the difficulties in quantitatively assessing the economic benefits of the social aspects of sustainability.

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Because of the difficulties highlighted in the literature regarding 3BL assessment we do not attempt an exhaustive assessment of the sustainability of each of the retailer supply networks. The study uses assessment criteria under each dimension to match the current context while accepting the problematic issues noted in the literature. It does not claim to provide a comprehensive analysis of the economic performance of each of the networks but aims to provide indicators of their economic health.

Two aspects are considered under the economic heading – the structural stability of the network and the approaches to achieving quality. Wages and remuneration are considered under social benefits. A stable network provides long term economic benefits to its participants and facilitates mutually beneficial collaboration, development, investment and prosperity. It may also encourage training and skills development, enhancing the future employability of workers in the network (de Brito et al 2008).

The structure of a supply network can be studied in different ways (Lambert and Cooper 2000; Choi and Hong 2002). Choi and Hong (2002) discuss the vertical, horizontal and spatial complexity of supply networks. Vertical complexity is assessed in terms of the number of tiers in the network, horizontal complexity in terms of the number of different entities in the same tier and spatial complexity in terms of the geographical dispersion of entities in the supply network. Here we are concerned with the frequency of changes in the structure of a network, i.e. its structural stability. In order to assess stability the three complexity dimensions of Choi and Hon (2002) have been used. Each dimension has been assessed qualitatively for its stability on a scale ranging from 'stable' to 'non-stable'. Higher stability scores signify a less stable dimension. The details of the scales used for each structural dimension are given in the appendix.

The ability of a supply network to compete internationally is affected by its quality performance, its responsiveness and delivery performance, as well as the prices it offers. Although the authors have studied both of the latter issues, here we consider the quality assurance practices used in the network as a further indicator of the economic sustainability of the network (de Brito et al 2008). Enhanced quality processes are an indicator of strong operational capabilities in the network that should enable a network to compete strongly in global markets.

de Brito et al (2008) recognize the development of employees including remuneration, training and working conditions as social dimensions of the sustainability. Camarinha-Matos et al (2010) note that social aspects include the social services that target the local community. The study here assesses the remuneration, working conditions and training activities of the employees as well as the nature and extent of social projects of the respective networks to address the social dimensions of sustainability in each supply network.

As highlighted by several studies (e.g. Allwood et al 2006 and 2008, Carter and Rogers 2008, de Brito et al 2008, Camarinha-Matos et al 2010), the environmental dimension is studied in terms of the maintenance of eco-friendly production environments, including the use of renewable energy sources, the use and

disposal of toxic chemicals, waste and effluent treatments, and the use of recycling facilities. The approach adopted is to compare practices in different networks, rather than a product-based lifecycle assessment, which would require a differently focused study. In globally dispersed supply networks, the sustainability of modes of transportation is also an important issue. However, the assessment of their sustainability in terms of environmental emissions and impact would require a major separate large scale study its own right. These are avenues noted for further work.

4. Supply network analysis

Case 1 is a long established leading clothing retailer and Case 2 is a major supermarket brand retailer. Both are located in the UK. An overview is first given of each network followed by the sustainability dimensions described above.

4.1 Case 1: The supply network of a leading brand retailer

Figure 2 shows the supply network for a leading brand retailer. The retailer designs the styles using the services of garment designers and fashion houses. They then request the manufacturer to develop samples accordingly. Once samples¹ are approved by the buying team at the retailer they place orders with agreed colors, volume, sizes and delivery dates. These orders are then placed with appropriate production plants listening to the request of the retailer or its agent while considering the competencies of the plants. It is important to note that fabric and accessory sourcing decisions including material specification and supplier selection are made mainly on the recommendation of the retailer or its buying office. Mostly, the retailer sources the fabrics and accessories from suppliers that are either fully owned by the prime manufacturer or are joint ventures. However, some fabrics may be sourced from other suppliers but the retailer's preference always strongly influences fabric supplier selection. This reflects a backward-integrated network, as the prime manufacturer and majority of material suppliers are strong collaborators. The quality approved garments (note: the quality assurance process is discussed later) are exported to the retailer's distribution centers (DCs) via a forwarding company recommended by the retailer.

