Agile Supply Chain Management in the UK Fashion Sector

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I

Abstract

More demanding customers and the globalisation of both markets and production have led to companies nowadays facing a highly volatile and uncertain environment. In this environment, the ability to react to environmental uncertainty is key for competitiveness. Long lead times and high levels of stock have higher and higher risks associated with and, as a result, producing just-in-time to customer specifications has become the key to succeeding in the market place. Efficient supply chains often become uncompetitive because they don't adapt to changes in the structures of markets. In this context, the area of agile supply chain management has gained increasing attention over the past few decades. It focuses on increasing the speed and flexibility of a network of interconnected businesses involved in the ultimate provision of product and service packages required by end customers.

If extensive research has been previously conducted on various aspects of agility, the majority of previous studies focus on consumer acceptance of the strategy and not on operational issues. Building on this weakness, this thesis aims to construct a framework of agile supply chain management practices and, through two case studies, investigate the interactions between its components. The UK fashion sector was chosen as the focus of this research, due to its high levels of demand volatility. It also presents a set of challenges, as the high levels of globalization that characterises the sector and the complexity of the supply networks operated by fashion retailers, have previously been identified as barriers to responsiveness.

The thesis' main findings are threefold. First, due to the fact that traditional supply chains are either too complex and cost-laden to distribute low-cost products effectively or too asset-intensive and inflexible to quickly harness and deploy innovation, companies need to build 'fit-for-purpose' supply chain networks. This involves configuring supply networks in a tailored fashion to deliver innovation and responsiveness for premium brands and high efficiency for mass value products. Second, through high levels of process integration companies should accelerate the innovation process so that new products and promotions can be introduced into stores more cheaply and quickly. They should also reinvent the value chain by reconfiguring operations to radically cut costs and proactively meet customer demands. Third, to enable high levels of agility in a global sourcing context through rapid supply systems reconfiguration, new supply chain structures and actors, such as trade agents / intermediaries, need to be involved.

Acknowledgements

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And finally, but most importantly, I would like to thank my family for their love and belief that anything you set your mind to is achievable: my husband Robert, who put up with a lot of sleepless nights while listening to me typing, my daughter Sophie, who kept me up on numerous nights and, hence, allowed me to finish the corrections on the thesis, my mum Florica and my sister Dana, for always being there. Dad, thanks for looking over me.

Table of Contents

List of Figures

List of Tables

Chapter 1 Introduction

In this chapter background information pertaining to the research is given. A brief introduction to the research and its context is provided, highlighting the motivation for this thesis' focus. This is followed by the introduction of the research question. Finally, an overview of this thesis' chapters is included in order to familiarise the reader with the structure of the thesis.

1.1. Background

Recent decades have been characterised by unprecedented change across industries and in the marketplace (Harris and Cohen, 2003). In response, companies have had to consistently re-appraise their role in providing competitive value to their customer base (Balmer and Gray, 2000). The demands to be faster to market with new products and services, to achieve better service and sales results, together with an on-going lowering of production and distribution costs, have been constantly increasing. In addition, the volatility of the world economy, shorter life-cycles in many product areas, oscillating (and largely escalating) commodity prices and the fast changing dynamics of demand have meant that, in many sectors, companies have needed to develop the capability to be increasingly flexible to survive (Childerhouse et al., 2008).

New business models centred on the principle of process rather than functional optimisation, have consequently emerged towards the end of the 20th century and into the early part of the 21st century. These are driven primarily by fundamental changes in each of the core elements of industry: the nature of production, distribution and the customer.

The area of supply chain management has gained increasing attention over the past few decades. It focuses on the management of a network of interconnected businesses involved in the ultimate provision of product and service packages required by end customers (Harland, 1996). At the same time,

as customers become more demanding, strategies required to manage nowadays' supply chains need to be tailored to different customer segments (Fisher, 1997). Torres and Miller (1998) suggested that supply chain operations should be aligned with customer segments to gain higher market penetration, greater customer loyalty and profitable growth. This implies that enterprises have to be both efficient and flexible in their operations in order to fulfil different customers' unique needs. Consequently, the careful design of information and material flows within and between organisations is required (Christopher, 1992).

Christopher and Peck (2004) refers to 'resilience' in the context of supply chain management as the ability to absorb shocks and to continue to function even in the face of unexpected disruption. And as uncertainty in today's business environment continues to increase, organisations need to adopt a more systematic and structured approach to supply chain management. One way in which companies can respond to the extreme environmental instability that appears to be characterising the new millennium (Fabbe-Costes and Colin, 2007) is through the use of an appropriate network strategy which will allow businesses to take advantage of opportunities as they arise, while remaining in tune with their environment. This reflects the view that networks are not necessarily static structures, but can be dynamic and respond to specific needs (Walters, 2007).

The increase in outsourcing activities and opening up of global markets has also contributed to supply networks becoming more global (Harland et al., 2003). Global sourcing has in recent years been actively sought out by managers because of reduced cost, increased revenues and improved reliability (Meixell and Gargeya, 2005). However, experts maintain that global supply chains are more difficult to manage than domestic supply chains (Dornier et al., 1998; Wood et al., 2002; MacCarthy and Atthirawong, 2003), they are more vulnerable to disruptions and offer limited scope for responsiveness in highly volatile environments. Handfield and Nichols (2004) note that many buying organizations appear to be operating under the belief that by merely expanding the scope of their current practices, processes and associated information

3

systems to the far corners of the globe, they will be able to establish and manage a productive global supply base.

One sector for which off-shore procurement is an integral and crucial dimension in respect of achieving cost benefits, skills and flexibility (Doyle et al., 2006) is the UK fashion sector. Currently, for many large fashion retailers the decision is no longer whether to engage in foreign production, but how to organise and manage it better. As well as high levels of internationalisation, the industry has, in the past few years, been increasingly confronted with high demand volatility and low predictability, short product life cycles and high levels of impulse purchasing.

1.2. Aim and Research Question

Based on the above discussion, the main challenges the fashion retailers are facing is to increase their market sensitivity and ensure product availability while keeping their product obsolescence low. Their ability to respond to market signals is critical, especially in a sector in which the competition is increasing (Kincade et al., 2007). The field of competition is therefore switching towards retailing and towards a demand-driven, agile supply chain (Brun and Castelli, 2008). Being close to the customer is a goal of any market-oriented business, but in fashion it is vital (Christopher et al., 2004). Furthermore, high levels of retail concentration in the UK means that inefficient or undifferentiated retailers are unable to survive in a retail environment characterised by over-capacity, ever-growing exposure to risk from product proliferation and continuing pressure to lower prices (Abernaty et al., 1999).

Previous studies have revealed that globalised supply chains are inherently incompatible with agile, demand-led retailing (Taylor, 2006). Given the need for speed and agility in the fashion industry, the time expansion of the supply chain implied by global sourcing is not only undesirable, but results in an erosion of competitive advantage. However, in the last few years there has been significant evidence to suggest that UK high street fashion retailers have overcome the barriers of global sourcing in achieving speed to market. For

4

example, clothing and accessories imports from China to the UK rose from $669 million in 1997 to $2,861 million in 2003 in the detriment of local sourcing (DTI, 2004), while, as highlighted in the introduction of this chapter, the fashion content of the retailers' offerings has been consistently increasing.

As such, considering the global nature of fashion supply networks, the main research question for this thesis is:

> ***How do companies operating in the UK fashion market sector achieve high levels of agility?***

If extensive research has been previously conducted on various aspects of agility in both apparel and other industries' supply networks (Duray, 2002; Lee et al., 2002; Ulrich et al., 2003), the majority of previous research focused on consumer acceptance of the strategy and not on operational issues (Loker et al., 2004, Kincarde et al., 2007). Building on this weakness, this thesis aims to construct a framework of agile supply chain management practices and, through two case studies, investigate the interactions between its components.

Supply Chain Management has long been acknowledged as an area in which researchers often find themselves trailing behind practitioners. Thus the case study research strategy is well-suited for capturing the knowledge of practitioners and developing theories from it (Meredith, 1998). Furthermore, Agile Supply Chain Management in a global context is poorly understood from an academic perspective and few studies have been conducted in it, especially involving multiple companies along the value stream. As a result, rather than focusing on a single in-depth case study of a UK fashion retailer, which would provide a too narrow understanding of agile supply chain management practices adopted, two cases were decided upon, looking along the entire supply network, in order to gain both the sufficient research depth and width. At the same time, this will make the research more compelling and the overall study more robust (Yin, 2003) as it leads to higher external validity and helps guard against observer bias (Voss et al., 2002; Yin, 2003).

1.3. Thesis Structure

As has already been seen, Chapter 1 provides background information on the research and introduces the research question. This helps to set the scene for the overall research.

This thesis consists of three parts, as illustrated in Figure 1.1. The first part provides a literature review of the theoretical aspects of the study and includes Chapters 2, 3 and 4. The second part, Chapters 5, 6 and 7, presents the empirical evidence which validates the framework developed in the first part of this research. The final part, Chapter 8, provides a summary of research findings and a discussion of the research's contributions and their implications. It concludes the research. The work presented in all three parts of this thesis has formed the basis of a series of journal and conference articles. Though all these papers have multiple authors, they have stemmed from the scholarity work of the author of this thesis, who was also the main contributor in terms of their write-up.
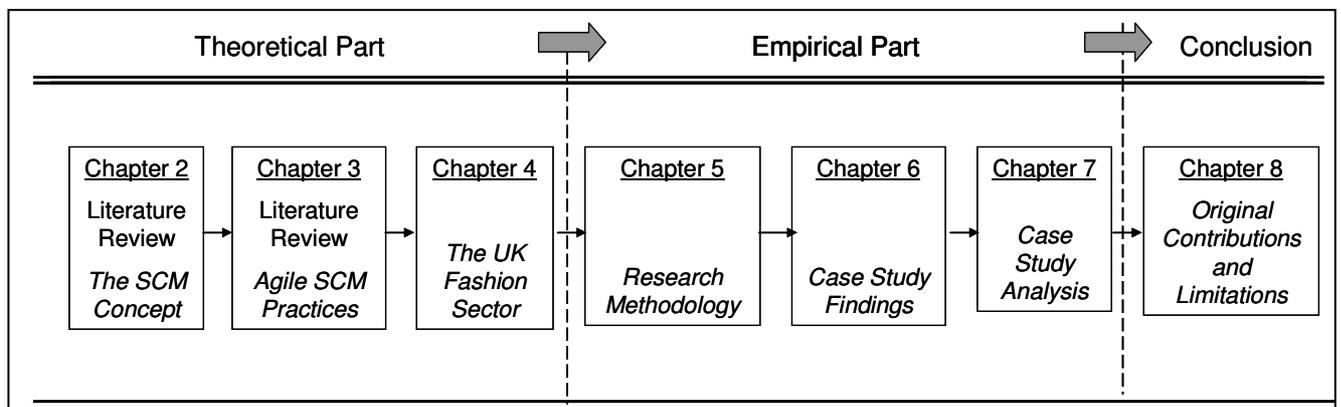
Figure 1.1. Thesis Structure

Chapter 2 presents a review of the supply chain management concept, with a brief review of its origins and subsequent development, as well as the pressures with which nowadays supply chains are confronted. This work has been published in:

Iosif, L., Masson, R., Fernie, J. and Mackerron, G. (2004), 'Supply Chain Management – Where Are We Now?', In Knowledge Driven Manufacturing, Edited by Cottrell, M., CIT Press, Cork, Ireland.

Chapter 3 illustrates that one way in which the extreme environment instability that appears to be characterising the new millennium can be mitigated against is through the use of an appropriate supply network strategy. The lean, agile and leagile strategies are reviewed, as well as the role of different types of flexibility in distinguishing between them. Ultimately, the agile supply chain strategy is identified as offering the highest levels of market responsiveness in highly volatile environments, and a framework for agile supply chain management practices is presented. This work appears in:

Iosif, L., Masson, R., Fernie, J. and Mackerron, G. (2005), 'Demand Led Supply Chain Management', 2nd European EIASM Forum on Supply Chain Management, Milan, Italy.

Chapter 4 provides an overview of the UK fashion sector and supply chain management practices that have been reported in the literature as having been adopted by the industry. The main research question is introduced here, as well as some of the challenges anticipated in answering it. This work has been published in:

Iosif, L., Masson, R., Fernie, J. and Mackerron, G. (2005), 'Global Agile Supply Chain Management in the European Clothing Industry', in EUROMA Proceedings, Budapest, Hungary.

Chapter 5 has four purposes. First, it reviews the strengths and weaknesses of research paradigms considerations in general. Secondly, it puts forward an argument as to why the selected research strategy and data collection method have been perceived as the most suitable for this research. The third purpose is to explain in detail the data collection procedures. Finally, the potential limitations of the overall validity of the research methodology that was adopted are discussed.

Chapters 6 and 7 report the major case study findings. Chapter 6 provides an overview of the supply chain management practices adopted by the companies interviewed. In Chapter 7, the key case study findings presented in Chapter 6 are compared against the general framework for agile supply chain management introduced in Chapter 3. It reveals the fact that the companies under study needed to build 'fit-for-purpose' supply networks in order to increase their competitiveness, and a framework is constructed to aid the design and management of these networks. This work is published in:

Masson, R., Iosif, L., Mackerron, G. and Fernie, J. (2007), 'Managing Complexity in Agile Global Fashion Industry Supply Chains', International Journal of Logistics Management, vol.18, no.2.

Finally, Chapter 8 discusses the overall research findings and the original contributions the researcher has made to the field. Academic and practical implications, together with limitations and potentials for future research are also presented. This work appears in:

Iosif, L., Gosling, J. and Naim, M. (2008), 'The Implementation of a Network Flexibility Strategy', Proceedings of the 15th European Operations Management Association (EUROMA) Conference, Groningen, Netherlands.

1.4. Summary

This chapter has provided background information for this research and introduced the research question. An overview of the content of the thesis has also been provided in order to aid the reader's understanding of the research process and its progression.

Chapter 2 From Supply Chains to Global, Integrated Demand Networks

In this chapter, the concepts of 'supply chain' and 'supply chain management' are introduced, with a brief review of their origins and subsequent development. The literature devoted to the overall makeup and environment of supply chain management is reviewed, and some of the developed models explaining the overall scope and form of supply chain management are introduced. The changes in the external environment of companies operating in today's markets are also highlighted, with a focus on outsourcing, supply chain relationships, concentration of ownership, mass customisation and the emergence of demand chains, integrated supply chains, supply network complexity and globalisation.

2.1. The Supply Chain Management Concept

The origins of the concept of supply chain management (SCM) are unclear, but is often traced back to Forrester (1958, 1961), who identified the dynamics of response to changes in demand in supply chain situations. He highlighted the fact that there typically is a distortion in demand patterns created by the dynamic complexities present in transferring demand from end users along a chain of supply to manufacturers and material suppliers. Other antecedents can be found in the Total Cost approach to distribution and logistics (Heckert and Miner, 1940; Lewis, 1956) or in the emergence, from the 1950s onwards, of 'systems theory', which argues that the behaviour of a complex system cannot be understood completely by the segregated analysis of its constituent parts (Boulding, 1956; Burbidge, 1961). All these approaches show that focusing on a single element in the chain cannot assure the effectiveness of the whole system (Croom et al., 2000) and any participant's potential to optimise performance would be constrained by the limitations inherent in the overall system (Lee, 2000). However, the term supply chain management originated, along with the concept of Just-In-Time, in the 1980s, mostly in the context of logistics (Houlihan, 1984; Oliver and Webber, 1992).

9

However, the distinction between the supply chain management and logistics literatures is unclear. Mills et al. (2004), for example, argue that the logistics literature essentially presumes rational co-operation between buyers, suppliers and service providers and on this basis strives to find optimal solutions for inventory, transportation, information flow, etc. In contrast, SCM considers, additionally, the behavioural and political dimensions of trust and power, conflict and dependence between the supplier and the buyer. Lamey (1996) argues that the field of logistics research focuses on minimising total cost, while supply chain management is concerned with the long term profitability of serving customers and customers' customers. Analysing the developments in the logistics and supply chain management literatures, Larson and Halldorsson (2004) conclude that there are four different perceptions of the relationship between supply chain management and logistics (Figure 2.1):

- Traditionalist – The traditionalist positions SCM within logistics and tends to view SCM as 'logistics outside the firm';

- Re-labelling – The re-labelling approach simply renames logistics - what was logistics is now supply chain management. The '*supply chain*' and '*logistics network*' are synonymous.

- Unionist - This perspective treats logistics as a part of SCM: SCM completely subsumes logistics. Stock & Lambert (2001), for example, suggest that supply chain management is the management of eight key business processes: (1) customer relationship management, (2) customer service management, (3) demand management, (4) order fulfillment, (5) manufacturing flow management, (6) procurement, (7) product development and commercialization, and (8) returns. These processes subsume or include much of logistics, purchasing, marketing and operations management.

- Intersectionist – The intersectionist approach considers that supply chain management is not a subset of logistics but is a broad strategy which cuts across business processes both within the firm and through the channels.

In this thesis the author adopts the unionist approach in the belief that supply chain management is 'more than a new name for logistics', since:

10

'There is definitely a need for the integration of business operations in the supply chain (across firm boundaries) that goes beyond logistics. New product development is perhaps the clearest example of this since all aspects of business should ideally be involved (…). In addition to these internal functions there is a need to include external organisations in the product development process in order to reduce the time-to-market on new product introductions (…). The integration of business processes across the supply chain is what we are calling supply chain management' (Cooper et al, 1997, p.1).
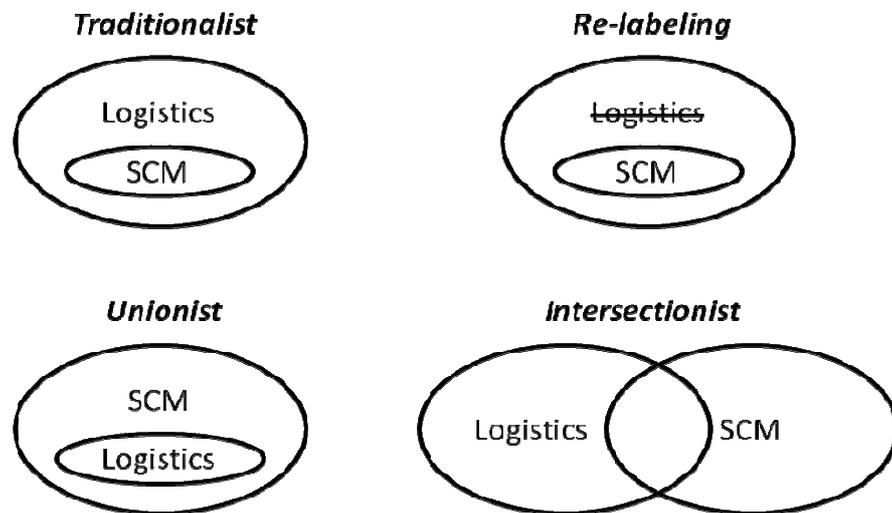
Figure 2.1. Perspectives on Logistics versus Supply Chain Management (Source: Larson and Halldorsson, 2004, p.19)

Various definitions of what actually constitutes the 'supply chain' have been offered in the past several years. The APICS Dictionary (Cox and Blackstone, 1998, p.350) describes the supply chain as:

1. *The process from the initial raw materials to the ultimate consumption of the finished product linking across supplier-user companies.*
2. *The functions within and outside a company that enable the value chain to make products and provide services to the end customer.*

At the same time, the Supply Chain Council (2010) uses the definition:

'…The supply chain encompasses every effort involved in producing and delivering a final product, from the supplier's supplier to the customer's customer'.

The supply chain encompasses organizations and flows of goods and information between organizations from raw materials to end-users (Handfield and Nichols, 2002). Quinn (1997) defines the supply chain as all of those activities associated with moving goods from raw-materials stage through to the end user. This includes sourcing and procurement, production scheduling, order processing, inventory management, transportation, warehousing and customer service. Importantly, it also embodies the information system so necessary to monitor all of those activities.

In addition to defining the supply chain, several authors have further defined the concept of supply chain management. The literature supports the view that the integration of key business processes within and across companies that add value for customers and other stakeholders can be called SCM (Cooper et al., 1997). Ellram and Cooper (1993, p.13) view supply chain management as *'an integrating philosophy to manage the total flow of a distribution channel from supplier to ultimate customer'*. It encompasses material/supply management from the supply of basic raw materials to final product (and possible recycling and re-use). Supply chain management focuses on how firms utilise their suppliers' processes, technology and capability to enhance competitive advantage. It is a management philosophy that extends traditional intra-enterprise activities by bringing trading partners together with the common goal of optimisation and efficiency' (Tan et al., 1998).

Croxton et al. (2001) state that the interest in supply chain management has steadily increased since the 1980s, when companies started to see the benefits of collaborative relationships within and beyond their own organisation. They realised that the largest potential for improvement is not found inside an individual company, but in the interfaces between legally independent companies in the supply chain. This was highlighted by a survey by Deloitte & Touche in Canada (Factor, 1996), which showed that 98% of companies

12

considered supply chain management to be either 'critical' or 'very important' to their success in the marketplace. The same survey revealed that over 90% of organisations were currently improving their supply chain or planning improvements within the next two years (Factor, 1996).

As such, the focus changed on integrating all value adding activities into a seamless process. Hoek et al. (1998) highlighted the fact that supply chain management represents a move away from traditional command and control, vertical hierarchy based organisation, toward one structured around processes rather than functional, product or geographical units.

Meier et al. (2004) highlight the diversity that exists in the realm of supply chain management research as some researchers have focused mainly upon the definition of the supply chain (i.e. Christopher, 1992), while others concentrate upon both the definition of the supply chain along with its strategic management (Crowley and Domb, 1997; Dodgson, 2001; Mentzer et al., 2001).

Another frequently researched component of SCM is the exploration and understanding of the motivations for/ benefits of engaging in SCM. Reported benefits of research in SCM include decreased order cycle time (Sheridan, 1999), reduced costs/increased efficiency (Christopher and Ryals, 1999; Quin, 2000), improved product delivery and responsiveness (Lalonde and Masters, 1994) and revenue and profitability growth (Quinn, 2000; Timme and Williams-Timme, 2000). Finally, both bridges and barriers to implementing supply chains have received a great deal of research attention (i.e. Monczka and Morgan, 1997; Blackwell, 1999; Stank et al., 1999) and these will be further explored in the following sections.

2.2. Supply Chain Management Components

A great body of literature has been devoted to the overall makeup and environment of supply chain management, including the structure, processes and components (Dyer, 2000; Mariotti, 1999; Lambert et al., 1998; Cooper et al. 1997). Mills et al. (2004) note that one main area of interest in supply chain

13

management is concerned with all ongoing operations in the supply chain, namely the material and information flow. As such, looking upstream and including second and third tier suppliers into management activities extends the scope for business process re-engineering and integration efforts. In this area looking at supply chain operations, a considerable amount of literature focuses on logistical issues. Aspects included are supply chain logistics strategy and planning, order processing and integration of information systems, transportation modes, forecasting, inventory policies and warehouse management, facility location and network planning and third-party logistics (Ballou, 1998).

Numerous authors have attempted to develop models explaining the overall scope and form of supply chain management. The broader understanding of the supply chain management concept is illustrated in Figure 2.2., a framework proposed by Lamber and Cooper in 2000, which captures a simplified supply chain network structure, the information and product flows and the key supply chain business processes penetrating functional silos within the company and the various corporate silos across the supply chain. Thus, business processes become supply chain business processes linked across intra- and inter-company boundaries.
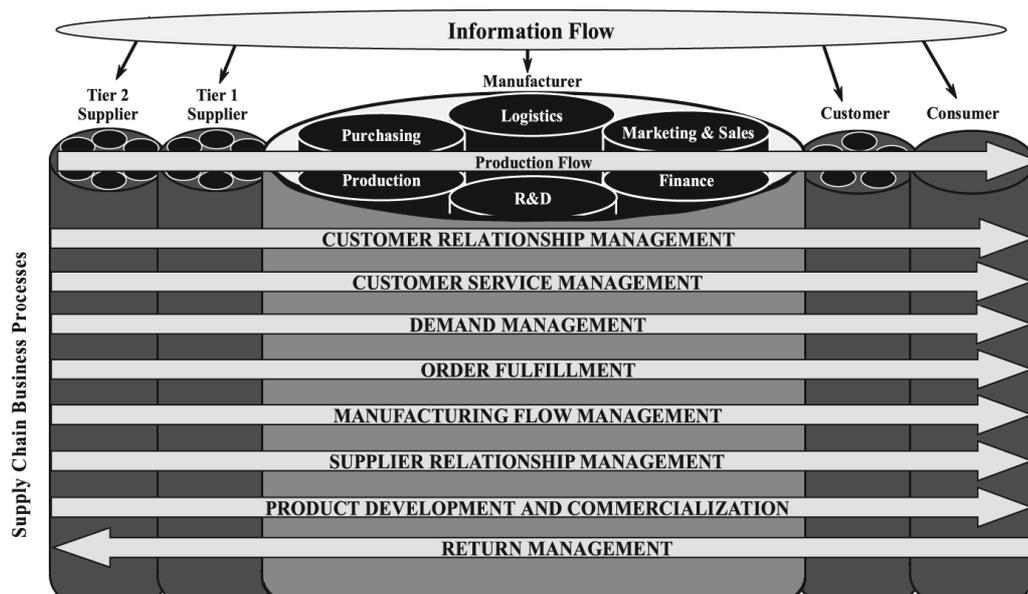
Figure 2.2. SCM Components (Source: Lambert and Cooper, 2000, p.67)

14

Croom et al. (2000) present a content overview of the existing literature in the area, highlighting the fact that the multi-disciplinary origin and evolution of supply chain management is reflected in the lack of robust conceptual frameworks for the development of theory on the subject (Figure 2.3.). There is a relatively poor supply of empirically validated models explaining the scope and form of supply chain management, its cost and benefits.

Strategic management Strategic networks Control in the supply chain Time-based strategy Strategic sourcing Vertical disintegration Make or buy decisions Core competencies focus Supply network design Strategic alliances Strategic supplier selection Global strategy Capability development Strategic purchasing **Logistics** Integration of materials and information flows JIT, MRP, waste removal, VMI Physical distribution Cross docking Logistics postponement Capacity planning Forecast information management Distribution channel management Planning and control of materials flow **Marketing** Relationship marketing Internet supply chain Customer service management Efficient customer response Efficient replenishment After sales service	**Relationships/Partnerships** Relationships development Supplier development Strategic supplier selection Vertical disintegration Partnership sourcing Supplier involvement Supply/distribution base integration Supplier assessment Guest engineering concept Design for manufacture Mergers acquisitions, joint ventures Strategic alliances Contract view, trust, commitment Partnership performances Relationship marketing **Best practices** JIT, MRP, MRPII Continuous improvement Tiered supplier partnerships Supplier associations (kyoryoku kai) Leverage learning network Quick response, time compression Process mapping, waste removal Physically efficient vs. market oriented supply chains **Organisational behaviour** Communication Human resources management Employees' relationships Organisational structure Power in relationships Organisational culture Organisational learning Technology transfer Knowledge transfer

Figure 2.3. Content Overview of SCM Literature (Source: Croom et al., 2000, p.70)

Several further models have been proposed for understanding the activities required to manage material and information movements across organizational and functional boundaries. Cooper et al. (1997), for example, aim to integrate different views of SCM related issues and thereby define the domain of SCM. Their framework (Figure 2.4) distinguishes between business processes (the activities that produce a specific output of value to the customer), management components (the components by which the business processes are structured and managed) and supply chain structure (the configuration of companies within the supply chain). It highlights the fact that supply chain management transcends firms, functions and business processes and calls for a level of integration of business operations in the supply chain that goes beyond logistics.
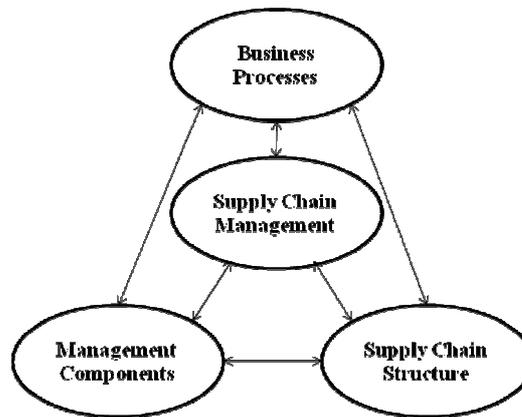
Figure 2.4. The Domain of SCM (Source: Cooper et al.,1997, p.6)

The Supply-Chain Council also proposes a supply chain operations reference model (SCOR) for benchmarking supply chain processes and designing IT solutions for supply chain management. As shown in Figure 2.5., SCOR identifies the source, make and deliver processes, integrated by a fourth process, planning. All four components are active at all links in the supply chain, as well as across them. The model was the first cross-industry framework for evaluating and improving enterprise-wide supply-chain performance and management. It allows companies to compare their processes to those of other companies and compare their own practices to demonstrated best practices. Most importantly, users of the model are able to meet management expectations for supply-chain integration efforts (Stewart, 1997).

16
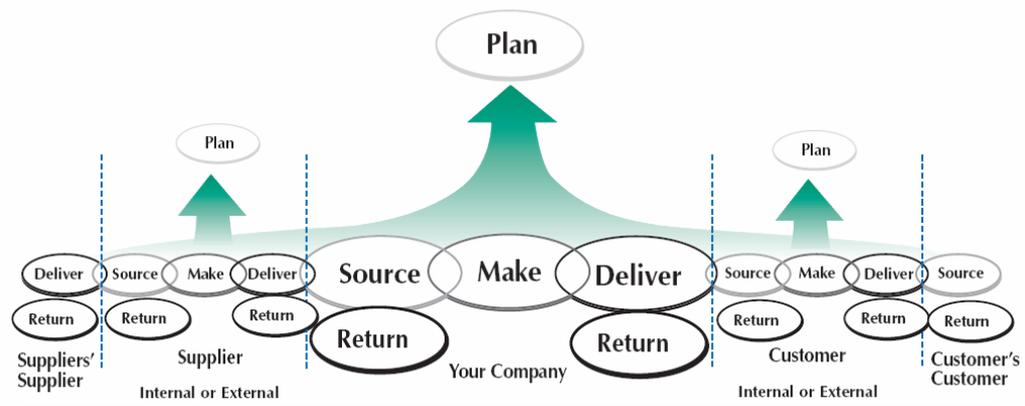
Figure 2.5. The SCOR Reference Model (Source: Supply Chain Council, 2010)

2.3. Responding to Changes in Today's Competitive Environment

The above sections highlight the breath of the field of supply chain management, as its emergence represents a shift away from organisations viewing themselves as entities that exist independently from others and indeed need to compete with them to survive (Christopher, 1998a). At the same time, changes in the external environment of companies operating in today's markets are increasingly shifting the focus from managing internal operations to integrating processes across companies' borders. These will be further explained in the following sections.

2.3.1. Outsourcing

The importance of the field of supply chain management has been increasing as companies continuously focus on their core competence while outsourcing peripheral activities to specialists. Outsourcing, defined as '*turning over to a supplier those activities outside the organisation's chosen core competencies*' (Sharpe, 1997, p.535), has seen a clear increase in the last few decades (Christopher, 1992; Rao and Young, 1994; Lamming, 1993; Earl, 1996; McFarlan and Nolan, 1995). This has mainly happened due to global competitive pressures that positioned large companies to adopt greater market discipline, reducing their product range and loosening their vertical links in the production process (Grant, 1995; Domberger, 1998). The search for greater

17

efficiency, in turn, has led to increased specialisation and, as such, outsourcing is seen by certain writers as a manifestation of this trend (Domberger, 1998).

One of the particularly popular functions for outsourcing, with specialist service providers taking over part, or all, of the material movement and storage, is logistics (Walters, 2007). The use of third-party logistics (3PL) has the usual benefits of lower fixed costs, expert services, combined work to give economies of scale, flexible capacity, lower exposure to risk, increased geographical coverage and guaranteed service levels (Walters, 2007).

Kakabadse and Kakabadse (2000) summarise further achieved benefits of outsourcing that have been reported in the literature, such as shared risk and benefits (Henderson, 1990; Willcocks and Fitzgerald, 1994; Quinn, 1999), the reduction of transit times and transportation costs (Aichlmayr, 2001), greater capacity for flexibility, especially in the purchase of rapidly developing new technologies, fashion goods, or the myriad components of complex systems (Carlson, 1989; Harrison, 1994), decrease the product/process design cycle time and increased quality (Quinn and Hilmer, 1994). Perhaps the greatest advantage of outsourcing is the full utilisation of external suppliers' investments, innovations and specialised professional capabilities that otherwise would have been the case, which for any one organisation would be prohibitively expansive to replicate (Kakabadse and Kakabadse, 2000). As such, outsourcing decisions seem to go beyond considerations of scale and costs and should be integral to an organisation's overall strategy formulation process (Quinn and Hilmer, 1994; Venkatraman, 1997; DiRomualdo and Gurbaxani, 1998; Domberger, 1998; Quinn, 1999).

There have also been many examples of unanticipated and unwanted outsourcing outcomes, such as the creation of additional competitors. For example, Ford, after outsourcing some gasoline engines to the Dodge brothers (founders of what became a division of Chrysler), was in head to head competition with them in 1914 following their forward integration to produce entire automobiles (Welch and Ranganath Nayak, 1992). It is no wonder that incumbent firms can be nervous that outsourcing can potentially lead to lost

18

capabilities, new competitors and limits on their ability to trade (Mills et al., 2004). However, as outlined in the early paragraphs of this section, there remain powerful arguments for outsourcing.

Following the extended use of outsourcing, a key focus for supply chain management is to structure the supply base and then integrate and coordinate the flow of materials and information between supply chain actors. This includes a company's supplier selection and supplier development policy and processes, and the whole area of buyer supplier relationships. Mills et al. (2004) note that this area accounts for one of the largest bodies of research within the supply chain management literature. Researchers here focus on supplier selection (e.g. Kraljic, 1983; Ellram, 1990; Wilson, 1994), supplier relations (e.g. Ellram and Carr, 1994), supplier development (e.g. Trent and Monczka, 1998) and performance of the supply base (e.g. Ellram, 1995). Furthermore, purchasing research has stressed a total cost view looking beyond the price of a purchase to include many other purchase related costs (e.g. Mills, 1998), fitting well with the supply chain management paradigm.

2.3.2. Supply Chain Relationships

Furthermore, the introduction of the just-in-time (JIT) production and purchasing concept has led to a new way of looking at the buyer-supplier relationship (Watts et al., 1992). The proposition is that buyer-supplier relationship should be based largely on a co-operative partnership rather than on an independent adversarial relationship. The reason behind this is the fact that by using a traditional adversarial approach, the buyer assumes that there are no differences in suppliers' abilities to provide value-added services, technology gains, process innovations and other methods of gaining competitive advantage and therefore it does not make direct use of the total resources of the supplier and does little to engender long-term coordination or cooperation between the buyer and supplier (Cooper et al., 1997). Hence, many organisations are increasingly developing strategic partnerships with their suppliers and customers in an effort to reduce waste in their procurement and order fulfilment processes (Porter, 1985).

19

The emergence of partnership or alliance arrangements as alternatives to the formerly more popular transaction based contracts (usually shorter and more tightly defined) indicates a shift to closer interactions between client and provider (Elfing and Baven, 1994; Bensaou, 1999). Whilst partnership arrangements vary considerably in their operations, from flexibly defined, formal contacts, to loose strategic initiatives, they also encompass the provision of shared risk and benefits (Henderson, 1990; Willcocks and Fitzgerald, 1994; Quinn, 1999). The type of emerging relationship between purchaser and supplier depends on the nature of the purchase capabilities required, the nature of the product exchange and its technology, the competitive conditions in the upstream market and the capabilities of the suppliers available to meet the purchaser's needs (Bensaou, 1999). Furthermore, the quality of the relationship will also depend on the quality of information sharing, the attitudes and dispositions of the 'boundary spinners', and the social climate within which relationships are pursued (Bensaou, 1999).

Most researchers agree that the relationship between members in the supply chain is a crucial factor in any attempt to exploit the full potential of a holistic approach to supply chain management. Long-term, co-operative and trusting relationships between buyers and suppliers are often recommended (Dwyer et al., 1987; Lambert and Knemeyer, 2004; Fynes et al., 2005). Especially powerful companies, such as retailers and car manufacturers, see great opportunities from suppliers that are willing to engage in continuous improvement programmes and in long-term mutual commitment (Mills, 2004). On the other hand, authors also refer to the potential risks of such policies (Krause and Ellram, 1997; Handfield et al., 2000). First, heavy reliance on one partner can be disastrous if the partner does not meet expectations (MacBeth and Ferguson, 1994). Also, Maloni and Benton (1997) highlight that firms risk decreased competitiveness due to loss of partnership control, complacency (Kalwani and Narayandas, 1995), and over-specialisation with an affirmed partner. Leavy (1994) further cautions that firms may overestimate partnership benefits while ignoring potential shortcoming and suggest a need for more research examining direct comparisons of the conventional and partnership

strategies. Finally, Newman (1989) notes that partnerships may actually open the weaker party up to influence potential and suggests that competition may in some cases abate power.

As such, Cox (1999) argues that in understanding how to manage supply chains strategically and operationally it is essential that practitioners properly understand the power structures that govern relationships in their supply chains. Otherwise, both practitioners and academics may well be guilty of recommending strategies and operational practices that are inappropriate for the supply chains in which they operate.

2.3.3. Concentration of Ownership

Due to the fact that large companies can get economies of scale and achieve more efficiency in their operations, recent years have seen fewer, larger companies often dominating industries (for example supermarket chains). Continuing benefits mean that these large companies tend to grow at the expense of the smaller rivals (Walters, 2007). At the same time, the transport sector has seen the emergence of forth party logistics providers (4PLs) as the answer to the increasingly complicated administration of several 3PL contracts with which most companies were confronted with. Fourth-party logistics (4PL) has emerged as the ideal solution that allows companies around the globe and from a diverse range of industries to have a single point of accountability across both supply and demand chains (Win, 2008). The result is a continuing concentration of ownership, with the largest organisations setting standards that others strive to match.

2.3.4. Mass Customisation and the Emergence of Demand Chains

Today's customers are looking for more choice, lower prices, shorter lead-times, accurate fulfilment, better value and a generally better experience (Walters, 2007). This should put the customer at the centre of all activities performed along the supply chain. This view is reflected in The Chartered Institute of Logistics and Transport (1998) definition of a supply chain as 'a sequence of events intended to *satisfy the customer*'.

21

As such, supply chain management is now associated with a move away from operations based on mass marketing and mass production towards mass customisation, which aims at combining the efficiency of mass approaches with the flexibility of customised products (Spring and Dalrymple, 2000). Ultimately, mass customisation refers to the ability to personalise products to meet individual customer demands (Brown and Bessant, 2004).

More demanding customers and the globalisation of both markets and production has led to companies nowadays facing a highly volatile and uncertain environment. In this environment, the ability to react to environmental uncertainty is key for competitiveness (Holweg, 2005). Long lead times and high levels of stock have higher and higher risks associated with and, as a result, producing just-in-time to customer specifications has become the key to succeeding in the market place. Efficient supply chains often become uncompetitive because they do not adapt to changes in the structures of markets (Lee, 2004). The problems that Marks and Spencer, and to a degree Sainsbury, experienced during the 1990s were not because they mismanaged the operational effectiveness of the business, but rather because they missed the shift in customer expectations and did not appear to respond to those expectations (Walters, 2006).

As a result, before focusing on the efficiency of the supply chain, identifying and understanding the nature of demand is paramount. This would mean moving away from the traditional 'push', make-to-stock approach to resource allocation, in which the production is not based on actual demand but forecasts, towards a demand driven, make-to-order, pull system (Childerhouse and Towill, 2000), which puts customer value at the centre of all supply chain activities:

> *'Demand chain analysis and management puts emphasis on the needs of the marketplace and identifies the roles and tasks to be designed in the supply chain to satisfy these needs, instead of starting with the supplier/manufacturer and working forward' (Vollmann and Cordon, 1998, p.684).*

22

Implementing demand chain management and mass customisation will require direct communications between the final customer and a manufacturer, and chains that can move materials reliably and quickly (Walters, 2007). As a result, close cooperation between the actors in the supply chain becomes essential and this can only be achieved through increased transparency in the supply chain to the effect that distorted information from one end of a supply chain to the other can be eliminated (Lee et al., 1997a).

2.3.5. Integrated Supply Chains

Many of the theoretical arguments for closely integrating operations between suppliers and customers come from the process reengineering literature (Burgess, 1998). Typically, the goal is to create and coordinate processes seamlessly across the supply chain in a manner that most competitors cannot very easily match (Lummus et al., 1998). The opportunity to use process integration across functional boundaries is now considered a key to competitive success (Birou et al., 1998). It is a recognition that all organisations along a particular supply chain share the same objective, which is to satisfy the final customer, and they should collaborate to achieve this aim (Walters, 2007). This is further highlighted by Christopher (1999), who argues that most opportunities for cost reduction and / or value enhancement lie at the interface between supply chain partners. The performance of supply chains, especially in fast-moving environments, depends on how well all members work together and not on how well each member performs separately.

As a result, the main concern of supply chain management should be how to coordinate independent players to work together as a whole in order to pursue the common goal of chain profitability in changing market conditions (Cooper et al., 1997). Close cooperation in terms of organising, planning and monitoring will lead to less duplication of effort along the supply chain, elimination of activities that add no value for customers, replenishment and movement triggered by actual demand as opposed to long term forecasts and easier planning (Bowersox and Closs, 1996; Samaddar et al., 2005). This will make

possible the removal of superfluous stocks, reduce lead-time, reduce uncertainty and achieve better capacity utilisation (Tage, 2000), as well as lower unit cost and enhance quality and delivery performance in the long term (Sharp et al., 1999).

Most authors agree that the integrated supply chain will require increased sharing of information in the supply chain, from raw materials to on-time delivery of finished products to customers (Sabath, 1995). As an example of what can go wrong in the absence of shared information and joint planning, demand variations can amplify from one company to the next up the chain, leading to the effect known as the 'bullwhip effect', which clearly represents an inefficiency in the supply chain (Lee et al., 1997b).

Recent technological advances have ensured that improved communications are the means by which organisations can exchange information. Bar codes, magnetic stripes and radio frequency identification (RFID), monitored vehicles through telematics, controlled warehouses through automatically guided vehicles, vendor managed inventory (VMI), collaborative planning, forecasting and replenishment (CPFR), synchronised material movement through the whole supply chain, payments through electronic fund transfer (FT) (Birtwistle et al., 2003; Walters, 2007) are just a few of the tools that companies now have available in order to integrate activities along the supply chain.

By increasing demand visibility and integrating processes across companies' borders, demand uncertainty will be reduced and a consistent supply and demand plan could be developed, from the final consumer to the raw material supplier (Christopher and Lee, 2004). In other words, by taking a holistic view of the process from the start to finish, a supply chain planner can devise a complete scenario for the movement through the chain of a specific product, which includes where the raw materials for the product will come from, what their path through the manufacturing cycle will be, and how they will be warehoused and distributed. This kind of planning could take place between the various functional groups (sales/marketing, manufacturing, distribution) of a vertically integrated enterprise, or between several independent companies in

the distribution channel (raw material suppliers, manufacturers, third-party logistics services) (Moncza and Morgan, 1997).

However, integrating activities across all players in the supply chain is a mammoth, if not impossible task. As a result, Dyer et al. (1998) suggests that firms should think more strategically about supplier management and perhaps should not have a one-size-fits-all strategy for managing their supply base. Instead, each supplier should be analysed strategically to determine the extent to which the supplier's product contributes to the core competence and competitive advantage of the purchasing firm. Due to the fact that resources are limited, to optimize supply chain effectiveness, the author argues that executives should strategically segment their suppliers into strategic partners and durable arm's-length suppliers in order to allocate different levels of resources to each group. A company's ability to strategically segment suppliers in such a way as to realise the benefits of both the arms-length as well as the close partner and strategic alliance models provides the key to future competitive advantage in supply chain management (Dyer et al., 1998). High levels of integration are not required with all partners along the supply chain.

A further issue arising from integrating supply chains is the fact that if only the dominant partner drives supply chain optimisation decisions, this can create an asymmetrical distribution of information, inventory and, ultimately, bargaining power between the partners (Iacovou et al., 1995). Thus, in order to optimise the entire supply network and not just create local optima in one or two partners, the organisations must jointly make supply and demand decisions that create sustainable value for all involved.

However, Poirier and Quinn (2003) point out that achieving an efficient customer response through process integration across organisational barriers is more talk than action in practice. At the time of their study they found that most organisations were still working on internal integration and only 10% of the companies surveyed have made significant progress towards external integration. A variety of reasons are quoted in the literature for the lack of application of this principle in practice, from an unwillingness to share

25

information to a lack of appropriate technology. The reality is that most organisations are currently missing the opportunity to both raise customer service and to lower costs.