4.1.1 Case 1: Economic aspects

Structural stability: The solid line in Figure 3 shows the assessment of the structural stability of this retailer's supply network in the form of a spider diagram. It summarizes the assessment scores of the network on each of the vertical, horizontal and spatial stability dimensions shown in the Appendix (for brevity, the full assessments of each dimension are not discussed). Although this retailer has a relatively complex supply network (compared to Case 2), it maintains a relatively stable network while allowing temporary re-configurability. Strong vertical stability is shown as the main tiers in the network do not change. The backward integration of the network, which is enabled by the extensive resources and collaborations of the prime manufacturer, further assures vertical stability. External subcontractors are not utilized for

¹ Sample development is an important process consisting of several stages – space limitations preclude its further elaboration here.

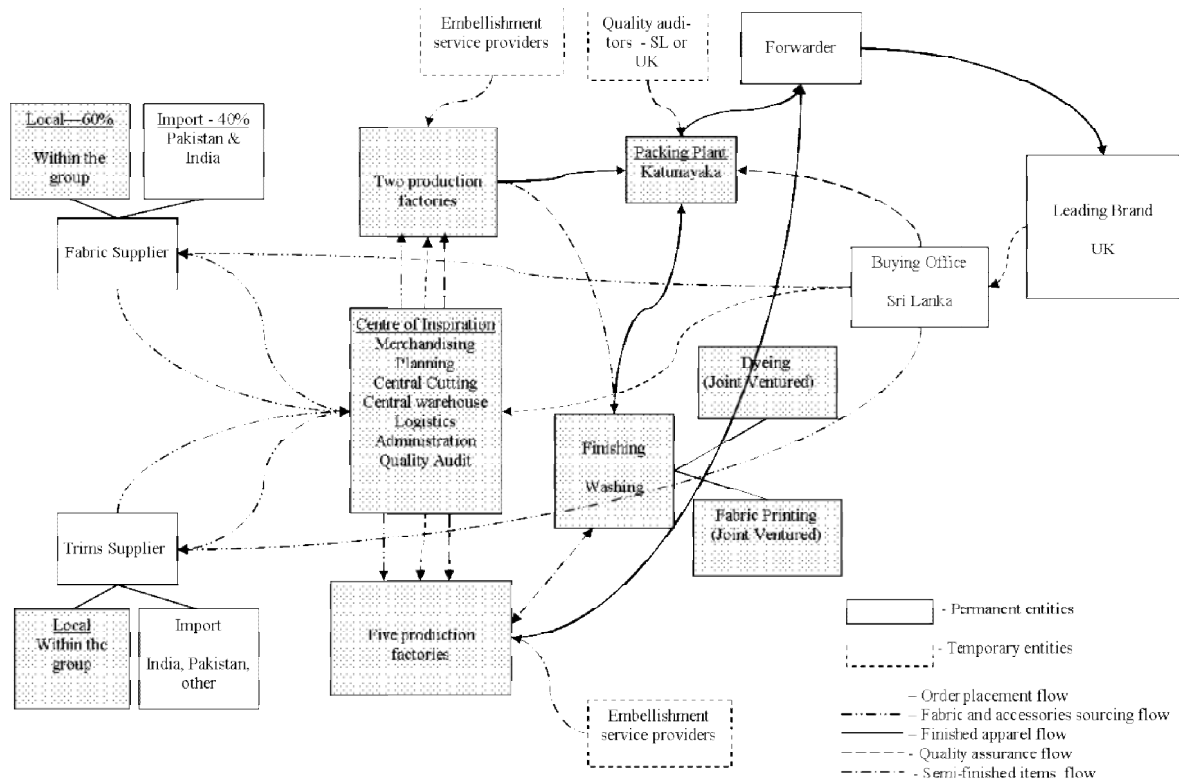


Figure 2: Supply network of a Leading Brand retailer in the UK

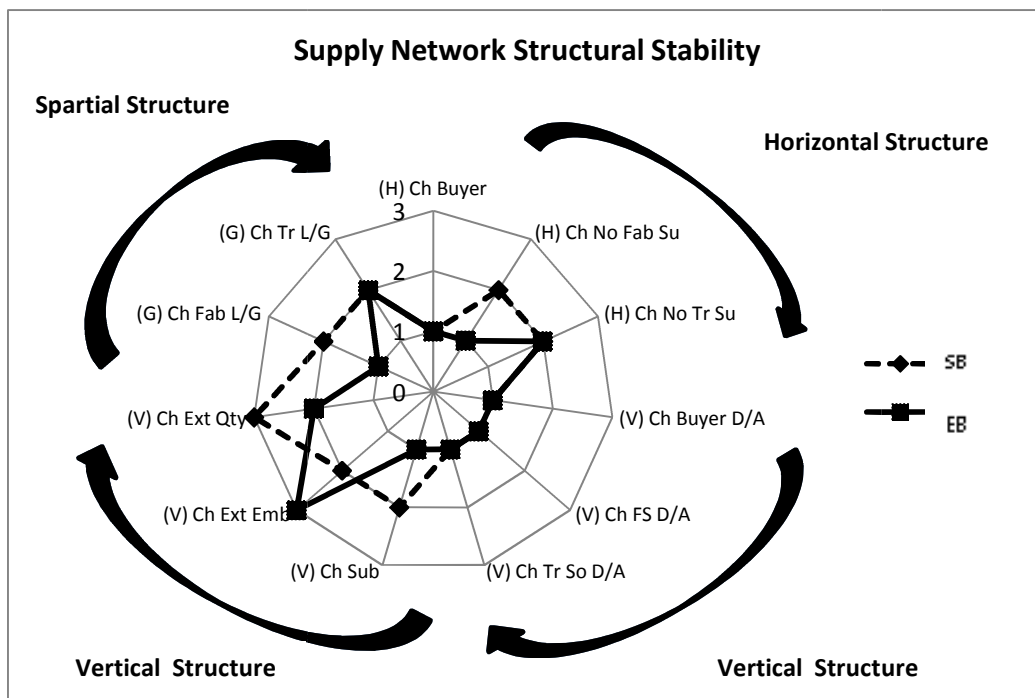


Figure 3: Comparing the structural stability of two supply networks²

capacity management except for specialist services such as external embellishment providers (e.g. embroidery). The network re-configures itself horizontally as the number of accessory suppliers is flexible, depending on current styles. However, the number of fabrics suppliers is mostly stable.

In terms of spatial structure, the network is globally dispersed as it supplies for retailers based in developed countries while production mainly occurs in one of the Asian developing countries (Sri Lanka) utilizing both local (Sri Lankan) and a wider Far Eastern raw material base. Much priority has been given to locally produced fabrics, mostly sourced from the suppliers who operate under the prime manufacturer's umbrella. Although accessories are sourced from the suppliers who operate under the prime manufacturer, certain types of accessories are supplied by other specialists operating in the Far East.

Quality assurance procedures – The leading brand retailer sets the quality standards of the garments comprehensively and helps the prime manufacturer to develop their competency to carry out the internal quality assurance activities as well as final quality audits to make sure all the retailer's standards are met. In addition, the agent of the retailer closely monitors the entire process and is involved in the final quality audit in order to ensure garments are produced according to the retailer's standards. The retailer also appoints an external quality auditor who can audit the prime manufacturer's network at any time to further assure the quality of the garments and production processes.

4.1.2 Case 1: Social aspects

Workforce rights – The retailer not only fulfills the rights of workforces but also sets benchmarks for the entire industry. Some of the strategies encouraged by the retailer include highly competitive remuneration packages, maintaining low labor turnover, providing medical services, maintaining workforce diversity, training and developing employees. It also maintains fair partnerships with employees, communities and suppliers in order to ensure that people working in its supply network and living in its local community benefit from its success. Specifically this retailer works with suppliers to pay high wages while assuring the well-being of the employees in clothing production factories in developing countries.

The retailer pressures their direct suppliers to fully comply with all relevant local, national, and international laws and regulations with regard to working hours and conditions, rates of pay and terms of employment, and enforces a minimum age of employment. The prime manufacturer ensures that their activities across the network³ go beyond the minimum compliances set by the local government; no child or forced labor is used. Safe, hygienic working conditions are provided and human rights are protected. Partly owing to the influence of the retailer, the prime manufacturer complies with international standards

² (V) shows the criteria of the vertical structure; (H) shows the criteria of the horizontal structure; (G) shows the criteria of the spatial structure. SB = Supermarket brand retailer; EB = Established brand retailer. The other abbreviations for each structural dimension are explained in Appendix A.