2.3.6. Complex Supply Networks

One of the great barriers to integrating processes along the whole supply chains is the high level of complexity they currently exhibit (Fawcett et al., 2008). In practice, there are complex relationships between organisations, and for most organisations their supply chain looks less like a pipeline or chain than an uprooted tree, where the branches and roots are the extensive network of customers and suppliers with which they interact (van der Zee and van der Vorst, 2005). It is very rare that one company is part of a single supply chain, and, as a result, Lamming et al. (2000) defined supply networks as sets of supply chains, describing the flow of goods and services from original sources to end customers.

To mirror the development of academic work in this area over time, Harland (1996) provided a four-level framework for the evolution of supply chain management, from level 1 in the 1960s to level 4, in the early 1990s (Figure 2.6.).
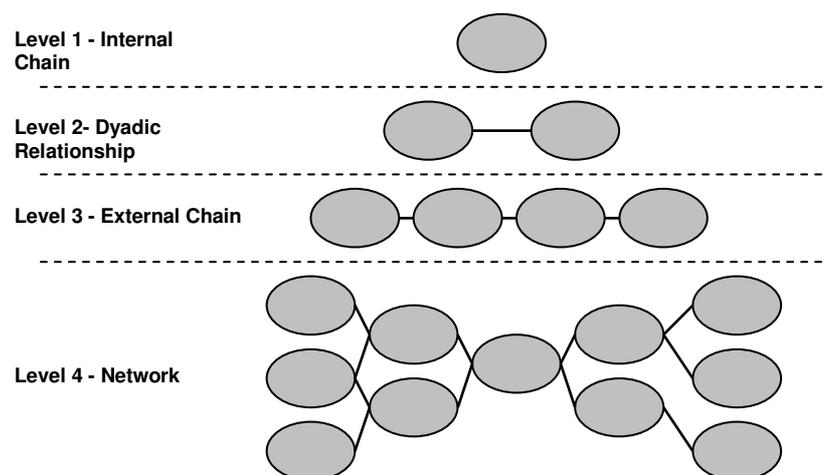
Figure 2.6. Four Level Framework for SCM (Source: Harland, 1996, p.72)

At Level 4, supply networks are characterised by sets of purposeful and connected exchange relationships, which may change over time as specific actors are involved, deactivated, or reactivated in the performance of production tasks (Andersen and Christensen, 2005). The relatively recent incorporation of the term 'network' into supply chain management research represents an attempt to make the concept wider and more strategic by harnessing the resource potential of the network in a more effective manner (Lamming, 2000).

Coordination and accurate timely transfer of information becomes particularly problematic when considering supply networks (Danese et al., 2004), due to their structural and relational complexity. Choi and Hong (2002) identified three different forms of structural complexity in supply networks: vertical, horizontal and spatial. Vertical complexity refers to the number of levels in the whole system (i.e. the number of tiers), horizontal complexity refers to the number of different entities in the same level of the supply network (e.g. number of suppliers in each tier) and spatial complexity refers to the average distance between operating locations. Thus, managing business processes along supply networks is a very complex task that requires managers to properly activate coordination mechanisms to adapt, align and synchronize activities carried out by the different and interdependent members of the network (Danese et al., 2004).

For these reasons, further studies have argued that the more complex the supply network, the less adaptable it becomes, and argue that network complexity is counter to improving responsiveness and other aspects of supply performance (Milgate, 2001; Prater et al., 2001). As a result, if a business process can be simplified, it will usually enhance overall performance, leading to more consistent quality, lower operational costs and inherently greater responsiveness through supply chain integration and synchronisation. This powerful combination will most certainly yield more satisfied customers (Hoole, 2005). Some authors have advocated a range of approaches to solving this issue, for example focusing on reducing supply complexity (Hoole 2005), trying to manage it better (Meijboom, 1999), or simply trying to avoid it altogether (Christopher, 2004).

27

But in uncertain environments that require a higher rate of new product introduction and a wider product range, organisations have little option than to develop complex, differentiated networks in an effort to increase their responsiveness. This will lead to supply chain actors striving to limit interdependence and retain the ability to easily switch partners, allowing for greater organizational flexibility. This flexibility will result in a more intensive capacity utilization resulted from industry-wide sharing (Chung et al., 2004). Unfortunately, measures taken to increase responsiveness often lead to increases in complexity, which works against agility (Prater et al., 2001). Large multinational firms have argued that they are 'hostage to complexity' (Davis, 1993). These statements support the model that a network's structure and management processes must grow increasingly complex to respond to a complex environment (Prater et al., 2001), a fact argued in traditional organisational theory as early as Ashby (1956).

Additionally, the internationalisation of supply chain activities involving different national business contexts adds considerable complexity to the coordination tasks performed by suppliers (Fletcher and Nigel, 2001; Kinder, 2003) and this will be discussed further in the following section.

2.3.7. Globalisation

The increase in outsourcing activities and opening up of global markets has contributed to supply networks becoming more globalised (Harland et al., 2003). This is mainly attributed to trans-national mobility of capital, information, people, products and services, leading to 'global entanglements' (Fombrun and Wally, 1992). Strategic intent, global brands, economies of scale and scope, management of the value chain, comparative advantage, market access, the growth of free trade and improved communication through facilitating information technologies, most recently e-business, improved logistics services, convergence of market demands have all been cited by various authors as further contributory reasons for globalisation (Harland, 1995; Walters, 2007).

Meixell and Gargeya (2005) highlight that international sourcing has been mainly sought out by managers because of reduced cost, increased revenues and improved reliability. Manufacturers typically set up foreign factories to benefit from tariff and trade concessions, low cost direct labour, capital subsidies and reduced logistics costs in foreign markets (Ferdows, 1997). Further benefits are achieved due to access to overseas markets, organizational learning though close proximity to customers, and improved reliability because of close proximity to suppliers (MacCormack et al., 1994).

However, experts maintain that global supply chains are more difficult to manage than domestic supply chains (Dornier et al., 1998; Wood et al., 2002; MacCarthy and Atthirawong, 2003). Substantial geographical distances in these global situations not only increase transportation costs, but complicate decisions because of inventory cost tradeoffs due to increased lead-time in the supply chain. Different local cultures, languages, and practices diminish the effectiveness of business processes such as demand forecasting and material planning. Similarly, infrastructural deficiencies in developing countries in transportation and telecommunications, as well as inadequate worker skills, supplier availability, supplier quality, equipment and technology provide challenges normally not experienced in developed countries. These difficulties inhibit the degree to which a global supply chain provides a competitive advantage. Furthermore, global supply chains carry unique risks that influence performance, including variability and uncertainty in currency exchange rates, economic and political instability, and changes in the regulatory environment (Dornier et al., 1998). Currency exchange rates affect the price paid for goods that are purchased in the supplier's currency and so influence the timing and volume of purchases, as well as the financial performance of the supply chain (Carter and Vickery, 1988).

Accordingly, practitioners are well advised to factor these risks into their decisions when designing global supply chains. Handfield and Nichols (2004) note that many buying organizations appear to be operating under the belief that by merely expanding the scope of their current practices, processes, and associated information systems to the far corners of the globe, they will be able

29

to establish and manage a productive global supply base. Some of these organizations are attempting to accomplish this task with limited face to face contact with their suppliers and find that mere information sharing is insufficient for a successful alliance (Myers and Cheung, 2008; Premus and Sanders, 2008). These organizations should recognize that practices and processes that work in their local environment may not be at all appropriate in other parts of the world. They should also recognize that while information systems are truly a key enabling factor that allows supply chains to be managed, they are not sufficient in themselves to guarantee a capable global supply base (Cousins and Lawson, 2008). Furthermore, despite the impressions that some information systems suppliers attempt to convey, an organization's global supply base cannot be managed by 'automatic pilot' regardless of the technology that is applied (Handfield and Nichols, 2004).

As such, in essence, the key for competitive advantage is compressed lead times, synchronised material flows, transparent and instantaneous information flows and simple and robust decision support systems. But to be successful in the marketplace, all these will need to be utilised via a common supply chain strategy (Childerhouse and Towill, 2000). However, as previously noted by Anderson and Christiansen (2005), despite the growing awareness of the internationalisation and management of supply networks, little is known about the dynamics of such networks and how it affects the position and roles of individual suppliers, especially in a global environment. These issues will be further explored in the following chapter.

2.4. Summary

In this chapter, the concept of supply chain management was introduced, with a brief review of its origins and subsequent development, as well as the pressures with which nowadays supply chains are confronted. As new competitive pressures are demanding greater efficiency and higher levels of responsiveness, integration of business processes across company borders is becoming more imperative. This requires greater openness and closer relationships between supply chain members. However, the increasing level of

globalisation, higher levels of demand uncertainty and increased complexity of supply networks make the integration of supply chains increasingly difficult.

These aspects illustrate that the concept of supply chain management is based on several key tenets. The key principle is that all strategy, decisions and measurements should be made considering their effect on the entire supply chain, not just separate functions or organisations. A broader approach is based on partnerships and the sharing of information between the links in the chain (Helms et al., 2000). Finally, the increased requirements for mass customisation have led to the development of demand-driven, agile supply chains, and this advancement will be investigated into more depth in the following chapter.

Chapter 3 A Framework for Managing Agile Supply Networks

This chapter illustrates that one way in which the extreme environment instability that appears to be characterising the new millennium can be mitigated against is through the use of an appropriate supply network strategy. The lean, agile and leagile strategies are reviewed, as well as the role of different types of flexibility in distinguishing between them. Ultimately, the agile supply chain strategy is identified as offering the highest levels of market responsiveness in highly volatile environments, and a framework for agile supply chain management practices is presented.

3.1. Supply Chain Strategies

The principle that an organisation can only succeed by doing key activities better than competitors or by doing completely different activities than competitors can be traced back to Selznick (1957). The same principle can be found in Porter's (1996) theory that companies have to choose to perform activities differently or to perform different activities than competitors. This is in line with the earlier distinction that Porter (1985) made between the strategy of cost leadership (offering the same, or comparable products or services at a lower price) and that of product/service differentiation (offering products / services that customers cannot find elsewhere).

Fisher (1997) uses these principles to distinguish between physically efficient supply chains (able to respond to predictable demand efficiently at the lowest possible cost) and market responsive supply chains (able to respond quickly to unpredictable demand in order to minimise stock-outs, forced markdowns and obsolete inventory). Fisher (1997) further highlights the importance of considering the nature of the demand for a company's product before devising an adequate supply chain strategy: physically efficient supply chains should focus on the delivery of functional (commodity) products, as they have stable, predictable demand and long life cycles, while market responsive supply chains

32

should focus on the delivery of innovative (fashion) items, as their demand is unpredictable and their life cycles much shorter.

In the operations and supply chain management literature these two generic strategies are commonly phrased as 'lean' and 'agile'. The origins of lean philosophy can be traced to the Toyota Production System. Essentially, a lean strategy aims for the lowest possible cost with efficient flows of materials that eliminate waste, minimise stocks, reduce lead times, use fewer resources, employ fewer people, remove duplicated effort and so on (Bicheno, 2004; Walters, 2007). Although this may seam a sensible approach, leanness can put too much emphasis on cost, takes a 'product push' approach and does not have the flexibility to deal with the rapidly changing conditions that characterise today's markets (van Hoek, 2000). As an alternative, the agile strategy emphasises the importance of the customer and focuses on maintaining a good level of productivity under pressure of uncertainty (Helo, 2004) – mainly caused by increasing competition, more sophisticated customers, changing customer requirements, variable demand, unforeseen conditions, natural disasters, etc. (Walters, 2007). At its simplest, the lean paradigm is most powerful when the winning criterion is cost; however, when service and customer value enhancement are prime requirements for market winning then the likelihood is that agility will become the critical dimension (Christopher and Towill, 2001).

To further distinguish between the two strategies, based upon the existing literature at the time on lean thinking, agile manufacturing and supply chain management and pertinent case material, in their paper 'Leagility: Integrating the Lean and Agile Manufacturing Paradigms in the Total Supply Chain', Naylor et al. (1999) develop the framework illustrated in Figure 3.1., which presents some of the key characteristics of the agile and lean paradigms. The table indicates the prerequisite characteristics of the lean and agile paradigms, which have been classified as essential, desirable and arbitrary for a given paradigm to be successfully implemented. To highlight the role of flexibility in the context of both supply chain strategies, it should be noted that agile manufacturing calls for a high level of rapid reconfiguration and will eliminate as much waste as possible but does not emphasise the elimination of all waste as a prerequisite.

33

Lean manufacturing states that all non-value adding activities, or muda, must be eliminated. The supply chain will be as flexible as possible but flexibility is not a prerequisite to be lean (Naylor et al., 1999).

While the 'muda' and 'reconfiguration' characteristics are similar for both paradigms, the issue of flexibility then leads to the differentiation highlighted by the latter two characteristics, namely 'robustness' and 'smoothing demand'. Agile supply chains must be flexible, and hence robust, to changes or disturbances and will in fact exploit this capability to achieve competitive advantage. In contrast, lean systems aim to minimise internal and external variation as much as possible (Naylor et al., 1999).

Keyword	Lean	Agile
Use of market knowledge	○○●	○○●
Virtual Corporation / Value Stream / Integrated Supply Chain	○○●	○○●
Lead Time Compression	○○●	○○●
Eliminate Muda (Waste)	○○●	○●
Rapid Reconfiguration	○●	○○●
Robustness	●	○○●
Smooth Demand / Level Scheduling	○○●	●

○○● = Essential, ○● = Desirable, ● = Arbitrary

Figure 3.1. Rating the Importance of Different Characteristics of Leanness and Agility (Source: Naylor et al., 1999, p.109)

The issue of flexibility is further highlighted in Figure 3.2, which shows the two dimensions of product variety and production variability, linking to the concepts of mix flexibility (ability to cope with demand for product variety) and volume flexibility (ability to cope with demand for variability in production output levels) respectively (see, for example, Slack, 1987). While the figure has four quadrants, Naylor et al. (1999) highlight that the shading is a more important consideration. The darker areas on Figure 3.2. tend towards leanness and the lighter areas to agility. The dominant factor is whether there is a need for volume flexibility, hence where there is clear differentiation between agility and leanness. In contrast, as can be seen from the degree of shading in the y-axis,

34

lean systems may cope with a fairly high degree of mix flexibility, allowing for variability in product variety.
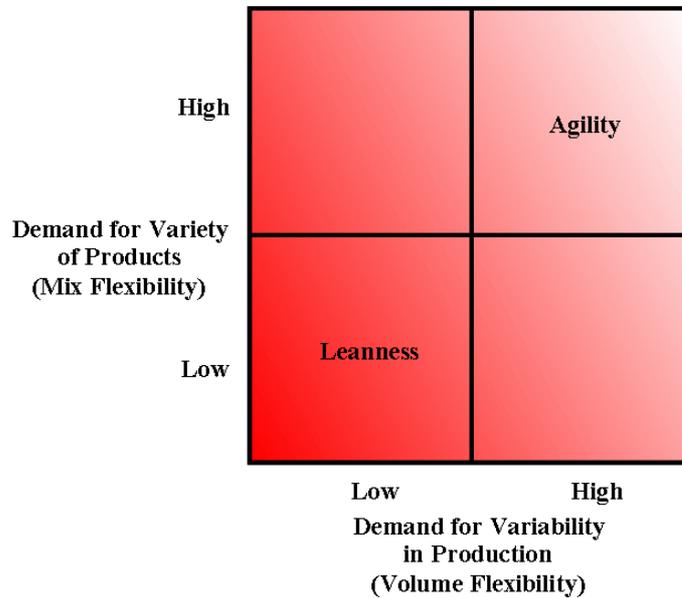
Figure 3.2. Flexibility in Satisfying Demand for Variety of Products and Variability in Demand (Adapted from Naylor et al., 1999, p.112).

At first sight it may seem difficult to reconcile the aims of lean and agile strategies. One minimises costs, and sees customer service as a constraint; the other maximises customer service, and sees cost as a constraint (Walters, 2007). Naylor et al. (1999) highlighted how the best of both worlds could be achieved by the prudent integration of the two concepts in order to develop what they ultimately decided to call 'leagility'. Using Hewlett Packard as an example, the concepts of decoupling and postponement were utilised as means through which the two different strategies could be combined.

    - *De-coupling* advocates the idea of holding inventory in some generic or modular form and only completing the final assembly or configuration when the precise customer requirement is known (van Hoek, 1998; Christopher and Towill, 2001).

    - By applying the concept of *postponement*, companies may utilise lean methods up to the de-coupling point and agile methods beyond it. A parallel concept to the 'material' de-coupling point described above is that of the "information" de-coupling point (Mason-Jones and Towill, 1999). This

35

represents the furthest point upstream to which information on 'real' demand flows, i.e. information which has not been distorted by inventory policies such as re-order points and re-order quantities (van Hoek, 1998; Christopher and Towill, 2001).

As such, the processes upstream of the decoupling point may be characterised as lean and those downstream as agile. Thus, leagility enables cost effectiveness of the upstream chain and high levels of service in a volatile marketplace in the downstream chain.

Some further suggested methods by which lean and agile paradigms could be combined to provide affordable products within requisite time frames are presented in Figure 3.3.

Hybrid Strategies	Appropriate market conditions and operating environment
Pareto 80:20 Using lean methods for the volume lines, agile methods for the slow movers	High levels of variety; demand is non-proportionate across the range
De-coupling Point The aim is to be lean up to the de-coupling point and agile beyond it	Possibility of modular production or intermediate inventory; delayed final configuration or distribution
Surge / Base Demand Separation Managing the forecastable element of demand using lean principles; using agile principles for the less predictable element	Where base level of demand can confidently be predicted from past experience and where local manufacturing, small batch capacity is available
Fractal Manufacturing Partnerships Allows the selected suppliers to perform design, manufacture and assembly operations in close proximity to the OEM	Where the cost of logistics is a major component of total cost and markets are volatile, these partnerships would minimise inventory levels for required service levels.

Figure 3.3 Practical Approaches to a Leagile Supply Chain
(Source: Faisal et al., 2006, p.885)

Other authors have further suggested the possibility of implementing, within a single company, a portfolio of supply chain strategies (Christopher and Towill, 2002), depending on the features of different business segments in which the company operates.

3.2. Agile Supply Chain Management

Due to the increasing rate of change in the market and ever-shorter product life cycles, companies are now faced with increased difficulties in predicting future demand (Ballou, 1998). As a result, there is an increasing recognition that agility allows for an effective response to a constantly changing and highly competitive business environment and has become a necessary condition for competitiveness (Hibelar et al., 1998). This is reflected in the Agility Forum's definition of agility as *'the ability of an organisation to thrive in a continuously changing, unpredictable business environment. Simply put, an agile firm has designed its organisation, processes and products such that it can respond to changes in a useful time frame'* (Agility Forum, 1994).

The original concept was popularised in 1991 by a group of scholars at the Iaccoca Institute of Lehigh University in USA and it is gaining currency among practitioners and academics alike. It is now widely accepted as a strategy that enables enterprises to match supply more closely with demand. By focusing on the output, Gehani (1995) asserted that an agile organisation can quickly satisfy customer orders, can introduce new products frequently in a timely manner and can even get in and out of its strategic alliances speedily. It implies a system that shifts quickly (speed and responsiveness) among product models or between product lines (flexibility), ideally in real-time response to customer demand (customer needs and wants) (Yusuf et al., 1999).

The external requirements for supply chains to become more responsive, and adopt an agile strategy, have been summarised by Reichardt and Holweg (2007) as:

- Demand uncertainty – It is the main requirement for being responsive. For example 100% reliable demand would considerably reduce the need for responsiveness An important component here is schedule instability, which is particularly important for industries operating under rolling schedules.

- Demand variability – It is often closely linked to demand uncertainty, yet conceptually different. In this situation, even if demand was 100% reliable, large volume swings in demand could still require responsiveness.

- Product variety - Product variety further increases demand uncertainty and it can directly increase the need for mix responsiveness. High product variety increases the cost of using finished good inventories to fill orders.

- Lead-time compression – It directly increases the need for responsiveness, as less time is available to respond to customer orders Indirectly, it increases the need for responsiveness through increased demand uncertainty (changes in P:D ratio) (Reichardt and Holweg, 2007).

3.3. External Flexibility Types

A key characteristic of an agile organisation, which distinguishes it form a lean enterprise, is the high levels of flexibility it is able to exhibit (Christopher and Towill, 2000). Indeed the origins of agility as a business concept lie in flexible manufacturing systems. As a result, agile systems must be flexible, and hence robust to changes or disturbances, as opposed to lean systems, which aim to minimize internal and external variation as much as possible, placing more rigid controls on flexibility types (Naim, 2008). In this respect, Swafford et al. (2006) characterise agility as a capability and flexibility as a competence, where capabilities are derived from lower level competencies. Flexibility tends to be used at a lower, more operational level, and agility tends to be used at a more encompassing, business wide level (Baker 2006).

Further, Upton (1994), following Slack (1987), highlights the fact that flexibility is based on internal resources that can be used to achieve different types of internal flexibility (such as machine flexibility and routing flexibility), which in turn can support the system's ability to demonstrate external flexibility to its environment. The external flexibility of a system (such as mix flexibility, volume

38

flexibility, product flexibility and delivery flexibility) will determine the actual or perceived performance of the company and, ultimately, the supply chain (Oke, 2005). In addition to these external flexibility types, Sanchez and Perez (2005) further identify 'access flexibility' as the ability to provide extensive distribution coverage, facilitated by adequate coordination of internal and external downstream activities in the supply chain (see Figure 3.4.).

According to Oke (2005), the former (internal flexibility) may be seen as causal to the latter (external flexibility), which may be seen as outcomes. It should also be noted that a combination of the internal types might be to yield one or more of the external types (Naim et al., 2006).

Distinguishing between external and internal flexibility types is important, as external flexibility types are generic and define the performance of either a whole supply chain or any sub-system such as manufacturing or transport. On the other side, for the purpose of this thesis, the internal flexibility types will have to be either adapted or totally re-defined to reflect the fact that the unit of analysis in this thesis is the entire supply network. As such, the above categorisation into internal and external flexibility types is important because further in the chapter analogues with supply chain flexibility and agility will be drawn and there is a need to differentiate between internal flexibility attributes and external competitive performance.

External Flexibility Types	Definitions
New product flexibility	The range of, and ability to accommodate the production of new products
Volume flexibility	The range of, and ability to accommodate changes in production output
Mix flexibility	The range and ability to change the products currently Being produced
Delivery flexibility	The range of and ability to change delivery dates
Access flexibility	The range and ability to provide extensive distribution coverage

Figure 3.4. External Flexibility Types (Source: Naim et al., 2006, p.299)

In relation to external flexibility types, a contingency based approach to supply chain management is finding common currency in much of the literature that attempts to consolidate perceived and real differences between lean and agile systems (see for example Naylor et al., 1999; Christopher and Towill, 2002). Based on this work it can be concluded that responsive, or agile, supply chains, when compared to functional, or lean, supply chains, require a far greater degree of new product flexibility, volume flexibility, slightly more mix flexibility but the same degree of access and delivery flexibility. As such, what clearly distinguishes lean and agile strategies, as highlighted in the first part of the chapter, is volume flexibility, with new product and mix flexibility coming close second and third (see Figure 3.5.).
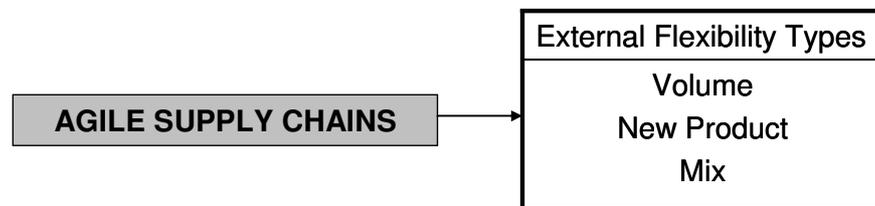
Figure 3.5. External Flexibility Types for Agile Systems (Source: Author)

Christopher and Lee (2001) consider that another key to agility is speed. If flows through the pipeline can be accelerated then the volatile, unpredictable demand can be met more precisely. Shorter lead times will allow supply chains to operate with less inventory along the pipeline, while complete information visibility along the pipeline will, in effect, substitute information for inventory and increase the speed of response. In this context, numerous authors view computer technologies as a platform for agility, as they facilitate time-compression in new product design and development (Frayret et al., 2001; Sambamurthy et al., 2003). As a result, agility implies synchronisation of activities from one end of the pipeline to the other in order to reduce speed to market.

The notion of agility is therefore recognised to be holistic rather than functional, and of strategic rather than tactical importance (Power et al., 2001). As a result, the concept has been extended beyond the traditional boundaries of the

40

individual organisation, to encompass the operations of the supply chain within which the organisation operates. This implies that effectiveness of an organisation's response to rapidly changing market conditions will be largely determined by the capabilities of its trading partners. Towill (1997) expresses this in terms of creating a seamless supply chain, where territorial boundaries between trading partners are eliminated and they effectively operate as if part of the one organization. In this sense, the development of strategies for competing on the basis of agility become key for the management of the total supply chain (Power et al., 2001).

However, the researcher's review of agile supply chain management literature found that even though previous research has addressed the general issue of organisational agility (Fliender and Vokurka, 1997; Mason-Jones and Towill, 1999; Nagel and Bhargava, 1994), the theoretical base for understanding supply chain agility is fragmented and there is little understanding of agility in terms of key practices of creating and managing responsive supply chains. Researchers are still at the stage of defining factors or determinants of agility (Giachetti et al., 2003; Li et al., 2008) and there is very limited understanding as to how agile supply chains are managed in practice. This is one of the main gaps that this thesis aims to close.

Previous authors such as Goldman et al. (1995), Lee (2004) and Swafford et al. (2006) argue that agile systems must first be able to identify changes in their external environment, often before they occur (Market Sensitivity) and then have structures and processes in place that enable rapid and fluid changes to provide customer enriching business activities (Response Capability). Both are required, and by effectively integrating these two competencies companies can achieve enhanced levels of competitiveness. While the Market Sensitivity dimension highlights agility as an opportunity-seeking capability from both external and internal vantage points, the Response Capability dimension emphasizes agility in terms of change-enabling capabilities that are embedded in organizational processes (Li et al., 2008). These two dimensions will be explored in more depth in the following sections of this chapter.

41

3.4. Internal Determinants of Agility

3.4.1. Market Sensitivity

Traditionally, the easiest way of managing supply chain risk has been through inventory, but shorter product life cycles and fast changing customer needs have made this option very risky in itself (Faisal et al., 2006). In other words, because supply chains have little direct feed-forward from the marketplace by way of data on actual customer requirements, they are forced to make forecasts based upon past sales or shipments and convert these forecasts into inventory (Gattorna et al., 2002). The breakthrough of the Efficient Customer Response (ECR) and the use of information technology to capture data on demand direct from the point-of-sale-use are now transforming the organisation's ability to hear the voice of the market and to respond directly to it (Christopher, 1998a).

As a result, the first prerequisite for an agile supply chain is to be market sensitive. That means it has to be capable of reading and responding to real demand. By capturing emerging market trends, listening to customers and monitoring real demand through daily point of sales data, the identification of potential market needs for new products, and the subsequent monitoring of market demand for these products can be achieved. The ability to respond to market signals and to develop accurate demand forecasts (and to update them based on current information) is, hence, critical in the fast moving markets (Lam and Postle, 2006).

Market sensitivity incorporates demand for individualized products and services with quicker delivery time and fast response to sudden changes in order quantity and specifications (Faisal et al., 2006). It dictates that collaborative initiatives should be driven by quick response to customer requirements (Yusuf et al., 2004) and requires that the supply chain is capable of reading and responding to real customer demands (Christopher and Towill, 2000).

The key components that have been identified in the literature as impacting on customer sensitivity in a supply chain are:

42

- responding to real demand (van-Hoek et al., 2001; Christopher, 2000; Yusuf et al., 2004);

- fast introduction of new products (Lin et al., 2006);

- retaining and growing customer relationships (Lin et al., 2006);

- customer-based measures (Christopher and Lee, 2004).

Numerous authors have suggested that customer segmentation is another tool available to retailers in order to enhance their market sensitivity. The concept of 'market segments' was first introduced by Smith (1956, p.5), who defines a market segment as *'a group within a market that is clearly identifiable based on certain criteria'*. The purpose of market segmentation is to identify the taxonomy of consumption patterns by dividing a market into several homogeneous sub-markets (Lin, 2002). As a result, retailers can formulate product strategies, or product positions, tailored specifically to demands of these homogenuous sub-markets (Birtwistle et al., 1998). Traditional demographic variables, such as gender, age, income and education, as well as wants and interests, can be used to explain the characteristics of the sub-markets and classify the key factors of a market segment (Lin, 2002). The main rationale behind dividing a market into several markets is so that fashion retailers can aim to understand and satisfy the specific needs of any targeted market segment (Brooksbank, 1999). Understanding consumer values gives retailers a direction on how best to satisfy their customers' needs (Chudy and Sant, 1993). This will also allow retailers to retain and grow customer relationships (Lin et al., 2006). A competitive market position and a good reputation of a company can quickly translate into market share and profit, but that distinction is often earned only through a philosophical commitment to service, backed by diligent attention to what customers want and need (Zineldin and Bredenlow, 2001). Those companies with the deepest and strongest customer relationships will stand the best chance of retaining the customer's transactions. As a result, many companies are selecting a few key market targets and concentrate on trying to serve them better than competitors (Zineldin, 2005).

Li et al. (2008) highlight that the 'market sensitivity' characteristic of agile supply chains is part of the 'alertness' dimension identified in the agility research in the

43

knowledge management and information systems management disciplines. In these two domains, 'alertness' also encompasses other facets of a supply chain's environment, aside from macro market conditions and customer tastes: regulatory factors, socio-political conditions, new candidates for inclusion in the supply chain, technological advances, competitors' moves, demographic trends (Sambamurthy et al., 2003; Holsapple and Jones, 2004). As a result, market sensitivity should be seen as key component in any agile supply chain management strategy implementation.

3.4.2. Response Capability

As well as developing high levels of sensitivity to market changes, fashion retailers' success in the market place is a function of their ability to make available products they think will be successful, monitor demand for these, and manage a flexible supply chain that allows them to adapt to any changes in demand, including quickly ramping up or discontinuing supply. Identifying the market needs is essential, but given the very short product life cycles, a supply chain able to deliver the product in a timely manner is also required. For high fashion content products, with very volatile demand and high risk of obsolescence, the risks of holding the wrong stock at the wrong time and not being able to react quickly to changes in demand could be disastrous (Christopher and Lee, 2001, Handfield and Bechtel, 2002). Thus agility in the fashion business also includes the ability to manage the supply chain in such a way as to quickly cancel production lines that do not sell to avoid markdowns (Jin, 2004).

Swafford et al.'s (2000) model of supply chain flexibility, as an enabler for managing agile supply chains, rests on the assumption that investigations of supply chains flexibility should explore the interactions among flexibilities with respect to the key supply chain functions: design, sourcing, manufacturing and logistics. As such, they propose that the agility of a supply chain is impacted by flexibility in product development, procurement, manufacturing and logistics. They further define each dimension of flexibility by range and adaptability. Along the same lines, Prater et al.'s (2001) model identifies speed and flexibility of

44

sourcing, manufacturing and delivery as key determinants of supply chain agility.

Further, in a series of case studies investigating both drivers and sources of supply chain flexibility, Tachizawa and Thomsen (2007) identified two main strategies that could be employed at supply chain level in order to increase the overall responsiveness of the supply chain:

- Improved supplier responsiveness (flexible suppliers) – At supply chain level, the focus of this strategy is on the durability of relationships. In this context, Das and Abdel-Malek (2003) identify supply chain flexibility as the 'elasticity' of the buyer-supplier relationship under changing supply conditions. Gosain et al. (2005) refer to this as 'offering flexibility', the ability of a supply chain linkage to support changes in product or service offering in response to changes in the business environment. Swafford et al. (2007) highlighted the fact that such definitions of supply chain flexibility primarily focus on the existing supply chain structure and have a narrow view of supply chain flexibility, consistent with the idea of rigid flexibility (Collins and Schmenner, 1993). Stevenson and Sprong (2007), for example, argue that the robust network view, bounded by existing relationships, provides limited scope for flexibility in the supply chain.

- Flexible sourcing – this practice involves the adoption of a larger supplier base and constantly redesigning and reconfiguring the supply chain, known as adaptability (Easton and Rothschild, 1987; Lee, 2004). An 'adaptable' supply chain is one that can adjust its own supply chain design to meet structural shifts in markets and modify supply networks to strategies, products and technologies (Lee, 2004). Gosain et al. (2005) calls this 'partnering flexibility', the ease of changing supply chain partners in response to changes in the business environment, while Mello (2001) views supply chain flexibility as the ability to restructure the system quickly and inexpensively. Hence, it is recognised as important to re-configure and re-invent the supply chain as needs change, providing a more dynamic and evolutionary means of being flexible (Stevenson and Sprong, 2007).

This distinction is in line with previous segmentations of sourcing strategies, for example 'strategic' or 'market exchange' (Bensaou, 1999) and 'strategic' or 'leverage' (Kralijic, 1983).

Drawing on the above studies, it can be concluded here that there are two approaches to agility in supply chains: it can be achieved by either managing, through close relationships, a stable network of very flexible suppliers, or by maintaining loose relationships within a network that can be reconfigured rapidly in the face of high levels of market uncertainty.

As such, the ability to meet the changing needs of customers requires changing the supply of product, including mix, volume and new products, in a timely manner. Meeting these needs in the supply chain requires the ability to select flexible suppliers, add and remove suppliers when required and identify an appropriate portfolio of relationships that match the various product, market and supplier conditions (Lummus et al., 2003). These issues are mostly related to network design and have been grouped here under the umbrella of '*Sourcing Flexibility*'. Further on, once the appropriate supply pipeline configuration has been decided upon, its responsiveness will be determined by the ability of the focal firm to integrate processes between the various actors involved in the delivery (*'Process Integration'*). As such, the author's proposition is that agile supply chain management practices can be grouped into:
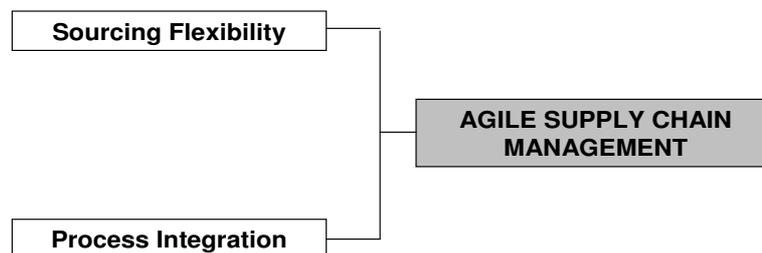
Figure 3.6. Framework for the Management of Agile Networks (Source: Author)

This grouping is consistent with previous studies such as those by Harrison (2001) and Harland et al. (2003) who classify supply chain analysis into supply chain design and supply chain operation or execution.

46

3.4.2.1 Flexible Sourcing

The author's review of the literature in the area of supply chain agility and flexibility identified that the characteristics that influence sourcing flexibility include:

- the ability to select suppliers who can add new products quickly or make volume changes quickly (*Supplier flexibility*)
- the ability to add and remove suppliers (*Reconfiguration flexibility*)
- the ability to vary supplier relationships (*Supplier relationships*)

Supplier Flexibility

Lasch and Janker (2005) suggest that a company's success is largely determined by the abilities of its suppliers. Selecting suppliers who can introduce new products quickly can add responsiveness to a supply chain. Burt and Soukup (1985) suggest that the most vulnerable aspect of product development in many companies is the failure to use the creative potential of suppliers. McGinnis and Vallopra (1999) found that supplier involvement could contribute to new product success. Fisher et al. (2000) found that for short lifecycle products, such as fashion apparel, retailers are most successful if they can work with suppliers who can provide initial shipments of product based on forecasts, but then rapidly increase production to the right style, color, size, etc. based on actual sales. They note that fast supply chains can produce products as they sell rather than worrying about accurate forecasts. These studies suggest that supplier selection based on product development capabilities and rapid deployment capabilities positively impact the delivery time of new products (Thatte, 2008).

Furthermore, Power et al. (2001) highlighted the importance of supplier selection in this environment. An organisation with key suppliers that have poor quality and delivery records will find it very difficult to provide high levels of customer service even in stable environments. Place this manufacturer in a rapidly changing environment and it may be eliminated from participation in the competitive game altogether. In this context reliability of supply becomes a

47

critical issue (Power et al., 2001). At the downstream end of the supply chain, this same manufacturer will again find it hard to operate in this environment if distribution channels are unable to respond due to physical or information flow related issues.

Reconfiguration Flexibility

The debate between rigid networks (stable, robust, narrow networks using very flexible suppliers) and rapidly reconfigurable networks (broad and involving loose relationships between the players) had received increasing attention in the last few years. Harland et al. (2004), for example, highlight that the relative merits of broad and narrow networks have been examined both in the marketing literature (Hakansson, 1982) as well as the purchasing and supply literature (Nishiguchi, 1994). Easton and Quayle (1990), for example, investigate the advantages and disadvantages between single and multiple-sourcing networks and suggested that single-sourcing networks would be more rigid but stronger, due to the dense flow of exchanges between them. There may, however, be disadvantages in a narrow network structure, such as increased risk, fewer contacts and therefore less knowledge sharing, and reduced ability to adapt to changes in the environment through switching (Easton and Quayle, 1990; Sabel et al., 1987).

As a result, a growing body of literature in the area of supply chain management considers that the responsiveness of a supply pipeline is related to the ability of the focal firm to re-configure the supply chain, altering the supply of products in line with demand (Gosain et al., 2005; Stevenson and Spring, 2007). Lee (2004) argues that agile companies do not stick to the same supply networks when markets or strategies change. Rather, they keep adapting their supply chains so they can adjust to changing needs. The main argument here is that agility requires that the supply chain should be designed with change in mind. As one member of the chain sees the need to add partners to complete a task, new partners with the required capabilities must be found (Jordan and Michel, 2000). As partners complete the tasks they were brought into the chain to provide, provisions must be made to reconfigure the supply chain and dissolve the partnerships (Duclos et al., 2003).

48

As markets continue to change, the competitive priorities of the supply partners should include a parallel shift in focus at each level of the supply chain down to the remotest level of supply (Rich and Hines, 1997). However, the core resource competencies required to realise the extended range of objectives are often difficult to mobilise and retain by individual companies (Kasarda and Rondinelli, 1998; Gunasekaran, 1999; Gunasekaran and Yusuf, 2002). Hence, it is recognised that it is important to reconfigure and re-invent the supply chain as needs change, providing a more dynamic and evolutionary means of being flexible. In this case, the flexibility of the supply chain is determined by the ability of the leading firm to redesign the supply network quickly and at low cost. This argument was also put forward in previous studies such as those of Fine (1998) and Chung et al. (2004).

However, Harland et al. (2004) noted that the focus of previous studies has been on the factors that bond companies together, such as trust and commitment, rather than opportunism and power that tend to be at the centre of industrial economic theory. De Toni and Nassimbeni (1995), for example, found that the ability of a focal firm to plan the governance structure of supply relationships was closely related to the stability and effectiveness of the supply network in which it operated. However, Kopczak and Johnson (2003) state that in sectors in which product and process technology evolves rapidly and product lives are short, with each new generation of products, the components and process technologies that are specified may change dramatically. This generally leads to significant changes in the supply base and in the structure of the supply network, as supplier-selection decisions define product locations and lead times.

These supply chains display the characteristics of complex systems in that a large number of firms operate simultaneously with many supply partners, interacting through a variety of information and material flows in an uncertain way (Beamon, 1998, 1999; Christopher, 2000; Harland, 1996; Kehoe and Boughton, 2001; Quayle, 1998; Wikner et al., 1992; Wilding, 1998). Christopher et al. (2004) state that retailers have to act these days as network

49

orchestrations, their behaviour being similar to the director of a theatre play. They will have to work with a team of actors closely for a while but that will, however, be disbanded and a new one assembled for the next play. In this respect, Da Silveira et al. (2001) note that, in the context of supply networks, external agility is associated with the idea of virtual enterprises. A virtual enterprise consists of several individual companies linked in a collaborative effort to design high-quality and customised products. Virtual organisations have the following main characteristics: product orientation, team-collaboration style, short-term relationships between individuals, speed and flexibility (Song and Nagi, 1997).

Of course, managing such a rapidly reconfigurable global supply chain incurs massive costs and adds to the complexity of the overall network. Some of these costs are related to the quality and delivery variables, high initial training costs, credit control, long lead time incurring large inventories (Christopher, 2005) and greater uncertainties (Liu and McGoldrick, 1995).

Supplier Relationships

De Toni and Nassimbeni (1995) highlight that the ability of focal firms to plan the governance supply network structure is affected by particular aspects of supply relationships, such as the choice of the type of relationship with suppliers, the development and use of adequate procedures for the selection, evaluation and monitoring of the sources, the system of incentives, risk-sharing practices and rewards for suppliers, and tools to control any possible opportunistic tendencies.

The nature of relationships that companies form with different supply chain partners varies. Companies may choose to solicit short-term bids, enter into long-term contracts and strategic supplier relationships, form joint ventures, form consortiums, create problem-solving councils or vertically integrate (Duclos et al., 2003). Flexibility in forming and dissolving these relationships, along with managing the relationships, is key to successfully meeting changing customer requirements. Companies must select the most appropriate relationships to match the specific set of circumstances (Cooper and Gardner, 1993). There is

50

little point in offering a cost-driven relationship to a firm which emphasizes quality and technical expertise, or vice-versa (McLoughlin and Horan, 2000). As a result, companies have to develop a portfolio of the different types of relationships they want, ranging from close strategic relationships to loose non-strategic relationships.

As Bensaou (1999, p.35) states, *'successful supply-chain management requires the effective and efficient management of a portfolio of relationships: first, firms must match the optimal type of relationship to the various product, market, and supplier conditions; second, they must adopt the appropriate management approach for each type of relationship'.*

In a study of supplier selection practices, Choi and Hartley (1996) found that the capability of suppliers to make product volume changes was a significant factor in supplier selection in the automotive industry. In certain industries, e.g. electronics, demand volatility poses a unique challenge to suppliers to vary output in line with demand. The increases or decreases may come at short notice and need to be sustained over some time period. The ability of firms to react quickly to customer demand is dependent on the reaction time of suppliers to make volume changes.

Many classifications of supply chain relationships can be found in the literature (Webster, 1992; Harland, 1996; Spekman et al., 1998). KSA (1996), for example, gave a useful delineation between strategic alliances, operational partnerships and opportunistic partnerships (see Figure 3.7). Their taxonomy is underpinned by a continuum illustrating relational arrangements as either close or distant and the degree to which this range is influenced and characterised by adversarial behaviours through to integrating behaviours (Hines and McGowan, 2005).

There is a vast amount of literature advocating the value of developing collaborative relationships with supply chain partners (Dwyer et al., 1987; Lambert and Knemeyer, 2004; Fynes et al., 2005). Key reported benefits of collaborative partnerships include lower costs, shared risks, reduced

51

uncertainty, improved product and service quality, all emerging from the development of inter-organisational trust and commitment (Handfield and Bechtel, 2002; Gao et al., 2005).

Characteristics	Weak	Semi-Strong	Strong
	Price very important	Price still important	Price less important
	Commodity supplier	Buffer / Insurance	Open book accounting
	Adversarial	Adversarial	Partnership approach to solving problems
	Short term, maybe to fill a gap	Short or long term	Long term
	Less reliable?	Reliability and responsiveness	Flexibility – QR
	Slower response	Variable	Reliable

←——————————————————————————————————→

Adversarial   Coercion   Control   Co-operative   Partnership   Integration
DISTANT   CLOSE

Figure 3.7. Types of Supply Chain Relationships (Source: KSA, 1996)

Increased responsiveness through the reduction of time to market is another benefit of collaborative relationships between supply chain partners. Wheelwright and Clark (1992), for example, observe that, despite working within complex and rapidly changing environments, characterised by considerable uncertainty and ambiguity, firms were able to get new products to market faster and more efficiently by establishing strategic partnerships with suppliers. Section 3.5 (Response Capability) introduced the concept of Robust Networks. In these networks, the existence of strong relationships between supply chain partners is seen to play a fundamental role in ensuring the existence of much needed levels of flexibility in the relationship, allowing scope to accommodate changes when and where necessary (Fruin, 1992; Imai, 1986). The advent of most relational exchange activity, it seems, will be prompted by a need, by the

actors involved, to exercise some level of control over the risks and uncertainties attached to their enterprise of the way that they have to do business (Hines and McGowan, 2005). The greater the level of complexity and uncertainty within the environment within which actors are operating, the greater the likelihood that the actors will engage in social exchange and develop a portfolio of supply chain relationships (Wikstrom, 1996).