³ This includes activities of all the shared entities in the network, noting that it covers the majority of the network.

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and certificates. It sets constantly increasing best practices for the industry and has received a number of awards for safety⁴. Further, the adoption of ISO 14001 for environmental management, SA 8000 for Social Accountability and OHSAS 18001 for Occupational Health and Safety Management System, and GOTS accreditations for Global Organic Textile Standards, helps to support occupational health and safety in garment production processes across this network. Further, the prime manufacturer's network recruits differently-abled employees and provides training facilities for current employees and potential employees collaborating with leading international educational institutions.

Social projects – The retailer carries out programs to ensure the health and well-being of its employees, customers, and the community. They are evident in the social concerns, attitudes and initiatives undertaken by the retailer. The prime manufacturer is also motivated to carry out several social projects with either direct or indirect influence of the retailer. The Corporate Social Responsibility Centre of the manufacturer engages in micro to macro water projects. Some examples include establishing desalination plants (tube wells, water storage tanks) along the coastal belt following the post-tsunami crisis, implementing several smaller water projects at various other villages and schools, and establishing the Water Resources Board Centre for Water Conservation and Management in a rural village. The prime manufacturer has also collaborated with several other organizations on much larger projects, e.g. the United Nations Development Program (UNDP) and the Water Resources Research and Training Centre (partnered with another reputed brand retailer in the USA) aiming to educate students, teachers, community workers and the general public on water conservation and management.

4.1.3 Case 1: Environmental aspects

The retailer has an advanced program to reduce environmental impact and harm. It has implemented several strategies and programs focusing on climate change, waste management, and the sustainability of raw materials. Under its climate change program, the retailer seeks to improve the efficiency of energy use within the retail stores and in other related activities. Some of the strategies under its waste management program include the use of less packaging and improving recycling rates. The retailer seeks to ensure natural resources are used as efficiently as possible through some of its environment-oriented strategies. It encourages sourcing from suppliers who use organic cotton under Cotton Sustainability Programs that aim to reduce the use of toxic chemicals. It publishes Water Efficiency Guides for suppliers to minimize water usage and educates consumers on eco-friendly washing standards, recycling of used garments and it is committed to improving animal welfare. It has also implemented programs to help protect the rainforest in Sri Lanka.

This retailer focuses on all the areas of environmental impact with holistic programs, which embrace the whole company's culture as well as its suppliers and customers. As a result, it has won awards for its green practices⁴. It seeks to cultivate the same attitudes and similar strategies across its supply network. For instance, it encourages the use of organic cotton for textile production by nominating textile and yarn

⁴ Further details are not given here in order to maintain confidentiality.

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suppliers who use organic cotton amongst the acceptable suppliers that can be used. Prime manufacturers are directed towards the eco-friendly practices in their production environments, the use of renewable energy sources, and recycling. The prime manufacturer in this network has invested in innovative eco-friendly production facilities, some on its own and some jointly with the retailer.

The prime manufacturer has developed a 'Good Waste Management (GWM) system' to ensure that all the operations release cleaner water to the environment⁵. Minimizing water waste during production, fume extraction systems, eliminating dye reprocessing, and solid waste disposal through re-use or recycling are some of the important aspects of the GWM system. The prime manufacturer in this network is one of the first manufacturers in the South Asian region to invest in a fully automated water neutralization plant. Its 'Central Energy Management system' is targeted to reduce the overall energy consumption. Under this system environmental measures are implemented including the use of efficient lighting and air conditioning, better management of air compressors and pneumatic systems and monthly flue gas analysis. Further, the production process continuously monitors noise levels, ambient air quality, temperatures and treated waste water to ensure standards compliance and to eliminate discharge of toxic gases.

Further, this network has award-winning eco-friendly apparel production facilities, which have resulted from a partnership between the retailer and the prime manufacturer. It is worth noting that this was the first apparel manufacturing facility to achieve the highest standard in eco-friendly manufacturing, awarded by an international agency. The award of WRAP (Waste and Resources Action Programme) and GOTS accreditation for Global Organic Textile Standards reflects a high level of environmental concern. It is evident that apparel production in the network of this retailer sets a global benchmark for water conservation, solid waste management, energy consumption, and carbon emissions. The range of awards that the prime manufacturer has achieved is also evidence of the degree of social and environmental concern it shows. These have included local, national and international awards celebrating its environmental performance⁶.

4.2 Case 2: The supply network of a major supermarket retailer

Figure 4 shows the supply network of a major supermarket brand retailer. Unlike the network of the leading brand retailer, the prime manufacturer plays a more significant part in garment design. The prime manufacturer often develops a range of designs and presents them to the retailer, from which the buying team of the retailer selects certain designs. The prime manufacturer then proceeds with sample development. In other cases, the retailer designs the garments either as a 'concept', or as a 'sample

⁵ Water consumption is substantially high in apparel production (de Brito et al 2008)

⁶ Space restriction precludes discussion of all the awards which show the success of social and environmental concern.

garment' or as a 'tech-pack'⁷ and lets the prime manufacturer proceed with the rest of the development, including developing a set of sample garments.

After sets of samples are approved, orders are placed including details of colors, volumes, sizes, delivery dates, etc. These orders are then placed with the relevant production plants according to their production competencies. Fabric and accessory sourcing decisions including material specification and supplier selection are mostly made by the prime manufacturer, unlike the leading retailer's network described in Case 1. The prime manufacturer needs to get the quality of all fabric and accessories approved by the supermarket in advance. However, they can then source from any suppliers that can meet the approved standards. Quality approved garments are directly exported to the retailer's DC via the forwarder recommended by the supermarket retailer (the quality assurance process is discussed later).