Nevertheless, previous studies have highlighted that the configuration of the supply network has a profound effect on the level of process integration. As such, the rationalization of the supplier portfolio should precede practices of integration between customers and suppliers (Scott and Westbrook, 1991; Olsen and Ellram, 1997; Fujimoto, 1997). According to Bowersox (1997), demand integration requires that companies should have previously developed a set of profound long-term agreements to improve connections with selected customers and suppliers. A similar perspective emerges from Spekman et al. (1998) and Fynes et al. (2005). Building collaborative relationships with all supply chain partners is impractical, expensive and can conflict with the flexibility strategy of the supply chain (Krajlic, 1983).

Moreover, although it is acknowledged that there are advantages in reducing the number of suppliers within highly collaborative situations, such as increased risks and higher levels of dependency, and the literature describes a wealth of operational and behavioural success factors, the disadvantages of reduced flexibility and competition are only covered in restricted depth. At times, reduction of the supplier base can be in direct conflict with maintaining the ability to respond quickly to unforeseen events. Entering into a long-term procurement contract with a supplier may help to reduce uncertainty for both parties, develop trust and mean that a supplier is willing to accommodate small changes at short notice but 'arms-length' relationships and spot-purchasing may provide a more dynamic means of being flexible in the short-term. Hence, there is a clear trade-off when developing supply chain relationships between uncertainty and (re-configuration) flexibility (Stevenson and Spring, 2007).

53

As such, to support and maintain high levels of responsiveness, it is widely accepted that collaboration and partnership relationships between the players in the supply chain achieve benefits for the participants, and have long been identified as good practice for agile supply chain management (Stevens, 1989; Lamming, 1996; Christopher, 1999; Christopher and Juttner, 2000; Fernie and Azuma, 2004). Such relationships may well facilitate or better enable the synchronisation of the supply chain through accurate and timely information exchange, better visibility and accessibility and this may reduce inventory while simultaneously improving responsiveness to demand (Christopher and Lee, 2001). Flint (2004) for example argues that an increased level of information exchanges and collaboration between the different actors in the chain for quick response systems is essential. The more turbulent the environment and the more uncertain decision making, the greater the need for strong supply chain relationships (Flint, 2004). However, it is also apparent that full supply chain management implementation is not being achieved because partners are still taking a short-term view which generates adversarial practices such as power abuse, lack of transparency, poor communications and reluctance to adopt attitudinal change (Anscombe & Kearney, 1994; Braithwaite, 1998; Hines & Jones, 1996). It might also not be entirely desirable when high levels of flexibility are being sought. Research into these situations is rare, and this is another gap that this dissertation will aim to address.

3.4.2.2. Process Integration

Once the supply network has been configured and a portfolio of relationships developed, the level of flexibility achieved will depend on the ability of the leading firm to coordinate and integrate the entire supply chain (Tachizawa and Thomsen, 2007). As such, if *Sourcing Flexibility* looks at what configuration of flows of resources and information can be effectively governed, *Process Integration* considers the coordination mechanisms that enable this governance (Grandori, 1997). It involves interventions for coordinating and integrating the flows of physical goods and information between suppliers, manufacturers and customers (Handfield and Nichols, 1999; Chopra and Meindl, 2001). Surprisingly, very little literature directly defines integration. Although most authors acknowledge that integration involves some form of combining the

54

assets and people of the buyer and the target, in general, the term is used quite loosely (Schweiger & Goulet, 2000). As far as the operation or execution of the network is concerned, previous studies have identified demand and supplier integration mechanisms among supply network members as fundamental drivers in improving supply network performance (Cooper et al., 1997; Lee and Ng, 1997; Harland et al., 1999; Kopczac and Johnson, 2003).

Effective management to achieve competitive advantage here includes the ability of one of the players to manage, or orchestrate, the often complex network as a whole and ideally to focus on, or make the best use of, the core competencies and strengths of the individual network suppliers (van Hoek and Cammandeur, 1998). As such, it can be argued that in today's challenging global markets, the route to sustainable advantage lies in being able to leverage the respective strengths and competencies of network partners to achieve greater responsiveness to market needs (Christopher, 1998b).

Further, to manage the supply network effectively, *Process Integration,* where there exists collaboration and integrated processes and systems across the supply chain, becomes essential. Moreover, given the way value chains have been disaggregated in the past few years, this in turn requires responsiveness throughout the supply chain (Gattorna, 1998a; Pine, 1993; Goldman et al., 1995; Christopher, 1998b). Towill (1997) expresses this in terms of creating a 'seamless supply chain' where territorial boundaries between trading partners are eliminated and they effectively operate as if part of the one organization.

In fast moving environment, such as the electronics, toy or fashion sector, demand for products is hard to predict due to fashion, seasonal changes, high levels of innovation and large variation in style preferences. In such sectors, large quantities of unsold inventory are unacceptable to the manufacturer. Thus, it follows that increasing the supply chain's responsiveness by synchronising activities up and down the supply chain is more efficient than holding large quantities of finished goods As a result, manufacturers compete not only on the basis of price, but also on their ability to meet 'rapid replenishment'

requirements by retailers. As a result, agility becomes a competitive advantage under lean retailing practice (Jin, 2004).

Due to the high level of market turbulence arising from factors such as frequent new product introduction, high levels of customisation, difficult design specifications and customer shifts, continuous contact with customers and suppliers through supply chain integration becomes most important (Russ and Camp, 1997; Davenport, 1998) and facilitates the synchronisation of the supply chain. In addition, various functions and spatially distributed project units of companies require more co-ordination and integration. Furthermore, as competition intensifies, efforts to reduce cost through just-in-time purchasing, scheduling and distribution lead to more frequent monitoring of specified and delivered quality, schedules and other customer expectations as a routine process (Yusuf et al., 2004).

The subject of supply chain integration has been discussed by numerous other authors, for example see Morash and Clinton (1998), Harrison et al. (1999), Lee (2000), Bask and Juga (2001) and Van Hoek et al. (2001). Even though the terminology used for grouping supply chain integration 'sub-factors' is different, the components identified cover broadly the same content: coordination, organisational linkages and information integration (Lee, 2002).

Coordination

Coordination refers to ongoing efforts to achieve alignment between different organisational units to ensure that required tasks are completed (Simatupang et al., 2002). It refers to the redeployment of decision rights, work, and resources to the best-positioned supply chain member It refers to how processes, value-adding steps and related decisions are coordinated and potentially rearranged across firm boundaries and how internal or external resources are shared to add value to products at interfaces in the supply chains (Lee, 2000). Reichhart and Holweg (2007) highlight that a very limited number of studies have looked at the extent to which supply chain partners coordinate their processes, yet some examples can be found in related publications. Burbidge (1961) for example describes how misaligned re-order levels can create demand

56

variability and uncertainty in supply chains. Li and Liu (2006) further demonstrate that supply chain partners can benefit from a co-ordination of quantity discount policies. Additional developments can be found in Collins et al. (1997), Lee (2000), Holweg et al., (2005).

The above studies illustrate that coordination along the supply chain refers to the redeployment of decision rights, work, and resources to the best-positioned supply chain member As such, a company that historically has developed its own replenishment plans may opt to give up its decision rights and let the supplier replenish on its behalf (Lee, 2000). The supplier may be in a better position to do the replenishment because of its superior knowledge of the product, the overall market, and forecasting techniques. This is the basis of programs like Vendor Managed Inventory (VMI) - practical way of seeking to obtain the benefits of echelon elimination (Disney and Towill, 2003) and Continuous Replenishment Programs (CRP) – aimed at linking the manufacturer and distributor in a partnership which will transcend the basic interchange of electronic data to generate orders and manage inventory (Andraski, 1994).

Companies also may shift the actual work they perform in order to improve overall supply chain efficiency. In this case, the coordination of processes can be further supported by outsourcing processes at the interfaces to third parties, such as logistics service providers (Spencer et al., 1994; Reichhart and Holweg, 2007).

Organisational Linkages

Process integration is not complete without tight organizational linkages and resource sharing between companies (Fawcett and Cooper, 2001). The supply chain literature features many studies of the effects of organisational integration on supply chain performance and its contributing factors (Suarez et al., 1995; Lamming, 2000; Droge et al., 2004), and the ways in which organisational integration can be achieved (Rich and Hines, 1997; Bagchi and Skjoett-Larsen, 2002; Perona and Saccani, 2004). Hill and Chambers (1991), Suarez et al. (1995), Liker and Wu (2000) and Droge et al. (2004) all agree that close

57

organisational integration positively influences manufacturing and supply chain performance and responsiveness.

The range of activities that lead to the creation of organisational linkages can vary, from cross-functional coordination, participation in decisions to knowledge sharing (Braganza, 2002), from extensive communication to close cross-supplier integration in the case of Japanese supplier associations (Reichhart and Holweg, 2007). Suppliers can also employ engineers at customer sites to facilitate better communication and faster problem solving (Ikeda, 2000). Concurrent new product development through process integration can also lead to the creation of organisational linkages (Clark and Fujimoto, 1991). It involves the joint consideration of overlapping activities in product and process choice with an objective of reducing time to market (Jayaram et al., 2000). Handfield (1995), for example, found that concurrently engineered products were developed in approximately 60 percent of the lead time required to manufacture sequentially developed products.

Bagchi and Skjoett-Larsen (2002) provide a concise overview of the most common characteristics of organisational integration which include: joint design teams, process and quality teams, joint performance measurement and problem solving, amongst others. Alongside Bagchi and Skjoett-Larsen (2002), other studies have also highlighted the fact that, in order to facilitate the formation of organisational linkages, the performance measures for the supply chain members need to be specified, integrated across the chain, and monitored (Kaplan and Norton, 1996; Dale, 1999; Bourne et al., 2000). Thus, one supply chain member may be held accountable for certain performance measures of another.

Also, there may be some joint performance measures for which multiple organizations are jointly held accountable (Lee, 2000). Such extended performance measures encourage further closer collaboration and coordination. Finally, organizations in a supply chain can work closely for the same goal only if the incentives of the multiple players are aligned (Lee, 2000). Conflict of interest is likely to occur when the existing incentives lead to actions that

58

maximise personal gain but often reduce the total profitability (Clemons and Row, 1993; Simchi-Levi et al., 1999). In this context, incentive alignment refers to the process of sharing costs, risks, and benefits amongst the participating members (Simatupang and Sridharan, 2002) and requires mechanisms assuring that the associated risks and gains of integration efforts are equitably shared (Lee, 2000). Also, resources can be redeployed, consolidated, or shared, so that multiple players in a supply chain benefit. Shared warehouses, inventory pooling, and supplier hubs are examples of this.

Early supplier involvement is another practice that can reduce development time, product complexity and costs while improving parts commonality, ease of manufacture and quality. Involving suppliers in product development can also improve flexibility (Narasimhan and Das, 2000; Petroni and Bevilacqua, 2002; Sanchez and Perez, 2003; Schmenner and Tatikonda, 2005) through modular product designs which enable the supply chain to produce product variations quickly and allow re-manufacturing.

Further linkages can be achieved through supplier certification programmes for product and quality systems, regular visits to supplier facilities, continuous monitoring of supplier base-performance and supplier involvement in process/product innovations and quality management (Macbeth and Ferguson, 1994; Kanter, 1994; Hines, 1994, 1996; Lambert et al., 1996; Cooper et al., 1997). As such, organisational linkages along the supply network should be seen as positively affecting the responsiveness and agility of the supply network.

Information Integration

Information integration refers to the sharing of information and knowledge among members of the supply chain, such as demand information, inventory status, capacity plans, production schedules, promotion plans, demand forecasts, and shipment schedules, with the ultimate aim of creating a virtual supply chain (Lee et al., 1997b). This creates transparency or visibility of both demand and capacity information in the supply chain without any time delays (Christopher and Lee, 2004). Mondagron et al. (2004) note that the operation of

59

agile enterprises requires the existence of efficient supply chains. And the availability of information across tiers facilitated by information systems may significantly improve the performance of entire supply chains. Some benefits to entire supply chains may include the reduction of pipeline inventory and supply chain cycle times, as well as reducing upstream demand variation or bullwhip effect (Forrester, 1958; Towill, 1997; Sterman, 1989). Sharing information can improve transparency, avoid lost sales, speed up payment cycles, create trust, avoid over-production and reduce inventories (Huang et al., 2002; Sahin and Robinson, 2002).

Chapter 2 of this thesis highlighted that the overall goal for any supply chain should be to have perfect visibility whenever an event takes place anywhere along the chain. As customers place orders, information should be shared back through the supply chain to producers, suppliers and suppliers' suppliers. The success of Dell Computers in its implementation of "virtual integration", gaining almost instant access to information throughout the chain, has highlighted how visibility has lead to speed and efficiency (Magretta, 1998).

Many authors consider that the flow of accurate and real-time information in the supply chain is as important as the flow of goods. The main reason is that information sharing can provide flexibility and improve the responsiveness of the supply chain (Golden and Powell, 1999; Fredericks, 2005; Gosain et al., 2005). Most of the popularly used supply chain strategies, such as quick response (QR), efficient customer response (ECR), vendor managed inventory (VMI) and continuous replenishment programs (CRP) embed information sharing as the cornerstone of these programs (Lee and Wang, 2000).

Information sharing requires a willingness on the part of all the members of the supply chain to work to a single supply chain plan. Arterial information systems should cut across functional, organisational and geographical boundaries, as this enables production decisions to be taken much later in the cycle and minimises unnecessary hand-offs, 'silo' behaviour, uncertainty and delays (Sabath, 1995). This is consistent with the idea of substituting information for inventory, allowing the adoption of postponement strategies in order to facilitate

60

higher levels of responsiveness. However, the availability of information technology and software to enable the capture and sharing of information across a supply chain makes this tasks nowadays much easier. Advanced information technology, which has turned the world into a global village through 'speed of light' transfers of information, data and files, is a major driver of supply chain integration (Yusuf et al., 2004). The entire supply chain can now be linked by information about anticipated and actual demand, supply and movement, sales forecasts, order status, inventory levels, capacity availability, lead times, and quality and this information is used to coordinate the activities of all supply chain partners (Sabath, 1995).

The role of technology in facilitating agility has received significant support in theory (Cooper and Kleinschmidt, 1994; Millson et al., 1992; Handfield and Pannesi, 1995). In such agile supply chains, success depends on the firm's ability to identify and monitor the level of demand on a real time basis, communicate changes in demand instantly to suppliers, suppliers adapting their manufacturing to these changes in demand and then promptly despatching production to the point of sale. All this requires processing information both accurately and in a timely manner for quick response systems that require frequent changes in response to fluctuations in customer demand.

Schonsleben (1999) argues that agile companies compete through increased levels of knowledge and competency, allowing them to broadly implement information technology. Goldman et al. (1995) describe information systems as the central, critical and fundamental part of any change to agility. This creates a 'digital supply chain' (Hines, 2001) or what many authors chose to call an 'information enriched supply chain', in which the storage of expensive items that no one wants to buy is not necessary as inventory is substituted by information. Bovel and Martha (2000), in quoting a 1999 survey by Mercer Management Consulting, indicate that the use of information technologies was a major indicator of supply chain management best practice, particularly if employed to connect customers, suppliers and value adding activities. This view is supported further in the literature by authors such as Lee and Billington (1995), Davis and O'Sullivan (1999), Cachon and Fisher (2000).

61

Current inter-organisational information systems and Internet technologies facilitating the sharing of real-time information in the supply chain are given various umbrella terms, such as electronic data interchange (EDI), advanced planning and scheduling (APS) systems, collaborative planning, forecasting and replenishment (CPFR) systems and the customer and supplier relationship management (C/SRM) modules of enterprise resource planning (ERP) packages (Stevenson and Spring, 2007). Inter-organisational information systems also have implications for the way that supply chains are designed and managed. One important example is the use of vendor managed inventory (VMI) systems where an upstream supplier is able to react directly to the inventory and demand information of a downstream customer by adjusting the quantity and timing of deliveries. This provides the customer with an improved balance between excess inventories and lost sales and provides the supplier with reduced uncertainty and greater flexibility (Lau and Lee, 2000; Disney and Towill, 2003; De Toni and Zamolo, 2005; Holweg, 2005).

Gunneson (1997) suggests that for agile enterprises there is a need for ubiquitous information systems including e-mail systems, expert systems, modelling and simulation systems and decision support systems. According to DeVor et al. (1997), advances in information networking, processing and electronic commerce are rapidly expanding the capability to achieve powerful interactive links among organisational and functional units of the agile enterprise. In addition, tools such as computer aided design (CAD) enable buyers and designers to draw new or alter designs and to send these on-line to their suppliers. Manufacturers can link CAD systems directly with the computer aided manufacturing (CAM) processes, which reduce the final development time (Hunter, 1990; Perry and Sohal, 2000). Stock can be fully labelled and tracked through bar codes or RIFD tagging by suppliers, with automatic replenishment processes, on-line electronic communications used between Head Office and stores and between Head Office and distribution centres (Birtwistle et al., 2003).

As Dabbiere (1999, p.1) states, *'when a major player in the supply chain decides to upgrade to a new technology or adopt a new technical functionality, the rest of the industry is challenged to synchronize the change throughout the supply chain'.* This synchronization must incorporate the changing requirements of business partners, including items such as order information and shipping data. Information sharing is also affected by the speed with which changes can be made to hardware architecture and software to allow for synchronization between firms in the supply chain. In addition to information sharing between supply chain partners, information systems can impact internal business process capability (Duclos et al., 2003).

The above Process Integration framework highlights the fact that integrating a supply chain along the information, coordination, and organizational dimensions positions the network for ongoing success. Lee (2000) believes that with the integration foundation in place, the responsibilities of the members can shift dynamically based on changing customer needs and partners can enter and exit the network with minimal disruptions and costs. Such evolving and integrated networks can result in much greater efficiency and responsiveness.

3.5. Agile Supply Networks Framework Consolidation

Based on the literature review of supply chain agility presented in the sections above, the framework presented in Figure 3.8. is proposed as a conceptualization of supply network agility. In this framework, volume flexibility, new product flexibility and mix flexibility are suggested as external flexibility types exhibited by agile networks, while market sensitivity, flexible sourcing and process integration are viewed as the key sources of flexibility internal to the supply network. It is important to view the proposed framework as a tool designed to be applied to every important interface in a supply network, starting with the end customer and going upstream. At every interface the supply network partners, usually under the lead of the network coordinator, can evaluate what type and level of flexibility is really required and then determine the appropriate combination of the internal determinants available. The first step will largely reduce costs throughout the supply chain by reducing the need to be

63

flexible in the first place (Fisher, 2007), while the second step adjusts and reconfigures the supply chain to deliver the required level of responsiveness cost-efficiently. It can also facilitate an understanding of how individual nodes in supply chains interact in determining the overall system's ability to respond to customer demand.
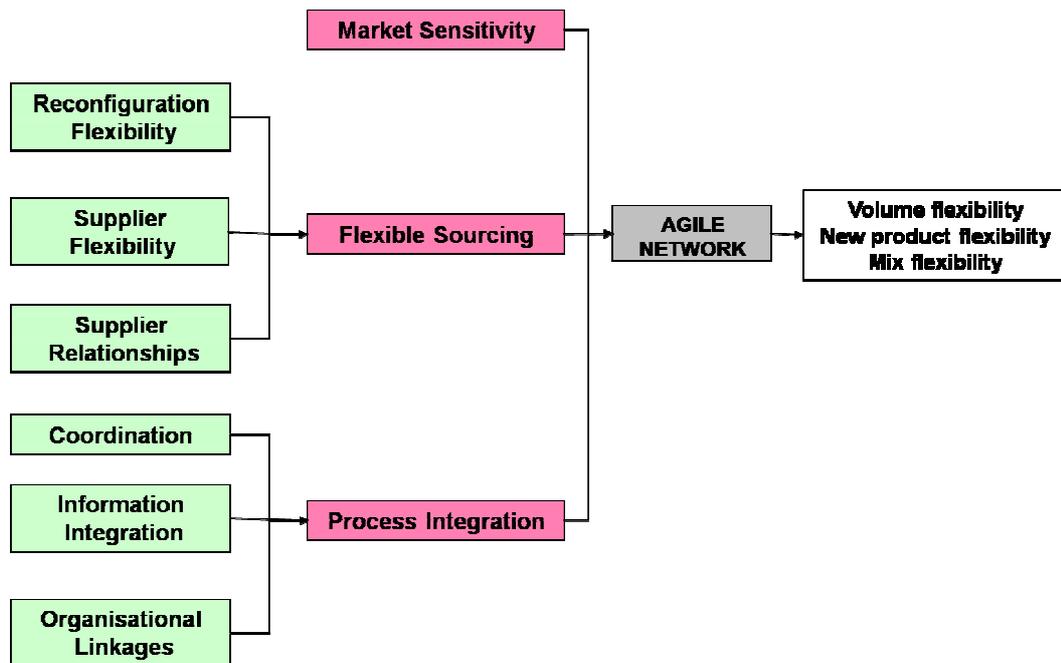
Figure 3.8. A Framework for the Management of Agile Supply Networks (Source: Author)

3.6. Summary

This chapter has illustrated that one way in which the extreme environmental instability that appears to be characterising the new millennium can be mitigated against is through the use of an appropriate supply network strategy (Fabbe-Costes and Colin, 2007). This reflects the view that networks are not necessarily static structures, but can be dynamic and respond to specific needs. The lean, agile and leagile strategies were reviewed, as well as the use of different types of flexibility in distinguishing between them. Ultimately, the agile supply chain strategy was identified as offering the highest levels of market responsiveness in highly volatile environments, and a framework for agile supply chain management practices was presented. Three types of external flexibility were identified as being exhibited by agile supply networks (new

64

product, mix and volume flexibility), while three internal determinants of flexibility have been put forward: Market Sensitivity, Flexible Sourcing and Process Integration.

The following chapter provides an overview of the UK fashion sector and justifies why it has been chosen as the focus of this research.

Chapter 4 UK Fashion Supply Networks

The role of this chapter is to provide an overview of the UK fashion sector, such as sector performance and structure, the nature of the apparel market and its increased globalisation, as well as highlighting the supply chain management practices that have been adopted by the sector. The chapter concludes with the articulation of the research question, which was drawn from the theoretical analysis presented in Chapter 3, as well as introducing some of the challenges anticipated in answering it.

4.1. Introduction

Fashion supply chains have been receiving increased attention from academic researchers in the last few years (see Lowson, 1999; Christopher et al., 2004; Bruce et al., 2004), mainly due to the view that they have become increasingly complex and dynamic. Brun and Castelli (2008) consider that the high level of demand volatility, the dramatic shift in the scale and power of major retail buyers in the market, the advent of own brands retail networks, the nature of sourcing and supply chain decisions, which are increasingly global in nature, are just some of the factors that have contributed to their complexity and dynamism and have attracted the attention of the academic world.

The UK fashion market has been growing steadily over the past few years. According to Euromonitor (2007), clothing sales reached £36.05 billion in the UK in 2006, a 24% increase over 2000. This represents an above average level of performance compared with the total UK consumer expenditure during the same period. Strong increases in house prices and low levels of inflation and interest rates are just some of the reasons that generated a boom in consumer spending (Mintel, 2007). It is the large clothing multiples, however, that have benefited at the expense of smaller businesses. According to the indices published by the Mintel in 2007, the former have seen their sales grow by 48.3% since 1995, while sales through smaller businesses have actually fallen by 3.4% over the same period.

66

The UK clothing retailing industry, following the global trend, is dominated by large organisations that are moving toward greater specialisation by product, which led to the rise of speciality stores, and price, which led to the growth of high-volume, low-cost discount chains (Gereffi, 1999). Historically, fashion retailing in the UK has been characterised by high levels of concentration and domination by large multiple retailers, resulting in a highly competitive market (Hines and Bruce, 2001). The market is dominated by four chain store groups (Marks and Spencer, Arcadia Group, Next Retail and New Look), which accounted for 29.1% of clothing retailers' sales in 2007 (Mintel Report), with the top seven clothing retailers accounting for 33.8% of the market. The fastest growing retailers, however, are chains of specialist clothing retailers (Oasis, New Look, River Island, TopShop, Warehouse, etc.) that dominate the middle market (Birtwistle et al., 2003). According to National Statistics, sales through specialist clothing retailers in the UK stood at £28.8 billion (excluding VAT) during 2004, a 25.6% increase in real terms over 1998. Their success has been widely associated in the literature with their increasing ability to offer fashionable items at reasonable prices. Their key competitors are established variety retailers, such as BHS, department stores such as House of Fraser and John Lewis Partnership, supermarkets with clothes ranges such as George at Asda, Tesco and Sainsbury's, discount retailers such as Primark and factory outlet centres. Moreover, international chains such as Benetton, Zara, Mango, Gap, Kookai and H&M have increased competition for all these retailers. This has resulted in the UK fashion scene being the most competitive in Europe (Whitefield, 2001; Mintel, 2007).

4.2. The Nature of Apparel Markets

Euromonitor (2007) research identified that UK consumers increasingly regard an item of clothing as a disposable item, rather than an investment, and this is increasingly reflected in their purchasing patterns. Due to socio-cultural factors, consumer needs are changing at a much more frequent pace and the women of today are revising their wardrobes more often than in previous years (Mintel, 2007), even within a single season. In terms of clothing, no one really needs to

buy a new dress (Kuffner, 2004) and purchasing decisions in developed countries are increasingly based on 'want' rather than 'need' (Jones and Hayes, 2002). The reason for buying new items is the appeal factor (or fashion content) that will satisfy individual needs, mainly for self-image. Modern fashion is claimed to affect everyone with its ephemera, where the spread of 'fast fashion' promotes greater purchasing frequency. Customers now have more choice, are likely to be less loyal, are not prepared to accept second best and have become more sophisticated in their tastes and their approach to buying goods and services (Hines, 2001). They can also increasingly gain easier access to better value and stronger fashion content offerings more widely across the retail spectrum, and a wider choice of fittings and sizes promotes higher impulse buying (Kacen and Lee, 2002).

Fashion retailers can exploit this market by bringing new products to their stores as frequently as possible. This has led to fashion markets becoming more synonymous with rapid change and, as a result, commercial success or failure is largely determined by the organisation's flexibility and responsiveness (Christopher et al., 2004). Typical activity for high street fashion retailers would be 60,000 stock keeping units, customers visit stores about 35 times a year, 15% of the items in a store are 'new' every week, and product life cycles - from first offering in a store to sell out or discounting - average 6 weeks but can sometimes be as short as 3 weeks.

4.3. What is Fashion?

According to Christopher et al. (2004, p. 367), '*fashion is a broad term that typically encompasses any product or market where there is the element of style that is likely to be short lived'*. Cambridge Dictionary (2008) refers to fashion as '*a style that is popular at a particular time, generally in personal appearance and especially in things such as clothes, hair and make up*'.

In this context, several studies have shown that as the fashion element of a clothing product increases, so its shelf-life decreases (Forza and Vinelli, 2007). This is reflected in Figure 4.1, which highlights the fact that fashion articles have

a useful selling period very much lower than that for basic or seasonal articles. As a result, fashion articles must be available on the shelves with minimum error as regards to both quantity (volume) and range (product mix). A retailer with un-sellable stock incurs the cost of extra inventory, and eventually has to mark it down to sell at a lower margin than budgeted. A retailer without enough stock is still renting, heating and manning the space that lacks sellable merchandise. Both strategies risk failure (Flanagan, 2005).

Following Fisher's (1997) theory, the supply chain of High Fashion items should be extremely reactive for products staying on the market for a very short period. In contrast, efficiency should be pursued when dealing with Basic products characterized by a long lifecycle. Also, as a general rule, fashion items have higher risks, are sold in smaller volumes per stock keeping unit (SKU) and, as a result, command higher mark-ups.
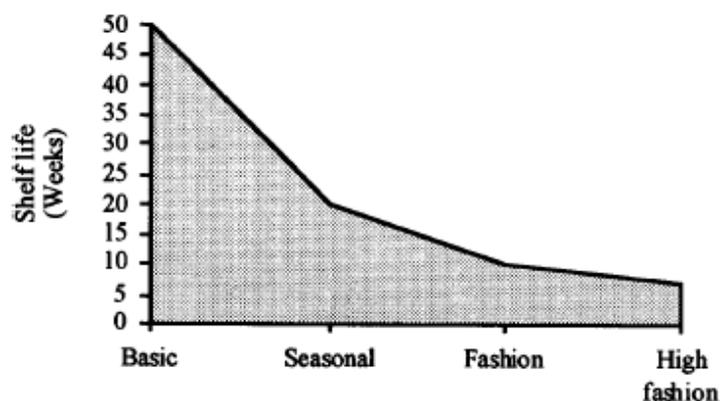
Figure 4.1. Variation in Products Shelf Life Based on Fashion Content (Source: Forza and Vinelli, 1997, p.131)

Recently, the term 'fast fashion' has emerged to reflect a business strategy which aims to reduce the processes involved in getting new fashion products into stores, in order to satisfy consumer demand at its peak (Barnes and Lea-Greenwood, 2006). The concept of fast fashion has gained wide acceptance in the retail industry mainly in the last five years, and is largely based on Quick Response principles. Hines (2007) highlights the fact that 'fast fashion' is a term

69

mostly used by retailers whilst manufacturers refer to it as Quick Response. Recent studies, such as Barnes and Lea-Greenwood (2006) and Bruce and Daly (2007) have linked the enhanced competitive advantage gained by companies such as Zara and H&M in the fashion market to the adoption of fast fashion practices. Zara's lead times are estimated at around fifteen days, while H&M have minimised their lead times to approximately three weeks.

The target group for 'fast fashion' is mostly style aware females from 16 to 24 years old (Hines, 2007). As such, if 'fashion' refers to any product or market where there is an element of style that is likely to be short lived, fast fashion is a particular manifestation of this trend, where the shelf lives of products are extremely short and companies need to track fashion trends quickly and to identify potentially popular new designs through daily data proximity to fashion markets, fashion images and fashion makers (Doeringer and Crean, 2004).

The view that companies operating in the fashion sector need increased levels of responsiveness is reflected by some of the characteristics that fashion markets have recently exhibited (adapted from Christopher et al., 2004):

- Short life-cycles – Fashion products are often ephemeral, designed to capture the mood of the moment. Consequently, the period in which they will be saleable is likely to be very short and seasonal, measured in months or even weeks.

- High volatility – demand for these products is rarely stable or linear. It may be influenced by the vagaries of weather, films, or even by pop stars and footballers. The obsession with celebrity has increased as the number of weekly glossies (e.g. Grazia) has, fuelling consumer demand for the latest look or product at a faster pace. Fashion trends are moulded by fashion icons, popular culture, for example what is happening on the street, in clubs, lifestyle hotspots and fashion 'flash points', not from a mood board or a trend prediction agency 12 months in advance of a selling season (Barnes and Lea-Greenwood, 2006). In a 1998/1999 survey of the UK textile and clothing retailers, 85% agreed that 'for sale' or selling seasons (shelf life of fashion lines) were already becoming

much shorter, while 93% had witnessed a trend towards greater product volatility, fashion influence, difference and customisation over the last three years.

- Low predictability – Due to the high volatility of demand, it is extremely difficult to forecast with any accuracy even total demand within a period, let alone week-by-week or item-by-item demand.

- High impulse purchasing – many buying decisions by consumers for these products are made at the point of purchase. In other words, the shopper, when confronted with the product, is stimulated to buy it, hence the critical need for 'availability'.

In this operating environment, the main challenge the fashion retailers are facing is to increase their market sensitivity and ensure product availability while keeping their product obsolescence low. Their ability to respond to market signals is critical, especially in a sector in which the competition is increasing. The field of competition is therefore switching towards retailing and towards a demand-driven supply chain (Brun and Castelli, 2008). Being close to the customer is a goal of any market-oriented business, but in fashion it is vital (Christopher et al., 2004). Furthermore, due to the high levels of retail concentration that characterise the UK clothing sector, inefficient or undifferentiated retailers are unable to survive in a retail environment characterised by over-capacity, ever-growing exposure to risk from product proliferation and continuing pressure to lower prices (Abernaty et al., 1999).

As such, a great level of responsiveness is required, with a high rate of new product introduction. As a result, the traditional, forecast-based, two-season fashion cycle (spring-summer and autumn-winter) has been replaced by some of the high fashion retailers by as many as 20 seasons a year. This reduces the forecast horizon and brings them closer to the market place, reducing the risk of error (Wilding, 1998).

71

Birtwistle et al. (2003) noted that the average UK fashion retailer typically commits 60% of their buying budget six months before the season commences. This increases to 90% by the start of the season and only 10% is purchased during the season. In contrast, Zara only commits up to 20% six months in advance of the season, a commitment which increases to 50% by the start of the season. This permits the other 50% to be decided once the season has been launched. This allows the company to react to the latest fashion trends and consumer demands. Being able to spot trends quickly and to translate them into products in the shop in the shortest possible time has become a pre-requisite for success (Christopher et al., 2004). The whole business should be demand driven and the response time from design to product in store can be as little as three weeks (Morell, 2001). As a result, in the mass fashion industry success and market position are maintained by a combination of the use of innovative designs and high product quality, whilst being responsive to varying demand and fashion changes, and speed to market (Bergvall-Forsberg and Towers, 2007).

Successful fashion retailers capture emerging trends using a variety of means, such as daily point-of-sale data analysis. If the intention is to continue to make the product available, the data will be used to determine replenishment requirements. If the product will not be replenished, then the data can be used to analyse trends (Christopher et al., 2004). Powerful information systems provide their owners with vast databases that they can mine to identify market trends and utilise their targeted promotional activity (Hines, 2001). Fashion 'scouts' who seek out new ideas and trends across the markets in which they compete, feeding back all the information to the design team, are also widely used (Christopher et al., 2004).

As a result of fashion trends changing at a faster pace, long high volume production runs are not required anymore and the focus for responding to consumer demand must be through lead-time reduction (Christopher et al., 2004). In search of flexibility and responsiveness to changing consumer demand, shorter runs are becoming more frequent. (Barnes and Lea-Greenwood, 2006). This has lead, progressively, to retailers introducing a

72

number of phases within seasons lasting, on average, 8-12 weeks. Retailers who follow this strategy refresh their stock so often that markdowns are indirectly reduced (Hayes and Jones, 2006). This trend towards mid-season purchasing is changing the traditional two fashion-seasons regime of Spring/Summer and Autumn/Winter (Tyler et al., 2006) and has far reaching effects on the way today's mass fashion retailers operate. Such a staggered new product introduction schedule has 2 major benefits:

- smoothing out production for the vendors and
- keeping the retail store constantly refreshed in merchandise display with new items (Sen, 2008).

One of the effects of this practice has been a huge increase in the number of stock keeping units (SKUs) retailers have to deal with each season. An SKU is the most detailed level of product specification. The SKU is a unique product code identifying a specific manufacturer, colour, fabric, style and size. Unlike other manufacturers, an apparel company develops numerous SKUs in a season, with an average of 15,000 SKUs in its collections (Abernathy et al., 1999). Most manufacturers coordinate their seasonal lines so the retail customer can 'mix and match'. The combination of different sizes, colours, styles, fabrics and price lines for the customer forces retailers to carry an enormous range of different products. At the same time, depending on the product characteristics, the nature of demand for different SKUs will vary. Some items, like socks, can be treated as a commodity that allows standardised volume production. Other items, like business suits, lend themselves better to small batch instead of volume production. Thus, effective merchandising management begins at the SKU level, not the product level (Suh et al., 2002).

Other practices employed by the UK fashion retailers in order to increase their market sensitivity which have been identified in the literature are:

- continuous monitoring of market trends to identify potentially popular new designs through daily data proximity to fashion markets, fashion images and fashion makers (Barnes and Lea-Greenwood, 2006; Christopher et al., 2004; Doeringer and Crean (2004);

- fast and frequent introduction of new products (Christopher et al., 2004; Lin et al., 2006);

- responding to real demand using daily POS feedback (van-Hoek et al., 2001; Christopher, 2000; Yusuf et al., 2004; Forza and Vinelli, 1997);

- reduced volumes per SKUs (Barnes and Lea-Greenwood, 2006)

- numerous SKUs (stock keeping unit) in a season (Jin, 2004);

- reduced level of pre-season buying (Birtwistle et al., 2003; Flanagan, 2005; Jin, 2004)

- customer-based measures (Christopher et al., 2004).

Hines (2001) summarised, simply, the realities with which fashion markets are now confronted: fragmented markets leading to targeting and segmentation difficulties; increasingly more demanding customers making it difficult to spot a sustainable winning formula; individualism breaking down traditional fashion trend predictions; shorter fashion cycles leading to a more volatile marketplace and less predictable fashion icons, which increases the volatility of demand.

As such, retailers' success in the market place depends on their ability to identify and monitor demand on a real time basis but also on their ability to adapt to changes in demand and promptly dispatch the right product to the point of sale. Identifying the market needs ('*getting the product right*') is essential, but in order to achieve a high speed to market, a supply chain able to deliver the product in a timely manner is also required ('*getting the response time right*'). This distinction is in line with Fisher's (1997) differentiation between a supply chain having to perform a physical function (that includes converting raw materials into finished goods and transporting them along the supply chain), as well as a market mediation function (whose purpose is ensuring that the variety of products reaching the marketplace matches what consumers want to buy. Physical costs are related to the efficiency of the supply chain, while market mediation costs are related to the responsiveness of the supply chain: how accurate and fast supply is able to match demand (Sen, 2008).

The balance between physical and market mediation costs will inform the retailer's decision as to where the garments should be purchased from. Basic

apparel products have longer selling seasons, and physical costs are likely to represent a major part of potential total costs and, as a result, qualify first for global sourcing. Fashion products, on the other hand, have generally shorter life cycles and market mediation costs play a major role. For these products, apparel retailers seek responsiveness when making their sourcing decisions, and lead times play a major role. If the order lead times are long, apparel retailers need to order much in advance of the start of the season, when their knowledge of consumer demand is limited. This will increase the risk of obsolesce. Long lead times also prohibit the replenishment opportunities within the season (Sen, 2008).

4.4. The Globalisation of Clothing Supply Chains

The intensive globalisation of the UK fashion sector has long been investigated. Currently, for many large fashion retailers the decision is no longer whether to engage in foreign production, but how to organise and manage it better. Off-shore procurement is today an integral and crucial dimension of the fashion industry in respect of achieving cost benefits, skills and flexibility (Doyle et al., 2006).

Even though long considered a sunset industry in industrial societies (Taplin, 2006), in its 'National Strategy for the UK Textile and Clothing Industry' (DTI, 2000), the Department of Trade and Industry describes the UK clothing and textile sector as substantially contributing to the UK economy, adding £7 billion of value annually. According to UK Trade & Investment, the clothing and knitwear sectors are worth about £8.1 billion, with 7,500 companies employing around 180,000 people. Clothing alone has sales of £6.6 billion and exports £2.2 billion each year. However, the industry has been marked by a rapid decline since the mid-1990s that follows an even longer period of secular decline since the late-1970s (Winterton and Winterton, 1997). For the past few years, the UK clothing sector has been confronted with decreasing production (£3,871 million in 2006 compared to £5,938 million in 2000) and a massive fall in employment by 53% (2006 compared to 1973), while the UK consumer expenditures on clothing are increasing (CAPITAB Trust, 2006). Given imports

75

rose by 104.5% between 1993 and 2006 while UK domestic production fell by 36.6% during that same period, it would appear that the growth of import penetration is the principal culprit in explaining domestic industry decline (Taplin, 2006).

The expectation is for the employment picture in the UK clothing manufacture to continue to worsen as more and more UK retailers migrate off-shore to source clothing products, attracted by lower production costs and higher profit margins (Hines, 2005).

Labour costs are an important element of cost for the manufacture of most items of clothing. Estimates vary, but it is not unusual for this cost element to be between 30% and 50% of the total garment cost in the UK. The industry is still very labour intensive and it is acknowledged that many parts of clothing manufacturing operations cannot be mechanised. Furthermore, many sewing operations require skilled handling. Corroborated with the growing retailer concentration in the UK, which increased competitive pressures along price, this has led to the industry focusing attention upon the reduction in labour cost within garment manufacture (Hines, 2001) which could be achieved mainly through global sourcing (Jackson and Shaw, 2001; Bruce et al., 2004).

Cho and Kang (2001) quote availability as another factor that motivates global sourcing in this sector, with UK based retailers often having to rely on foreign sources simply because the desired products are not available in the local market. In some cases, however, the lack of domestic suppliers is a result of previous industry behaviour. For instance, domestic buyers' foreign sourcing may drive out the domestic suppliers, which, in turn, may decrease the availability of the domestic products, resulting in a further dependence on the foreign source (Cho and Kang, 2001).

Globalisation as a phenomenon is also seen as having been hastened by rapid communication and transportation infrastructures (Hines, 2001). Given the proximity of plentiful suppliers of low wage but skilled workers in Central and Eastern Europe, plus the existence of preferential trade agreements with this

76

region (Scheffer, 1994; Commission of the European Communities, 2003), it was perhaps not surprising that a simple solution to the cost problem for UK firms was to sub-contract garment assembly to this region. Furthermore, the geographic location meant that goods could be shipped quickly to Western retailers, thus meeting their more stringent demands for shorter lead times (Taplin, 2006).

The globalisation of the UK fashion industry has intensified and is now extending to further away regions of the globe (Thailand, Vietnam, Philippines etc.), with many companies either sourcing components from these regions, or moving their own manufacturing facilities to such countries, with much lower labour costs (Jones and Hayes, 2002).

Outsourcing to further away regions has resulted in extensive and complex apparel supply chains, and consequently long lead times for fashion products due to large geographical distances between sourcing and selling markets, not to mention operational differences between members of the supply chain and the import-export procedures (Christopher et al., 2004). However, apparel businesses have long perceived the cost benefit achieved through off shore sourcing as advantageous, despite being offset by a reduction in speed to market and some quality barriers (Fernie and Azuma, 2004).

Other reasons quoted in the literature as being responsible for the decline of the UK clothing industry are the inevitability of the production cycle in countries at varying stages of development, poor UK productivity growth relative to other countries, lack of investment, lack of support from the financial institutions, short-sighted and inadequate management, loss of captive markets and complacency, lack of government support, failure of the educational system both in terms of general standards and in terms of a bias against manufacturing (Jones and Hayes, 2002).

Further, import penetration in textiles is similar to that reported in apparel, reaching 55% in 2003. Imports of textiles are drawn from a variety of sources, and some sourcing is dictated by circumstances such as location of garment

77

manufacturer or preferential trade agreements. However, textiles manufacturers in developing countries are reputed by buyers to be less risk averse and more open to technological innovations than their UK counterparts (Oxborrow, 2003). As such, price, although significant, is only one of a number of sourcing influences on the UK textile sector.

4.5. Supply Chain Management in the UK Fashion Industry

The previous section has highlighted the fact that the UK clothing retailers' success in the market place is a function of their ability to make available products they think will be successful, monitor demand for these, and manage a flexible and responsive supply chain that allows them to adapt to any changes in demand, including quickly ramping up or discontinuing supply, and reduce lead times. For items with a high fashion content, identifying market needs is essential, but given the very short product life cycle, a supply chain able to deliver the product in a timely manner is also required. For high fashion content products, the risks of holding the wrong stock at the wrong time and not being able to react quickly to changes in demand could be disastrous (Christopher and Lee, 2001, Handfield and Bechtel, 2002). Thus, agility in the fashion business also includes the ability to manage the supply chain in such a way as to quickly cancel production lines that do not sell in order to avoid markdowns (Jin, 2004).