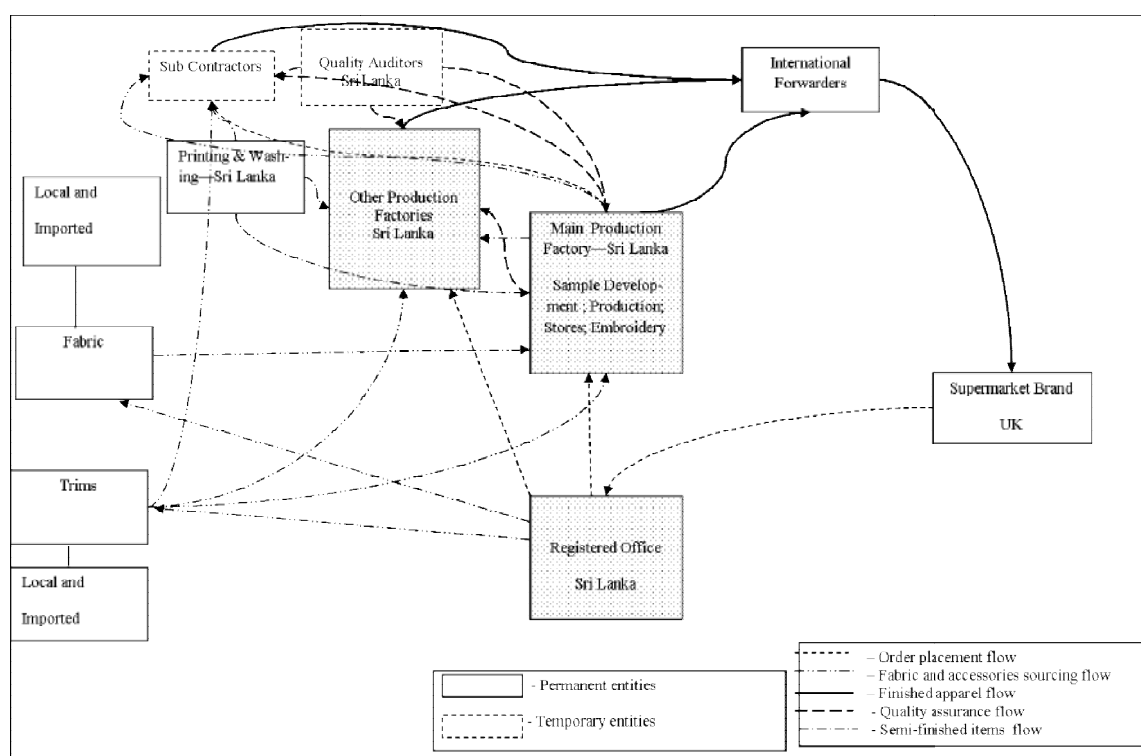


Figure 4: Supply network of a Supermarket Brand retailer

4.2.1 Case 2: Economic aspects

Structural stability: The dotted line in Figure 3 shows the assessment of the structural stability of this retailer's supply network. Although this retailer has a less complex supply network compared to Case 1, it is a relatively less stable network. As with Case 1, the network is reasonably vertically stable in terms of the number of tiers as it does not tend to add or withdraw any of the main tiers of the network. However, it is not as strongly vertically integrated as the leading brand retailer. Unlike Case 1, the supermarket retailer's supply network allows the use of subcontractors as well as employing the services of external

⁷ Set of documents which include all the guidelines and details about a particular design.

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embellishment providers depending on current styles. The network re-configures itself horizontally as the number of fabric and accessory suppliers are flexible depending on the current range of garments and volumes. In spatial structure, this network searches for suppliers globally to source fabrics and accessories at the lowest price.

Quality assurance procedures – The supermarket retailer sets the quality standards of the garments produced, but not in as detailed or as strict a manner as the leading brand retailer. The prime manufacturer carries out the internal quality assurance activities as well as final quality audit to make sure such standards are met. The retailer assigns external quality auditors to audit the prime manufacturer and related subcontractors annually to ensure that the set standards are complied with and fulfilled. It is worth noting that the leading brand retailer in Case 1 uses the services of external quality auditors very frequently, but the supermarket retailer mostly uses such auditors annually.

4.2.2 Case 2: Social aspects

Workforce rights – Unlike in Case 1, the prime manufacturer mostly fulfils only the minimum requirements of the workforce rights in terms of remuneration and working conditions. However, no child or forced labor is used in this network. The network also fulfils all local and national government compliances but does not seek to comply with higher international standards.

Social projects- Some social projects have been implemented by the prime manufacturer targeting its employees and the local communities in which it operates. Two projects aimed at the well-being of the employees include contributions to medication and housing needs of employees and a scheme of death donations following the loss of family members of the employees. Social projects targeting the public community are the support and help provided for places of religious worship, welfare societies and sports clubs, and conducting blood donation campaigns.

4.2.3 Case 2: Environmental aspects

This prime manufacturer in this network complies with national regulations and standards in its facilities and in its environmental practices. However, there is little evidence of proactive development or investment in eco-friendly production facilities, or in the utilization of renewable energy sources, or the availability of recycling facilities. Unlike Case 1, there is much less evidence of the adoption of international standards or accreditations by the prime manufactures. It is not evident that the retailer stresses or strongly influences the prime manufacturer to ensure proactive environmental practices in its or its suppliers' production facilities.

4.3 Summary of the findings

Table 1 below summarizes the key points highlighted above for each network.

Table 1 Summary of findings for Case 1 and Case 2

3BL dimensions	Assessing criteria	Leading brand retailer	Supermarket retailer
Economic	<i>Stability</i>	Mostly stable. Strong vertical stability facilitated by the high degree of vertical integration. Horizontally re-configurable network; but fabrics suppliers are mostly stable. In spatial structure, the upstream of the network emphasizes local suppliers as it mostly sources the raw materials from the suppliers who are owned by the manufacturer.	Mostly stable. Although vertically stable, the network is not as vertically integrated as the leading retailer. Horizontally re-configure network. In spatial structure, the upstream of the network is global as it searches for suppliers at the lowest price.
	<i>Quality assurance processes</i>	Advanced and comprehensive while encouraging collaborative efforts with the prime manufacturer. Very frequent monitoring by the retailer and frequent auditing of the process through external auditors.	Adheres to minimum standards. The responsibilities lie with the prime manufacturer. Process audited annually by an external auditor.
Social	<i>Workforce rights</i>	Goes beyond the minimum requirements and sets global benchmarks.	Fulfils mostly the minimum requirements compliant with national standards.
	<i>Social projects</i>	High concern for the well-being of employees and the community. Participation in many minor and major	More limited concern on the well-being of employees and the local community only.