In the apparel industry, the supply chain starts with raw materials (either from animals, i.e. wool; agricultural crops, i.e. cotton; or synthetically produced fibres, i.e. polyester) that are then woven into fabric, which is then dyed and passed on to apparel manufacturers. The apparel manufacturers will cut the cloth, make it up and trim to a specific design template before finishing (packing, labelling, pricing) and delivering to a retail customer, who sells it on until it reaches its final destination – the consumer (Hines, 1994). The industry tends to be dominated at one end by powerful, large chains of retailers. Further back down the chain the manufacturing sector of the industry consists of large numbers of small companies with a limited amount of power (Werner, 2001).
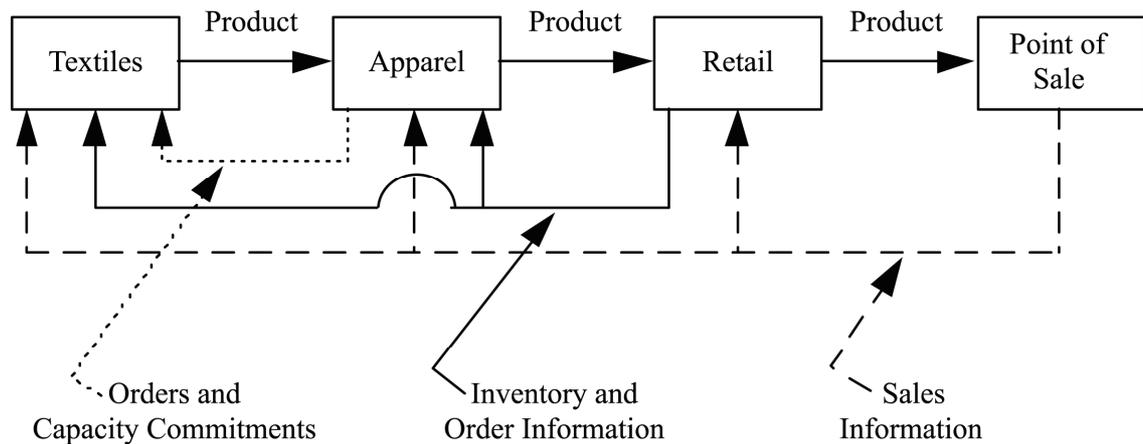
Figure 4.2. The Clothing Supply Chain (Source: McMichael et al., 2000, p.614)

4.5.1. Textile Production

This segment of the supply chain transforms the yarn into fabric by weaving, knitting or a non-woven process. In a weaving process, yarns are interlaced lengthwise and width wise at right angles. Yarn may be woven by a simple procedure to produce generic goods and then dyed for a specific fabric. Alternatively, dyed yarns may be woven. In knitting, yarn is interlooped by latched and spring needles. The process may generate rolls of knitted fabric or may specialize in a particular apparel such as sweaters or hosiery. Non-woven processes involve compression and interlocking fibres by mechanical, thermal, chemical or fluid methods (Kumar, 2008).

4.5.2. Apparel Manufacture

Apparel manufacturing starts with the design of the garment to be made. Pattern pieces are created from the designs, which are then used to cut the fabric. The cut fabric is assembled into garments, labelled and shipped. The apparel segment is the most labour-intensive and fragmented segment of the supply chain. Capital and knowledge requirements are not significant, making it attractive for new entries (Sen, 2008). Apparel companies usually specialize in narrow product categories. The type of product the company focuses on defines not only the manufacturing cycle and the intensity of the design in its operations

but also the manufacturing strategy, as suggested by Fisher (1997). Companies manufacturing basic products can utilize larger batches and tend to be larger in size. Cost reduction is a priority for these companies. Companies manufacturing fashion products have to live with smaller batches and tend to be smaller in size. Flexibility is the key to success for such companies (Taplin, 1997).

As the previous section has highlighted, the last few decades have seen a major shift in production of clothing away from the UK to low-cost production centres, primarily in Asia or Eastern Europe. For example, Marks & Spencer abandoned its previous strategy of sourcing the majority of its products from UK production in 2005 and it now sources around 17% of clothing materials from India and 44% from the rest of Asia (Euromonitor, 2007). To compensate for this shift in production, leading UK manufacturers began to emphasise their expertise in product design and merchandise in order to add value to the finished product (Buxey, 2005).

4.5.3. Retailing

The UK clothing and footwear market is essentially mature. Both clothing and footwear have been hit by price discounting during recent years. Increased competition at retail level, particularly due to high levels of concentration and the growing involvement of grocery retailers have been considered the main culprits for causing this price deflation in most clothing and footwear (Euromonitor, 2007).

Clothing products are sold through a variety of retail channels: clothing multiples, variety stores, discounters, department stores, clothing independents, supermarkets, mail order, etc. A 2007 Euromonitor Report revealed (see Figure 4.3.) that consumer purchasing of clothing and footwear has started to move away from traditional outlets, such as department stores, variety stores and high street specialists, to supermarkets and discounters. In fact, whilst mixed retailers lost share, grocery retailers expanded their position to almost 10%. This reflects a general move to out-of-town shopping, with consumers particularly attracted to the convenience of purchasing clothing and footwear at

80

the same time and in the same store as they regularly buy groceries. As a result, 'traditional' clothing retailers are facing even more challenges in trying to survive in this highly competitive environment.

% Retail Value rsp	2001	2002	2003	2004	2005	2006
Clothing and footwear retailers	74.1	73.6	73	72.5	71.9	71.4
Direct selling	1.3	1.2	1.1	1	0.9	0.8
Grocery retailers	5.9	6.7	7.5	8.3	9.1	9.9
Home shopping	2.5	2.2	1.8	1.5	1.2	0.9
Internet retailing	2.2	2.9	3.6	4.3	5	5.7
Mixed retailers	11.9	11.3	10.8	10.3	9.7	9.2
Others	2.2	2.2	2.2	2.1	2.1	2.1

Figure 4.3. UK Sales of Clothing and Footwear by Distribution Format (Source: Euromonitor Report, 2007, p.5)

4.5.4. Intermediaries

Popp (2000) suggests that, in addition to the above presented key apparel supply chain players, in many chains there often one or more intermediaries, often import or export agencies acting as significant figures within the chain. Their addition has come about as a result of the increased globalisation within the industry. Many of the intermediaries are agents in the broadest sense of the word, with no manufacturing or logistics capability or assets whatsoever, but who do have access to an appropriate supplier network. Others, such as the Li and Fung Group, employ considerable amounts of resources and operate a sourcing network of over 80 offices covering over 40 economies across North America, Europe and Asia. They are in essence used to manage the supply network immediately downstream from the retailers, taking responsibility for the whole process of sourcing product from low-cost countries, and subsequently managing the logistics of delivery to the retailers' main distribution centre.

The emergence of additional layers in the supply chains, such as intermediaries, is not a new trend, though, and has been documented as early as Alderson (1954, p.15), who, in his work entitled 'Factors Governing the

81

Development of Marketing Channels', identifies four fundamental reasons why it makes sense to introduce an intermediary into a distribution channel or chain of supply. His research reveals that intermediaries:

1.   Emerge as they increase the efficiency of the exchange process by adding time, place and possession utility;

2.   Enable the adjustment of the discrepancy of assortments by performing the functions of sorting and assorting. (e.g. where the assortment of goods and services held by the producer and demanded by the consumer differ channel intermediaries can sort, accumulate, allocate – i.e. break bulk, or assort – build up assortments of products);

3.   Act as marketing agents to make possible the routinisation of transactions;

4.   Facilitate the searching process by consumers and therefore reduce

- Selling Costs
- Transportation Costs
- Inventory Carrying Costs
- Storage Costs
- Order Processing Costs
- Accounts Receivable/Bad Debts
- Customer Service Costs.

As such, even though intermediaries add complexity to the overall supply chain, their use can add considerable value to supply chain actors.

4.6. Responsiveness in the UK Fashion Supply Chains

4.6.1. The Need for Quick Response

The 'danger' of describing fashion supply chains as beginning with the raw materials and ending with the customer, and, as a result, adopting a push-through distribution system approach (Hines, 2001) has been highlighted in Section 4.3. Lately, the pull supply chain concept has gained industrial adoption. It begins and ends with the customer. In the volatile, fast moving fashion environment, the adoption of the later approach is essential and supply chains should be viewed as demand driven by customers (Christopher et al.,

82

2004). Supply chains should be dynamic, efficient, effective, responsive 'networks' delivering customer requirements flexibly and on time (Hines, 2001).

Failure to adapt such a strategy in the fashion industry could incur huge risks. Christopher and Lee (2001) identified three forms in which these risks may come. Firstly, the financial risks could be huge. Inventory costs due to obsolescence, markdowns and stock-outs are significant. These risks are obviously higher for high fashion products. Their value deteriorates at an enormous speed and holding the wrong stock at the wrong time and not being able to react quickly to changes in demand could be disastrous. They further suggest that the complexities and uncertainties forces that threaten the clothing supply chains can also drive the 'chaos' risks of supply chains, resulting from overreactions, unnecessary interventions, second guessing, mistrust and distorted information throughout the supply chain. The 'bullwhip effect', an amplification of demand variability as we move upstream the supply chain, is an example of such chaos. All these lead to an inability of the supply chains to respond to changing market needs and customised preferences, as the market signals cannot be obtained. These are, ultimately, the 'market risks'. As a result, market sensitivity and high levels of agility are essential for companies operating in such volatile, fast moving environments.

Fashion supply chains are prototypical buyer-driven commodity chains, characterised by highly competitive, locally owned and globally dispersed production systems in which large retailers play the pivotal role in setting up decentralised production networks in a variety of exporting countries, typically located in the Third World (Gereffi, 1999). The retailers carry most of the risks and at the same time assume most of the benefits, but this all depends on the retailers' ability to control uncertainty in customer demand, manufacturing processes and supplier performance (Kilduff, 2000). In these chains profits derive mainly not from scale, volume and technological advances as in producer-driven chains, but rather from unique combinations of high-value market research, design, sales, marketing, financial services (Gereffi, 1999) and the use of accurate planning and control mechanisms that facilitate the rapid reconfiguration and synchronisation of the supply network. The companies that

83

develop and sell brand-named products have considerable control over how, when and where manufacturing will take place, and how much profit will be accrued at each stage. The main job of the core company in a buyer-driven commodity chain is to manage these production and trade networks and to make sure all the pieces of the business come together as an integrated whole (Gereffi, 1994). Thus, whereas producer-driven commodity chains are controlled by industrial firms at the point of production, the main leverage in buyer-driven chains is exercised by retailers through their ability to shape consumption via strong brand names and their reliance on global sourcing strategies to meet this demand (Tyler et al., 2006).

In order to provide the flexibility to quickly respond to consumer needs in this volatile industry, a series of technological innovations and business practices called Quick Response were initiated by the industry in 1985 (Hammond and Kelly, 1991). Ideally, a Quick Response system would enable the manufacturer to adjust the production of different styles, colours and sizes in response to retail sales during the season. This leads to increased responsiveness, which can be used to effectively substitute for fashion sense, forecasting ability and/or inventory required for operating under uncertainty (Richardson, 1996). The immediate objective is to reduce the cycle times and be able to produce as close to the consumers' needs as possible, decreasing risks and inventories at each stage of manufacturing and retailing operations (Sen, 2008).

A number of business practices are required for an ideal Quick Response system. In the logistics arena, just-in-time shipping policies with frequent and small lots, pre-ticketing and drop shipments are necessary. On the manufacturing side, flexible, short-run and high-speed processing, automated material handling and modular production concepts are commonly practiced by Quick Response manufacturers (Hunter, 1990).

A successful quick-response implementation also depends on substantial information sharing and coordination between the manufacturer and the retailer, which both would require an increased level of collaboration between the different players in the supply chain (Yu et al., 2001).

84

4.6.2. Collaboration

Due to the high level of consolidation that characterises the UK clothing retail sector, the supply chain power has shifted from apparel manufacturers to large and powerful retailers. The fewer but stronger vendors are in a position now to mandate favourable terms in their contracts with manufacturers involving price, services, delivery and products diversification and differentiation (Sen, 2008). Manufacturers are increasingly requested to present goods floor-ready, bar-coded and priced. Direct deliveries to individual stores, ratio-packed cross docking are also growing, and together these practices enable the retailer to save time and space on the warehousing and pre-retailing of goods. Barnes and Lea-Greenwood (2006) highlight that as the retailers' power in the supply chain is increasing, they are able to insist that manufacturers take additional responsibilities and are responsive to their needs, or they simply take business elsewhere. As well as lowering their costs, suppliers are under increased pressure to be more flexible and responsive to changing demand. This has manifested itself in the retailers pushing further responsibilities onto their suppliers, for example suppliers are now expected to carry out quality control, packaging, ticketing and are encouraged to do creative product development in a attempt to reduce cycle times further and be more responsive to consumer demand (Barnes and Lea-Greenwood, 2006). Reported additional services the retailers are expecting from their suppliers are supplier-managed inventory, up to full-fabric sourcing services and a permanent presence at the retailer's HQ (Palpacuer, 2002). As a result, collaborating with fashion retailers has led to suppliers having to work differently to become more consumer-responsive, but this had resulted in added costs for the suppliers (Storey et al., 2005).

Oxborrow (1999) states that it is possible that the UK suppliers are disadvantaged by being expected to supply these services with little recompense and within the agreed price per unit, when specialist processing companies are developing to supply similar added-value to imported goods at additional expense to the retailer or importer. Abernathy et al. (2000) highlight that although it is certainly true that a supplier gains from successful customers,

85

the degree to which such a company actually benefits has much to do with its internal manufacturing choices. A supplier that has done little to change its internal practices and lacks flexibility in its operations, may end up simply holding the retailer's inventory, for example. Alternatively, an adept supplier who substitutes information for inventory in planning, production and distribution may well share in the competitive advantages derived from better information on the true state of final customer demand.

The power imbalance between retailers and their suppliers in the buyer-driven fashion supply chains has led to previous studies reporting that feedback 'from apparel manufacturers and fabric suppliers to date shows a clear need for greater co-operation between the two sectors of the industry' (Haines, 1990), with Banning (1994) concluding that the relationship between the manufacturer and retailer for the past thirty years has been largely a matter of 'dog eat dog'. An EMAP UK Fashion Report (1998/1999) also concluded that the main dynamic holding the industry back is the largely adversarial relationship of manufacturers and retailers. This inhibits best practice and generates supply chain inefficiencies, which contribute to the lack of competitive edge (Jones, 2006).

The global nature of the fashion industry, furthermore, increases the need for close collaborative relationships between the different actors. Authors such as Flanagan and Leffman (2001) suggest that the risks associated with offshore sourcing can be mostly overcome if a high trust relationship is developed between the buyers and their suppliers or if the buyer establishes a presence in the country of manufacture to ensure standards are kept up. In the apparel industry, however, due to its low barriers to entry, the global garment manufacturing sector of the fashion industry consists of a huge number of low cost, highly developed apparel manufacturers able to provide the wide supply skill base required (Nordas, 2004). These are mostly SMEs, with a limited amount of power, from which the retailers can 'pick and mix' those able to respond to its continuously changing needs. There is overcapacity in the global apparel manufacturing industry and this has granted even more power to the fashion retailers (Speer, 2003).

86

In this context, the collaborative supplier relationships that might even have traditionally been described as 'long term' may be less applicable. Corbett et al. (1999) for example have already identified the difficulties in fostering close partnerships and developing close integration across the supply chain in such a regime.

As highlighted earlier, in the fashion industry the customer's appetite for variety, increased rates of product introduction, product proliferation and shortened product cycles have, in recent years, increased demand uncertainty, requiring retailers to respond much faster to rapidly changing and unpredictable markets (Jin, 2004). This has resulted in product specifications changing frequently during the development process, and these changes are not infrequent as the product nears the sales season and sealed samples are produced by suppliers (Kincade et al., 2007). This is when ranges are finalised and when fashion trends become clearer. These changes are costly and disruptive, as is found in all manufacturing sectors (Tyler et al., 2006). In such environments, numerous studies have emphasised the importance of integrating suppliers, manufacturers and customers (Frohlich and Westbrook, 2001; Clinton and Closs, 1997) across the supply network from the early stages of product development.

However, product development in the textile and clothing industry has long been characterised by functional independence, with each participant contributing to the process sequentially (Tyler et al., 2006). This is a practice which results in excessive costs and rework in production associated with late stage design changes (Hartley, 1990). A supply chain benchmarking study (Clothing World, 1996) reveals that product development was a major area for improvement in the apparel industry. It appears that time scales are too long, there is much wasted effort, and that communications between the different functions – design, production, marketing, sales are poor. Watson (1997) estimated that, on average, only 30% of the products developed actually find their way into the store, with product development cycles in the UK averaging 167 days. The manufacturing part of this is only 39 days, so the industry spends

87

a lot of time on non-value adding activities, and clearly, this has both a direct and indirect cost (Tyler et al., 2006).

In response to this, some clothing retailers and their apparel manufacturers have started collaborating in demand forecasting (Oxborrow, 2000). In general, buyers usually focus on sales forecasts, predicting consumers' reaction to fashion trends and demand for new product lines and promotions, while manufacturers emphasise the order forecasts, aiming at the achievement of efficient replenishment and optimum utilisation of production capacity. If these forecasts are done in isolation, which is commonplace, it could be difficult to get similar predictions of demand. Hence, stock-out and overstock would result (Au and Ho, 2002). Such examples of collaboration and process integration are, however, much more relevant to markets and products that lend themselves to easy forecasting. However, in an industry such as fashion, where the average product shelf life is four weeks the system's flexibility, responsiveness and synchronisation become much more important (Storey et al., 2005).

4.6.3. The Use of Information Technology

The synchronisation of activities along the supply chain will require the adoption of information technologies, such as bar codes and electronic data interchanges (EDI). EDI systems, which allow the tracking of customer demand in real time, are gaining increasing popularity as retailers are compressing their cycle times. Retailers can use these technologies to respond to demand variation, while procuring products at a cost low enough to make a profit. Real time sales information allows vendors to place frequent ongoing replenishment orders with delivery requested in as little as three days (Jin, 2004).

Furthermore, the global nature of supply chains in the apparel industry, together with the large number of product combinations identified by the SKU code in a season, require accurate planning and coordination and make effective communication between the different actors involved even more important (Haynes and Jones, 2006) but also more challenging. Highly developed communication and integrated tracing systems become essential to respond to

88

changing market demands in a timely manner. Utilising technology to assist in communication with manufacturers can contribute to quick response by allowing decisions regarding colour, fabric and shape to be delayed (Anson, 2002). The later these decisions are made, the more likely they are to accurately reflect consumer preference (Christopher, 1992), which is critical in such a fast moving environment (Barnes and Lea-Greenwood, 2006). Forza and Vinelli (1997) further highlight the fact that in the clothing industry the order management cycle seems to be a fundamental process in which the need for information integration between actors involved both upstream and downstream in the value chain system is growing and in which the new telecommunication services are beginning to be used effectively.

Furthermore, responsiveness could be greatly enhanced by the adoption of computerised systems that can aid in the reduction of the time required for designing products. Computer-aided design (CAD) systems are recently being used for such reduction efforts. Besides reductions in the actual design time, CAD systems also reduce the time for making the pattern and enable electronic storage of the design, which makes later modifications and communication easy (Blackburn, 1991). Recently emerging product lifecycle management (PLM) technologies are targeting to improve communications throughout the supply chain during the product development process. The primary benefit of these new technologies is to shorten the concept-to-production cycle time (Cavinato et al., 2006).

Therefore, the image of the apparel manufacturing industry as entirely low-tech is false. While the entry barrier of apparel production tends to be low compared to other industries, it requires the highest level of information management technologies (Jin, 2004). Their adoption becomes a prerequisite to agility in the fashion industry (Christopher et al., 2004).

4.7. The Research Question

The above sections have focused on introducing key developments in the UK fashion sector. They mainly highlighted the fact that the main challenge the

89

fashion retailers are currently facing is to increase their market sensitivity and ensure product availability while keeping their product obsolescence low. Given the need for speed and agility in this industry, the time expansion of the supply chain implied by global sourcing is not only undesirable, but results in an erosion of competitive advantage. However, in the last few years there has been evidence to suggest that UK high street fashion retailers have overcome the barriers of global sourcing in achieving speed to market. However, even though extensive research has been conducted on various aspects of mass customization in both apparel and other industries (Duray, 2002; Lee et al., 2002; Ulrich et al., 2003), much of this research focused on consumer acceptance of the strategy and not on operational issues (Frutos et al., 2004; Loker et al., 2004).

At the same time, the existing research fails to explore the full inter-organisational impact of supply chain agility on the supply chain by focusing on a single plant or firm as the unit of analysis. Stevenson and Spring (2007) highlight the fact that authors in the wider Operations Management field have acknowledged the benefits to be gained by companies that treat the supply chain as a single entity, compete as a chain and focus on satisfying end-customer demand (Tan et al., 1998; Croom et al., 2000; Hill and Scudder, 2002), leading to the belief that the unit of analysis for researchers should be the supply chain or the network (Harland et al., 1999; Frohlich and Westbrook, 2001; Van Hoek et al., 2001; Cousins, 2002). However, the number of studies taking a network perspective and aiming to develop a more complete understanding of supply chain agility is limited (for some notable exceptions see Golden and Powell, 1999; Gosain et al., 2005; Krajewski et al., 2005), and none specifically addresses the UK fashion sector.

As such, using the agile supply chain management practice framework developed in Chapter 3 and using the whole network as a unit of analysis, the research question that this thesis sets to answer is:

How do companies operating in the UK fast fashion market sector achieve high levels of agility?

However, in light of the characteristics of the fashion retail market and supply chain practices that have been introduced in this chapter, there are some aspects that require consideration.

4.8. Challenges to Answering the Research Question

4.8.1. Globalisation as a Barrier to Agility in the Fashion Industry

Developing agile, demand driven networks able to constantly adapt to changes in the market place is becoming difficult with the continuous shift of garment and textile manufacturing away from the UK to low-cost production locations such as South-East Asia, Eastern Europe, Central America, Northern Africa, etc. Retailers now have access to a much larger supplier base, offering not only low labour costs, but also a highly skilled work force and proximity to developed textile industries (Buxey, 2005).

However, previous studies have highlighted that the major trade-off in global sourcing is between the responsiveness of the supply chain and its cost efficiency. Agility is very difficult to achieve as far as global sourcing is concerned (Jin, 2004). Given the need for speed and agility in the fashion industry, time expansion of the supply chain is not only undesirable, but results in an erosion of competitive advantage and, as such, the significance of technological developments as a means by which both cost benefits and time gains can be achieved has been the subject of much recent literature (Perry and Sohal, 2000; Birtwistle et al., 2003; Christopher et al., 2004). Christopher et al. (2004) furthermore, caution that there may exist hidden risks associated with offshore suppliers, such as unstable exchange rates and inflexibility, which can ultimately affect the efficiency and effectiveness of fashion supply chains

The dilemma is that global sourcing can reduce the production cost, but cannot simultaneously ensure agility. Therefore, apparel manufacturers need to establish strategies that optimally mix global sourcing and domestic sourcing to achieve agility and cost benefit simultaneously. Jin (2004) notes that in a lean

91

retailing world, agility, the ability to respond quickly to changing customer needs, has become a critical factor in sustaining a competitive advantage. Lean retailing makes manufacturing firms that utilise a global sourcing strategy face the dilemma of balancing the benefits of cost effectiveness with the benefits of agility. That is, by sourcing globally, firms can reduce production costs, but may not be agile enough to meet retailers' needs on a timely basis.

Figure 4.1. has illustrated that the apparel products have varying levels of fashion content, which will determine their season length. This will ultimately impact on where retailers and, further up the supply chain, their manufacturers and fabric providers, will source their products from. At one end, for basic products, with longer shelf lives, the physical costs are likely to represent a major part of the total potential costs. Like most of the labour-intensive industries, a natural choice of production venue is the developing or underdeveloped countries, where wages are substantially lower (Sen, 2008). Due to the long replenishment times, Subrahamayan (2000) highlighted that initial orders constitute anywhere between 60% to 100% of the total order in a given basic product category, leading to large inventory holding costs. At the other extreme, for high fashion products with much shorter life cycles and higher market mediation costs, the retailers will seek responsiveness when making their sourcing decisions. This will give domestic manufacturers a huge advantage (Sen, 2008).

As such, companies operating in the fashion sector may use a combination of domestic and overseas sources of supply, which would allow them to provide a customised response to the needs of the marketplace. However, this would dramatically increase the complexity of their supply networks, which might affect the extent to which the agile supply chain practices identified in Chapter 3 have been adopted.

4.8.2. Network Complexity as a Barrier to Agility in the Fashion Industry

In search of the right set of skills and cost saving opportunities, the sourcing network of clothing retailers is now spread over a large range of countries and

regions. Corroborated with the rapidly reconfigurable nature of the clothing supply networks and arm's length relationships discussed in the previous sections, this raises the particular issue of complexity in the fashion supply chains and its possibly negative impact on managing the supply network and fostering collaboration and information exchanges between the network players.

The literature supports the view that the more complex the supply chain, because of the large number of different suppliers used in a global sourcing context, the less adaptable it becomes. While a larger and more varied supply network may be sought to improve the product range dimensions of agility, this leads to increased complexity which is counter to improving supply agility and other aspects of supply performance (Milgate, 2001; Prater et al., 2001). The shift to offshore sourcing, according to Ohmae (1989), is a necessity born from the ongoing need for cost management (Doyle et al., 2006). However, in doing so, the supply chain, while benefiting from advantageous cost structures, becomes increasingly complex to manage, not least in respect of supplier selection, evaluation and management (Vokurka et al., 1996; Doyle et al., 2006; Cebi and Bayraktar, 2003). Prater et al. (2001) highlighted the fact that international supply chains are now complex, dynamic systems that are subject to large time-lags and variability in delivery. Complexity may also arise here from physical distances. Long distances usually increase transportation and order lead times (Stank, 1999) and decrease the reliability of demand forecasts (Ho, 1992). This, in turn, increases the uncertainty with respect to production schedules, orders to suppliers, and the likelihood of meeting demand (Swenseth and Buffa, 1991).

In Chapter 3, the importance of process integration to enhance agility was highlighted. Controlling the interface between textile suppliers, offshore manufacturers and domestic retailers goes beyond mere logistics management, adding complexity to otherwise discrete firm specific activities (Taplin, 2006). Highly complex logistical networks potentially imply that more resources and effort are required to synchronise and coordinate activities within the network (Meepetchdee and Shah, 2007). And as greater levels of coordination and more information and business processes for decision making will be required, this

93

also implies higher costs under higher complexity (Meepetchdee and Shah, 2007).

Some authors have advocated a range of approaches to solving this issue, for example focusing on reducing supply complexity by restructuring the supply chain (Prater et al., 2001; Hoole, 2005), trying to manage it better (Meijboom, 1999) which might require the implementation of costly coordination mechanisms (Prater et al., 2001), or simply trying to avoid it altogether (Christopher, 2004). However the geographic separation of the supply chain elements, increasingly prevalent in international operations, and the very wide network supplier base required, may challenge these approaches. It follows that the supplier network complexity in this industry presents a series of problems that might impact on supply chain performance, particularly collaboration and communication between the network players. Indeed even before widespread off-shoring in the fashion industry became apparent, studies reported, as highlighted earlier on, that this was already a major issue in the industry.

Prater et al. (2001) conclude that in supply networks exposed to a high level of vulnerability, their inherent complexity essentially limits the degree of agility that they can and should attempt to achieve. While some previous research deals with complexity issues pertaining to general logistics (Harland, 1996; Lamming et al., 2000; Choi and Hong, 2002; Danese et al., 2004), the results of that research are not always applicable to planning an agile international supply network.

It follows that in order to be successful in the market place, fashion retailers have either opted to reduce the level of complexity and uncertainty of their supply networks, or identified mechanisms through which they can increase their speed to market while managing increasingly complex, global networks.

4.9. Summary

The role of this chapter was to provide an overview of the UK fashion sector and supply chain management practices that have been adopted by the sector. The main research question was also introduced here ('*How do companies operating in the UK fast fashion market sector achieve high levels of agility?),* as well as some of the challenges anticipated in answering it, such as the fact that the sector is characterised by extensive globalisation and high levels of supply networks complexity, which have been previously reported as acting as a barrier to agility.

The following chapter provides an overview of the methodology adopted in order to answer this thesis' research question.

Chapter 5 Research Methodology

5.1. Introduction

This chapter has four purposes. First, it reviews the strengths and weaknesses of research paradigms considerations in general. Secondly, it puts forward an argument as to why the selected research strategy and data collection methods have been perceived as the most suitable for this research. The third purpose is to explain in detail the data collection procedures. Finally, the potential limitations and the overall validity of the research methodology that was adopted are discussed.

The purpose of this thesis is to explore, understand and explain the agile supply chain management practices adopted by companies operating in the global fashion sector in order to improve their speed to market. It is therefore essential to adopt research methods and supporting philosophical approaches that facilitate the production of comprehensive results that will be both useful to business policy-makers and 'interesting' to academics (Davis, 1971). Tranfield and Starkey (1998, p.347) describe this as a Mode 2 knowledge-production study where '*knowledge is produced in the context of application, with the intention of allowing dissemination and exploitation',* whilst maintaining scholarly quality and relevance (Whitley, 1984; Pettigrew, 1996; Huff, 2000).

5.2. Research Paradigm

Guba and Lincoln (1994) consider that the term 'paradigm' is used loosely in academic research and can lead to confusion because it tends to have multiple meanings. Colin and Hussey (2003), for example, consider that the term paradigm refers to the progress of scientific practice based on people's philosophies and assumptions about the world and the nature of knowledge. It should indicate the researcher's philosophical assumptions and positioning and the way in which research should be conducted (Hussey and Hussey, 1997). The definition used in this research is that a paradigm is a way of examining

social phenomena from which particular understandings of this phenomenon can be gained and explanations attempted (Saunders et al., 2007).

In social science research, a broad spectrum of research paradigms have been identified, differentiating between positivism, post positivism, critical theory and constructivism (Guba and Lincoln, 1994), ethnography, etnomethodology and scientific (statistical) paradigms (Bailey, 1994) or radical humanist, radical structuralist, interpretative and functionalist (Burrell and Morgan, 1979).

In business management research, a more basic approach has been adopted, distinguishing between the positivist and phenomenological paradigms (Hussey and Hussey, 1997), referred to by Easterby-Smith et al. (1991, p.28) as *'the two main traditions'*. Throughout the centuries, positivism has enjoyed great successes, but critics have surfaced to question its validity in numerous occasions (Lincoln and Guba, 1985). This has led to what Tashakkori and Teddlie (1998) termed 'the paradigm wars'.

The positivistic paradigm is based on the assumption that both social and natural words are bounded by certain fixed laws in a sequence of cause and effect (Collis and Hussey, 2003) and the researcher should focus on facts, formulate hypotheses and then test them. Only phenomena that you can observe will lead to the creation of credible data (Saunders et al., 2007). The preferred method used is the operationalisation of concepts, so that they can be measured. As a result, it tends to produce quantitative data and mainly uses large samples. Goles and Hirschheim (2000) consider that positivism can be summarised as being based on five pillars:

1. Unity of the scientific method, meaning that the accepted approach for knowledge acquisition (the scientific method) is valid for all forms of enquiry.

2. Search for Humean casual relationships, reflecting the desire to find regularity and casual relationships among the elements of the study. The process used is based on reductionism, where the whole is further and further reduced to its constituent parts;

3. Belief in empiricism, referring to the strongly held conviction that the only valid data is that which is experienced from the senses;

4. Science (and its process) is value-free, reflecting the belief that there is no intrinsic value proposition in science;

5. The foundation of science is based on logic and mathematics, providing a formal basis for quantitative analysis and an important weapon in the search for casual relationships (Goles and Hirschheim, 2000).

On the other hand, the phenomenological (anti-positivist) paradigm is based on the belief that the world is socially constructed and subjective, and understanding it is best achieved by analysing subjective accounts of a situation or a phenomenon. As a result, the researcher should look at the totality of each situation in order to understand the phenomenon under study. Phenomenological studies tend to produce qualitative data using small samples investigated in-depth over time. They orient the researcher toward the depth and detail that can be appreciated only through an exhaustive, systematic, and reflective study of experiences as they are lived and are concerned with generating theories (Sokolowski, 2000).

Furthermore, a growing number of authors (Willmot, 1993; Blau, 1996; Frost, 1996; Goles and Hirschheim, 2000) highlight that adoption of a single perspective leads to a narrow view which does not reflect the multi-faceted nature of social, organisational and phenomenological reality. These authors argue that there are strengths and weaknesses in both the positivist and anti-positivist paradigms and point out that the conflicting positions have achieved a state of coexistence (Tashakkori and Teddlie, 1998). This new position is grounded in the philosophical school known as 'pragmatism' and rests on the assumption that researchers should use the philosophical and/or methodological approach that works best for the particular research program under study (Tashakkori and Teddlie, 1998). As such, pragmatists fall somewhere in between positivists and anti-positivists.

To help differentiate between research paradigms, Goles and Hirschheim (2000) suggest four perspectives for examining their assumptions:

98

- Ontology (the nature of reality);
- Epistemology (the acquisition of knowledge
- Assumptions about human nature
- Methodological assumptions

This is consistent with work by Burrell and Morgan (1979) and Collis and Hussey (2003).

These perspectives are casually linked. Bryman (2001), for example, highlights that the differences in epistemological and ontological assumptions underpinning the positivist and anti-positivist paradigms consequentially led to differences in the research methods with which they are associated. As a result, writers such as Kuhn (1970), who emphasise epistemological issues, have depicted quantitative and qualitative research as based on incompatible principles, and therefore as not capable of being combined.

With the rise of pragmatism, however, other authors, such as Teddlie and Tashakkori (2003), argue that the incompatibility thesis between the two paradigms has now been largely discredited. Maxcy (2003, p.79) suggests that pragmatism '*seems to have emerged as both a method of enquiry and a device for the settling of battles between research purists and more practically minded scientists*'. As such, pragmatism tends to denote a no-nonsense practical approach to research (Bryman, 2001) and the choice of methodology should be guided by the research questions posed. Teddlie and Tashakkori (2003, p.457) capture these views by stating that:

'*The selection of adequate methods should not be made on the basis of sympathies towards a certain methodological camp or school. Methods are tools for the answering of research questions and not vice versa*'.

The methodological assumptions on which the three paradigms are based have been summarised in Table 5.1.

99

	Positivism	Pragmatism	Anti-positivism
Ontological assumptions	Reality is external to the individual. It is a 'given' (**Realism**)	The individual is not committed to any one system of reality (**Critical realism**)	Reality is interpreted by the individual. It is socially constructed (**Nominalism**)
Epistemological assumptions	Researchers should focus on empirical evidence and hypothesis testing, looking for fundamental laws and casual relationships.	The process of acquiring knowledge is a continuum, rather than two opposing and mutually exclusive poles of objectivity and subjectivity.	Knowledge is relative. Researchers should focus on meaning and examine the totality of a situation.
Axiological assumptions	Research should be value-free and researchers should stand as neutral observers. Personal values and theoretical learnings should be minimised. Internal and external validity of the research performed is essential.	An individual's values play a significant role in research. Values are relevant and important only insofar as they influence what to study and how to do so.	Research is bound by the researcher's values. Biases and subjectivity are acknowledged, arguing that the alternate perspectives generated by this approach offer a more accurate reflection of a complex and multi-faceted reality.
Methodological Assumptions	Quantitative. Deductive, testing of theory. Large samples. Research techniques: - cross-sectional studies - experimental studies - longitudinal studies - surveys - mathematical modelling - simulation	Depending on the research questions.	Qualitative. Inductive, generation of theory. Small samples investigated in depth over time Research techniques: - action research - case studies - ethnography - feminist perspectives - grounded theory - hermeneutics - participative enquiry

Table 5.1. Differences between Positivism, Pragmatism and Anti-Positivism (Adapted from Burrell and Morgan, 1979; Goles and Hirschheim, 2000; Collis and Hussey, 2003).

In the field of Supply Chain Management, quantitative studies based on the positivist paradigm dominate the field, although qualitative approaches are increasingly being adopted. Sachan and Datta (2005), in a review of 442 papers published from 1999 to 2003 in three leading academic journals found that quantitative research methods such as survey, mathematical modelling and simulation have been used in over 57% of the articles published, compared to 22% using the interview and case study as the main research techniques . This gap has been previously highlighted by Dunn et al. (1994) and Mentzer and Kahn (1995). They have also highlighted that although Supply Chain Management is concerned with integrating all firms in the value chain and treating them as a single entity, the number of empirical studies approaching research at inter-organisational level is very limited, but slowly growing. One of the reasons for this has been the fact that research in the field of SCM has mainly taken a positivist approach, which assumes that the whole is equal to the sum of its parts. At the same time, Supply Chain Management is based on 'systems thinking' and assumes that the whole differs from the sum of its parts due to synergy effects (Sachan and Datta, 2005). As such, there are underlying contradictions between the discipline and the research methods employed.

Further criticism of the positivistic approach revolves around the views that the complexity of the world makes positivist precision impossible and even undesirable (Dow, 1996), so it is inappropriate for complex and ill defined issues, it is past, not future oriented and only provides 'snapshots', not a wide canvas, and overemphasises the testing of already established theories and ideas. In fact, many have argued that paradigmatic unity (e.g. positivism dominance) is done at the expense of research variety and a deeper understanding of the real context and situation (Benbasat et al., 1987; Collis and Hussey, 2003; Becker and Niehaves, 2007).

'The objectivity provided by quantification in the rationalist methods can be a hindrance in the attempt to build theory because a qualitative understanding of the quantified factors is still required for theories to be accepted by others in and outside the field. But a major conclusion here is that these alternate research methods are not mutually exclusive and, if combined,

can offer even greater potential for enhancing new theories than either method alone' (Meredith, 1998, p.442).

Holliday (2002) argues that one does not begin by choosing a method. Methods can be sufficiently flexible to grow naturally from the research question, and in turn from the nature of the social setting in which the research is carried out. As a result, this research adopts the 'pragmatistic' view and believes that '*different types of research problems require different solutions in terms of research approach and choice of method'* (Frankel et al., 2005, p.185).

Therefore, based on this point of view and taking into account the research question formulated in Chapter 4, a multiple case study approach is adopted in this study. The choice of this approach was not pre-determined due to the author holding an anti-positivistic view point. Rather, it was chosen because the author believed that this approach would work best for this particular research. The rationale for choosing this approach is discussed in detail in the following section.

5.3. Case Study Methodology

Burgess et al. (2006,) using Wacker's (1998) classification scheme, suggest that research methods can be broadly divided into two groups: analytical and empirical. Analytical research methods primarily use logical, mathematical and / or mathematical - statistical methods, while in the empirical research major classification, the methodology must use data from external organizations or businesses to test if relationships hold in the external world (Wacker, 1998). Empirical research methods could be classified more correctly as 'real world' empirical methodologies. Analytical methods are further categorized as conceptual, mathematical or statistical, while empirical methods include experimental design, statistical sampling or case studies (single or multiple). These have been illustrated in Table 5.2:

In this thesis, the first stage of the research is the development of a conceptual framework, which is developed using the existing conceptual literature in the field of operations management, logistics and supply chain management, and

secondary case examples. As such, it is analytical and deductive in nature. In the second stage, empirical research is conducted in order to inform the conceptual model presented in Chapter 3, and also gain insights into agile supply chain management practices in a global context. As a result, this research integrates both the analytical and empirical research approaches.

		Types of research included	Importance to operations management theory building
Analytical research	**Conceptual**	Futures research scenarios, introspective reflection, hermeneutics, conceptual modelling	Develops new logical relationships for conceptual models of theory
	Mathematical	Reason / logical theorem providing, normative analytical modelling, descriptive analytical modelling, prototyping, physical modelling, laboratory experiments, mathematical simulation	Explores the mathematical conditions underlying the relationships used in theory-building
	Statistical	Mathematical statistical modelling	Integrates the other five methods into a single theory for empirical investigation
Empirical research	**Experimental design**	Empirical experimental design, descriptive analytical modelling	Tests and verifies casual relationships between variables
	Statistical sampling	Action research structured and unstructured research, surveying, historical analysis, expert panels	Tests the theory by investigating statistical relationships to verify their existence in larger populations
	Case studies (single or multiple)	Field studies, case studies	Tests and develops complex relationships between variables to suggest new theory.

Table 5.2. Analytical and Empirical Research (Adapted from Wacker, 1998)

In choosing the type of empirical research to be conducted, a multiple case study methodology was deemed most appropriate, after reviewing all three empirical research approaches at the start of the research project.

'Experimental design' was quickly dismissed because it would be impossible for the author to control certain variables in an open system in which the companies under study operate. Purely questionnaire based 'statistical sampling', involving a large group of companies, was also rejected because it would lack sufficient depth, particularly in such a new area of study such as agile supply networks (Edwards et al., 2001). There are also other drawbacks to statistical research such as model limitation, the possible omission of crucial variables, the abstract and remote character of key variables, the casual complexity of multivariate analysis, and the difficulty in understanding, interpreting and especially implementing the results of studies (Bonoma, 1985; Meredith, 1998).

'A case study examines a contemporary phenomenon within its natural settings and the boundaries between the phenomenon and context are not clearly evident' (Yin, 2003, p.23). The case study represents a specific tradition within the qualitative research paradigm (Creswell, 1998) and attempts to arrive at a comprehensive understanding of the event under study but at the same time to develop more general theoretical statements about regularities in the observed phenomena (Fidel, 1984). Because case studies are intended to take the reader of the research into the world of the subject, case studies can provide a much richer and more vivid picture of the phenomena under study than other, more analytical methods (Marshall and Rossman, 1999). Yin (2003) argues that case study research is particularly suitable for exploring 'why', 'what' and 'how' research questions and examines contemporary events, and this is one of the main reasons why it was adopted for this thesis. Wacker (1998) considers that empirical case studies provide new conceptual insights by investigating individual cases for an in-depth understanding of the complex external world, while empirical statistical research methodologies verify models for their empirical validity in larger populations to reduce the number of relationships in future research. Meredith (1998) and Voss et al. (2002) put emphasis on the fact that case studies include the richness of their explanations, having validity with practitioners and their facilitation of theory testing, extension and refinement.

Benbasat et al. (1987) also indicated that case research is very appropriate for those problems in which research and theory are at their early, formative stage, the variables are still unknown and the phenomenon is not very well understood. Strauss and Corbin (1990) and Yin (2003) argue that the purpose of the case study approach is not to generalise findings into predictions about a population but to ground the development of theory in empirical observations and further refine it through the test of reality.

Supply Chain Management has long been acknowledged as an area in which researchers often find themselves trailing behind practitioners. Thus, the case study research strategy is well-suited for capturing the knowledge of practitioners and developing theories from it (Meredith, 1998).

To sum up, there are four main reasons why this research adopted the case study approach:

- Agile Supply Chain Management in a global context is poorly understood from an academic perspective and few studies have been conducted in it. Case study research can provide in-depth insights into it.

- The research question formulated in Chapter 4 is exploratory and explanatory in nature, a 'how' question, and the case study approach is most suitable for answering it

- A qualitative study of companies operating in a dynamic, global environment will allow a closer exploration of the issues identified and the development of theoretical and practical insights into the research issues, underpinning the belief that knowledge and our understanding of it is socially constructed (Berger and Luckmann, 1966; Gergen, 1999).

- Due to the characteristics of the UK mass fashion sector, with a few very large retailers and many small independent manufacturers, mainly located overseas, a small response rate was anticipated with regard to a mail survey. This assumptions was confirmed during the case sampling period of the research, when overseas suppliers proved very reluctant to sacrifice time for the purpose of this research. The characteristics of the UK mass fashion retail sector discussed in the previous chapter also meant that there is a limited number of large retailers that could participate in the study.

In addition, although a single in-depth case study with a major UK fashion retailer has been considered, it was quickly rejected as providing too narrow an understanding of agile supply chain management practices. A single case study would also have more potential for bias as a result of, for example, exaggerating easily available data. After careful consideration, a two case-study research design was decided upon, with various companies across the two supply chains, in order to gain both the sufficient research depth and width. At the same time, multiple cases research is considered more compelling and the overall study more robust (Yin, 1994) as they have higher external validity and help guard against observer bias (Voss et al., 2002; Yin, 2003).

Authors also caution that there are disadvantages to choosing a case study methodology and much of its criticism is related to validity and reliability (Voss et al., 2002; Yin, 2003). Related to its validity, authors such as Gill and Johnson (2002) and (Saunders et al., 2007) distinguish between external validity, internal validity and construct validity.

- *External validity* is important when considering the rigor of the case study and is called 'transferability' by some researchers (Marshall and Rossman, 1989; Creswell, 1994; Stuart et al., 2002). It reflects the extent to which any research findings can be generalised or extrapolated beyond the immediate research sample or setting in which the research took place Gill and Johnson (2002). As opposed to statistical generalisation, Yin (2003) argues that case studies rely on 'analytical' generalisation, which requires the researcher to generalise a particular set of results to some broader theory.
- *Internal validity* reflects whether or not what is determined as the cause or stimuli actually produces what has been interpreted as the effects or responses. Yin (2003) considers that internal validity is a concern to explanatory case studies only, where the researcher is trying to demonstrate weather there is a casual relationship between the independent variable and the dependent variables.
- *Construct validity* reflects the extent to which the measurement questions actually measure the presence of those constructs they seek to measure.

It refers to the establishment of the proper operational measures for the concepts being studies.

- *Reliability* is the extent to which a case study's operations can be repeated with the same results. Gill and Johnson (2002) consider that it should be possible for another researcher to replicate the original research using the same subjects and the same research design under the same conditions.

Based on the work of Yin (2003) and Trochim (2002), Table 5.3. summarises the tactics adopted in this research in order to assure validity and reliability.

5.4. The Unit of Analysis

Yin (2003) argues that there is a need to delimit the scope of a case study by identifying the 'unit of analysis'. The key issue in selecting and making decisions about an appropriate unit of analysis is to decide what it is that the researcher wants to be able to say something about at the end of the study (Grünbaum, 2007). As such, the unit of analysis defines the boundaries to which the research variables or phenomena under study and the research problem refer, and reflects which data is collected and analysed (Collis and Hussey, 2003). The unit of analysis for case study research can be an organisation, a department or occurrence (Voss, 2002; Yin, 2003), but also social entities, such as social groups, communities or organisational events (Hakim, 1987).

To answer the research question posed in Chapter 4, agile supply chain management practices were sought to be investigated at different stages along the supply chain, to reflect the impact that the environment in which the companies under investigation operate has had on the supply chain management practices adopted. The choice of companies in different tiers of the supply network is a common choice in studies of network management practices (Choi and Hong, 2002). The starting point, as a unit of analysis, for this research was the 'fashion retailer'. Further investigation of upstream suppliers allowed a more in-depth understanding of how the retailer interacts with the other parts of the system and the impact this has had on their behaviour. This is an industrial systems approach, in which the ultimate goal of

the researcher is an understanding and conceptualisation of how the whole works together.

Test	Tactics	Approach within this Research
Construct validity	Use of multiple sources of evidence (Yin, 1989; 1994)	-Semi-structured interviews performed within 2 supply networks (7 companies in total) -Sources included a wide range of actors within the supply chain -Use of secondary data: company reports, presentations, media reports -Interviewing different respondents about similar or identical aspects to eliminate biases
	Have key informants review draft case study report (Yin, 1989; 1994)	-Interview transcripts verified by interviewees -Case study reports reviewed by case companies -Data examined by PhD supervisors -Dissemination of initial research findings
	Pattern matching (Trochim, 2002b)	-Continuous comparison between initial research findings and conceptual model -Pattern matching in between cases
	Establish a chain of evidence (Yin, 1989; 1994)	-Using evidence from previous research and own findings to refine the overall line of enquiry -Following the line of enquiry from the research question to specific evidence and results, as proposed by Yin (2003) -Research findings reported at academic workshops, industrial seminars, international conferences and peer reviewed journals, which allowed for evaluation of the clarity and logical flow of ideas presented
Internal Validity	Pattern matching (Yin, 2003)	As illustrated above
	Explanation building (Yin, 2003)	-Explanations of phenomena as the research progressed upstream the supply chain -Conference publications, academic workshops and industrial seminars for feedback
	Prolonged engagement in research (Lincoln, 1985)	-Sufficient time was invested to understand the 'basics' (desk research, participation at industrial seminars, presentations at academic conferences) -Field work took place over one year
External Validity	Use replication logic in multiple-case studies (Yin, 1994; 2003) Verify patterns	-Use of multiple-case studies: 2 case networks were studied, including 7 companies in total - A conceptual model was developed at the literature review stage, which was then used as a template for analysing the similarities and differences between the cases
Reliability	Use case study protocol (Yin, 2003)	-A research protocol was developed (Appendix 1), piloted and then used throughout the course of this research
	Develop case study database (Yin, 2003)	-Establishment of Case Company database, including case study notes, interview transcripts, company documents, presentations, media reports

Table 5.3. Case study tactics for quality of research design (Adapted from Yin (2003) and Trochim (2002))

As such, two cases of two fashion supply networks were chosen to be investigated. Within these networks, cases of UK mass fashion retailers were followed by a study tour of some of their overseas suppliers located in China and Romania, as these two global industry clusters were identified as preferred sources of supply by the retailers interviewed at the early stages of this research.

5.5. The Case Research Protocol

Using the framework of agile supply chain management practices developed in Chapter 4, a research protocol was developed, to be used for case study selection, data collection and analysis (Appendix 1). The three core clusters of practices that emerged from the literature review provided a framework for structuring the interviews. These were Market Sensitivity, Flexible Sourcing and Process Integration.

Initially, the case protocol was designed as an interview guide containing a series of 65 open- and close-ended questions that stretched over 6 A4 pages. To test the protocol developed, feed-back was sought from both academics and practitioners. Consultations were initially conducted with academics belonging to the organisation that the researcher was part of, following a short presentation and a focus group discussion. Additional feed-back was received during an international conference for which the framework of agile supply chain management practice was developed into a paper. Minor alterations were required, such as the inclusion of a RACI (Responsible, Accountable, Consulted and Informed) project governance model in order to control the research quality.

The refined protocol was then further tested through a pilot case study with a mass fashion retailer. During the pilot interview specific attention was placed on the practicalities of using such a long list of questions as a case protocol. It was found that, in order to allow a logical flow to the discussion with the interviewees, a one page Case Study Protocol would allow the researcher to follow the discussion more closely and just prompt the interviewee in the right direction, rather than ticking through the long list of interview questions initially

developed. This gave the researcher the flexibility of asking new questions that followed up interviewees' replies and vary the order of questions and even the wording of questions as seen fit. As a result, the Case Study Protocol was refined to a single page protocol, attached in Apendix 1.

5.6. Development of Interview Facilitation Skills

Conducting interviews with industrial practitioners must be one of the most daunting tasks for any new researcher. As Kvale (1996) suggests, the interviewer needs to be knowledgeable, structured, clear, gentile, sensitive, open, steering, critical remembering and interpreting, as well as balanced and ethically sensitive. It requires versatility, an ability to be non-judgemental and enough self-awareness to be able to temporarily set aside one's own preconceptions. Being able to think on your feet is also essential, as well as coping with being watched by academic supervisors and industrial practitioners while doing it. In order to help with the development of this long set of skills, the researcher took part, initially, in a series of training workshops on 'Qualitative Interviewing Skills' offered by Glasgow Caledonian University. These training sessions were followed up by role playing sessions with the research supervisors, as well as taking part, as note taker, in interwiewes conducted by more experienced academics in the university as part of their own research. However, developing as a proficient interview facilitator was an on-going process throughout this research, and it required a very steep learning curve. The interviews which needed to be followed-up by phone calls and e-mails, as some issues failed to be clarified during the face-to-face stage, were not few and far between to start with, but they became more rare as the research progressed. As C.S. Lewis (1950) said:

'Experience: that most brutal of teachers. But you learn, my God do you learn'.

5.7. Case Sampling Strategy

To answer the research question, it was essential to select representative case studies. Unlike survey design, case study research focuses on selecting units of analysis on the basis of theoretical rather than statistical reasons (Miles and

Huberman, 1994; Yin, 2003). According to Strauss and Corbin (1990, p.187), the choice of companies should be driven by the researcher's desire to *'maximise opportunities to verify the story line, the relationship between categories and for filling in poorly developed categories'*. At the same time, referring to the process of selecting cases, Pettigrew (1997, p.274) state that *'there is an intentional or design component in the process of choosing and gaining access to research sites, but the practicalities of the process are best characterised by the phrase 'planned opportunism''*. This is an honest assessment of the approach to case selection for this research. Thus, a purposive sampling strategy was adopted, which also enabled the adoption of a snowball effect, making it possible to gain access from one critical case study participant to another.

One first aspect in the process of selecting case studies is the extent to which the cases should be pre-selected at the start of the study. The case selection choice facing a researcher is, at one extreme, to define in advance every specific organization to be studied and to conduct the studies either simultaneously or sequentially. At the other extreme is the alternative of selecting only the first case, which is completed before selecting the second, and so on. This second option has the advantage that important but unforeseen features of each successive case are allowed to steer the course of the study. The data collection is thus controlled by the emerging theory. This was the method chosen for this thesis, with UK retailers selected first, as the literature review revealed that in fashion supply chains they are the most likely network coordinators. Following an initial analysis of these two case study participants, trails of evidence were followed sequentially up the value chain with studies of garment suppliers, accessories manufacturers, textiles finishers and printers and trade intermediaries.

Miles and Huberman (1994) acknowledge the advantage of such flexibility, but point out that research designs which are too 'loose' can be unfocused and unmanageable. At the same time, designs which are too unstructured run the risk of leading nowhere, particularly when there is no clear conceptual framework. Miles and Huberman (1994) suggest that both extremes should be avoided. To reduce these risks, the approach of this research has been to

provide a common analytical framework and a clearly defined question. As will be shown further on, the approach was successful in that, in practice, early findings had important consequences for the selection of later case study participants.

5.8. Case Selection

For external validity, two supply networks were sought to be investigated, allowing for agile supply chain management practices to be explored at different stages along the supply chain. Following the typical structure of clothing supply chains introduced in Chapter 4, cases of fashion retailers, garment manufacturers and textile suppliers were initially sought to be performed. Further, previous studies such as Popp (2000) suggest that as a result of the increasing globalisation within the fashion industry, in many fashion chains so called agents or intermediaries (often import or export agencies), are very frequently encountered, acting as a significant figure within the chain. The increasing use of trading agents was also highlighted during the initial case studies with fashion retailers, and, as a result, a further case study with an intermediary was sought.

In chosing the total number of companies to be investigated in order to ensure external validity, Eisenhardt (1989) highlights that there is no ideal number of cases, but a number between four and ten cases is recommended. Ellram (1996) supports this and argues that in most conditions six to ten cases should provide enough prevailing evidence. Perry (1998) considers that due, to the constraints of time and funding in postgraduate research, a recommended range is extremely useful. Through a review of the literature, he concluded that the widest accepted range seems to fall between two to four as the minimum and ten to twelve or fifteen as the maximum.

Following these guidelines, as well as the fact that the unit of analysis for this research is the entire supply network, the aim of this research is to conduct two case studies of fashion supply networks, including a total of six to ten fashion retailers and their upstream suppliers. A further decision was made to have at least two case study participants covering the downstream tiers of the clothing

supply chain. According to Yin (2003), the case must be chosen so that either it predicts similar results (a literal replication) or predicts contrasting results but for predictable reasons (a theoretical replication). Yin (2003) further points out that few cases (two to three) might be used for literal replications and a few other cases (four to six) might be used for theoretical replications. In this research, therefore, choosing at least 2 cases fulfils the need for literal replication. Over six case companies in the aggregate should provide compelling support for theoretical replication when analysis across the entire supply chain is needed. The selection of the number of cases was also constrained by the amount of funding and time available for this research, as well as gaining access to overseas suppliers.

As stated above, the researcher's investigation into agile supply chain practices in the clothing sector started with the fashion retailers. This was mainly due to the UK apparel industry being a prototypical buyer driven commodity chain, with large retailers and branded marketers playing the pivotal role in setting up production networks (Gereffi, 1999) and demand becoming increasingly dominated by the purchasing power of the major multiple retailing chains (Jones, 2002).

	2004 (%)	2005 (%)
Marks & Spencer	9.5	9.6
Arcadia	7.3	7.5
Next	7.8	8.3
Mosaic Fashions*	3.3	3.6
New Look	2.7	2.9
Bhs	2	1.9
River Island	1.3	1.5
H&M	1.1	1.1
Monsoon	1.1	1.3
TK Maxx	1.5	1.6

*Oasis, Karen Millen, Whistles, Coast, Warehouse and Principle

Table 5.4. Targeted Retail Cases (Source: Mintel, 2005; Verdict, 2005)

The top 10 leading UK clothing specialists in terms of market share were initially approached thorough email (Table 5.4.), which also contained a PowerPoint presentation presenting the proposed research framework. This was followed-

up by phone calls. Three of them replied, but one of them expressed great concerns in terms of time availability for this research and was used as a pilot case study to test the interview protocol. The remaining two rateilers' supply networks were used as main case studies for this research.

Five global upstream suppliers were also involved in the study, spanning the entire apparel pipeline: two garment manufacturers, one textile finishing and printing company, one accessories manufacturer and one integrated service provider. All companies selected were involved, at different stages, in the supply of fashion garments for the two UK specialist retailers initially selected (see table 5.5.). The overseas suppliers were selected from Romania and China, as these two global garment manufacturing clusters were mentioned as preferred sources of supply by the retailers interviewed.

Case Company Profile	Country of Origin	Network	Interviewee
Retailer 1 (Pilot)	UK	N/A	Store Manager
Retailer A (Network A)	UK	A	Purchasing Director
Retailer B (Network B)	UK	B	Supply Chain Manager
Garment Manufacturer 1	China	B	Executive Director Production Director Sales Director
Garment Manufacturer 2	Romania	A	Managing Director
Textile Printer	China	B	Sales Director Production Planning Manager
Labels and Trims Manufacturer	China	B	Sales Director Production Planning Director
Integrated Service Provider (ISP)	China	A and B	Logistics Manager, Production Manager

Table 5.5. Case Companies

Romania was preferred for its proximity to the UK market, its highly skilled work force, low labour costs (at least compared with the rest of the European Union), good infrastructure and a long tradition in clothing manufacturing. At the time of the study, the Romanian clothing manufacturing sector accounted for over 25% of Romania's exports and there were over 5,000 companies in the sector employing some 0.5m people (National Institute of Statistics, 2006). Previously known as 'the tailor of Europe', the Romanian clothing sector was beginning to feel more and more the pressure of the Far East markets, able to offer much lower labour costs and a well developed textile sector.

114

At the time of the study, China was the world's fourth largest trading nation, following the United States, Japan and Germany. The Chinese textile and clothing industry was a major national industrial sector accounting for about a fifth of the country's total exports. In 2003, China accounted for 28% of the world's clothing exports and 16% of textiles exports. Since the beginning of 2005, China's textile and clothing exports have grown by more than one fifth, due to the end of global quotas at the beginning of the year 2006 (International Labour Organisation, 2006). Some of China's competitive advantages are considered to be their skilled labor supply and low cost, a robust source of raw materials, proximity to efficient ports, and compliance with labour laws and bilateral or regional trade agreements.

The distribution of companies along the fashion supply pipeline is presented in Figure 5.1.
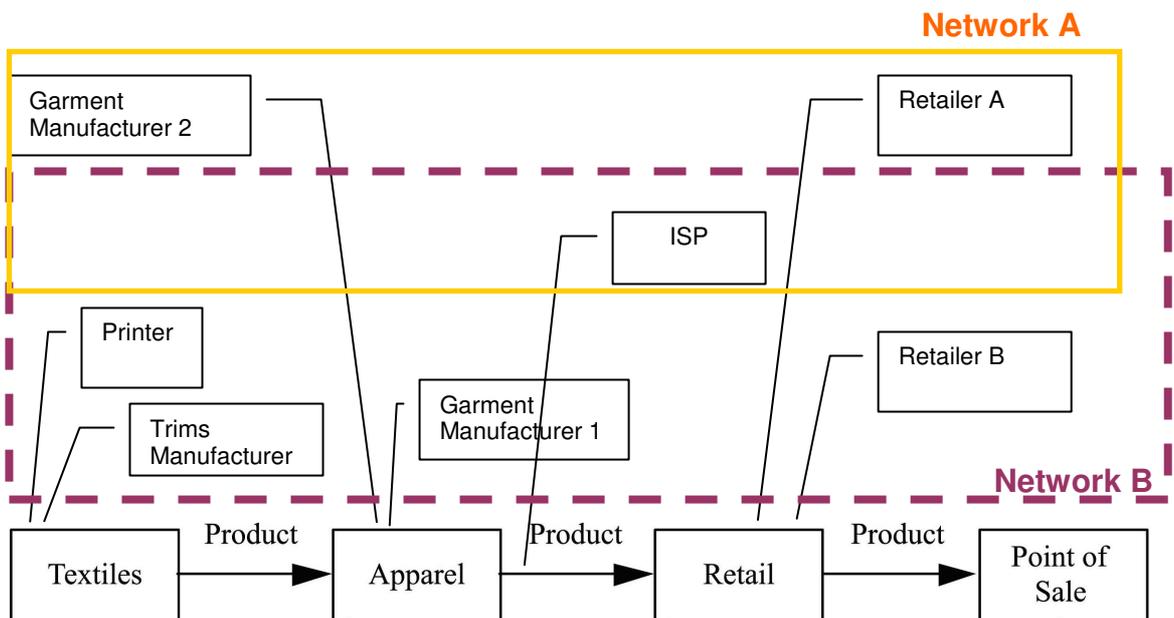
Figure 5.1. Distribution of Companies along the Supply Pipeline

5.9. Data Collection Techniques

The semi-structured interview was chosen as the main data collection technique for this research. Compared with a structured interview, which uses a

formalized, limited set of questions, a semi-structured interview is flexible, allowing new questions to be brought up during the interview following insights provided by the interviewee. To avoid biases, interviews were carried out with at least two members of the company, if possible at different times. Interviews typically lasted three to six hours. Having access to a variety of top and middle management participants was instrumental, as most of the information sought was both strategic and operational in nature. As a result, interviews were mainly sought with supply chain managers, purchasing managers, logistics managers and production managers (see Table 5.5).

Participants were encouraged to discuss freely their views and experiences and probing was only used to encourage discussion and to maintain focus around the three core themes identified in Chapter 3: *Market Sensitivity, Flexible Sourcing* and *Process Integration*. Participants agreed to take part in the study providing personal anonymity was maintained. The interviews were recorded, transcribed and cross checked with the interviewees to ensure maximum objectivity. This offered an opportunity to revise any interpretations made at this first draft stage.

In addition, data was further collected during companies' visits, when visual observations, as well as ad-hoc interviews with shop-floor staff were made. To aid the data collection process during company visits, the Quick Scan methodology (Naim et al., 2002) was adopted, with five key areas being examined:
- Material flows
- Information flows and ICT systems
- Measures of performance
- Organisational structures
- Relationships and attitudes

Lincoln and Guba (1985) highlight that the use of multiple data sources can provide the case study researcher with a richer set of data and promote the transferability of the study's findings. The process of triangulation involves corroborating data from multiple perspectives to enhance the depth of understanding of a particular theme and to provide verification (Atkinson and

116

Delamont, 2005). To triangulate the data obtained through semi-structured interviews and site visits, a large amount of time was spent accessing archival records and company websites, attendance at industrial seminars, site visits and use of existing business databases in the library.

Once the semi-structured interviews for each company had been conducted and further information obtained through site visits and secondary data collection, a company report was compiled which was then sent to each company for verification. If any issues were raised at this stage, they were clarified during follow-up phone interviews. Different sources of data thus provided efficient triangulation of research results. Investigator triangulation was also used, as at least two interviewers (the researcher and one of the PhD supervisors) were involved in the data collection process. This insured greater richness of data, as well as cross checking.

The interviews conducted within the Romanian and Chinese companies that participated in this research provided further challenges, as the interviewees were non-English speakers. In the case of Romanian companies, the use of an additional translator was not necessary, as the author of this thesis is native Romanian.

A small body of literature is available on the use of a translator when conducting interviews (Baker, 1981; Glaser, 1983; Freed, 1988). The limited amount of studies suggest that the requirements that, ideally, a translator should satisfy are a familiarity with qualitative research in general, and the topic of interest in particular (Freed, 1988); proficiency in both the language of the participant and researcher (Westermeyer, 1990), as well as having the ability to express the same feelings and intonations as the interviewer through verbal and non-verbal means (Freed, 1988). As a result, for the interviewes conducted with Chinese participants, the aid of a logistics professor in the Chinese University of Hong Kong was employed, who was both familiar with qualitative research and the topic under investigation, as well as proficient in both languages, having had completed his own PhD in a UK university.

5.10. Data Analysis Techniques

A unique feature of case studies is that data collection and analysis are concurrent. As data comes in, it is analyzed and the emerging results are used to shape the next set of observations. Ellram (1996) suggests that the first step of any data analysis process should be documentation. Accordingly, every interview was transcribed in detail, along with any other background data related to each particular company, obtained during or outwith the interviewing process.

Initially, analysis within each case was performed. Using the data analysis framework discussed in Chapter 3, concepts such as Market Sensitivity, Sourcing Flexibility and Process Integration were grouped together as categories. These categories served as building blocks to structure the case for an agile supply chain management business model presented in Chapter 7. Thus, each case's characteristics were identified and then compared with the proposed attributes developed in the conceptual model.

The main technique used for analysing interview data within this research was 'pattern matching', initially proposed by Trochim (2002). It involves predicting a pattern of outcomes based on theoretical propositions to explain what you expect to find (Saunders et al, 2007). Yin (2003) describes pattern matching as one of the most desirable and suitable techniques for case study analysis. For this research, pattern matching was most suitable, since it was applied to compare conceptual ideas (as discussed in Chapter 3) with real word insights (Chapter 6).

Information collected was grouped into the three main categories detailed in the conceptual framework introduced in Chapter 3. Sub-categories were also used to give more structure to the data. Using pattern matching, specific data from interviews was matched against the literature and theories. New literature was also consulted in cases where the reviewed literature could not fully explain or cover the case study findings. One such area was the use of indirect sourcing and intermediation in agile supply chains and the development of further leagility concepts. The use of indirect sourcing, for example, is not supported by

the existing operations and supply chain management literature, and grounding had to be sought in the transaction-cost economics literature once initial case findings emerged. The process was then repeated for each further case study conducted.

Yin (2003) states that the case analysis should be about significant parts of the case. However, due to the nature of the field, supply chain management focuses on holistic points of view. This can cause conflicts since the within-case analysis might be about insignificant parts of the bigger picture (the supply chain). Yin (2003) recommends that a balanced description of the case with the applied theory is probably the best way to solve the problem and this was the method chosen to write the case analysis stage, presented in Chapter 7.

5.11. Reflections on the Research Process

Along the research journey, any doctoral student will come across a plethora of books on how to get a PhD. Most of these will emphasise the institutional and organisational forms necessary for the accomplishment of a PhD (Pansiri, 2009). Some of these will emphasise the importance of choosing a research topic and adequate methodology once the purpose and significance of the study have been discussed. A very limited number of the literature available, though, highlights the fact that the problem statement, research questions and methodology of a PhD study continuously change as the student goes through 'a brutal, mind blowing experience' (Brause, 2000, p.12). The research journey is even more difficult if the student tries to make a significant contribution in a field such as supply chain management, whose boundaries are becoming less clear. In such a field, 'finding the gap in the literature', a process highly emphasised in the above mentioned PhD writing books, becomes a mammoth and daunting task. Hambrick (2005, p.124) notes:

> 'I am pretty sure about where theories don't come from. They don't come from scholars struggling to find holes in the literature. Young academics, especially doctoral students, become so immersed in the extant theory and research in a field that they become overtaken by it. They often come to believe that the written word is their entire intellectual armament; and they then become riveted on finding ways to patch, reconcile, or fill

holes in the literature. I don't think you can read your way to developing a theory. It is far better to start with real-life, interesting puzzle; then develop a preliminary set of idea for solving the puzzle; and then turn to the literature for guidance and insight'.

Identifying the gap in the literature and refining the research question for this present thesis was definitely one of the most difficult task throughout the entire research journey. In a field that crosses many disciplines, identifying a gap in the existing literature in the first year of the research soon became a limitation to enquiry and discovery. Only once the data collection process began it became obvious that some of the key problems that the companies interviewed were confronted with found very little grounding in the literature already available. As a result, the focus of the study and the research question evolved along the research journey. It was only when data started to be collected, analysed and the merging results cross-checked with the already available literature that the research question was finally framed. Though this was a much more difficult than anticipated journey, it ensured that what Pansiri (2006) calls 'the two major themes' regarding the significance of a PhD were easier identifiable: 'stewardship of the discipline' and 'relevance to industry and practice'.

This also meant that the choice of a methodological approach was shaped by a process of reflection not only on various philosophical readings, but also on past learning, experiences, as well as own beliefs. As a result, what was initially suggested by the PhD supervisors to be a 'straight-forward, positivistic study of the UK fashion retailing sourcing practices' became a pragmatic look at global agile supply chain management practices in the sector. However, even though finding a methodological identity in pragmatism sat well with the author's own beliefs, the limited studies in the field based on this paradigm posed additional challenges. Nevertheless, it is, the author's strong belief that the richness of findings of this thesis would not have been possible with the employment of a different methodological paradigm. As Albert Einstein once said, 'in the middle of every difficulty lies opportunity'.

5.12. Summary

In this chapter, three main research paradigms have been introduced, and the position held by the researcher has been justified. The use of the multiple-case study research methodology has also been justified, taking into account the research question introduced in Chapter 4. Advantages of the case study research, in particular multiple-case study, have been illustrated. Disadvantages have also been presented as well as tactics developed to avoid these issues have been explained.

Case research and sampling have been presented in detail. Purposive and snowball sampling were adopted in order to gain sufficient understanding of supply chain management practices in a real-life context. A research protocol was developed and piloted within both the academic and practical context. Two supply network cases with seven participating companies were successfully recruited into the project.

The main data collection technique used was semi-structured interviews. This was coupled with site visits and company documentation. Finally, the data analysis process has been presented, with the use of pattern matching as a key strategy.

Chapter 6 Case Studies Findings

The aim of this chapter is to provide an overview of the agile supply chain management practices adopted by the case companies operating in the fashion sector. Seven companies participated in this research, and the data collected mainly through semi-structured interviews and desk research, following the case protocol presented in Appendix I, is presented in this chapter. Following a brief introduction of the two retail case organisations, their market sensitivity and response capabilities along different supply pipelines employed will be presented. These will be then followed by an overview of agile supply chain management practices employed by the five case companies positioned upstream in the supply chain.

6.1. Fashion Retailers' Market Sensitivity

The two UK retailers that participated in this research were chosen from the top 10 leading UK clothing specialists in terms of market share. Retailer A is one of the largest womenswear retailers in the UK with a 4.8% market share and has a growing presence in the men's and children's wear markets. It offers customers fashionable clothing with value pricing and has been present on the UK high street for nearly 40 years. It operates from 885 stores in the UK, Eire and mainland Europe, which includes 6 franchise stores in the Middle East, with over 4 million sq ft of trading space. It 2008 it reported a rise in operating profit of 10.4% compared to 2007 (Company Report, 2008). Retailer B was founded in the early 1990s and operates 280 outlets in the UK and Republic of Ireland. It sells high-fashion clothing at a slight premium on average high street prices, with 80% designed in-house to maintain exclusivity. Merchandise covers the category of womenswear, with formal and casual clothing, underwear, footwear, accessories and jewellery. Its group has 3.1% of the market (Verdict, 2007).

The two retailers interviewed performed the design, planning and marketing functions in-house but contracted out the actual production to foreign or domestic sources. They did not own any manufacturing or logistics capabilities.

They supplied a market ranging from functional, long life cycle, low-fashion products with a predictable demand (e.g. basic T-shirts), to the volatile, short life cycle, fast-fashion products. As a result, the retailers' product range covered the whole spectrum of products shelf life based on fashion content which was introduced in Chapter 4, Figure 4.1, from the very basic, up to 50 weeks shelf life products, to the fast fashion ones, averaging a shelf life of just over 5 weeks. Even though they were all perceived as fast fashion retailers, none of them was entirely dependent on fast-fashion items. As much as 80% of their offerings would belong to the low and mid fashion end of the market, while the rest 20% would be relied on for creating their fast fashion image and an overall sense of responsiveness and agility. This introduced a huge amount of complexity in their operations.

The retailers 'creative journey', covering the sum of steps required to bring a concept to store, would begin with trying to identify the product range as early as 9-12 months before the season began. Those functional (basic) products, with a very low fashion content, much less dynamic and most of the time trans-seasonal, had a stable demand and a very low risk of obsolescence allowed the retailers to make accurate sales forecasts well ahead of the season, based on previous sales data. The orders for these products would be placed as far as 12 months before the season (autumn/winter/spring or summer) was due to start. They would range from 10% to 20% of the total seasonal offering.

Of great significance was the enormous lengths the retailers went to in trying to identify emerging fashion trends. As one of the interviewees stated, '*a year out we know nothing*' (Retailer B). To help customise products around market needs, typical market segments were identified, for example one UK retailer identified six female groups from young teenagers 'tweens' through 'cool career girls' to slightly older 'mums before fun' (see Figure 6.1.).

Each of these groups would be defined by age, ambitions, financial independence, designer preferences, social networks, music preferences, television programmes watched and magazines read. For a typical consumer profile, see Figure 6.2.

Increasing their market sensitivity through segmenting their customer base was perceived by the retailers interviewed as key to their success in the marketplace. This would allow them to formulate specific product strategies specifically tailored to the nature of demand of these homogenous sub-markets. This allowed them to address the specific needs / wants of each target market segment and, as a result, reduce significantly the risks of either obsolescence or missed market opportunities that characterise the fashion sector.

Figure 6.1. Typical Market Segments for Retailer A

For each customer segment main trends, colours and fabric forecasts were investigated, this information being mainly obtained from trend and colour forecasters, trend predictions from established fashion agencies, mood catalogues from fabric developers, trade fares, exhibitions, catwalk presentations by designer houses. Once a product design and budget block had been approved, backward scheduling was used from the date of its public launch. These were the mid-fashion items. Early order placement with the fabric spinners was essential, as the textile industry operates on a make to order strategy, the lead times are long and there is limited capacity available. As such, most of the times the fabric design, a fashion item in itself, was decoupled from garment design. Six months before the season starts the retailers had committed 50% and 60% respectively of their buying budget, fabric orders had been placed and capacity booked with garment manufacturers, increasing to 75% to 80% by the start of the season. This leaves 20% to 25% to be

purchased during the season, which introduces a measure of the unknown in the equation.

'The closer you commit to the season, the more opportunities you have to finesse your buying'(Retailer B).
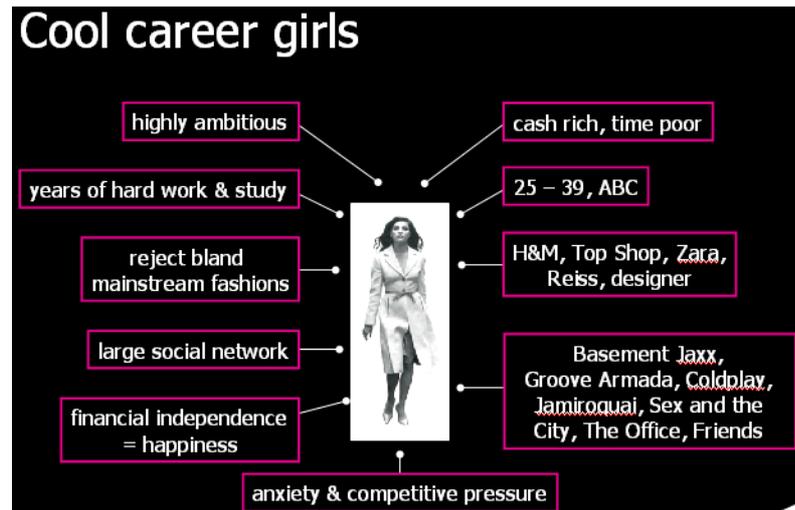
Figure 6.2. Typical Consumer Profile for Retailer A

As the season cycle progressed at different stages, sample product collections based on market information would be created and fashion industry and customer feedback sought to help identify a focused view in which the must have fashions, new colours, trends and possible profit blocks were identified. The decision on the final product specification was always postponed to the last possible moment *('If you're selling fashion then the more you know close to the market, the better it is'* – Retailer A), indeed it was reported to us by the suppliers interviewed that changes to product specifications were often still being made after fabric was cut, as the retailers constantly adjusted their product range well into the season. Based on the available buying budget, the total quantities of product required and the number of stock keeping units (SKUs) to be distributed in each store would be decided. Committing as close to the season as possible would also allow for a controlled response to unseasonal weather, or economic factors such as interest rate rises.

The season would also have to allow for new product introductions designed as a response to shifts in popular culture, expected to occur anytime from anywhere and creating significant demand for a fashion style or trend. For these high fashion items with very short shelf lives (averaging 3 to 4 weeks), forecasts were impossible to be made. As a result, the retailers had to be extremely agile in both capturing emerging trends and then bringing them to the market. As such, lead-time reduction for high fashion products is key to the modern fashion retailers' success.

For these later items retailers were always looking for new market opportunities and much of their product offerings were developed well within the traditional seasonal cycle of autumn/winter- spring/summer. Continuous screening of the UK competitors' offerings, trend shopping in the world's fashion capitals (New York, Paris and Milan), inspiration from movies, popular holiday destinations, music, clubs and the daily capture of point-of-sale data allows them to quickly identify emerging trends. The constant renewal of product ranges with fast fashion styles would attract media attention and bring their customers into the stores more frequently.

Due to the high risks associated with high fashion items, only small volumes, 3,000-4,000 thousand, would be brought to the market on a very frequent basis which, as well as refreshing the available stock, would indirectly reduce the level of markdowns and discounts, as well as minimising the inventory holding costs. They would also offer customers the 'luxury' of exclusiveness at lower prices than the designer end of the market.

'Our stock turns over every 6 weeks, we have 14% newness every week and our customers visit on average 34 times per year' (Retailer A).

The retailers observed were putting much resources and energy into new product development *('There is more research and development going on in fashion then in any other industry and is redundant as soon as you've done it. It's tough, it's fast'* – retailer B), but found that the percentage of products actually reaching the market place was very low (in some cases as low as 25%), and there have often been situations in which none of the samples

developed would be selected at all. One of the retailers interviewed described a situation in which four different suppliers were asked to develop different samples for a high-fashion blouse and in the end only one design was decided to have market value. In another situation, the retailer had to cancel the production of an entire line of shoes, after the manufacturer had already bought the necessary soles ('*We bought 3 or 4 thousand soles for shoes and we told the factories to throw them away. It was cheaper for us to do that than to take the product through the manufacturing process anyway'* – Retailer A**).** This was perceived as one of the realities retailers have to live with in order to increase their agility and reduce time to market. As such, agility in the fast fashion industry also requires the ability to cancel production lines fast.

Newly developed products were first tested by sourcing small trial quantities, sometimes as few as twenty items, from specialist quick response suppliers to see if they were successful. A mix of local and global suppliers would be used in the sampling/trailing process, their selection being made based on their new product development capabilities, flexibility, access to raw materials. This process will be described in the following section.

More definite seasonal offerings might well be tried out in small quantities across a range of stores while the less definite, more opportunistic 'impulse' offerings would typically only be offered in the retailers' flagship stores, these mainly based in major fashion conscious locations. For the fashion products that did seem to succeed the higher volume supply required, though still in small quantities, perhaps as low as a few hundred items, was switched to lower-cost global suppliers mainly located in Morocco, Turkey, Rumania and China. This was virtually universal in terms of the cutting and assembly process to finish the garments, though, as previously highlighted, fabric production was often pre-booked as part of the earlier product definition process. Sourcing these products was also almost universally carried out through intermediaries or integrated service providers, located in the low-cost counties.   How this was managed will follow, but typical lead times, from the placement of the order to delivery to the retailers European distribution centre, could be a short as seven days for items air-freighted out of Hong Kong, or twenty-five days by sea, and of

course always around the former figure by road transport from Rumania, Turkey or Morocco.

These products were now offered across a retailers store chain, though again stores in what were seen as the most fashion conscious locations had priority, to the annoyance of many regional store managers. Demand for these products was continually monitored by both retailers, as well as continuous screening of competitors' offerings. The daily capture of 'point-of-sale' data for the newly introduced products allowed retailers to quickly identify emerging trends, as well as slow moving items. Even where demand indicated that further supply was required for the same product many retailers still couldn't resist changing the product specification a little to better meet the market needs as they perceived. If new products failed to take off they would be quickly marked down and or moved to less fashion conscious locations in order to free floor space and release capital, but this would incur a significant profit loss. However a key element in supplying the uncertain demand for short life cycle products seemed to be simply to source fashion products in small quantities.

Of course, by focusing on operating a mix of low, mid and high fashion strategies, fast fashion retailers had to manage much more complex material and information flows. However, this was perceived as the only available option, as evidenced by Retailer A:

'If you are an infinitely fast supply chain, you'd never have to do any markdowns. You would always have the item that they want, but that's impossible. On the other hand, if you have a business that is set-up so that you actually commit totally to the season and you take no interest in demand risk then your only alternative to that is markdown and discount. We don't like markdowns and discounts' (Retailer A).

As such, for low fashion, functional items, with a relatively long shelf life and stable demand the retailers would place orders with overseas manufacturers long before the season would start, enabling economies of scales, reduced costs and increased availability. Mid fashion items, would be designed and produced much closer to the moment of consumption, ensuring consistency of

supply of newness to the stores while allowing some element of production planning and postponement to take place. Fast fashion items would contribute further to the overall sense of dynamism, offering customers high fashion at reasonable, high street prices. The higher the fashion content, the higher the risks but the higher the margins would be. A total low fashion approach would leave them vulnerable in the face of competition, while a total fast fashion approach would have too high operating costs and could result in gaps in the product offer.

Another inherent complexity of operating a mix of low, mid and high fashion strategies was the need of accurate phasing/timing of new product introductions. Space in the retail area had to become available exactly when the new arrival reached the retailer, as the product's shelf life was short and the on-site storage space limited. Slow sales in one phase would have to be quickly discounted or moved to less fashion conscious locations or the retailer had no space available for the next phase of goods. Any error in the phasing of new arrivals would incur a profit loss for the retailer, through either an in-season sale, with its consequent loss of margin, or by storing the new arrivals, with associated costs and a high risk of lost sales and obsolescence.

As such, high levels of market sensitivity were key for both retailers' success in the market place, but they also had to exhibit high response capabilities in order to be able to bring to the market new trends quickly.

6.2. Response Capability in the Fashion Sector

6.2.1. Functional (Basic) Products

As highlighted earlier, to operate efficiently such a complex supply network, the retailers interviewed used a mixed system of sourcing. The production of functional, high volume, low fashion content, low risk products (e.g. basic T-shirts), characterised by long shelf lives and low demand variability, was committed long before the season was due to start, sometimes as early as 12 months.

'It is more appropriate for basics, these long lead-time things that you can actually place them far out, book fabric cheaply and it's usually a volume margin thing' (Retailer B).

Globalisation and direct sourcing was preferred for these products, as large volumes of standardised products were being ordered months in advance and the long delivery lead time was offset by the low labour costs. The preferred supplying countries were mostly in the Far East. Close proximity between garment manufacturers and fabric suppliers was preferred, in an attempt to reduce transportation costs and time wastage. As such, due to their developed textile industries, locations such as China and India would be favoured. Most of the time production was placed in a mix of countries with various strengths, such as short lead times, low costs, quality or most favourable trade agreements. Key elements in the supplier selection process were their proven financial ability to purchase fabrics and trims and to control finishing processes, good infrastructure and logistical know-how, willingness to invest in dedicated, trained teams with strong communication skills, highly skilled, fast pattern cutting and sampling.

Low cost manufacturing locations would always be sought for these products, but all the retailers interviewed also highlighted the fact that the labour costs would in some cases be as low as 40 pence per item, which only represents, on average, 5.5% of the total production cost. 'The real cost of making a garment is what is the quota for this company, what is the duty, what is the local bribery cost, how much does the electricity cost, what is the communication like in this country'.

The retailers perceived their relationship with their suppliers as a win-win partnership based on trust and communication. Their suppliers would buy the fabric up-front and hold it, most of the time at their own risk, and book capacity for the retailer.

'What we usually say is that we'll give you a decision in this day, whether we use you or we don't' (Retailer A).

Newly developed products were first tested by sourcing small trial quantities, sometimes as few as twenty items, from specialist quick response local suppliers to see if they were successful. These trials would typically only be carried out in the retailers' flagship stores, these being mainly based in major urban fashion conscious locations.   For the fashion products that did seem to succeed additional product supply was ordered, and this, though often still in small quantities as low as a few hundred items, was switched to lower-cost global suppliers mainly located in Morocco, Turkey, Romania and China.

If the initial trials showed that the product would not be successful, as the fabric had already been bought, shape alteration would be sought at the last minute or the entire production/order cancelled. Risks would be shared, but in most of the cases that would just mean that the manufacturer had to try to sell the fabric back, it was left with spare capacity and the retailer would just 'find something else to give them at a later day to make up for it'. No contracts would be drawn, apart from purchase orders (*'when we book things, it's all done on trust'* (Retailer A). However only a small number of suppliers would be used on a frequent basis and the retailers would take, on average, 30% of their capacity, which ensured constant business for their global garment suppliers.

Evidence of suppliers being under increased pressure to be more flexible and responsive to retailers' needs was also highlighted by the fact that the retailers were pushing more and more responsibilities further up the supply chain, with garment manufacturers being expected to carry out 100% quality control, packaging, labelling and tagging. *'The more you push upstream, the cheaper it is'* (Retailer B).

Both retailers expected their garment manufacturers to respond to manually placed orders by delivering goods held in stock on a 'call-off' basis. Initial volumes and delivery dates would be provided, but these were always subject to change once sales information would start coming through.

The level of information transparency in the supply chain differed for the retailers interviewed. One of the retailers would provide its garment manufacturers with monthly forecasts and any sales fluctuations would be

communicated back to them on a weekly basis. The manufacturer would also be expected to provide weekly updates on production and stock levels. E-mails, faxes or telephone calls would be used for these information exchanges.

'We won't have it all electronically going into our suppliers. We're not doing that. We don't think we need to' (Retailer B).

For each supplier the retailer would develop a 'critical path' based on which suppliers would be assessed on criteria such as volume accuracy, production start and finishing times, delivery dates. If areas of underperformance were identified, they would work together on an action plan. *'It is like we're internal consultants for any issues that might come up. We don't just say 'we're not working with you anymore'* (Retailer A). The retailer was aware that some of the delays in production start and/or completion times could be due to poor communication between itself and its garment manufacturers and, as such, feedback from garment suppliers was always sought and yearly workshops with garment suppliers were organised.

The second supplier would only communicate with its suppliers monthly by fax, e-mail or phone. It did not provide them with forecasts or sales updates, but it did require updates on production and inventory levels. Communication would mostly be sought when a delivery was late or if new delivery arrangements were required, such as an increase/decrease in volumes or a change of expected delivery date. It also demanded cost transparency from its suppliers.

'We work on an open cost thing principle, where we know how much the fabric is, we know the consumption of that fabric, we know what the trim costs, we know what the labour rate, what the factory unit cost is and we can actually run through a build-up of what that garment should be costing you and you can put on the factory's profit on top' (Retailer A).

6.2.2. High Fashion Items

For high fashion items, the retailers had a very short time available to design the product, identify fabric and accessories suppliers, manufacture the product

and then bring it to the market place. Small volumes of such items would be produced on a very frequent basis and, as a result, the pool of skills required for clothing manufacturing became more complex, requiring a larger network of suppliers every season.

'We try to have flexibility in products and where we source from' (Retailer A).

Even for these items, with a much shorter shelf life, the retailers preferred global sourcing to local producers. Some of the reasons for going global were the lack of skilled manufacturers in the UK, the reduced availability for fabrics and trims, high prices and very limited capacity.

For the retailers interviewed, developing a global sourcing network in the face of very significant cultural, linguistic and other apparent barriers was not effective, necessary or indeed sometimes even possible, and we found that the common norm was for the retailers to make use of third party indirect sourcing import/export agencies or what many choose to call agents, buyers or intermediaries. Many of the intermediaries are agents in the broadest sense of the word, with no manufacturing or logistics capability or assets whatsoever. They are essentially used to manage the supply network immediately downstream from the retailers, taking responsibility for sourcing product from low-cost countries, and subsequently managing the logistics of delivery to the retailers' European distribution centres.

'We have a team of buyers out there (Hong Kong) and everything that we design into we send all the information to that office and then they decide which is the best place to make our product. But if something new comes along we can say to that office we're looking for this. They might also need in their turn another supplier. And then the suppliers that are out there manage all of those suppliers' (Retailer B).

*'We have contractors that would do the whole thing for us, knit the yarns, assemble, source trims, subcontract embroidery. We get the most flexibility with them' (*Retailer A*).*

133

As stated before that once a new trend has been identified, the retailer has just a few weeks to design and manufacture the innovative products, in order to take advantage of the high profit margins. Experienced teams of designers with market and manufacturing knowledge could complete a new design in one to two weeks. To speed up the design process, early collaboration with sourcing intermediaries was always sought, as they would be able to assist in the early establishment of fabrics and fabric suppliers and, as most of them were previous manufacturers, they had advanced knowledge and could assist in the development of samples and plan manufacturing processes. Some of them also had in-house manufacturing facilities, and this helped cut the new product development time from weeks to days and sometimes hours. The retailers would put together a team of own designers who would then fly to the intermediary's location (which could be as far as China), where they would be presented with the latest fabric and accessories developments, get assistance in the manufacturing process development and then produce the samples required. If alterations would be required, this could be easily done. Once the final design and product specifications had been agreed on and the sample completed, the retailer had two options: it would either get the intermediary to manufacture the entire order in-house, quite a rare situation though as, if manufacturing facilities were available, these had limited capacity and high operating costs, or it would ask the agent to outsource production to a different garment manufacturer.

As such, direct sourcing for these fast fashion items was never used, and instead indirect sourcing through intermediaries would always be preferred. Different intermediaries operate in different regions of the globe, though some are present in more than one, and each intermediary will have access to a pool of suppliers with which it may have an existing relationship or simply work on a one-off basis. The choice of intermediary was more product than cost driven, and fabric availability would dictate in most of the cases where the garment production would take place.