		projects, often in collaboration with other organizations.	
Environment	<i>Environmental oriented strategies - the use of energy, use of toxic chemicals, waste and effluent treatments, and the use of recycling facilities</i>	High concern on environmental effects and impacts and the implementation of strategies for eco-production, natural energy sources, recycling, etc. Promotes global best practices in all aspects of environmental issues, with many international accreditations.	Little evidence of proactive strategies or initiatives beyond compliance with national legislation. Limited international accreditations.

5. Discussion and implications

The sustainability of collaborative supply networks raises significant issues for businesses, society and the research community. Network sustainability requires strategic intent but also needs to get to the heart of how businesses operate and collaborate, how they interact with society and with the physical environment. Thus, sustainability may involve many 'low level' issues and practices that appear far removed from the typical strategic considerations and executive decision making of senior managers. Case study research of practice is important to ensure that the thinking and analysis of sustainability issues are 'grounded' in the reality of business operations. The research literature also highlights the need for more empirical evidence to link the fields of collaborative networks and sustainability (Vachon and Klassen 2006; Camarinha-Matos et al 2010).

The study here has examined sustainability practices of two international clothing supply networks for two different types of retailer. Both are highly successful retailers in their own right. At an operational level the networks described share some similarities but also show some differences. From the sustainability perspective the networks show strong differences. The same methodology has been applied in both cases with the same level of access. It is evident that Case 1 demonstrates significantly more and better practices and initiatives than Case 2. Case 1 shows world-leading thinking across the network, whilst Case 2 shows a much more limited minimum compliance perspective. Case 1 could be described as providing a global benchmark whilst Case 2 could be described as an 'average performer' in the sector with regard to sustainability, reflecting typical practices particularly for this type of retailer

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As well as mandating high quality standards across its supply network, the leading brand retailer places 'soft pressure' on its supply network partners in general, and on the prime manufacturer in particular, to direct them towards a sustainability agenda. In contrast, the supermarket retailer, although requiring consistent garment quality, does not appear to exert pressure with regard to sustainability across its supply network. These findings support the argument of Humphrey and Schmitz (2001), which highlighted great diversity in the setting and enforcing of standards by different retailers. They note that some retailers may merely refer to the process standards to be attained (the supermarket retailer in this study). In other cases, they may specify precisely how particular standards should be attained by requiring and helping to introduce particular production processes and monitoring practices (the leading brand retailers in this study).

A clear distinction is noticeable between the supermarket brand and leading brand retailer with regard to 'environmental monitoring' and 'environmental collaboration' (Vachon and Klassen 2006). The supermarket brand tends to engage in activities using arm's length, market transactions in managing its network (environmental monitoring). The leading brand retailer has moved towards direct collaborative involvement with its suppliers to jointly develop environmental solutions (environmental collaboration). This links sustainability with the level of collaboration and/or independence evident in a network. The evidence here supports the conclusion that strongly collaborative networks (the leading brand retailer) in the international clothing industry tend to place greater emphasis on sustainable practices than less collaborative networks (the supermarket brand retailer), complementing ideas in the literature (de Brito et al 2008, Camarinha-Matos et al 2010). Supply networks that are less integrated and less stable are likely to be based more on short term contracts and are less likely to co-develop and invest in sustainable practices (Dolan and Tewari 2001, de Brito et al 2008). In addition, the full extent of practices in such networks is likely to be less transparent to the retailer and may therefore be more risky.

This study has implications for both retailers and suppliers in clothing supply networks. Some clothing retailers have developed a positive sustainability agenda and see it as potentially offering competitive advantages (Palpacuer et al 2005, Markley and Davis 2007, de Brito et al 2008). There may be a potential for major brand retailers to build a competitive edge not only as 'fashion leaders' but also as 'ethical leaders'. There are specific issues for retailers in Europe that use Asian supply networks (Palpacuer et al 2005, Brito et al 2008). Consumers, shareholders and stakeholder communities, both in the retailer's market and in the location of the supply base, are clearly more concerned about sustainable practices today than previously. They are also more aware of practices through much more widely available information, travel and the work of specific pressure groups. Thus, the 'responsibility bar' has been raised for all retailers. The study here indicates the benefits of strongly collaborative networks in helping to facilitate and enhance the sustainability agenda.