Once the retailer's product launch test indicated that a market existed, an order in a relatively small quantity would be placed with the intermediary. The intermediary would then organise competitive auctions for garment

manufacturing by passing the required specifications of the product and the volumes required to appropriate players in its supply base, giving them a few days to put together an 'offer package' based on price and lead time. The best offer in terms of meeting the design and quality specifications, delivery lead time and price would be selected and the manufacturer given the order. The intermediaries did have 'preferred' manufacturers, and indeed to try to assure better quality at the garment manufacturing stage only 'approved' manufacturers were allowed to participate in the auctioning process. The accreditation process would be based on the customers' individual assessment criteria, it had high costs for the intermediary but it also provided them with a high competitive advantage.

Of course, the sourcing of raw materials and trims, selected by the retailer during the earlier sampling process, would precede this. As suppliers for these items were much bigger players with a much higher bargaining power, strong partnerships existed between them and the intermediaries. Depending on the financial capability of the garment manufacturer, the raw materials would either be purchased by the intermediary or the assembler, but either way the raw materials would be shipped directly to the garment manufacturer, using third party logistics providers. For printed textiles, the sourcing process was more complex, as the intermediary would have to also arrange auctions with printers in the area. The same delivery arrangements were used, with the textile manufacturer delivering straight to the printer's facility and from here straight to the assembler. If textiles/trims manufacturers would be in different countries than the garment manufacturer, the intermediary would coordinate the delivery, the lohn system being preferred in this case, as most of the garment manufacturers did not have import/export experience.

At the time of the study there was significant global overcapacity and price and lead times could be aggressively driven down by the intermediaries if required. The 'lohn model' was a much less common approach, where the intermediary would source all the component parts, consolidate these and then supply everything as a production package to the manufacturers, including the fabrics, buttons, threads and bags.

Once the production was completed, the garment manufacturer would deliver to the intermediary's warehouse. This would be used both as a quality control point but also as a consolidation point of small orders for later transportation. From the retailer's point of view, the cost advantage of performing the quality check at the intermediary's distribution centre and then having the item delivered straight to the UK main warehouse were enormous (see Figure 6.3.). As such, by using the 'free on board and consolidated' method the quality check takes place before the item is shipped to the UK, where the cost of the process would be much higher. It also reduces the cost and time required for shipping/flying back to the manufacturer those items that do not conform to specifications.

Figure 6.3. Cost Implications for Different Positioning of QC Checks - Retailer B

Delivery to the UK would take place by road, sea or air, depending on the manufacturing location. Of course, products manufactured in the Far East would be expected to have longer lead times than those in the Easter Europe or Middle East, but as the costs for manufacturing these items was much lower, the margins achieved would allow for air freighting (3-5 days) rather than shipping by sea (27 days).

'Even by flying items over from the Far East, the margins achieved are in the range of 35%' (Retailer A).

The intermediaries had good partnership relationships with logistics providers to deliver the completed products back to Europe, in fact if the intermediaries did own any assets it was normally a major logistics capability. They routinely dealt with issues such as export-import permits, trade regulations, tariffs and quotas, border crossing procedures such as customs inspection, credit, currency regulations and so on. Some intermediaries have even located offices and distribution centres in the UK to assist the retailers with importing goods and cross docking activities.

Product tracking along the supply chain was only available by phone. Even though advanced technology was used internally both at the retailer and the intermediary's facilities, they were not integrated and the information exchanged was scarce. Both retailers interviewed developed critical path tracking for all of their intermediaries, which were pinpointing the garment production start and finishing times and the moment the order was received and this was based, again, on information received by phone.

It was evident from the interviews with the UK fashion retailers that they were not considering their buying agents as suppliers, but as production partners. The intermediaries were constantly providing assistance in the early product development stages and, much more knowledgeable about the garment and textile manufacturing processes, they would manage the entire sourcing and manufacturing process and also keep the retailers updated on the latest styles and designs, new production technology, new fabric technologies. Their relationship with the retailers was based on a high level of trust. They were taking full ownership of the product, no contracts were in place apart from purchase orders, and they were paid by the retailer once the product reached the main UK distribution centre.

There was, of course, a cost for this, but given the level of service they were providing to the retailer, they had a much higher bargaining power than independent garment manufacturers and the retailers were aware that without them it would be impossible to reach the level of flexibility and responsiveness that the fast fashion market was asking for.

Of course, operating in such a volatile, uncertain environment had its risks but also its benefits, such as constantly increasing market shares and high margins.

'I think we grew so quickly that we're getting less time for process, we're not following it up properly, we start making mistakes, and once we have mistakes than we don't have that flexibility to change in and out of it. But you can't get it right all the time. And from a supplier's point of view, it's keeping them happy all the time. It's maintaining that level of business, having that consistency. You've only got one cake to cut in so many different ways' (Retailer B).

The retailer only had access to the information the intermediary was providing, with no visibility further up the supply chain. This lack of visibility was summed up by one of the retailers interviewed, who admitted that 'sometimes we don't even know where the fabrics come from'.

6.2.3. The Mid Fashion Items

The mid fashion items were the core of a retailer's seasonal collection, accounted for 60% to 70% of the entire seasonal offer of the retailers interviewed, they were responsible for 70% of the end of year profit and defined the retailer's image on the high street. The previous section described the enormous lengths the retailers went to in trying to identify emerging fashion trends and design products that would meet as accurate as possible the needs of the volatile market place in which they were operating. As soon as new possible trends would be spotted in the market place, designers would create sketches and order fabrics. This would give them a head start over competitors, as the supply of fabrics had the longest lead times. However, the companies finalise the design and manufacture of the garment products only after more reliable sales data would be received from the marketplace. Postponing the final product configuration till market feedback would be received and designing a quick response, flexible supply network with minimum pre-commitment was the key strategy adopted for high fashion items. However, operating entirely in such a way would have high operating costs, would create the risk of having gaps in the product offer and, most importantly, as fabric manufacturers had very long lead times, would require either committing the fabrics before the product

design was finalised or produce entirely from basic, made to stock fabrics that most of the textile producers had on offer all year round.

As the fabric is a fashion item in itself, due to the low responsiveness of the textile industry, the fabric selection and order placement had to be committed long before the product was intended to reach the market place, sometimes as long as 6 months in advance. Strong partnerships existed between the retailers and their raw materials suppliers, who were mainly capital intensive large enterprises perceived as key players within the supply network. Garment manufacturing would then be subcontracted to intermediaries following the same indirect sourcing processes described in the previous section. However, competitive auctions between intermediaries located in the close vicinity of the raw material supplier were also sometime used.

'We might have 30 auctions in one month, all coming in at different times. Different decisions in different days. Buying is really strong time management, juggling agents and looking at critical paths' (Retailer B).

Depending on the existing arrangements between the retailer and its textile suppliers, the fabric would either be purchased by the retailer and delivered to the assembler directly from the raw material manufacturer's location, or the garment manufacturer would have to purchase the fabric directly from the producer or the lohn system would be used.

However, as the products were committed as long as 6 months before they were meant to reach the retailer's shelves, quite often the product specifications would change as the product nears the sales season and the retailer starts receiving market feedback and fashion trends become more clear. As such, the system had to allow for some degree of flexibility and responsiveness. Due to the fact that the fabric had been committed long in advanced, most of the time these changes were reduced to small alterations in design, such as the length of a sleeve or the number of pockets on a shirt. These changes were often the cause of a lot of frustration along the supply chain, as they would take a long time to communicate due to the use of adversorial relationships between the

retailer and its agents and then between the agent and its garment subcontractor.

A much more successful way of increasing the flexibility and responsiveness of the supply network for mid fashion items was the use of postponement (see Figure 6.4.). Much stronger relationships were required in this case, both between the retailer and its agent and between the intermediary and its garment manufacturer, as this way of operating required the manufacturer to pre-book capacity but only start production once more feedback was received from the retailer. This required flexible suppliers and accurate transmission of information up and down the supply chain, which also meant higher operating costs.
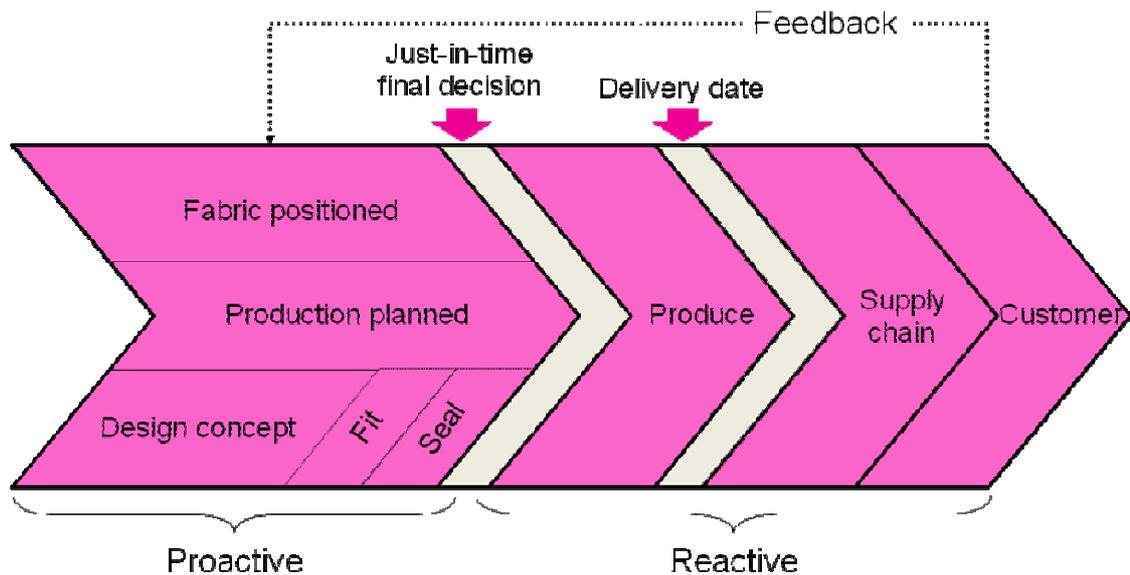
Figure 6.4. Postponement Strategy for Retailer A

Postponement was much more frequently used in the case of knitwear, as the type of fabric would allow for knitting to take place first and the colouring process to be postponed until more feedback was received from the market place.

'We had a fantastic sale on knitwear and we knew it was good, we knew we had one style that was an absolute winner so we booked all the yarn in advance, we actually had the garments knitted and made into this garment and we decided at the very last minute the colour. From placing the order, they had the yarn,

they knew the colours, so I think within 21 days we had garments made and then in 21 days was in the stores. And that was for a fashion knitwear, which, going back 5 years ago, we couldn't even repeat within a season. So it is a lot of work up-front, it really is, but you can be down' (Retailer B).

As for high fashion items, once the production was completed, the garments would be delivered to the intermediary's warehouse where they would be quality checked, volumes consolidated and then delivered to the retailer's warehouse.

The volumes would still be small, in the range of 300 to 500, to reduce risks and increase variety. This, of course, increased the complexity of the supply network, with the retailer having to coordinate the launch of as many as 300 different items during one season.

6.3. Garment Manufacturing

The mainly small and labour intensive low-cost global garment manufacturers were subject to the intermediaries auctioning process and endured severe price and lead time competition. Besides the competitive auctioning process where each order received was the result of negotiation and auctioning, the reducing volumes also had a large impact on the manufacturers' efficiency, as changing over from one product to another, both in terms of machine set-ups and staff training, caused non-productive time.

The two garment manufacturers interviewed dealt with a very large number of intermediaries on an on-off basis. All their UK customers would deal with them through intermediaries. A complex set of instances was described, with both manufacturers working either using the lohn system or purchasing the raw materials themselves, based on what the customer indicated. The later situation was always the case if the raw materials were available locally. In this case the garment manufacturer would take ownership of the product, sourcing the raw materials, manufacturing the garment and then delivering to the instructed location, which in most of the situations was the intermediary's main distribution centre. Both producers interviewed had logistics capabilities, in-house in the case of the Romanian manufacturer and part of a joint venture in the case of the

Chinese one. The Romanian manufacturer would deliver to the intermediary's warehouse, located in UK, whereas the Chinese one would deliver to Hong Kong, from where the intermediary would take ownership.

The lohn system was preferred by the Romanian manufacturer and this was due to a number of reasons. First, the Romanian textile industry focuses on the manufacture of basic fabrics, with low fashion content, and as a result most of the raw materials used would be imported from near by locations, mostly Turkey. The same situation applied to the other accessories needed in the manufacture of apparel items, such as buttons, zips, etc. But, as a fairly small apparel producer that lacked both importing expertise and the financial resources needed to purchase fabrics and trims, the assistance of an intermediary to do so was always necessary. The lohn systems would also enable them to have a relatively fast cash flow, without taking a lot of risks associated with sourcing raw materials or building up fabric stocks. At the time of the interview, the Romanian manufacturer was working exclusively with 3 buying agents operating on behalf of UK retailers. The intermediaries would outsource production through dutch-auctions on behalf of their customers. The three intermediaries were UK based companies, but had main offices in Romania to assist with import/export activities and warehouses/consolidation points in the UK.

The same practice described earlier on was used: the intermediary would usually fax and rarely e-mail the design specifications of a product and the volumes required. After this the manufacturer had a few days to put together an 'offer package': price, possible lead times etc. This offer would enter an auction and the manufacturer was informed in a couple of days if it has won the auction or not. The manufacturer would also have to prepare production samples according to buyer's specifications. A two-to-three weeks lead-time is usually expected. The fact that the buying agents sometimes failed or delayed to communicate key information on price, delivery arrangements, quantities required and other garment design specifications that are needed for starting production, combined with the out of date, inflexible equipment and the lack of training due to high staff turnover made really difficult meeting the promised lead-times, and this caused a lot of anger and frustration on both sides. Delays

in delivering the raw materials necessary for starting production or fabric quantity inaccuracies were quite frequent.

Working exclusively through intermediary has been a trend imposed by the retailers only in the last few years. Before then, dealing directly with the final customer was common practice. The manufacturer did feel that their relationship with the retailer used to be much closer than the ones they had with their intermediaries, with better communication and higher volumes allowing them a much smoother operation. In working directly with the retailer, they would book capacity in advance, had guaranteed work and the volumes were much higher. As opposed to this, working through intermediaries caused huge communication problems, while each order is the result of intense price negotiation, and the volumes were much lower. This had a huge impact on the manufacturer's efficiency, as changing over from one product to another, both in terms of machine set-ups and staff training, can take up to a few days.

The high cost of production, lack of financial capability to invest in people and technology, competition with overseas imports, low flexibility, over reliance on 3 main buying agents, constant miss of dead lines, poor information and communication flow in their supply chain, difficult relationships with their trading partners have forced the Romanian garment manufacturer to close its gates in the summer of 2005. Our interviews also revealed that their directors had a low level of management education, little knowledge of how the clothing industry operates beyond their own business and often wondered why relationships with their customers were always adversorial. There was no complete demand information flowing through and no application of information technology, as the management considered it irrelevant to their business.

The Chinese manufacturer operated along the same lines, working for overseas customers through buying agents that placed orders only after intense negotiation activities. As opposed to the Romanian manufacturer, they would rarely work following the lohn model, having to source the raw materials themselves, which were always available locally. They were part of a joint venture incorporating a third party logistics provider and a fabric printer, and felt that this was giving them a huge advantage as far as the lead times offered to

their customers were concerned. They were, as such, offering their customers a 'service package' that gave them a much higher bargaining power. However, there were situations in which the intermediary would arrange for the raw materials to be delivered to them, mostly when fabrics were delivered from nearby countries, such as Philippines or Vietnam, or would indicate a preferred source of supply, always local, who would deliver straight to the manufacturer's location. This would, of course, require financial commitment but they felt this was a small price to pay in order to compete with the vast number of suppliers in the market place. The raw materials were always sourced on a purchase to order basis, which would allow them to keep their inventories low, reduce risk and minimise blocked capital.

Communication with their suppliers/customers was done exactly the same as in the case of the Romanian manufacturer, using the phone, fax and rarely e-mail. This was a constant source of frustration too, as they felt it had a significant impacting on their lead-times. The negotiation part of the process was perceived as being the longest, with as long as 7 to 9 days, sometimes longer, being spent on defining product specifications. Of course, if they were working on full capacity, it might take up to another 10 days to reschedule their overall production. Once this was done, as the volumes were very small, production would be just a matter of a few days, depending of course on the volumes required, products' complexity, fabric lead-times. For basic fabrics, purchased from stock from local suppliers, the lead time can be as short as 2 to 3 days. The high-fashion textiles would have longer delivery dates as these, mostly prints, would be manufactured to order either in their partner's facility or directly supplied by the intermediary.

To enable the retailer to save money, time and space on the warehousing and pre-retailing of goods, both manufacturers were often required to deliver their products floor-ready (on hangers, sorted by size/colour, foil wrapped and with bar-coded price labels and size rings). As highlighted earlier, the more general environment in which they operated also included broader issues like low flexibility, a lack of financial capability to invest in people and technology, increasing government regulation, industry wide overcapacity, over reliance on - and sometimes difficult relationships and poor communication with - a few main

buying intermediaries, poor management education and little knowledge of how the clothing industry operated beyond their own business. In general all this made surviving in the fashion sector more and more difficult for the small garment manufacturers in particular.

The Chinese garment manufacturer was increasingly feeling the pressure of competition coming from near by countries such as Philippines and India, with much lower production costs, long tradition in garment manufacturing and developing infrastructures. However, they did feel that they had an advantage due to their highly skilled personnel, high quality, closeness to Hong Kong and highly developed textile industry available in China. The Romanian manufacturer was in a much more unfortunate situation, as their increasing labour costs and the continuous closure of textile manufacturers made survival more and more difficult.

The Chinese manufacturer had adopted a variety of tactics to avoid the harsh competition in the sector. One such tactic was to try to address their home market, allowing only about 40% of their capacity to 'contract manufacturing' (working for Western retailers through their buying agents), keeping the remaining 60% for the manufacture of their own brands developed for the local market, which for them offered higher margins. The competition in 'contract manufacturing' was on price, whereas focusing on the local markets and developing their own brands would offer much higher margins. However, the local markets were becoming more volatile too, so there was an acute need of increasing their flexibility in order to survive. Another approach would be to move away from manufacturing and becoming intermediaries themselves, this seen as being a much higher value adding activity. Starting up a joint venture with logistics and fabric providers was also offering them a huge competitive advantage, and, as such, they were able to meet the needs of their customers much faster.

6.4. A Chinese Textile Printer

The textile printer we interviewed was part of a joint venture with the garment manufacturer presented in the previous section, for which it became a main

supplier. With over 90% of its products aimed at the European and American markets, it concentrated on the dieing and finishing of weaving products, using raw materials sourced mainly from the domestic market.

The textile finisher was mainly operating on a make-to-order strategy, priding itself in being a quick response manufacturer. The average lead time for a batch of 100,000 yards could be as short as ten days, from the moment the design had been agreed on. However, the negotiation process that preceded this could be longer sometimes than the time taken to complete the order, as customers 'continuously change their minds about what and how much they want'. The Chinese finisher had very low minimums compared to the rest of the sector, which allowed them to enter some of the auctions organised by import/export agents on behalf of their customers, mainly Western retailers. However, the highest percentage of their production was high volumes for long term partners.

'Actually, when we say we work for Retailer X, they might just be the final buyer. But the majority of the sale is really through an import-exporter. They get orders from several companies like Retailer X. Then they consolidate the orders and only after that place the order to us. So the majority of the sales we make is through such import-export companies. So, yes, it's all done through intermediaries, nothing is direct to the retailers' (Textile Printing Company).

The raw materials needed were purchased from local producers, but if these were not available locally, overseas partners would be used. Long term partnerships existed between the finisher and its suppliers, which were continuously praised for giving them the flexibility and responsiveness they were then able to offer further to their customers. Once production was completed, the product would be delivered directly to the garment manufacturer, if it was located in China, or would go free-on-board to Hong Kong, from where the intermediary would take ownership and deliver further to locations such as Cambodia, Vietnam, Indonesia, the Philippines, where the garment assembly took place. Their joint venture logistics partner would be used in most of the cases, unless the buyer had other arrangements.

The relationship with their main customers, mainly buying agents for big retailers, was described as a 'love-hate' one. They 'loved' them for their big volumes, mainly generated by consolidating orders from different retailers before placing a final order to the textile manufacturer, as this allowed them to achieve economies of scale. But they 'hated' them for their constant pressure for lowering prices and playing suppliers against each other.

'They really push us down to the limits, they use information from different types of sources and then they use that to negotiate with us in terms of price, squeeze the buyer' (Textile Printing Company).

The commitment shown by the textile printer to its main customers was obviously higher than the one returned. The textile printer would always give priority to those orders coming from its main customers, would inform then about the latest product developments available in the market and give them assistance in the early new product development stages. But we found no evidence of electronic data interchanges or synchronised production planning with any of their main customers or suppliers.

'We don't feel that we have a close collaboration with our European partners in terms of maybe synchronising our processes in order to reduce costs. Nothing like that seems to really happen in this kind of business' (Textile Printing Company).

The main way of communicating with their customers was done by phone and fax. Our interviewee stated that the reason behind the lack of synchronised planning with its main customers and suppliers was not the financial inability to invest in information technology, but a lack of trust between the different actors in the chain. They did not have long term partnerships with any of their main customers. Each order they received was the result of intense negotiation and/or auctioning.

As the competition was increasing and the margins were getting smaller and smaller, the Chinese printer felt, too, that the way forward was to concentrate on the local markets and work directly with local manufacturers.

'There is so much competition, so many suppliers in this sector that this is definitely a buyers market' (Textile Printing Company).

6.5. A Chinese Garment Accessories Manufacturer

The accessories manufacturer interviewed was founded in 1985 and it had rapidly emerged as a world leader in the manufacture and supply of garment trims to the apparel industry. At the time of the interview, it had 40 different manufacturing facilities around the world and it was the largest label manufacturer in China, employing over 1,300 people at different locations. It worked with 1,000 different customers to whom it aimed to provide 'high quality, cost effective, efficient and design-inspired labelling solutions on time, at the right price'.

The manufacturer would deal either directly with apparel retailers, mainly American and European, or with intermediaries. The volumes and lead times they were required to provide varied greatly, but due to the advanced manufacturing technologies used and state-of-the-art production planning systems, they were able to accommodate any requirements in 95% of the cases.

The relationship between the accessory manufacturer and the apparel retailers was characterised by intensive information exchanges, collaborative product design and a high level of trust. The retailer would share with the manufacturer its long term forecasts, and this formed the basis for an initial rough production plan. However, the initial forecasts given were out, on average, by up to 40-50%, further evidence that the retailers constantly adjusted their product range well into the season. Sales updates were received weekly by phone/fax or e-mail. The retailer did not commit to any order, as the label manufacturer was happy to pre-book production for them. The interviewee stated that *'in this industry, there is no such thing as a confirmed order. They don't have to*

commit, we allow them to change this all the time'. In most of the cases, the retailer would pre-book production long before the season was meant to start and then place more definite orders closer to the season. However, one of the trends the trim manufacturer continuously noticed was the retailers pre-booking much more capacity than they knew they would need, just in case, with the final commitment being in some cases as low as 50% of the originally communicated volume.

As a result, the manufacturer used the initial forecasts for aggregate production and inventory planning, and then weekly sales updates provided by the retailers would be used for adjusting the daily production scheduling. Their highly flexible equipment, highly skilled labour and advanced ERP systems employed provided them the flexibility they needed. However, by pre-booking production and allowing their customers to constantly change the volumes required, their inventory levels had been increasing constantly over the last few years. This was also due to the fact that, as their raw materials suppliers were operating with long lead times and high volumes, they had to manufacture from stock.

However, due to the capital intensive nature of the industry, their margins were still very high. They were trying not to enter the price competition but differentiate themselves as a quick response, high quality, flexible and reliable supplier.

As a constant innovator in the sector, the accessories manufacturer would constantly inform its main customers on the latest product developments and would provide assistance in product design. The focus on new product development was also continuously attracting new customers in search of access to the latest developments in the sector. It constantly assisted its customers with anti-theft radio frequency identification (RFID) technology, 'smart tagging' the products for easier stock control, in-plant replenishment, in-store tracking and product identification.

To facilitate a fast order placement, an online system had been developed that enabled their customers to place orders over the web via the company's extranet. The system also included an on-line product design tool that gave

customers the possibility to view all their products before placing an order, which reduced the product development time. At the same time, the on-line system allowed customers to check stock levels and view the order status.

Their relationship with buying agents had the same characteristics. However, the volumes the agents would request were always much smaller and had much tighter lead times. The manufacturer was always trying to accommodate their orders, but would not pre-book capacity for them, as this was a 'privilege' only available to long term partners.

'We offer them the flexibility and technology that no other supplier is able to offer. But that comes at a price' (Textile Printing Company).

Once an order was completed, it would be delivered directly to the garment manufacturer's location, if it was located in China, or to Hong Kong, from where the retailer or the buying agent would arrange delivery to the apparel producer. Third party logistics service providers were used, in most cases chosen by the customer.

The manufacturer's main focus on customer service, quality, flexibility, innovativeness and willingness to integrate and synchronise its activities with those of its customers had proven to be a continuous source of competitive advantage in its sector.

6.6. An Integrated Service Provider

The previous section focused on describing how intermediaries act as coordinating hubs, identifying spare capacities in a timely manner, integrating information and material flows and synchronising supply chain activities. We also identified a significant alternative and different set of players that we have called Integrated Service Providers. These were very large organisations offering full in-house services from new product development through manufacture to logistics and delivery to the retailer's warehouse. For example, one such Chinese integrated service provider employed over 4,000 people and produced over 1.5 million garments a month in a vast 180,000-square-meter

facility. It also had similar facilities in other Asian counties and was the largest apparel manufacturer listed on the Hong Kong stock exchange. It was here that we found the most advanced production facilities, a world away from the often very basic facilities we saw in some of the smaller manufacturers.

The company differentiated itself through a "design-to-store" business model committed to take full product ownership, from the design stage until the products reach the stores, although in reality this meant the retailer's distribution centres. The partnerships with customers/suppliers could start from the very beginning of the product life cycle, spanning the entire supply chain from product development, research and laboratory centres, multi-product and multi-method production lines, advanced inventory and warehouse management systems that allowed flexibility and multi-faceted packing capabilities, and logistics services with customer integrated IT systems that tracked the products from the production floor directly to customers' distribution centres.

Customers could get assistance in any area of product development including product design, raw material selection, and sample development. The objective was to simplify and shorten the product development cycle and with the integrated service provider this could be completed in less than a week. The ability to make changes quickly and at the last minute, complete product samples and then begin full production runs much faster allowed fashion retailers to get new styles into stores faster. Samples, for example, could be developed for the European retailers in 24 hours.

'They may sit in our dedicated office, they work with our merchandisers, and then develop what they want, and then take the sample when they go back to their office. All this while others come to Asia, shop around, look for suppliers, and then chase them up to get a first sample, second sample and so on. This is a big improvement. Because otherwise it would take them weeks just to get a sample' (Integrated Service Provider).

For full orders, manufacturing lead times varied, depending on volumes, product complexity, level of service required. Orders coming from retailers with which they had long partnerships in place got priority over those from 'on-off' customers. There was no minimum order quantity and volumes of 200-300

items per order were the norm. For these volumes, production could be completed in 2-3 days once the raw materials had been received, to give somewhat shorter overall lead times than the intermediaries could manage. The customer was allowed to, and indeed did, make as many changes as it wished, up to the point where the raw material had been cut.

Normally, fabric suppliers were nominated by their customers, but since the integrated service provider had taken a proactive approach in servicing their customers, it also provided them with choices of such suppliers. The process called for accreditation, which meant the supplier had to be able to meet specified quality standards. Different raw materials had different lead times, with knitted products being mostly purchased from stock while woven products would take longer longer. The raw material lead time would, however, never exceed more than 3 to 4 weeks if it was made to order. The same situation applied to trims and accessories. Standard products, like simple, basic buttons, with no special marking or design could be obtained in 2 to 3 days, as they were made to stock by most of the manufacturers. Other had longer lead times, as the fabric needed to be ready first and the accessory manufacturer would dye the product according to the fabric colour. In this case the entire process might take another 1 to 2 weeks.

Most of the garment manufacture took place in-house. Autonomous production cells, state of the art equipment and well trained personnel gave the enterprise the flexibility required, with change-overs taking just over an hour.

If extra capacity was required or if the customer wished to, production could be outsourced to partner-manufacturers located both in China and in the nearby countries. In an effort to assist their customer further in their search for low cost manufacturing locations, the integrated service provider actively invested and helped develop apparel producers in locations such as the Philippines, Taipei, Honolulu, to where it could easily switch production for high volumes, long lead time products. Quicker but more expensive than the intermediaries, and always offering better quality because of the superior facilities and training, they did offer the view that they would in future prefer to outsource much of their in

house manufacturing capability, while still retaining the focus on the design to store capability.

The company also offered to their big customers the option of locating a permanent office on their premises, to which it would dedicate teams of designers and engineers. Big Western retailers had their new product development offices permanently located on the integrated service provider's (ISP) facilities. They could select the services they wanted from a local 'supply chain menu', keeping designers close to production and supply base and, as such, cutting development time and improving communication. This also allowed the company's employees to learn about client expectations for materials, styles and costs. The retailers thought of the ISP as their own manufacturing division, and in order to make this concept work visibility and trust were needed from both parties. As such, the integrated service provider had two main types of customers: those for which it had dedicated production facilities, from which it asked for a minimum advance commitment, and those that were using the rest of the available capacity. They wouldn't pre-book capacity in advance for these customers, however, those with which it was working with on a frequent basis would be given priority.

Of course, different customers operated in different ways, with some contacting the ISP only after the final product sketch had been completed and the fabric and accessories suppliers selected, and they would only request the manufacture of the product and delivery to a specified location once production was completed.

'We have to buy materials from this, accessories from this. No choice, we just follow the instructions' (Integrated Service Provider).

On the other hand, some customers would come along with an 'idea' of a new product and request assistance from new product development to final delivery. These were the customers for which the integrated service provider felt it would add the most value, cutting the completion of an order, from concept to store, from what used to be 20 weeks or even longer to just over 4 weeks, depending, of course, on the volumes requested, type of delivery, etc.

Once production was completed, it would be delivered to Hong Kong, from where it was shipped or flown to its final destination. The company did own its own logistics capability, including trucks used for local deliveries and three 737 cargo plains flying between Hong Kong, Japan, Taipei, Honolulu, where some of their customers and suppliers were located. They also had shares in some companies transporting between Hong Kong and China, their most frequent route, and also outsourced to external companies. A Hong Kong distribution hub was also owned, which was used as a consolidation point before delivering further. Advanced technology such as RFID tracking tags were tested here with some of their main customers, to increase visibility along the supply network.

In an effort to assist even further their customers, a Fabric and Trims Innovation Centre (a collection of latest development samples from 16 partner textiles and accessories manufacturers) and a Design and Research Centre (a team of graphic and fashion designers and trend 'spotters) had been set up. Here, customers could get assistance in any area of product development including product design, raw material selection, and sample development. The objective was to simplify and shorten the product development cycle even further. Cost analysis facilities were also available, in which industrial engineers can calculate total supply chain costs, costs of adjustments, etc. A Fabric Testing centre was also developed. If the average product development time used to be over a month, with the integrated service provider this could be completed in less than a week.

The ability to make changes quickly and at the last minute and complete product samples and then full production runs much faster by using the integrated service provider allowed fashion retailers to tackle one of their biggest weaknesses: getting new styles into stores faster.

6.7. Summary

This chapter has presented an overview of supply chain management practices adopted by the companies under study. These findings will be further analysed against the framework developed in Chapter 3 in the following chapter.

Chapter 7 Case Studies Analysis and Discussion

In this chapter, the key case study findings presented in Chapter 6 will be compared against the general framework for agile supply chain management introduced in Chapter 3. This will answer the main research question. Further, the mechanisms employed by the UK fashion retailers to overcome the barriers of globalisation and network complexity in order to maintain a high level of agility will be explored.

7.1. Introduction

The framework used to investigate the agile supply chain management practices employed, at operational level, by companies operating in the mass fashion sector was introduced in Chapter 3 (see Figure 7.1 below). These practices were grouped under 3 headings: Market Sensitivity, Sourcing Flexibility and Process Integration and will be explored in more depth in the following sections.
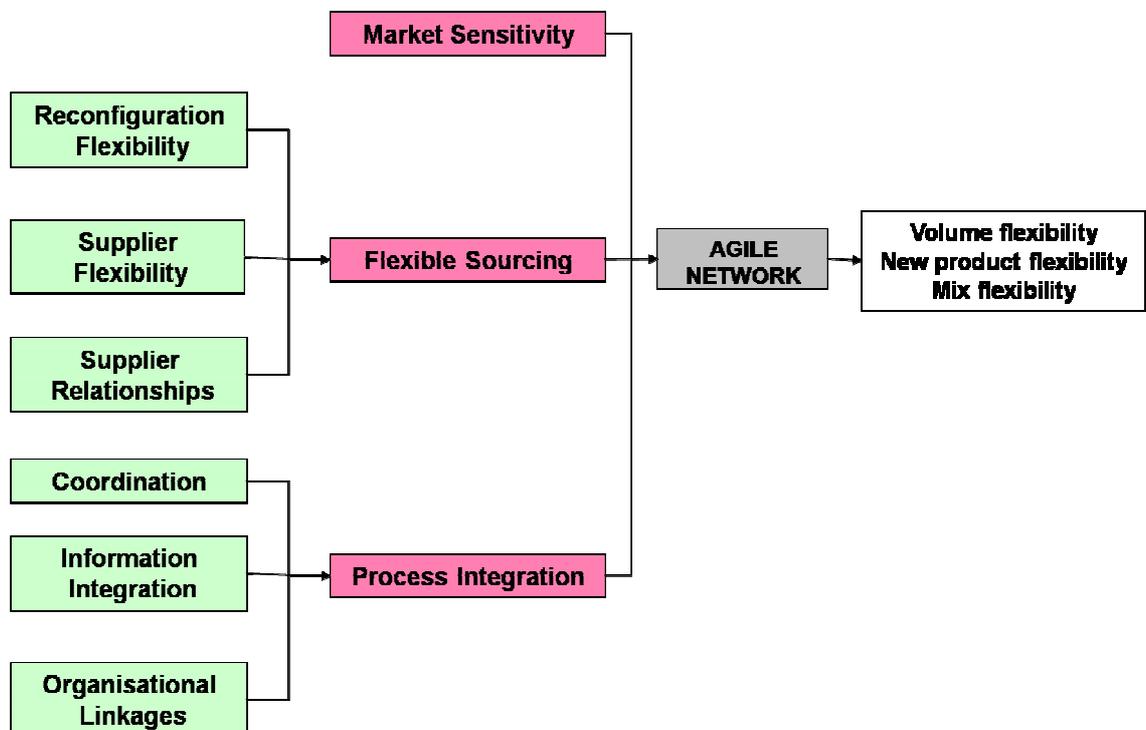
Figure 7.1. A Framework for the Management of Agile Supply Networks

7.2. Market Sensitivity

The first element of the agile supply chain management framework introduced in Chapter 3, *Market Sensitivity* was perceived as fundamental to the retailers behaviour and they went to extraordinary lengths in trying to predict or identify future successful fashion products and to very closely monitor consumer demand for what they and their competitors offered.

The need of a high level of market sensitivity stemmed from the high level of environmental uncertainty that the fashion retailers were faced with, and was reflected in the high levels of new product introductions, wide product variety (product range) and product variability (swings in volumes required) that the retailers needed to exhibit (see Figure 7.1.). Both retailers interviewed identified demand uncertainty as the most severe type of uncertainty they were faced with, and this is consistent with previous studies (see, for example, McCutcheon et al., 1994). This required them to exhibit high levels of *New Product Flexibility, Mix Flexibility* and *Volume Flexibility,* which were identified as key characteristics of agile networks in the framework presented in Chapter 3 (see Figure 7.3.).

	Retailer A:	**Retailer B**
Fast and frequent introduction of new products	-full stock turn every 6 weeks -14% newness every week	-Full stock turn every 7 weeks -10% newness every week
Daily POS feedback to respond to new demand	-Daily POS information analysis -Daily store replenishments	-Daily POS information analysis -Weekly store replenishment
Reduced volumes per SKU (high fashion items)	-15,000 (approximated average)	-8,000 (approximated average)
Reduced level of pre-season buying	25% of range developed 'within season'	15% of range developed 'within season'

Figure 7.2. Market Sensitivity Levels for Retailers A and B

New Product Flexibility

New Product Flexibility, or the ability to introduce and manufacture novel products or to modify existing ones (Slack, 1997) was fundamental to the retailers' success in the market place. While the notion of seasons was well established in the fashion sector, and indeed many industry events such as trade fairs, exhibitions, fashion shows, presentation of collections etc were still timed or scheduled around these seasons (Forza and Vinelli, 1997), it is important to recognise that the retailers were now always looking for new market opportunities and many of their product offerings were developed within the traditional seasonal cycles to increase the level of market sensitivity exhibited.

To guide the design of new products, customer segmentation was used to group customers by age, ambitions, financial independence, designer preferences, social networks, music preferences, television programmes watched and magazines read. Emerging fashion trends in each of these market groups would be very closely monitored as well as seeking more general inspiration from movies, television, popular holiday destinations, music industry offerings and so on.

Mix Flexibility

To attract customers into stores, mix flexibility, or the ability to offer a wide product range (Slack, 1997) was also perceived as essential to the retailers' success. At the same time, the wide product range, generated by the large number of product designs, colours and sizes offered to the market, attracted additional complexities with which the retailers were faced, with financial impact on both product development activities and manufacturing and logistics operations.

Randall and Ulrich (2001), as well as other authors addressing mass customization, such as McCutcheon et al. (1994), Lampel and Mitzberg (1996), Gilmore and Pine (1997) have addressed the issue that as product variety increases demand uncertainty also increases, making forecasting more difficult, as the same aggregated demand is split over more SKUs, leading to an increase in the aggregated errors associated with each forecast. This will also

157

have a negative impact on order fulfilment. Further studies, such as those by Fisher et al. (1994), MacDuffie et al. (1996), Berry and Cooper (1999), highlighted the fact that as product variety increases, the need for mix responsiveness increases also and as the customers are not willing to accept longer lead-times firms have had to rethink the level of product variety that is really demanded by their customers. However, this was not a trend exhibited by the fashion retailers under study. They both reported large increases in product range over the past few years, as the wide product offering was perceived as an essential market winning attribute.

Volume Flexibility

Linked to product variety, but yet conceptually different, was the high level of 'demand variability' that the retailers were also faced with, generated by large swings in demand attracted by factors such as weather, a celebrity being spotted wearing the item or the item being featured in a fashion magazine. As a result, the supply networks employed by the fashion retailers under study had to also demonstrate an ability to change the level of output for each SKU at very short notice.

Related to volume flexibility, of key importance in minimising this market risk for high fashion items was the approach to cautiously under-supply the market with smaller volumes than perhaps could have been sold before moving onto a new product offering. The risks of holding too much stock and subsequent discounting were thus reduced, at the recognised opportunity cost of possibly being able to sell more, though as previously mentioned, this supported the sense of newness, exclusivity and scarcity in the consumers, with the result that the more fashionable of them became regular store visitors to see what new products were on offer. All this made for orders in relatively small volumes, commonly of between two hundred to a thousand items per store. Nonetheless these volumes were virtually universally sourced overseas in low cost countries.

However, getting the market right did not always happen, and the need to introduce discounts and sale offerings was reported by both retailers interviewed. As opposed to the usual 2 sales seasons previously reported in the literature (January and August) (Christopher et al., 2004), the frequency of

discounting prices had increased in recent years, with retailers preferring to reduce prices for 'slow selling items' on a frequent basis in order to free up premium floor space. Retailer A reported as many as 10 'sales seasons' per year, while Retailer B stated that they are continuously having on display discounted items.
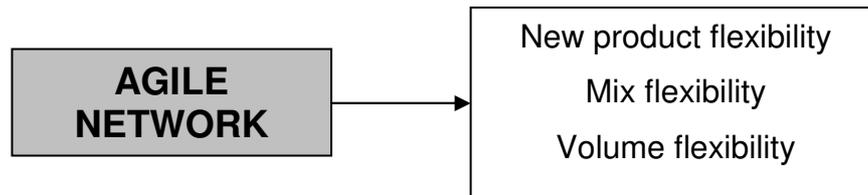
Figure 7.3. Agile Fashion Networks' Requirements for Flexibility Types

As such, the increasing need for market sensitivity required fashion retailers to focus on designing and managing supply networks with built-in capabilities for new product, mix and volume flexibility (see Figure 7.3.). The mechanisms employed for doing so will be explained in the following sections.

7.3. Flexible Sourcing

The literature review conducted in Chapter 3 argues that agile supply systems can be designed by selecting suppliers that are inherently flexible in their processes, or by continually switching between different suppliers. Each scenario will strongly influence the nature of relationships that will be encountered along the supply chain (close relationships in robust, stable network or loose, arms-length relationships in rapidly reconfigurable networks). The Agile Supply Systems framework introduced in Chapter 3 captured these facts through three sub-components, grouped under the 'Flexible Sourcing' heading:

- *Supplier Flexibility* (the flexibility of individual nodes within the chain);
- *Reconfiguration Flexibility* (the ability of the focal firm to re-design the supply chain) and
- *Supplier Relationships.*

Chapter 4 illustrated that for retailers to be successful in the current fast fashion markets, which increasingly require a high level of customised response to the different needs of different customers, developing 'one size fits all' supply chain solutions was no longer viable. Different products had different demand patterns, different product life cycle profiles, and, as a result, required supply pipelines that needed to be configured and managed in different ways. These supply pipelines functioned alongside each other, and each needed distinct design and management practices. As such, one of the key practices that enabled increased agility of the supply networks under study was to develop contingent pipelines that functioned alongside each other. This gave the overall network a higher degree of flexibility and provided an additional source of competitive advantage.

One of the findings of this thesis is the fact that these parallel pipelines could be best described by dynamically matching the two key sources of flexibility employed: flexible suppliers and/or flexible sourcing (see Figure 7.3.). And the type of supply chain relationships developed varied according to the sources of flexibility employed. This mirrors previous research studies (see, for example, Fisher, 1997; Towill and Christopher, 2002; and Vonderembse et al., 2006) which have all found that companies should design and manage parallel supply pipelines which match different operating environments. However, in all these studies the way in which specific operating environments impact on the choice of the sources of supply chain flexibility employed was not addressed.

Figure 7.4. Dynamic Matching of Reconfiguration Flexibility with Supplier Flexibility

Chapter 6 highlighted the fact that the retailers' product offerings could be grouped in 3 categories:

- *Low Fashion Items* (shelf life of 6 months to 2 years) - served by stable networks employing close relationships with global suppliers;

- *Mid Fashion Items* (shelf life of 3 to 6 months) – two different scenarios were encountered here:

      I) A small minority of items was served by flexible UK-based suppliers with which strong partnerships existed;

      II) The majority of these items were served by rapidly reconfigurable networks employing adversarial relationships with overseas garment manufacturers;

- *High Fashion Items* (shelf life of up to 6 weeks) – served by rapidly reconfigurable networks which also required high levels of flexibility from the garment manufacturers.

As a result, the companies interviewed designed and managed four different types of pipelines to adequately service their markets, corresponding to four types of supply systems. The design and management of these pipelines was driven by the characteristics of demand and the products' shelf lives with the sources of flexibility required. These scenarios have been summed up in Figure 7.4., in which by dynamically matching Reconfiguration Flexibility with Supplier Flexibility four different scenarios were created against which the case studies presented in the previous chapter will be analysed. For each individual scenario, the nature of supplier relationships employed will be investigated. As a result, the author suggest that the dynamic matching of these two components could be used as a guideline for designing and managing parallel supply pipelines which match different operating environments, as previously suggested by Fisher (1997), Christopher and Towill (2002) and Vonderembse et al (2006).

Reconfiguration Flexibility

Chapter 3 has highlighted that the design of a company's supply network is a key factor in determining how fast goods move from one point to another (Garber and Sakar, 2007). To ensure that goods are moving as quickly as possible, every company should periodically redesign its supply chain, based on

161

its strategic objectives and changes in the business environment (Garber and Sakar, 2007). As a result, the ability to attract a portfolio of partners that changes as customer needs change is a key component of network agility. Previous survey findings revealed that few companies have formal processes in place to re-evaluate their supply chain networks. Some executives blame this on "organizational latency," meaning that their companies are simply not inclined to root out and fix their supply chain problems. Others say there is a "lack of willpower" to make changes to an already running operation (Garber and Sarkar, 2007).

Supplier Flexibility

Previous studies (Duclos et al., 2003) emphasised the fact that the key strategy for gaining and keeping a competitive advantage in a dynamic environment is to create a flexible organisation (Sanchez, 1995). It is proposed that with a wide range of different strategic options, the organisation can more quickly respond to its environment.