Appreciating the sustainability agendas and policies of different retailers helps large apparel manufacturers to develop their corporate strategies and (re-)position themselves in the global apparel supply base.

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Especially in the 'quota-free era', there is much potential for them to strengthen their competitive advantage instead of competing solely on price, quality and responsiveness. This is especially important for Sri Lankan manufacturers as they struggle with achieving cost advantages against other clothing producing regions. Understanding the structure, operation and sustainability agendas of different retailers is also important for SMEs in developing their abilities to participate in global supply networks.

It is important for policy makers in industry and government bodies to understand the structure and operation of retailer-driven global supply networks and the attitudes of different retailers with regard to sustainability. This can facilitate the development of long term industrial policies, strategies and plans to strongly position clothing manufacturers in their region in the highly competitive global apparel industry. It may also help to encourage collaboration and networking among the different entities in a region to ensure a sustainable competitive clothing industry.

6. Conclusions

The kind of empirical analysis reported here on the supply networks of leading brand and supermarket clothing retailers has not been reported in the literature to date. The research findings may benefit apparel retailers in the developed countries, policy makers and manufacturers in developing countries, textile producers, and other entities who operate in the international clothing industry. Supply networks for other consumer products share some of the characteristics of clothing supply networks in that they are often buyer-driven and are international. Further work is needed to investigate the similarities and differences and to study the potential for the dominant players in the supply network to develop both a strong sustainability ethos and encourage sustainable practices with supply network partners.

Any study of this type has limitations. The challenges in assessing sustainability at a network level have been highlighted, particularly with respect to the economic aspects. Further theoretical and applied studies on the economic sustainability of supply networks are needed. The examination of sustainability practices adopted by the principal players in clothing supply networks has the potential to complement the product-based lifecycle studies in the sustainability literature. Further work in this direction is advocated. As noted, the study of the sustainability of transportation modes across supply networks is a major research undertaking but such studies should be encouraged. The replication of this type of study with supply networks in other product sectors would also be a valuable addition to enable cross-sectoral comparisons.

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Appendix: Assessment criteria for the Structural Stability of the Supply Networks

Dimension	Items	Decision Criteria	Scale	
Horizontal Stability (H)	Stability of retailers (H) <i>Cb Buyer</i>	Same retailers for a longer period of time	1	
		Retailers change seasonally	2	
	Stability of fabric suppliers – extent to which the number of fabric suppliers change (H) <i>Cb No Fab Supp</i>	Does not change at all	1	
		Changing somewhat	2	
		Changing frequently	3	
		Changing very frequently	4	
	Stability of accessory suppliers - extent to which number of fabric suppliers change (H) <i>Cb No Tr Sup</i>	Does not change at all	1	
		Changing somewhat	2	
		Changing frequently	3	
		Changing very frequently	4	
	Vertical Stability	Extent to which the way of placing orders from retailer to manufacturer change (V) <i>Cb Buyer D/A</i>	Does not change at all	1
			Change occasionally	2
Extent to which the way of fabric sourcing change (V) <i>Cb FS D/A</i>		Does not change at all	1	
		Change occasionally	2	
Extent to which the way of accessories sourcing change (V) <i>Cb Tr So D/A</i>		Does not change at all	1	
		Change occasionally	2	
Extent to which utilization of the capacity of subcontractors/ external embellishment service providers/ external auditors change (V) <i>Cb Ext Emb/ (V) Cb</i>		Does not change at all	1	
		Changing somewhat	2	

	<i>Sub/ Ch Ext Qlty</i>		
Geographical dispersion (Spatial)	Extent to which composition of local and imported fabric utilization change <i>(G) Ch Fab – L/G</i>	Does not change at all	1
		Change occasionally	2
	Extent to which composition of local and imported accessory utilization change <i>(G) Ch Tr – L/G</i>	Does not change at all	1
		Change occasionally	2

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