As previously discussed in Chapter 3, the two dominant factors used to distinguish between lean and agile systems are their mix and volume flexibility capabilities: lean systems require mix flexibility and agile systems require both volume and mix flexibility. As a result, for each of the four SC Flexibility scenarios presented in Figure 7.4., the requirements for volume and mix flexibility to be displayed by the garment manufacturers (Supplier Flexibility) were rated as low (0) or high (1), leading to the categorisation of the system as either lean or agile (see Figure 7.4.). Reconfiguration flexibility, or the ability of the supply network to efficiently reorganise at short notice, was rated, based on the work of Pires et al. (2000) as low (0) for lean systems or high (1) for agile systems. These scores are then used to categorise the supply strategy employed as either lean, agile or leagile (Figure 7.5.).

- Lean systems employ the use of both lean suppliers and lean sourcing systems
- Agile systems employ the use of agile, re-configurable networks with agile suppliers

- Hybrid (Leagile Systems) employ the use of either agile suppliers in lean, stable networks (Type I Leagile Systems) or lean suppliers and agile sourcing systems (Type II Leagile Systems).

These scenarios will be discussed in more depth in the following sections.

	Vendor Flexibility		Sourcing Flexibility	Supply System Strategy
	Mix Flexibility	Volume Flexibility		
Scenario 1	0	0	LEAN	**LEAN**
	LEAN			
Scenario 2	1	1	LEAN	**TYPE I LEAGILE**
	AGILE			
Scenario 3	0	0	AGILE	**TYPE II LEAGILE**
	LEAN			
Scenario 4	1	1	AGILE	**AGILE**
	AGILE			

Figure 7.5. A Lean, Agile and Leagile Supply Network Taxonomy

7.3.1. Low Fashion Items (Lean Supply Systems)

The demand for functional products, such as black socks or white T-shirts, was stable and predictable for both retailers. These products had a long life cycle and most of them had reached the maturity stage. The design alterations were rare from one season to another. The predictable demand allowed for level production schedules and required little network reconfiguration flexibility, and little flexibility from garment manufacturers. However, their stability invited competition, which often led to low profit margins. To enable economies of scale and achieve best performance, stable networks with collaborative partnerships were employed and this led to the creation of typical lean supply chains focused on cost minimisation. This enabled sourcing to be committed up to one year in

advance, and the search for low labour costs meant that global suppliers were always used, mostly located in the Far East

Production of these items would be placed in a mix of countries with various strengths, such as very low labour costs (Vietnam and the Philipines), high quality (China) or more favourable trade agreements (Eastern Europe). The products were selling in large volumes, with small unit profit margins.

Key elements in the supplier selection process were their proven financial ability to purchase fabrics and trims and to control finishing processes, good infrastructure and logistics know-how, willingness to invest in dedicated, trained teams with strong communication skills, highly skilled employees and a strong record of high dependability. Close proximity among garment manufacturers, fabric suppliers and logistics providers was seen as a key advantage. A simplified diagram for the material and information flows identified in these pipelines is illustrated in Figure 7.6.
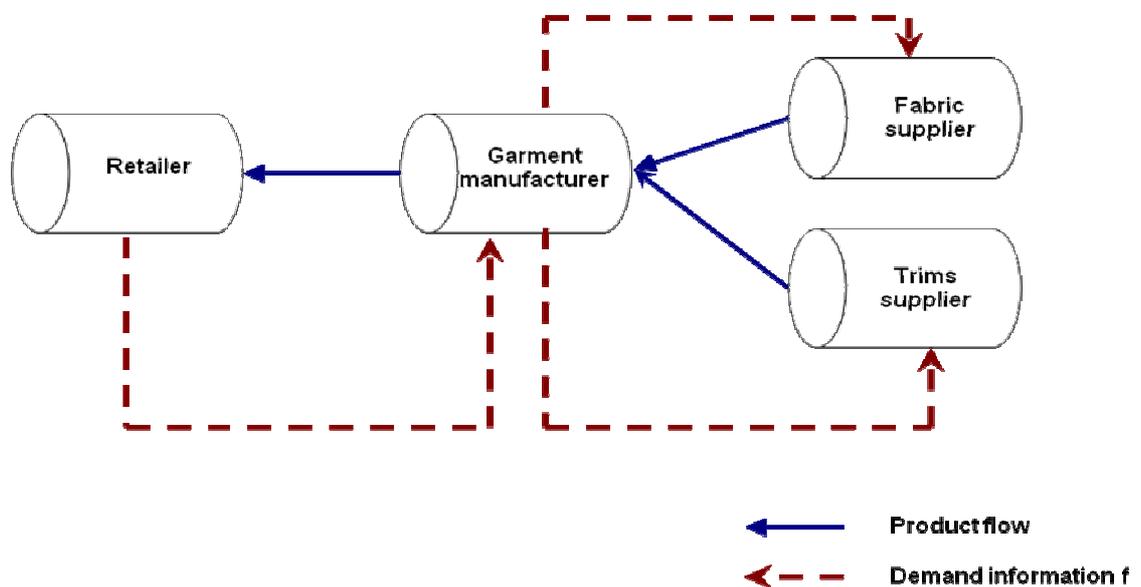
Figure 7.6. Material and Demand Flows for Low Fashion Items

These were very stable networks, with configurations changing very little over the years. Due to the stability of demand for the functional products which they were serving, the level of flexibility required in reconfiguring these supply pipelines was very low, with the same suppliers being used throughout. The

high volumes and stable, predictable nature of demand, with long product life cycles, enabled economies of scale and this could facilitate the development of stable and ongoing partnerships. Retailer A, for example, had used for the production of its winter coats range the same Romanian garment manufacturer for the last 8 years.

This type of pipeline exhibits the characteristics of lean supply systems (see Figure 7.3.). It requires low Vendor Flexibility, due to the low demand for variability in production (low volume flexibility) and low demand for variety of products (low mix flexibility). At the same time, the long term stability of the supply system employed also renders Reconfiguration Flexibility to be low (Figure 7.7.).
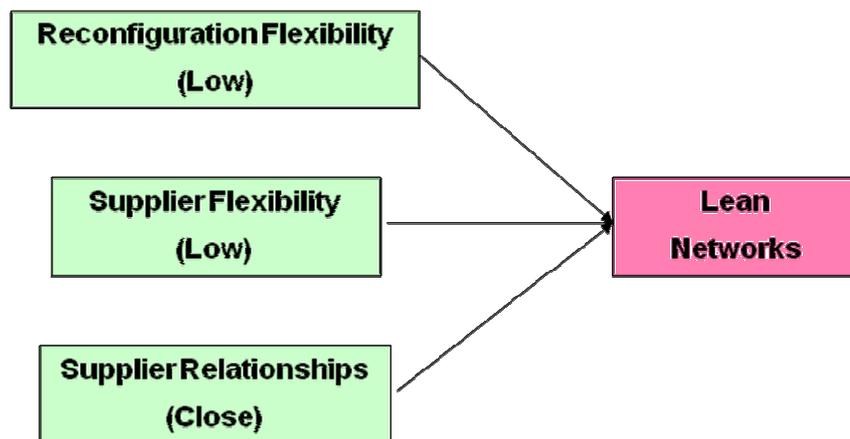
Figure 7.7. Flexible Sourcing Strategies for Low Fashion Items

7.3.2. Mid Fashion Items

The majority of the retailers' product range were the 'mid-fashion' items. Two sourcing models emerged from this research, both employed by each of the two retailers interviewed. These were:

1. Using local, flexible suppliers in a stable, robust network (Type I Leagile Networks)
2. Using less flexible, overseas suppliers in a rapidly reconfigurable network (Type II Leagile Networks).

Scenario 1: High Vendor Flexibility and Low Sourcing Flexibility (Type I Leagile Pipelines)

This sourcing strategy was employed by both retailers for a small proportion of their knitwear range. These were 'high end' products which attracted high profit margins. They were technically complex products which were woven in one piece by the same UK based garment manufacturer.

The products' life cycle would average 6 months (one season), after which the line would be discontinued and any left-over stock would be marked down, incurring significant losses. Newly developed products were first tested by sourcing small trial quantities from this quick response local supplier, with which the retailer had a long-term, strong partnership in place. If the market trial proved successful, the product would be offered across a retailer's stores chain. A wide choice of product designs, colours and sizes was made available, rendering the requirement for mix flexibility to be high.

Demand for these products was continually monitored and daily analysis of point-of-sale data allowed the retailer to identify quickly changes in demand pattern. To minimise the risk of obsolescence, frequent orders would be placed and small volume frequent deliveries would be expected. As a result, high levels of both volume and mix flexibility were required by retailers from their garment suppliers, which emphasised the need for an agile manufacturing strategy to be employed.

In this type of network, the typical buyer-supplier relationship that is too often motivated by opportunism in the fashion industry (Fernie and Azuma, 2004) had transformed into a more collaborative partnership. As a result, Reconfiguration Flexibility in these pipelines was low. In this Quick Response partnership, the retailer's objective was to develop the customer's business. The benefit to the vendor was the fact that they were treated as a preferred supplier. Cost benefits were being achieved through greater sharing of information and integrated logistics systems. The capital intensive nature of the knitted garment manufacturing sector in which it operated, combined with the adoption of a Quick Response strategy, was seen by the apparel supplier as the key to surviving against competition from low-cost imports.

166

The flow of information and materials along these supply systems were very similar to those employed in the sourcing of low fashion, functional items (see Figure 7.8.).
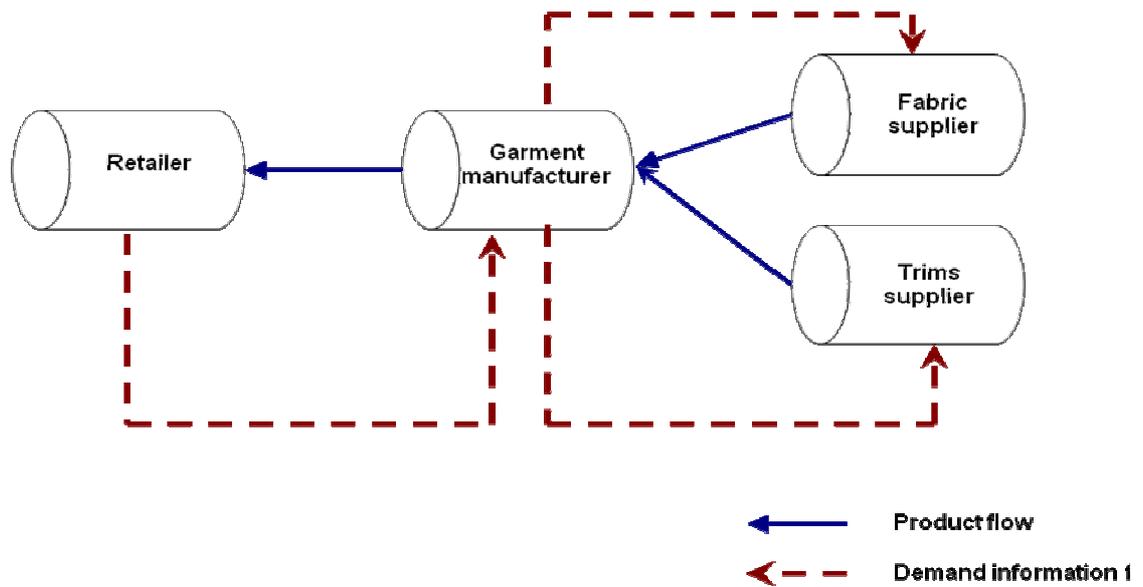
Figure 7.8. Material and Demand Flows for Mid Fashion Items

Based on Figure 7.4., this network is a Type I Leagile Supply System, in which agile vendors (characterised by high volume and mix flexibility) and low reconfiguration flexibility (Lean Networks) are combined to achieve an adequate response to the market place (see Figure 7.9.).

Scenario 2: Low Vendor Flexibility and High Sourcing Flexibility (Type II Leagile Pipelines)

Mid-fashion Items

The majority of the retailer's product range would be designed up to six months before each season would be due to start, once information from designers fashion shows and trend annalists would be gathered. These were the 'mid

fashion' items, designed based on forecasts generated from previous sales data and information received from trend annalists.
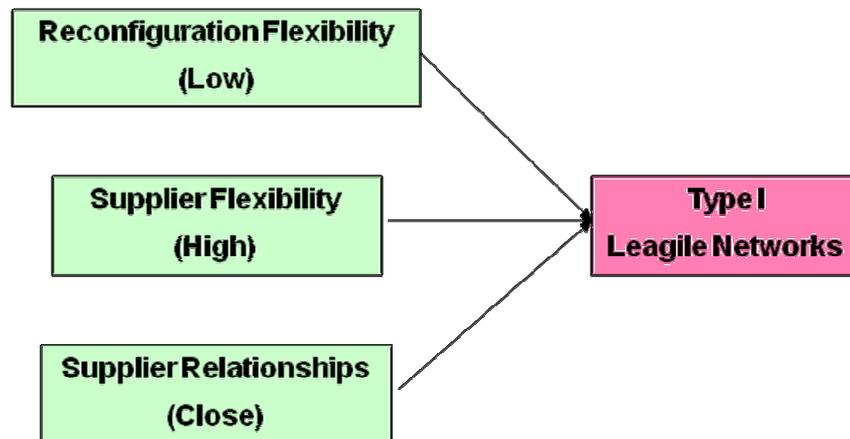
Figure 7.9. Flexible Sourcing Strategies for Mid Fashion Knitted Items

The sourcing model employed for the knittwear garments illustrated in the previous section was applied to a very small part of the retailers' product range, as knits accounted, on average, for just under 10% of their total annual stock-keeping-units. The remainder of the non-basic range was mainly made up of woven products, the manufacturing of which was a much more labour intensive process. A decision on the raw material (fabric) used for these products was made six months before each season would be due to start, once information from designers, fashion shows and trend annalists would be gathered. The six month design cycle was dictated by the long lead times imposed by the fabric suppliers used. These items were the core of the mid-fashion range.

With an increasing number of new products introduced each season and reduced volumes per stock-keeping-unit, the pool of skills required for clothing manufacturing was becoming increasingly complex, requiring a larger network of suppliers every season. And due to the large local labour costs, combined with reduced local capacity availability, the supply networks used were almost exclusively global in nature. The suppliers used were characterised by high labour intensity, small average plant size and relatively unsophisticated

technology used. For knitted items, these low cost suppliers were perceived by the retailer as more responsive than the local ones, due to the fact that low labour costs enabled them to afford excess capacity at short notice.

In order to reduce the complexities associated with global sourcing and the continuous need to restructure the supply network, this research found that the common norm for sourcing these 'mid fashion' items was to make use of overseas, third party indirect sourcing import/export agencies, so called intermediaries (Masson et al., 2007). Many of these were agents in the broadest sense, with no manufacturing, logistic resources or assets, but with a wide knowledge of the local supplier base. If and when the retailer's initial market trial seemed to indicate a market existed, the order for the new product in relatively small quantities would be placed with the intermediary. The intermediary would then organise competitive auctions for garment manufacturing. However, the final design of the product would not be decided till much closer to the season, which meant that the retailer had positioned the fabric and pre-booked capacity with the garment manufacturers through the intermediaries used, but still allowed for a high level of customisation.

Due to long delivery times incurred mainly due to the employment of sea transportation, and in an effort to cut down costs, large volumes of one-off deliveries would be placed, which meant that the level of volume flexibility required from the garment manufacturers was low.

Intermediaries

The need for quickly redesigning these global supply pipelines on an ad-hoc basis meant that indirect sourcing through export-import agents (intermediaries) was always employed as they could identify quickly available sources of supply.

They had access to the large supplier network which enabled almost limitless flexibility in terms of product capability, and coupled with the industry overcapacity, it allowed for the rapid identification and utilisation of spare finishing manufacturing capacity to enable rapid lead times. Many of these were agents in the broadest sense, with no manufacturing, logistic resources or assets, but with a wide knowledge of the local supplier base. If and when the

retailer's initial market trial seemed to indicate a market existed, the order for the new product in the relatively small quantities would be placed with the intermediary. The intermediary would then organise competitive auctions for garment manufacturing by passing the required specifications of the product and the volumes required to appropriate players in its supply network base, giving them a few days to put together an 'offer package' based on price and lead time. The 'best' offer in terms of delivery lead time and price would be selected and the manufacturer given the order. The intermediaries did have 'preferred' manufacturers, and indeed to try to assure better quality at the garment manufacturing stage only 'approved' manufacturers were allowed to participate in the auctioning process. However at the time of the study there was very significant global production overcapacity and price could be aggressively driven down by the intermediaries if required.

Previous studies, such as the one conducted by Forrester Research in 2002 (Radjou, 2002) indicated that in global supply chains higher degrees of inflexibility can be expected, mainly generated by a firm's inability to transfer production from one plant to another and its inability to successfully respond when capacity is constrained. The study's authors argue that global manufacturers must be able to respond to dynamic trade by showing an ability to satisfy current demand with customized response. Dynamic capacity includes the ability to add or reduce capacity at an existing facility, add or eliminate facilities, or source additional capacity at very short notice.

Dependent on the design of the product, the cutting and assembly may be in mainland China, Hong Kong or Vietnam. Depending on the fabric type and colour the supplier may be Thai, Indonesian or Bangladeshi. By reserving capacity with fabric and thread producers, dyers and assemblers around South East Asia, very short lead-times could be obtained. As such, the core competences of the intermediaries used were concerned with the skills of organising manufacturing networks to provide very rapid lead-times and maintaining and improving their retail customer relationships (see Figure 7.10.).

One of the key findings of this thesis is the fact that through the use of intermediaries, the Reconfiguration Flexibility of the supply systems employed

was highly enhanced, which increased the level of flexibility that these supply systems were ultimately able to exhibit. This was mainly done, as highlighted above and in the previous chapter, through sourcing capacity when and where required. For the intermediaries to be price, and of course mainly lead time competitive to support agile supply, the small, one off batches required by the retailers were auctioned in a traditional, and adversarial manner across those in the supplier network with capacity and capability to meet the requirements, subject to some caveats such as closeness to fabric suppliers.

Before	After

Retailer	Intermediary	Apparel supplier	Textile supplier
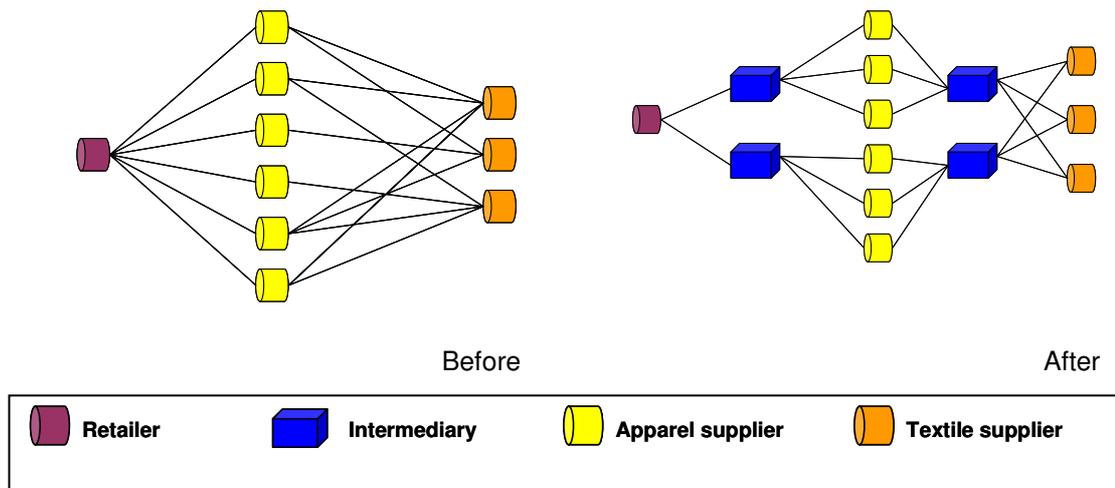
7.10. Supply Chain Structures before and after the Use of Intermediaries

The intermediaries' strategy of not owning any production facilities kept the supply chain flexible and adaptable, encouraging the constant search for flexible, quality-conscious and cost-effective producers. This is consistent with findings from previous studies, such as Magretta (1998).

The information and material flows across these supply pipelines is illustrated in figure 7.11. The diagram illustrates the fact that the intermediaries were engaged in all phases of apparel manufacturing, assisting the fashion suppliers in both the design of new products, as well as the design of the supply systems necessary to bring these new products to the marketplace: new product design, raw materials sourcing, apparel manufacturing and distribution of the finished goods. Fabric and trims were also sourced through the intermediaries, and raw materials would be delivered straight to the manufacturer's facilities.

171
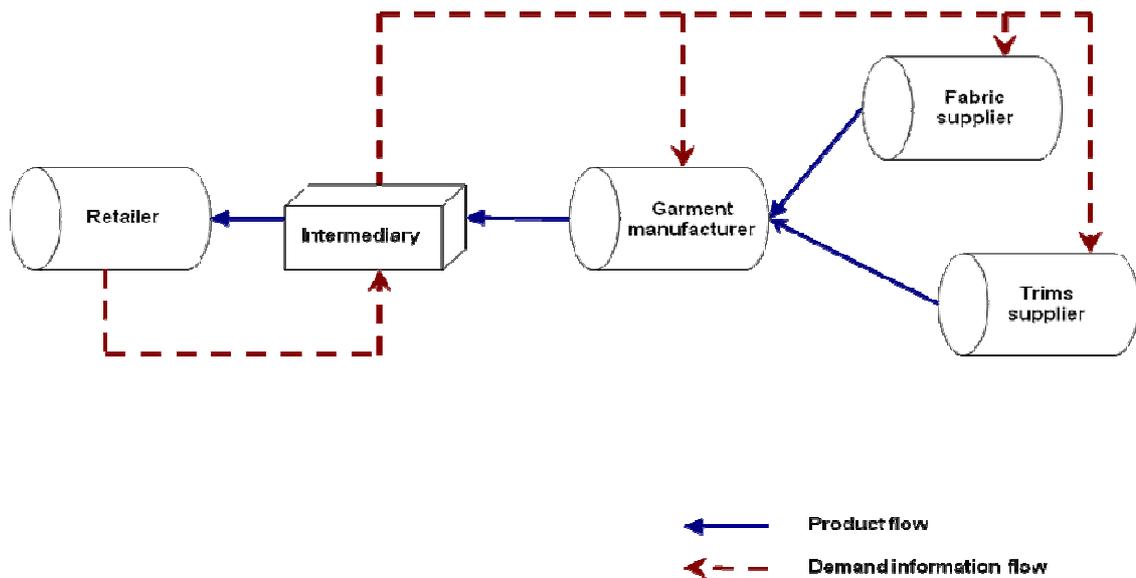
Figure 7.11. Flexible Sourcing Strategies for Mid Fashion Knitted Items

The Lohn Model

An alternative sourcing model (the Lohn Model) was, however, identified in the pipelines used to source such items from some of the Eastern European suppliers, such as the Romanian manufacturer interviewed. In these pipelines, the intermediary would source all the raw materials required for the manufacture of a particular product, coordinate their arrival to its own warehouse and then organise their delivery as a 'bundle' to the manufacturer's facility (Figure 7.12). This process was mainly employed in those cases where the raw materials required were manufactured in a different county than that in which the garment manufacturer operated and the apparel supplier lacked both the operational and financial ability to engage in global sourcing. This system offered less flexibility as the lead times involved were longer due to duplication of effort across the supply chain.

Chapter 3 has highlighted that previous studies, such as de Toni and Nassimbeni (1995), found that the ability of a firm to plan the governance structure of supply relationships was closely related to the stability and effectiveness of the supply network in which it operated. This thesis, however,

has found that in order to achieve the high level of market sensitivity required by the fast fashion sector, the employment of highly reconfigurable networks was essential.
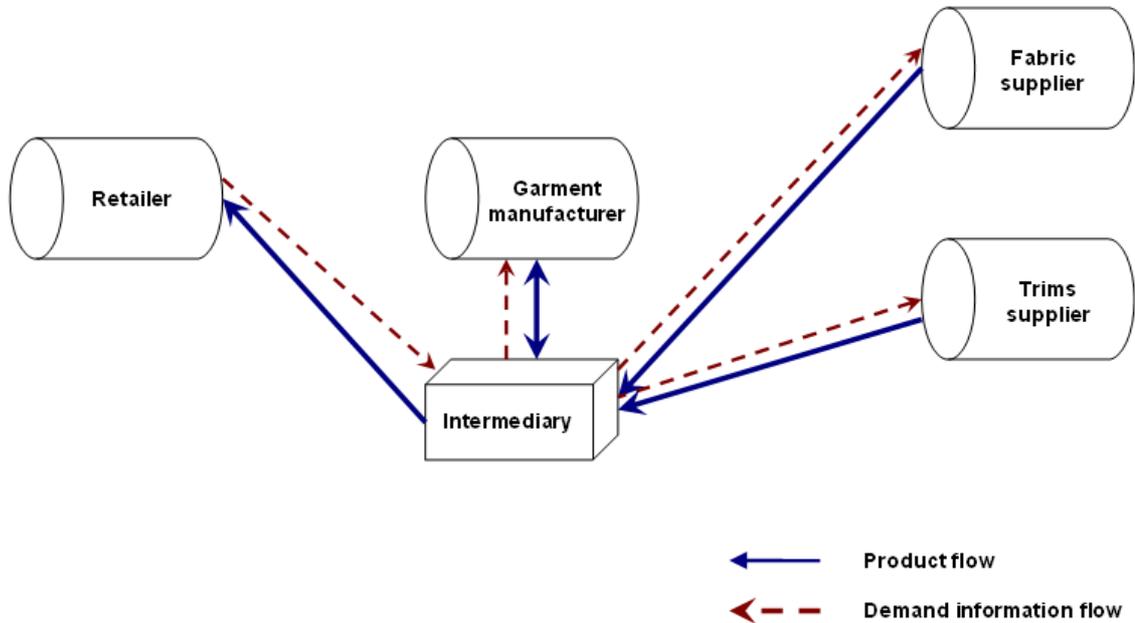
Figure 7.12. The Lohn Model

However, the ability of the fashion retailers to rapidly reconfigure the supply network employed was entirely dependant on the use of trading agents. Their constant presence in the retailers' supply networks reduced the level of complexity that otherwise the retailers would have been confronted with, as well as giving a higher sense of stability. Empirical evidence supports the fact that the stability of a network depends on the presence of a dominant player capable of developing and properly managing the complexity of supply relationships in the network. In the fashion networks under study, this leadership role was now shared between the retailer and the fashion agents employed.

There was clearly very significant retailer dependence on the intermediaries based in the low cost countries.   The risk, for innovative fashion products, of this dependence stifling creativity did not really apply in this situation since it was the unconnected supplier network that provided the wide ranging product capability rather than the intermediary partners who simply organised it, though they could influence this.   There were few barriers to entry in becoming an

intermediary, in the main the basic role only requiring knowledge of, and access to, the available low cost country supplier networks rather than, say, significant capital investment. When this was coupled with the current overcapacity in the supply side of this market, which applied to the intermediaries as much as it did to everyone else, it left the retailers feeling less vulnerable to opportunistic behaviour by intermediaries. Should the supply overcapacity disappear in future however, it would seem certain that the retailers would become more vulnerable to their high dependence on the intermediaries.

In these networks, establishing long-term partnerships with a small number of more flexible suppliers was perceived as likely to reduce the retailer's market-orientation capabilities to flexibly and responsively cater for a diverse, fast moving fashion market. It was, indeed, to risky to trade off the variety with a streamlined (lean) yet less flexible supply chain (Fernie and Azuma, 2004).

These networks have been categorised as Type II Leagile Supply Systems (see Table 7.5.). In these systems, lean suppliers, characterised by low levels of volume flexibility and mix flexibility (Naylor et al., 1999), and a high level of reconfiguration flexibility have been employed (see Figure 7.13.).
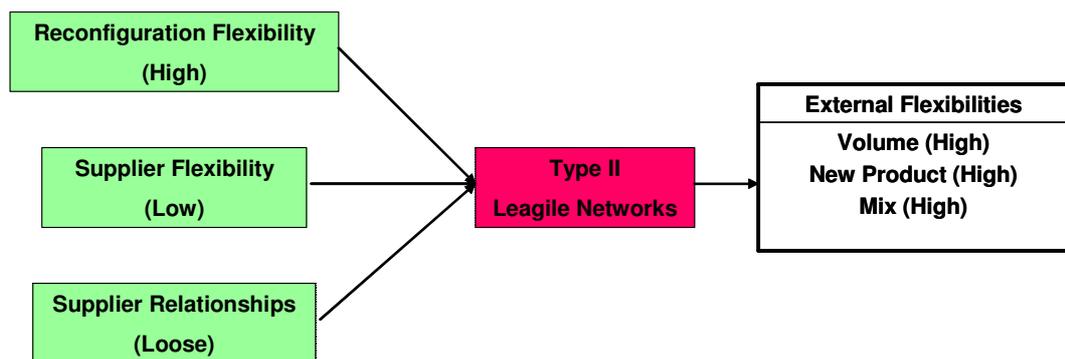

Figure 7.13. Flexible Sourcing Strategies for Mid Fashion Woven Items

7.3.3. High Fashion Items (High Vendor Flexibility, High Sourcing Flexibility, Agile Pipelines)

The retailers' seasonal product range offer would also have to allow for new product introductions designed as a response to shifts in popular culture,

expected to occur anytime from anywhere and creating significant demand for a fashion style or trend. The frequent introduction of new products would attract customers into stores more frequently, as well as attracting higher profit margins than the low or mid fashion items. However, the very newness of high fashion products and their very short shelf lives (averaging 3 to 4 weeks), made demand very unpredictable and increased their risk of obsolescence.

As a result, lead-time reduction for high fashion products was key to the fashion retailer's success and the retailers had to be extremely agile in capturing emerging trends, designing new products once the new season has already started and quickly bringing them to the market. As such, lead-time reduction for high fashion products was key to the fashion retailers' success. Even for these items, with a much shorter shelf life, the retailers preferred global sourcing to local producers. Some of the reasons for this were the lack of skilled manufacturers in the UK, the reduced availability for fabrics and trims, high labour prices and very limited capacity still available. Eastern Europe and North Africa were the preferred sources of supply for these items, due to their proximity to the UK market and hence short delivery lead times. A Buy-to-Order strategy was employed for the raw materials required for the manufacture of these garments, using fabrics designed to stock on a speculative basis by partner textile producers.

To minimise the risk of obsolescence, the final decision in terms of volume of completed product to be delivered would be delayed as long as possible. This required a high level of volume flexibility from the garment manufacturers. The low wage rates, flexible employment terms and highly skilled labour enabled the suppliers to afford excess capacity at very short notice.

The same sourcing practice of auctioning out production through trade intermediaries was used, allowing for quick reconfiguration of the supply chain on an ad-hoc basis. The intermediaries' strategy of not owning any production facilities kept the supply chain flexible and adaptable, encouraging the constant search for flexible, quality-conscious and cost-effective producers.

Based on the taxonomy introduced in Figure 7.4., these supply pipelines can be categorised as Agile Supply Systems, in which agile vendors (characterised by high volume and high mix flexibility) and high reconfiguration flexibility are both required in order to achieve a quick response to the market place (see Figure 7.14.).

As such, the four different scenarios presented above have illustrated that Lean, Agile and Leagile supply chains have different flexibility requirements. Using the framework introduced in figure 7.4., it was highlighted that different supply chain strategies can be rationalised by considering 'sourcing' and 'vendor' flexibility types. As a result, the two-sided approach to flexibility can facilitate the design of more effective supply systems. More specifically, for fashion retailers to be successful in the current markets, which increasingly require a high level of customised response to the different needs of different customers, it was shown that developing 'one size fits all' supply chain solutions is no longer viable. As such, this thesis suggests that the above framework could be used as a guideline for designing and managing parallel supply pipelines which match different operating environments. In order to do so, the nature of demand should be used as an assessment of how much flexibility a supply chain should have and what sources of flexibility should be employed in order to achieve it.
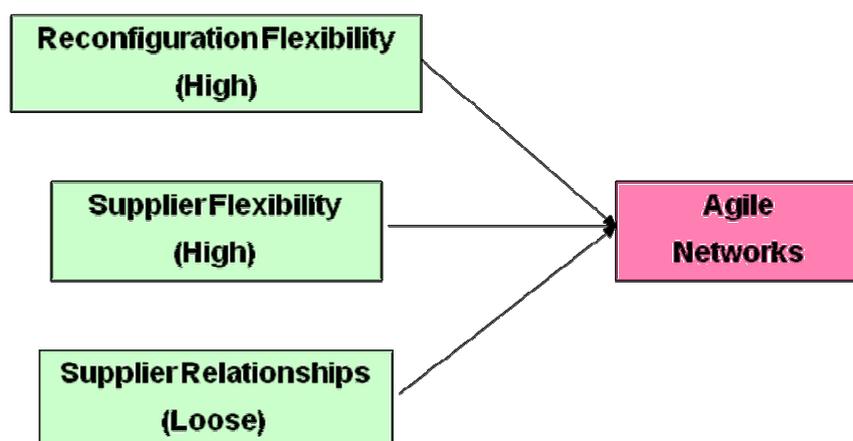
Figure 7.14. - Flexible Sourcing Strategies for High Fashion Items

Moreover, the above scenarios have highlighted the fact that the leagility concept can be extended to include two new types of Leagility:

- The make-to-order, Type I leagile strategy employed for the sourcing of knitted items required high levels of vendor flexibility, but low levels of reconfiguration flexibility, and was able to achieve a medium term (3 – 6 months) level of responsiveness.

- The Type II leagile strategy employed for the sourcing of mid-fashion, woven items, required high levels of sourcing flexibility, but low levels of vendor flexibility. A medium response (3-6 months), in terms of the time horizon affected, was also achieved through the implementation of this strategy.

At the same time, to enable high levels of agility in a global sourcing context through rapid supply systems reconfiguration, new supply chain structures and actors, such as trade agents / intermediaries were found to be necessary to be involved.

7.4. Relationships

The literature on supply chain relationships argues that there are various degrees of collaboration that can be achieved between companies (see for example Webster, 1992 and Spekman et al., 1998). A supply chain actor may wish to achieve a greater degree of collaboration with its suppliers and/or customers, attaining a partnership arrangement or even vertically integrate to create a new enterprise. Alternatively, an organisation may wish to concentrate on core activities and either outsource and establish a form of co-operation or simply buy a service as and when required from the market place. Figure 7.15. illustrates the degree of relationship types that can be identified in supply networks, progressing from a loose relationship to a close one.
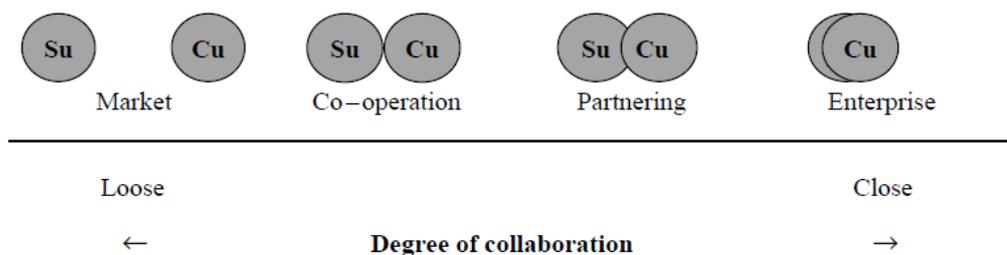
7.15. Degree of Collaboration in Supply Chains (Source: Naim et al., 2007, p.304)

As discussed in Chapter 3, in the supply chain management literature it is often explicit or implied that greater benefits are achieved by those companies that achieve closer relationships with their suppliers or customers (Dwyer et al., 1987; Lambert and Knemeyer, 2004; Fynes et al., 2005). However, this thesis case study findings revealed that the degree of collaboration employed between fashion retailers and garment manufacturers was dependent on the type of supply pipeline (lean, leagile or agile) and hence on the type of competitive outcome desired.

For low fashion items, direct sourcing employing long term cooperative relationships were evident throughout the pipelines serving these products. For mid and high fashion pipelines, a high degree of collaboration between the fashion retailers and their intermediaries and trim suppliers was reported. However, the relationships between the intermediaries and garment manufacturers, as well as the retailers and garment manufacturers were loose and adversarial. There is a vast literature on the value of developing collaborative relationships with supply chain partners (Dwyer et al., 1987; Dyer and Ouchi, 1993; Kalwani and Narayandas, 1995; Lorenzoni and Lipparini, 1999; Lambert and Knemeyer, 2004; Fynes et al., 2005). Key benefits of these relationships, such as JIT deliveries, lower costs, shared risks, and reduced uncertainty emerge from the development of inter-organisational trust and commitment (Handfield and Bechtel, 2002; Gao et al., 2005).

At times, however, this can be in direct conflict with maintaining the ability to respond quickly to unforeseen events. Entering into a long-term procurement contract with a supplier may help to reduce uncertainty for both parties, develop trust and mean that a supplier is willing to accommodate small changes at short notice but 'arms-length' relationships and auction purchasing may provide a more dynamic means of being flexible in the short-term (McLoughlin and Horan, 2000).

In the supply networks investigated in this research there was a clear trade-off when developing supply chain relationships between uncertainty and reconfiguration flexibility. Building collaborative relationships with all supply

chain entities would be impractical for the fashion retailers under study, expensive and conflict with the agile strategy of the supply chain. Important factors to consider when determining if building long-term collaborative relationships with a particular supplier would compromise the flexibility of the supply chain included the product's life cycle (long product life cycles for functional products, very short product life cycles for high fashion products) and the type of end-product (functional or innovative), as well as the market volatility. As such, at one extreme, primary supply chain members (such as intermediaries, fabric providers and trim suppliers) with which long-term relationships were established formed the robust part of the supply pipeline and served to reduce uncertainty. At the other end of the spectrum, supporting and inter-changeable supply chain members, with whom short-term relationships are maintained (the case of garment manufacturers), will form the part of the supply chain which can be more easily re-configured. In these pipelines, establishing long-term partnerships with a small number of more flexible garment manufacturers was perceived as likely to reduce the retailer's market-orientation capabilities to flexibly and responsively cater for a diverse, fast moving fashion market. It was, indeed, too risky to trade off the variety with a streamlined (lean) yet less flexible supply chain.

As such, for lean and Leagile type I supply pipelines, the degree of network re-configurability was low hence long term partnering relationships were adopted. For Leagile II and agile supply systems, the degree of reconfigurability was higher, hence the relationships between the retailers and their garment suppliers were much looser (see Figure 7.16.).

7.5. Process Integration

7.5.1. Coordination and Organisational Linkages

The design and management of the parallel supply pipelines introduced in the previous sections has enabled the retailers to focus on pre-production activities (research and development) and post-production activities (marketing and sales) and allow the intermediaries to take on the role of network coordinators.

They would make use of external suppliers specialised in each step of garment production and strongly connect them to the central planning system.
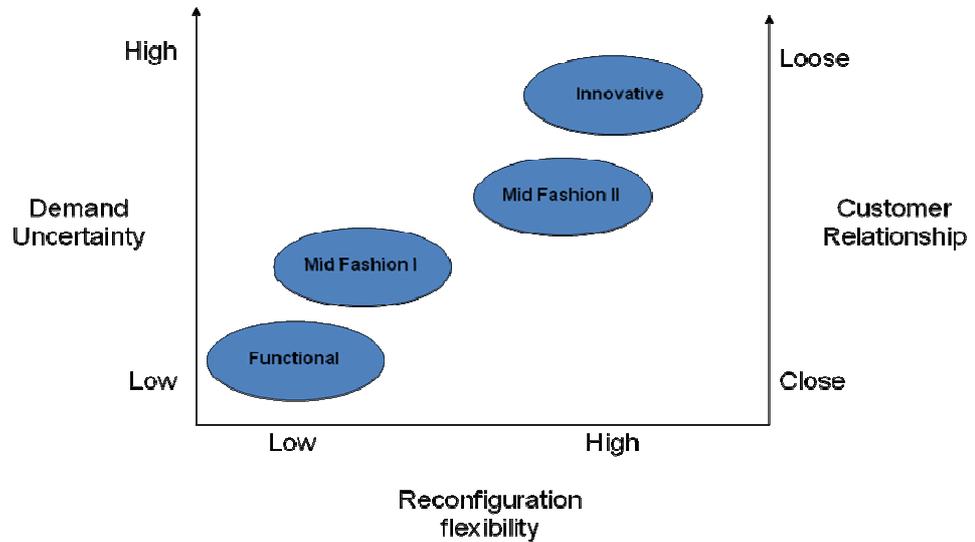
Figure 7.16. Nature of Relationships in Fashion Supply Networks

The two retailers participating in this research found that by involving trading intermediaries early in the product development process both cost and overall time to market were significantly improved. At the same time, they referred to increased communication seen in the use of multidisciplinary teams, increased involvement across company teams and the associates within those teams at earlier times within the process, and the use of communication technology to communicate quickly and share information easily.

It became obvious from the case studies conducted that in order to increase their ability to respond quickly to changing market requirements, the retailers interviewed saw both cycle time reduction and the implementation of a pull-based process as key supply chain management practices. In the fast changing markets in which they operate, traditional techniques such as forecasting and holding inventory would severely limit the agility of their supply networks. Forecasting techniques to predict short-term demand and supply needs would be fraught with error. Similarly, inventory-based approaches are becoming obsolete as they tie up capital, cannot completely eliminate uncertainty in the supply system and, in some ways, increase supply chain risks by increasing the

probability of being stuck with a pool of obsolete inventory (Garber and Sarkar, 2007).

In order to reduce the time to market of highly innovative, fashionable items, reducing the product development time was seen as essential by the retailers. Lead-time compression for time-based competition has received increasing attention in the last two decades (Bower and Hout, 1988; Stalk, 1988; McCutcheon et al., 1994) for companies operating in highly volatile environments. However, previous studies of the clothing retail sector (see Pitimaneeyakul et al., 2004; Wickett et al., 1999) highlight that the product development process within the apparel industry continues for many companies to be a traditional, linear, sequential and forecast-dependent system (Kincarde et al., 2007).

The product development portion of the apparel system has been documented by numerous researchers from the early work of DeJonge (1984) to the more recent work of Pitmaneeyakul et al. (2004). From the apparel product development literature, basic steps within the process include ideas and research, line conceptualization, preparation for production, and market preparation (see Figure 7.17.). Kincarde et al. (2007) indicated that this system would start with an idea about a product, often generated from a forecasted fabric or colour, pushes that idea through a lengthy product development period as well as through extensive financial and production analysis processes, and concludes with a push type sale to a final consumer. The typical process time from idea inception to final sale typically exceeds 24 months. Contact with consumers is often in the late stages of the overall system after many design and production decisions are made, and for some companies such contact is non-existent. The process is complicated by multiple and diverse tiers in the pipeline, including fibre producers, fabric manufacturers, apparel manufacturers and retailers (Dickerson, 2003).

In contrast, the companies interviewed exhibited the adoption of strong consumer-centric strategies proposed to meet demands of apparel consumers, with more simultaneous product development activities. Non-linear and involving pull strategies and extensive market feed-back mechanisms, the

product development strategies adopted allowed for extensive product differentiation, changing the core of traditional product development and delivery processes (Anderson-Connell et al., 2002; Swink and Hegarty, 1998, Kincarde et al., 2007). These consumer-centric processes, also called customer responsive, customer-engineering, and consumer driven, include the process of mass customization (Balasubramanian, 2001)

Ideas and Research	Line Conceptualization	Preparation for Production	Market Preparation
↓ Understand marketing concept	↓ Sketch garment ideas	↓ Produce sewn samples	↓ Prepare duplicate or road samples for market
↓ Search environment for information	↓ Evaluate and specify fabrics	↓ Create specifications and sample package	↓ Verify specification correctness
↓ Observe consumer	↓ Approve color	↓ Evaluate sewability of fabric and trim	↓ Evaluate sample appearance
↓ Compile color library	↓ Approve patterns	↓ Test textile piece good	↓ Review marketing strategies with sales staff
↓ Analyze competitor garments	↓ Decide optimum design solution	↓ Create production patterns	↓ Ship to market
	↓ Conduct slush meeting	↓ Approve marker	

Time before Sale to Consumer

12 months	→	11-9 months	→	10-8 months	→	7-6 months

Figure 7.17. Highlights of Traditional Order and Timing for Apparel Product Development Activities (Source: Kincarde et al., 2007, p.629)

In order to provide a 'market sensitive' product, the traditional order of product development, production and distribution activities had to be realigned by the retailers under study and moved from a linear system to a more concurrent process (Anderson, 1997). For example, Kincarde et al. (2007) highlight the fact that in customer-centred new product development, the final sale to the consumer becomes the first step in the process instead of the last step.

Much of the final fashion offerings in this research appear to be based on somewhat less ephemeral and more fundamental fabric and colour trends, so the retailers would try to make early choices on these from the main fashion trends emerging. Fabric lead times were much longer than for cutting, assembly and finishing so the early choice of fabric and colours often meant that key fabric suppliers would be identified and to some extent fabric production either 'pre-booked' or even begun. By the same token, finishing manufacturing capacity, and even logistics capacity, could also be pre-booked in advance. This was a good example of enhancing agility and reducing lead time by ensuring these activities were organised or planned well before final product definition was decided. Different sample product collections based on market information would be created and fashion industry and customer feedback sought to help to identify a focused view in which the must-have fashions, colours, trends were identified. The decision on the final product specification however, was always postponed to the very last possible moment, indeed it was reported to us by many suppliers that changes to product specifications were often still being made after fabric was cut as the retailers constantly adjusted their product range well into the season.

Previous studies, such as Bruce and Daly (2006) and Kincarde et al. (2007) highlight that concurrent engineering was perceived as difficult for many apparel manufacturers because of the costs of implementation and the dependency on manual labour in the production sewing processes. The studies also found that the integration of computers in the design of the product was essential in order to speed up the product development cycle, as well as the communication of product information throughout the company, including linkages to automated production systems and to trading partners.

The implementation of concurrent new product development has come about, in the case of the retailers interviewed, with the use of trading agents and integrated service providers. Overcoming the usual adversarial relationships that the retailers previously had with their apparel manufacturers and textile suppliers, the intermediaries facilitated the integration of all the activities required to bring a new product to the market place through their strong ties with both retailers and upstream suppliers. Using either in-house sample

creation activities or geographically proximate partners, they assisted the UK retailers in developing products that were both cost effective to produce and feasible for a company's production facilities and their capacities. Manufacturability was usually examined prior to beginning production but after establishing decisions for style, colour and fabrication. The process employed by the UK retailers would involve, once initial rough product guidelines had been agreed on at the retailer's headquarter, the co-location of the product development team at the intermediary's facilities. Here, by having access to fabric libraries, as well as in-house manufacturing expertise, the final product configuration would be agreed on, as well as identifying upstream potential suppliers. For those intermediaries that also had in-house manufacturing facilities, a sample of the product would be created and alterations agreed on, as well as product testing taking place. This process would overcome a series of the drawbacks of the previously used sequential product development cycle, such as reduced time to market and 'design first and cost later' (Diamond and Diamond, 2002) as well as the investigation of post-purchase product behaviour, such as ease of care, durability and comfort (Chen Yu and Kincarde, 2001; Gatta, 2001), and, of course, lower product development costs.

In Chapter 3 it was highlighted that many authors have focussed on the impact of developing collaborative relationships with suppliers on new product development (Dowlatshahi, 1998; Handfield and Nichols, 1999; Ragatz et al., 2002). Stevenson and Spring (2007) illustrate that early supplier involvement can reduce development time, product complexity and costs while improving parts commonality, ease of manufacture and quality. Involving suppliers in product development can also improve flexibility (Narasimhan and Das, 2000; Petroni and Bevilacqua, 2002) through modular product designs which enable the supply chain to produce product variations quickly and allow re-manufacturing.

As such, the use of trading agents and intermediaries has enabled the apparel product development activities to be realigned, or moved from the linear sequential order to a more simultaneous approach (Figure 7.18.).

Figure 7.18. New Product Development Activities for High Fashion Products for Retailer A

The activities of designing the prototype, coordinating raw materials for garment, grade patterns and manufacturing prototypes (samples) were brought forward significantly. This trend is compatible with mass customisation concepts including the need to realign processes (Anderson, 1997). At the same time, costing activities located late in the traditional apparel product development process were moved to earlier processing times by the subjects.

The time difference between the traditional product development process and the one identified through the present case studies is even more significant considering that the global nature of the supply chains under study. Before the use of intermediaries, the move into global sourcing has meant reduced production costs but longer delivery times, higher inventory levels, increased costs in terms of expedited freight, unfulfilled demand, tied-up capital and, poor quality levels, a lot of management time spent on 'fire-fighting' and ultimately less responsive supply chains. Long distances also led to increased lengths of communication lines, decreasing the closeness of contact and making problem solving at an operational level very difficult. With the adoption of indirect sourcing, the UK retailers have delegated the coordinated management of all in-bound material flows, as well as all the inbound and outbound information flows on the supply side.

As such, the centralised coordination and control of inbound material flows through the use of intermediaries has meant, for the UK retailers, increased delivery speed and a greater confidence in delivery reliability, and these were both critical aspects for increased competitiveness in the mass fashion industry. As most of the intermediaries used were working with a variety of other retailers, this has meant that by combining deliveries, handling costs and slack capacity were reduced, and these cost savings could be passed on to the retailers. This type of economy was referred to by Porter (1980, p.4) as *'economy of combined operations'*. This economy was enhanced by the awarding of bigger contracts to logistics providers than retailers would have been previously able to do individually, enabling the negotiation of better terms. This has also meant that the retailers could have more stable relationships with the few intermediaries used on a regular basis, rather than the loose

relationships than they previously had with the myriad of suppliers used on an on-off basis.

Another benefit has been the reduction of inventory in the supply chain. Partially, this has resulted from the increased reliability of deliveries from its suppliers, as they were more closely coordinated by the intermediaries used. The intermediaries were able to synchronise the movement of products through the supply chain so that deliveries of both raw materials and finished products occurred just prior to their use. However, one of the key enablers for the reduction in inventories has been the employment of postponement strategies. As a result, by using trade intermediaries, cycle times as well as costs were reduced. They were able to monitor the introduction of just-in-time manufacturing, produce smaller batch sizes. Because they shipped directly to the customer warehouses, they reduced the length of the supply chain and eliminated waiting time and in-process cycle time. Additionally, they could assist the retailers at the research and product development stage in order to roll out new designs faster. As such, in addition to economies, there were also service benefits to the fashion retailers, and ultimately to the final customers.

One of the most important benefits that has arisen for the retailer from the use of intermediaries has been the increased supply chain visibility. As highlighted earlier, the intermediaries have enabled the supply network to be managed more effectively, increasing its responsiveness but also minimising costs. Further, the retailer had better insight into the behaviour of its replenishment processes in response to changes in demand.

The quick responsiveness of the off-shore garment manufacturers, collaborated with the lack of capacity and raw material availability in the UK and the low switching costs within the rapidly reconfigurable network, mainly due to the use of trading intermediaries, has meant that the retailer was increasingly transferring offshore the sourcing of its high fashion items. This was perceived to have a considerable impact on the future strategies of domestic manufacturers. And as the above case studies have highlighted, only capital intensive, innovative and flexible suppliers stood a chance of survival in the UK garment manufacturing sector.

The framework for agile supply chain management practice introduced in Chapter 3 highlights the fact that process integration along the supply chain for cycle time reduction should be an essential component of any company's quick response to market strategy. However, the case study findings reveal that partners in fashion supply chains are eager to limit interdependence and retain their ability to easily switch partners, thus achieving a greater level of organisational flexibility. However, for reconfiguration flexibility to be both effective and cost efficient in a global context, the use of intermediaries was paramount. As well as assisting the fashion retailers in the design of responsive supply systems, the intermediaries had an essential role in time-compression at the product development stage.

7.5.2. Information Based

Goldman et al. (1995) describe information systems as the central, critical and fundamental part of any change to agility. This creates a digital supply chain (Hines, 2001) or what many authors chose to call an 'information enriched supply chain', in which the storage of expensive items that no one wants to buy is not necessary as inventory is substituted by information (Christopher et al., 2000). In these supply chains success depends on retailers identifying and monitoring the level of demand on a real time basis, communicating changes in demand instantly to suppliers, suppliers adapting their manufacturing to these changes in demand and then promptly despatching production to the point of sale(Christopher et al., 2004). In volatile environments such as the fast fashion industry, substituting inventory for information is essential.

A large number of studies, such as Garber and Sarkar (2007), have found that a company's IT and information systems can play an important role in determining how flexible a company's supply chain is. Many companies have invested in expensive enterprise resource planning (ERP) systems to streamline their financial and human-resource reporting systems but have not extended these systems to their supply chain partners. This is specifically problematic for today's enterprises, as they are inextricably linked to their supply chain partners. ERP systems continue to define the enterprise as being principally focused on

internal transactions, decisions, visibility, and reporting. This view can limit the supply chain's flexibility (Garber and Sarkar (2007). Even though advanced information technology is now available to aid integration between companies across the supply chain (e.i EDI, Web interfaces, supplier networks, and point-to-point links) most companies still use the phone, fax, and e-mail to exchange data with supply chain partners. These methods not only slow down the supply chain but also introduce an element of error and uncertainty. Clearly, there are far better ways to connect with suppliers.

These new state-of-the-art technologies available would allow almost limitless visibility into sales-order data and inventory levels, furthermore, the cost to make these connections has gone down significantly in recent years. The benefits of such a system can be seen in examples such as a global telecommunications company, which replaced its costly manual reporting structure with state-of the-art technology that allowed it to manage an end-to-end supply chain and respond faster to market demand. The new IT system is expected to reduce costs by more than 30 percent by removing manual labour and duplication of effort (Garber and Sarkar, 2007).

However, the use of inter-organisational information systems also presents a number of challenges for supply chain flexibility and responsiveness (Stevenson and Spring, 2007). For cost effectiveness, and to gain the full benefits, it is important for as many companies as possible to be incorporated (Holmstrom et al., 2002). But it has also been noted that inter-organisational technology is not widely used everywhere (Cagliano et al., 2005), particularly in SMEs with limited financial resources. Secondly, our case studies have demonstrated that for supply chains to be fully flexible high levels of re-configurability are essential and it is important to be able to dissolve links in the supply chain easily and form new ones once new market opportunities have been identified. However, linking information systems implies a degree of commitment, while inter-organisational information systems are not as flexible as they might be (Golden and Powell, 1999). Stevenson and Spring (2007) highlight that previous research suggests that the integration and flexibility of inter-organisational information systems are linked, but are inversely related: an increase in integration reduces flexibility and vice versa.

This thesis' case study findings confirm the fact that due to the high levels of re-configurability encountered in the supply systems employed, the level of information integration was very low, especially further up the supply chain. This was further exacerbated by the fact that, through the use of intermediaries, the level of complexity with which fashion retailers were confronted with was greatly reduced, but due to the addition of extra links in the supply network, the supply systems became longer. This had the potential of slowing down the speed at which demand information travels upstream the supply chain, a fact confirmed by all the suppliers interviewed.

Also, the lack of direct contact between the retailer and the garment manufacturer was quoted in all of the case studies as the reason for much delays and miss-communications. It was the retailer, rather than the manufacturer, that was mainly responsible for disrupting the relationship and de-emphasising the service values. As a result, the appealing, logical notion of 'customer responsive supply chain management', which has been so elegantly described in the normative literature (Storey et al., 2005), was thus found in practice to be prone to a number of critical organisational and behavioural barriers to its smooth enactment.

The case study findings highlighted the poor level of information systems adoption to enable communication along the supply chain. Intermediaries trying to check on progress at the manufacturing stage could at best telephone although once the product was in their distribution pipeline back to the retailers distribution facilities more sophisticated product tracking was apparent. Internet strategies previously identified as opportunities to integrate complex supply chains from concept design to store, and on to the final customer (Hines, 2001) were not identified in any of the case studies conducted. The somewhat advanced notion of a virtual web-based real time demand shared across the supply chain, at least down to the clothing manufacturers, seemed still some way in the future. However, during the course of the research it became apparent that the larger retailers all had sophisticated internal communication systems suggesting it is not the lack of technology or technical knowledge that inhibits them from embracing Quick Response methods. It appears to be the

unwillingness to commit time and money, as well as changing attitudes towards suppliers that is at the heart of this problem. In essence, information sharing is limited to the minimum necessary to complete the transaction (Birtwistle et al., 2003). However, as highlighted earlier in this section, many of the reasons related to the poor information integration across the supply network through the implementation of IT systems was due to the high levels of reconfigurability that these supply systems exhibited.

As such, the case studies conducted revealed that information technology was adopted in-house by fashion retailers in order to capture market trends and reduce demand uncertainty, but further evidence of systems adoption to aid supply chain integration and communication upstream the value chain was not found. An unwillingness to commit time and money, as well as changing attitudes towards suppliers, was found to be at the heart of this.

7.6. Summary

In this chapter, the key case study findings presented in Chapter 6 were compared against the general framework for agile supply chain management introduced in Chapter 3. It revealed that companies need to build 'fit-for-purpose' supply chain networks, and a framework was constructed to aid the design and management of these networks. Lean, Agile, and Leagile supply chains were found to have different flexibility requirements, and it was suggested that these can be rationalised by considering 'sourcing' and 'vendor' flexibility types. At the same time, the Leagility concept was extended to include two new types of Leagility: Type I where there is high vendor flexibility but switching between vendors is low, and Type II where the converse occurs. Furthermore, it was highlighted that for retailers to achieve high levels of agility in a global and complex sourcing context through rapid supply systems reconfiguration, new supply chain structures and actors, such as trade agents / intermediaries, need to be involved. However, the level of information integration achieved in these structures was limited to the minimum necessary to complete the transaction. This was mainly due to the high levels of re-configurability exhibited by these networks.

Chapter 8 Conclusions and Contributions to Knowledge

This chapter summarises the research findings in answer to the research question put forward in Chapter 4. The research's contribution to the existent literature and creation of new knowledge is highlighted and the limitations of the study are identified. Finally, areas for future research are proposed and practical implications of the study's findings will be addressed. This chapter concludes the thesis.

8.1. Summary of Research Findings

As the demand for more customised products, as well as lower prices, grows, companies have realised that their supply chains need to be more flexible. The more flexible they are, the faster their supply chains can respond to the market, and the better their chances to capture competitive advantage. Yet, in the past, the literature has shown that while companies realise the importance of flexibility, their struggle to lower prices has meant that global sourcing was adopted, at the expense of market responsiveness.

Christopher (1997) argues that those organisations that will be leaders in the markets of the future will be those that have sought and achieved the twin peaks of excellence: they have gained both cost leadership and service leadership. This research illustrates that by employing global sourcing into agile supply chain management practice the UK fashion retailers have managed to increase their competitiveness. This highlights that the global agile supply network is not a myth or an unattainable goal. Instead, it is becoming a necessity as customers are becoming more demanding in terms of more customised products at cheaper prices.

Furthermore, previous studies have emphasised the fact that functional, low-cost products require a company to manage massive volumes, whereas premium, innovative products necessitate flexibility in planning methods and a physical supply network able to anticipate unique market demand

characteristics. Traditional supply chains are either too complex and cost-laden to distribute low-cost products effectively or too asset-intensive and inflexible to quickly harness and deploy innovation. As a result, this thesis has found that:

- For fashion retailers to be successful in the current market, which increasingly require a high level of customised response to the different needs of different customers, developing 'one size fits all' supply chain solutions is no longer viable. By configuring 'fit-for-purpose' supply chain networks in a tailored fashion they are able to deliver innovation and responsiveness for premium brands and high efficiency for mass value products.

- Through high levels of process integration companies are able to first accelerate the innovation process so that new products and promotions can be introduced into stores more cheaply and quickly. Second, they have re-invented their supply network by reconfiguring operations to radically cut costs and proactively meet customer demands.

- To enable high levels of agility in a global sourcing context through rapid supply systems reconfiguration, new supply chain structures and actors, such as trade agents / intermediaries, had to be adopted.

8.1.1. Agile SCM Practices

Despite the fact that extensive research has been conducted on various aspects of agility in both apparel and other industries' supply networks (Duray, 2002; Lee et al., 2002; Ulrich et al., 2003), the majority of previous research focused on consumer acceptance of the strategy and not on operational issues (Loker et al., 2004, Kincarde et al., 2007).

Based on an extensive literature review, a framework of agile supply chain management practices was introduced in Chapter 3, which identified three components that the strategy adopted by companies operating in highly volatile environments should employ: Market Sensitivity, Flexible Sourcing and Process Integration. The extent to which the components of this framework are adopted in practice was then investigated through a series of case studies. These revealed that for companies to be successful in the current markets, which increasingly require a high level of customised response to the different needs of different customers, developing 'one size fits all' supply chain solutions is no

longer viable. As a result, the conceptual framework developed could be used as a guideline for designing and managing parallel supply systems which match different operating environments.

Brun and Castelli (2008) stress that, given the increasing demand for product variety, companies do not face a single demand pattern but cope at the same time with a set of market demands, which is consistent with previous research, such as Heikkila (2002), Holmstrom et al. (2002), Lee (2002). Hence, companies could reasonably apply different supply chain strategies in order to satisfy different demand patterns (Fisher, 1997; Sharifi and Zhang, 1999; Lee, 2002). Brun and Castelli (2008) further emphasise that such differences mainly emerge in terms of target performances of the supply chain, which therefore affect the related supply chain decisions, such as the ease of synchronizing the various processes along the supply chain. They should be considered when defining whether the most suitable SCM strategy is efficiency-oriented (lean) or it should pursue a high level of reactivity and flexibility (agile) (Fisher, 1997; Brun and Castelli, 2008).

The positive reaction of the interviewees and their involvement in managing activities along the value chain provided a confirmation of what a wide body of literature had already suggested: the area of supply systems strategy is actually perceived by fashion retailers as an area where sustainable competitive advantages can be achieved, but very little research has been conducted in its implementation along the value stream. For instance, the trend for relying on a wide network of suppliers required the retailers to expand the boundaries of their management activity towards integrating activities further upstream the value chain. In particular, by describing the evolution of their supply systems configuration and management practices adopted, these companies highlighted that choices regarding the supply chain often reflected a segmentation criteria: different SC configurations and management choices need to be applied within the same company's supply network (Brun and Castelli, 2008). This suggests not only that it is worth researching in the field of supply chain strategy but in particular that it is interesting to take into account the issue of defining and applying focused supply chain strategies.

8.1.2. Flexibility in Supply Chains

The review of supply chain flexibility has identified very little research that addresses the issue of flexibility outside the manufacturing plant and in the larger context of supply chain, network or system flexibility. By supply systems the author refers to aggregation levels that yield an entire business unit, dyadic relationships, supply chains and ultimately whole supply networks (Harland, 1996). But as the focus of today's companies is continuously changing from internal management of business processes to managing across enterprises, the concept of supply chain flexibility must also extend beyond an individual firm's internal flexibility.

The literature review conducted in Chapter 3 was used to identify that, at network level, the external flexibility of a supply system (being it new product flexibility, volume flexibility, mix flexibility, delivery flexibility or access flexibility) is determined by two internal sources of flexibility: the flexibility of individual nodes within the chain (Vendor Flexibility) and the ability of the focal firm to re-design (re-configure) and manage (coordinate) the supply chain (Sourcing Flexibility). Furthermore, the degree of their adoption will impact the nature of relationships developed along the supply chain.

Finally, the postulation in this thesis is that a fundamental difference between lean, agile and leagile supply networks is that they have different requirements for different types of flexibility (Supplier or Reconfiguration Flexibility). As argued by Naylor et al. (1999), agile systems must be flexible, and hence robust to changes or disturbances, whereas lean systems aim to minimize internal and external variation as much as possible, placing more rigid controls on flexibility types.

More specifically, for companies to be successful in the current markets, which increasingly require a high level of customised response to the different needs of different customers, developing a unique supply chain solution able to service a wide product range, with different demand patterns, is no longer viable. As a result, the above framework could be used as a guideline for designing and managing parallel supply systems which match different operating

195

environments. The case studies conducted with the two fashion retailers revealed that they required four types of pipelines to adequately service their markets. The design and management of these pipelines was determined by dynamically matching the characteristics of demand with the sources of flexibility required. As a result, this thesis suggests that the nature of demand should be used as an assessment of how much flexibility a supply chain should have and what sources of flexibility should be employed in order to achieve it. This is consistent with Fisher's (1997) findings that most companies fail in managing their supply chains due to a mismatch between the supply chain strategy adopted and the nature of demand for their products.

Through two cases of supply networks conducted in the apparel sector, this research illustrates how the framework developed in Chapter 4 can help distinguish between lean, agile and leagile supply networks and guide the implementation of parallel supply pipelines:

-        Functional items, with long shelf lives (1 to 3 years), required both low supplier and low reconfiguration levels of flexibility. This has led to the design of lean, make-to-sock supply chain strategies focused on cost efficiency.

-        The make-to-order, Type I leagile strategy employed for the sourcing of knitted items required high levels of vendor flexibility, but low levels of reconfiguration flexibility, and was able to achieve a medium term (3 – 6 months) level of responsiveness.

-        The Type II leagile strategy employed for the sourcing of mid-fashion, woven items, required high levels of sourcing flexibility, but low levels of vendor flexibility. A medium response (3-6 months), in terms of the time horizon affected, was also achieved through the implementation of this strategy.

-        Due to the unstable nature of market demand and non-standard nature of the high fashion items, an agile supply chain management strategy was employed for items that required short term responsiveness (3 to 6 weeks). In this situation, both high reconfiguration and high vendor flexibility were necessary in order to achieve speed to market.

These findings contribute to the creation of new knowledge by first highlighting the different combinations of flexibility sources that could be employed, at

network level, in order to help the design and management of lean and agile supply systems, and, secondly, by identifying 2 different types of leagile strategies that retailers operating in the fashion sector could employ in order to offer a customised response to the marketplace. These will be discussed in more depth in the following section.

8.1.3. Leagility

This thesis also presented an extension of leagility beyond the simple material flow decoupling point concept put forward by Naylor et al. (1999). The leagility concept, originally developed by Naylor et al. (1999), aims to leverage synergies in both leanness and agility, and hence their inherent flexibilities, through their decoupling via strategic use of stock in the product delivery process, specifically in a manufacturing context. The definitions of lean, agile and leagile paradigms developed by Naylor et al. (1999) have been exploited by many authors and well over 100 citations exist. For recent examples, see Agarwal et al. (2006), da Silveira and Cagliano (2006), Narasimhan et al. (2006). Other studies, such as those by Towill and Christopher (2002), Herer et al. (2002) and Vonderembse et al. (2006) have extended leagility beyond the material flow decoupling concept by virtue of its exploitation in new contexts.

However, none of the previous studies aimed at extending the concept of leagility directly consider the flexibility associated with switching between suppliers. Naylor et al. (1999) addressed the issue of supply chain and virtual enterprises by simply referring to the fact that both the lean and agile paradigms gave due consideration of the extended enterprise. Pires et al. (2000), building on the research of Christopher and Towill (2000) among others, clearly distinguished between lean supply chains and agile virtual enterprises. The former establish long term partnership relationships between dyads while the latter creates a temporary network of organisation that can be reorganised quickly at low cost penalties.

This thesis fills in this gap and extends the concept of leagility by identifying two new types of leagility in practice : Type I, where there is high vendor flexibility but switching between vendors is low, and Type II where the converse occurs.

197

8.1.4. Process Integration through Intermediaries and the Role of Integrated Service Providers

As supply systems' complexity and demand for frequent new product introductions grow, the levels of responsiveness that companies operating in highly volatile environments need to exhibit needs to grow too. Yet, while they realise the importance of flexibility, they struggle with how to accomplish this difficult task. The key elements are reducing cycle time and implementing a pull-based replenishment process. Furthermore, in an environment of global complexity, the importance of supply chain flexibility is even greater. The more flexible you are, the faster your supply chain can respond to the market, and the better your chances to capture competitive advantage. By reducing cycle time and improving the connection between production and demand, companies can make the supply chain more responsive (Garber and Sarkar, 2007).

The framework for agile supply chain management practice introduced in Chapter 3 captured the fact that process integration along the supply chain for cycle time reduction is essential. However, the case studies' findings reveal that partners in the fashion supply chains strive to limit interdependence and retain the ability to easily switch partners, allowing greater organizational flexibility. The flexibility will result in a more intensive capacity utilization resulted from industry-wide sharing. A more dynamic production network is formed with increased level of co-operative arrangement (Chung et al., 2004). However, this research has illustrated that for reconfiguration flexibility to be both effective and cost efficient in a global context, the use of intermediaries was paramount. They enabled the retailers to interface with the market with superior quality, quicker response and higher mix/volume flexibility, factors which are critical in a market subject to fluctuations in fashion.

To enable a quick response to rapid changes in market trends, fashion retailers needed suppliers with the capability to make garments, but who were also able to provide the logistical know-how to find all the parts needed for the finished product Thus, they required more advanced full-package companies (intermediaries) who, in turn, may subcontract out these orders to other local

firms. Some of these would also purchase fabric and trims for their overseas contractors through the lohn system and participate in the quality control inspections for finished goods.

As well as assisting the fashion retailers in the design of responsive supply systems, the intermediaries' role in time-compression at the product development stage was also essential. The product development stage was the point at which the retailer would be able to address a number of factors, such as the choice of fabrics and trims, flexibility of delivery issues to match consumer demands, the size of batches to be processed to reduce risks, ways of bringing design and colouring decisions closer to the point of sale, ways of reducing the total cost impact of product development. The most time efficient method encountered in addressing these issues was the use of Integrated Service Providers, one of which was used as a subject for one of this thesis' case studies. They would offer the fashion retailers assistance in bringing people with different areas of expertise together, including representatives from the retailer, the clothing manufacturer, the textile supplier, the dyer/printer and the yarn and fibre manufacturers. They would also source raw materials on behalf of the retailer and arrange the distribution system to the retailer's UK based warehouse.

One key finding is that it was not only labour-intensive activities that have migrated away from the UK and of the retailer's direct control (such as sewing and assembly) but high value adding activities too, such as product development, design, fabric testing, sample making, brand building, buying and sourcing.

The thesis also reveals that the fashion retailers interviewed have previously taken a high-level decision to source a large proportion of their products from overseas suppliers. For these retailers, the issue was not to carry out thorough make-or-buy and risk analysis in order to decide whether to outsource or not. Rather, it was to understand how to make the best of global sourcing in a very volatile market. Thus, this research proves that the global flexible supply chain is not a myth or an unattainable goal anymore. Instead, it is becoming a necessity as customers become more demanding in terms of both service and

cost. This has led to the retailers adopting several strategic responses that ultimately altered the content and scope of their global sourcing networks: they discontinued certain support functions (such as pattern grading, marker making and sample making) and reassigning them to contractors. They were instructing the contractors where to obtain needed components, thus reducing their own purchase and redistribution activities. They were shrinking their first tier supply base, mainly through using fewer but more capable contractors. They were implementing more stringent vendor certification systems to improve performance. In essence, fashion retailers recognised that overseas contractors have the capability to manage all aspects of the production process, which restricts their competitive edge to design and brands.

Through the adoption of these strategies the level of complexity that the retailers had to manage in their supply networks was hugely reduced, while fewer mark-downs and stock-outs were achieved, and this ensured that gross margin was maintained and customer satisfaction was increased.

8.1.5. Information Integration along Fashion Supply Systems

Birtwhistle et al. (2003) define and discusse the level of quick response implementation by fashion retailers by exploring its impact on replenishment processes. They found that information technology is particularly important in driving supply chain responses. Internet strategies present opportunities to integrate complex supply chains from concept design to store, and on to the final customer (Hines, 2001).

This thesis' findings reveal that information technology adoption aimed at capturing market trends was used by retailers in-house, but further evidence of systems adoption to aid supply chain integration and communication upstream the value chain was not found. It was not the lack of technology or technical knowledge that inhibited the retailers from embracing quick response methods but what appeared to be an unwillingness to commit time and money, as well as changing attitudes towards suppliers that was at the heart of this problem. In essence, information sharing was limited to the minimum necessary to complete

the transaction. This was mainly due to the high levels of re-configurability exhibited by these systems.

As such, poor support of information systems for integrating retailers' activities with manufacturing operations did not seem to determine the level of agility achieved and was not an impediment for developing agility. However, further research is needed to identify the level of performance these networks could achieve given a high level of information integration along the entire value stream would be implemented.

8.2. Contributions to Knowledge

The above sections have highlighted the key findings of this thesis. As a result, while aiming to answer the main research question, this thesis is believed to have contributed to the knowledge in the field of operations and supply chain management in numerous ways:

- The literature on supply chain agility and flexibility is still in its infancy, and most of the previous studies of flexibility in the wider context of inter-company collaboration have aimed to build conceptual frameworks and have lacked empirical validation. This thesis comes to fill this gap by first proposing a framework for agile supply systems management practice and then, through a series of case studies, investigating its applicability within the UK fashion sector;

- The proposed framework for the management of agile supply systems should be viewed as a tool designed to be applied to every important interface in a supply network, where the network coordinator can evaluate what type and level of flexibility is really required and then determine the appropriate combination of the internal determinants available. It can also facilitate an understanding of how individual nodes within the network interact in order to determine the overall system's ability to respond to customer demand;

- The number of previous studies taking a network perspective and aiming to develop a more complete understanding of supply chain agility is limited. They fail to explore the inter-organisational impact of supply chain agility on the supply chain by focusing on a single plant or firm as the unit of analysis. This present thesis' key findings acknowledge the benefits to be gained by

companies that treat the supply chain as a single entity, compete as a chain and focus on satisfying end-customer demand;

- This thesis has also developed a framework that dynamically matches supplier and reconfiguration flexibility in order to guide the implementation of an appropriate supply pipeline strategy. As such, this thesis argues that a fundamental difference between lean, agile and leagile supply systems is that they have different requirements for different types of flexibility. The novelty of this approach stems from the fact that most of previous research in the area fails to address the way in which specific operating environments impact on the choice of the sources of supply chain flexibility that should be employed. The framework also offers further guidelines as to the types of supply chain relationships that are best to be employed for each of the 4 identified scenarios.

- This thesis also presents an extension of leagility beyond the simple material flow decoupling point originally put forward by Naylor et al. (1999). Their Leagility concept was extended to include two new types of Leagility: Type I where there is high vendor flexibility but switching between vendors is low, and Type II where the converse occurs;

- At the same time, to enable high levels of agility in a global sourcing context through rapid supply systems reconfiguration, new supply chain structures and actors, such as trade agents / intermediaries and integrated service providers were found to be necessary to be involved. This contradicts previous studies which have argued that indirect sourcing acts as a barrier to high levels of responsiveness to volatile demand.

- Agile supply chain management in a global context is poorly understood from an academic perspective and few studies have been conducted in it, especially involving multiple companies along the value stream. Most of the previous research has highlighted that the major trade-off in global sourcing is between the responsiveness of the supply chain and its cost efficiency. This thesis, however, has revealed that the global flexible supply chain is not a myth or an unattainable goal anymore. Through the adoption of innovative sourcing mechanisms such as indirect sourcing and the employment of integrated service providers companies can make the best of global sourcing in a very volatile market.

- Previous studies have revealed that while a larger and more varied supply network may be sought to improve the product range dimension of agility, this

leads to increased complexity which is counter to improving supply agility and other aspects of supply performance. This thesis, however, has revealed that, even though the UK fashion retailers are hostage to complexity due to their rapidly reconfiguring supply chains, they have employed sourcing mechanisms through which they can increase their speed to market while managing increasingly complex, global networks.

8.3. Academic Implications, Limitations and Future Research

As well as some of the issues presented above, the thesis' research methodology was also a limitation. Within the 2 supply networks that were investigated in this thesis, apart from the 2 major cases studies of retailers A and B, data was gathered mainly from 2 garment manufacturers, a trim supplier, a textile printer and an integrated service provider. However, a few of the thesis findings are related to the use of intermediaries in the fast fashion global supply chains, and these were mainly based on the perceptions of both retailers and suppliers interviewed, rather than direct data collection from intermediaries involved in fashion sourcing. Potential bias may exist and their views may not have been as comprehensive as expected. Even though the case study conducted with an Integrated Service Provider gave some insights into how these actors might typically operate, further research should try to validate the research findings through further empirical research involving a triad of retailer-intermediary-garment manufacturer as the minimum unit of analysis. The use of a large scale survey and/or more case studies would also provide further insights. Nonetheless, this study is believed to present significant implications for academics to further study global agile supply systems and for practitioners seeking the development of such networks.

Further studies are necessary to investigate both the internal and external flexibility types that have been conceptualised in the framework put forward, as well as the complex interactions that can arise between them. The four different scenarios presented in this paper have only focused on mix and volume flexibility as external flexibility types and supplier and reconfiguration flexibility as internal sources.

Furthermore, like many exploratory case-based studies, further limitations resulting from the choice of research method exist, such as the small sample size, contextual bias and subjective criterion for some of the variables considered. These have been discussed to a greater extent in Chapter 5.

This thesis also raises a series of further questions, such as:

- Does supply chain flexibility provide benefits for every link in the chain? How can network value be judged? The case studies findings revealed issues of un-equal distribution of power along the supply systems, which ultimately lead to an unequal distribution of benefits. However, further research is required to validate these findings.
- How can strategic flexibilities be aligned, and conflict avoided, when companies are involved in many different supply chains at the same time, with varying characteristics? Throughout this research it became apparent that the same suppliers were used by directly competing companies, leading to confidentiality issues, conflicts, as well as capacity management and scheduling issues.
- How sustainable are these supply chain structures in long term?

8.4. Summary

In this final chapter, the aims of the study along with its findings and their implications have been presented. Original contributions have been summarised. Finally, academic implications and future research, as well as practical implications, have been discussed to conclude this thesis.

References

Abernathy, F.H., Dunlop, J.T., Hammond, J.H. and Weil, D. (2000), 'Retailing and supply chains in the information age', Technology in Society, vol.22, pp.5-31.

Abernaty, F.H, Dunlop, J.T., Hammond, J.H. and Weil, D. (1999), 'A stitch in time: Lean retailing and the transformation of manufacturing – Lessons from the apparel and textile industry', Oxford University Press, New York, NY.

Agarwal, A., Shankar, R., and Tiwari, M.K. (2006), 'Modelling the metrics of lean, agile and leagile supply chain: An ANP-based approach', European Journal of Operational Research, vol.173, pp.221-225.

Agility-Forum (1994), 'Introduction to Agility Workshop', Instructor's Manual. (www.AgilityForum.Org) [19 Sept 2007].

Aichlmayr, M. (2001), 'Warehouse pick, pack and build to order', Transportation and Distribution, vol.42, no.5, pp.87-91.

Alderson, W. (1954), 'Factors governing the development of marketing channels', in Clewett, R.M. (Eds), Marketing Channels for Manufactured Products, Richard D. Irwin, Inc., Homewood, IL, pp.5-34.

Andersen, P. and Christiansen, P. (2005), 'Bridges over troubled water: Suppliers as connective nodes in global supply networks', Journal of Business Research, vol.58, pp.1261-1273.

Anderson, D. (1997), 'Agile product development for mass customization: How to develop and deliver products for mass customization, Niche Markets, JIT, Build-to-Order and Flexible Manufacturing', McGraw-Hill, New York, NY, pp.7-25.

Anderson-Connell, L.J., Ulrich, P.V. and Brannon, E.L. (2002), 'A consumer-driven model for mass customization in the apparel market', Journal of Fashion Marketing & Management, vol.6, no.3, pp.240-58.

Andraski, J. (1994), 'Foundations for Successful Continuous replenishment Programs', The International Journal of Logistics Management, vol.5, no.1.

Anscombe, J & Kearney, A T (1994), 'Partnership or power play?', Logistics Focus, 2(6).

Anson, R. (2002), 'Sourcing for Western markets: Quick response or lowest cost?', Textile Outlook International, May-June, pp.3-5..

APICS, Dictionary, 9th Edition, 1998, American Production and Inventory Control Society, Falls Church.

Ashby, W.R. (1956), 'An Introduction to Cybernetics', Chapman and Hall, London.

Atkinson, P. and Delamont, S. (2005), 'Analytic perspectives', in Denzin', N.K. and Lincoln, Y.S. (Eds), 'The Sage Handbook of Qualitative Methods', 3rd ed., Sage, Thousand Oaks, CA, pp. 821-40.

Au, K.F. and Ho, D.C.K. (2002), '*Electronic Commerce and Supply Chain Management: Value-Adding Service for Clothing Manufacturers'*, Integrated Manufacturing Systems, vol.13/4, pp.247-254.

Bagchi, P.K. and Skjoett-Larsen, T. (2002), 'Integration of information technology and organizations in a supply chain', The International Journal of Logistics Management, vol.14 no.1, pp.89-108.

Bailey, K. D. (1994), 'Talcott Parsons, social entropy theory, and living systems theory', Behavioral Science, 39(1), 25.

Baker, N.G. (1981), 'Social work through an interpreter', Social Work, September, pp.391-397.

Baker, P. (2006), 'Designing distribution centres for agile supply chains', International Journal of Logistics: Research and Applications, 9 (3), 207-221.

Ballou, R. H. (1998), 'Business logistics management: Planning, organizing, and controlling the supply chain', 4h Ed, Upper Saddle River, Prentice Hall.

Balmer, J. and Gray, E. (2000), 'Corporate identity and corporate communications: creating a competitive advantage', Industrial and Commercial Training, vol.32, Issue 7, pp.256 – 262.

Banning, W., 1994, 'The Manufacturing and Retailer Conflict', World Manufacturing Clothier, vol.75, pp.44-45.

Barnes, L. and Lea-Greenwood, G. (2006) 'Fast fashioning the supply chain: Shaping the research agenda', Journal of Fashion Marketing and Management, vol.10, no.3, pp.259-271.

Bask, A.H. and Juga, J. (2001), 'Semi-integrated supply chains: towards the new era of supply chain management', International Journal of Logistics: Research and Applications, vol.4 No.2, pp.137-52.

Beamon, B.M. (1999), 'Measuring supply chain performance', International Journal of Operations & Production Management, vol.19, no.3, pp.275-292.

Beamon, B.M., 1998, 'Supply chain design and analysis: Models and methods', International Journal of Production Economics, vol.55, pp.281-294.

Becker, J. and Niehaves, B. (2007), 'Epistemological perspectives on IS research - a framework for analysing and systematising epistemological assumptions', Information Systems Journal, vol.17, no.2, pp.197-214.

Benbasat, I., Goldstein, D. K. and Mead, M. (1987),' The case research strategy in studies of information systems', MIS Quarterly, September 1987, 369-386.

Bensaou, M. (1999), 'Portfolios of buyer-supplier relationships', Sloan Management Review, vol.40, no.4, pp.35-44.

Bicheno, J. (2004), 'The new lean toolbox: Towards fast, flexible flow', PICSIE Books, Buckingham.

Birou, L.M., Fawcett, S.E., Magnan, G.M. (1998), 'The product life cycle: A tool for functional strategic alignment', International Journal of Purchasing and Materials Management, vol.34, issue2, pp.37-51.

Birtwistle, G., Clarke, I. and Freathy, P. (1998), 'Customer decision making in fashion retailing: a segmentation analysis', International Journal of Retail & Distribution Management, vol.26, no.4, pp.147-154.

Birtwistle, G., Fiorito, S. and Moore, C. (2006), 'Supplier perceptions of quick response systems', Journal of Enterprise Information System, vol.19, Issue 3, pp.334-345.

Birtwistle, G., Siddiqui, N. and Fiorito, S. (2003), 'Quick response: Perceptions of UK fashion retailers', International Journal of Retail & Distribution Management, vol.31, no.2, pp.118-128.

Blackburn, J.D., (1991), 'The quick response movement in the apparel industry: A case study in time-compressing supply chains', In: Blackburn, J.D. (Ed.), 'Time-based Competition', Business One/Irwin, Homewood, IL.

Blackwell, R. D. (1999), 'The century of the consumer: Converting supply chains into demand chains', Supply Chain Management Review, Fall, pp.34-49.

Bonoma, T. (1985), 'Case research in marketing: Opportunities, problems and a process', Journal of Marketing Research, vo.22, no.2, pp.199-208.

Boulding, K. (1956), 'General systems theory – The skeleton of science', Management Science, vol.2, no.3, pp.197-208.

Bourne, M., Mills, J., Wilcox, M., Neely, A. and Platts, K. (2000), 'Designing, implementing and updating performance measurement systems', International Journal of Operations & Production Management, vol.20, no.7, pp.754-771.

Bovel, D., Martha, J. (2000), 'From supply chain to value net', Journal of Strategic Management, pp.24-8.

Bergvall-Forsberg, J. and Towers, N. (2007), 'Creating agile supply networks in the fashion industry: A pilot study of the European textile and clothing industry', Journal of the Textile Institute, vol.98, issue 4, pp.377 – 386.

Bower, J.L. and Hout, T.M. (1988), 'Fast-cycle capability for competitive advantage', Harvard Business Review, vol.66, no.6, pp.110-8.

Bowersox, D. and Closs, D. (1996), 'Logistical management: The integrated supply chain perspective' New York: McGraw-Hill.

Braganza, A. (2002), 'Enterprise integration – creating competitive capabilities', Integrated Manufacturing Systems, vol.13, issue 8, pp.562-572.

Braithwaite, A. (1998), 'The nine maxims of supply chain management', Proceedings of the Logistics Research Network Conference , Cranfield.

Brause, R. (2000), 'Writing your doctoral dissertation: Invisible rules for success', London, Falmer.

Brooksbank, R. (1999), 'The theory and practice of marketing planning in the smaller business', Marketing Intelligence & Planning, vol.17, Issue 2, pp. 78-90.

Brown, S. and Bessant, J. (2004), 'The manufacturing strategy-capabilities links in mass customisation and agile manufacturing – an exploratory study', International Journal of Operations & Production Management, vol.23 , issue 7, pp.707 – 730.

Bruce, M. and Daly, L. (2006), 'Buyer behaviour for fast fashion', Journal of Fashion Marketing and Management, vol.10, no.3, pp.329-344.

Bruce, M., Daly, L. and Towers, N. (2004), 'Lean or agile? - A solution for supply chain management in the textiles and clothing industry', International Journal of Operations & Production Management, vol.24, no.2, pp.151-170.

Brun, A. and Castelli (2008), 'Supply chain strategy in the fashion industry: Developing a portfolio model depending on product, retail channel and brand', International Journal of Production Economics, In Press.

Bryman, A. (2001), 'Social research methods', New York, Oxford.

Burbidge, J. (1961), 'The new approach to production', Production Engineer, vol.40, no.12, pp.769-784.

Burgess, K., Singh, P. And Koroglu, R. (2006), 'Supply chain management: A structured literature review and implications for future research', International Journal of Operations and Production Management, vol.26, no.7, pp.703-729.s

Burgess, R. (1998), 'Avoiding supply chain management Failure: Lessons from Business Process Reengineering', International Journal of Logistics Management, vol.9, issue1, pp.15-23.

Burrell, G. And Morgan, G. (1979), 'Sociological paradigms and organisational analysis', London, Heinemann Books.

Burt, D.N. and Soukup, W.R. (1985), 'Purchasing's role in new product development', Harvard Business Review, Vol. 64 No.5, pp.90-7.

Buxey, G. (2005), 'Globalisation and manufacturing strategy in the TCF Industry', International Journal of Operations & Production Management, vol.25, no.2, pp.100-113.

Cachon, G.P. and Fisher, M. (2000), 'Supply chain inventory management and the value of shared information', Management Science, vol.46, no.8, pp.1032-48.

Cagliano, R., Caniato, F. and Spina, G. (2005), "Reconsidering e-business strategy and the impact on supply chains", International Journal of Operations & Production Management, vol. 25, no.12, pp.1328-32.

Carlson, B. (1989), 'Flexibility and theory of the firm', International Journal of Industrial Organization, vol.7, no.1, pp. 179-203.

Carter, J.R. and Vickery, S.K. (1988), 'Managing volatile exchange rates in international purchasing', Journal of Purchasing and Materials Management, vol.24, pp.13–20.

Castrogiovani, G.J. and Justis, R.T. (1998), 'Franchising configurations and transitions', Journal of Consumer Marketing, vol.15 (2), pp.170–190.

Cavinato, J., Flynn, A. and Kauffman, R. (2006), 'The supply management handbook', McGraw Hill.

Cebi, F. and Bayraker, D. (2003), 'An integrated approach for supplier selection', Journal of Logistics Information Management, vol.16, no.6, pp.395-400.

ChenYu, J. and Kincade, D. (2001), 'Effects of product image at the three stages of the consumer decision process for apparel products: alternative evaluation, purchase, and post-purchase', Journal of Fashion Marketing & Management, vol.5, no.1, pp.29-43.

Childerhouse, P. and Towill, D. (2000), 'Engineering Supply Chains to Match Customer Requirements', Logistics Information Management, vol.13, no.6, pp.337-345.

Childerhouse, P., Disney, S. and Towill, D. (2008), 'On the impact of order volatility in the European automotive sector', International Journal of production Economics, vol.114, issue1, pp.2-13

Cho, J. and Kang, J. (2001), 'Benefits and challenges of global sourcing: Perceptions of US apparel retail firms', International Marketing Review, vol.18, issue 5, pp. 542 – 561.

Choi, T.Y. and Hartley, J.L. (1996), 'An exploration of supplier selection practices across the supply chain', Journal of Operations Management, 14(4), 333-343.

Choi, T.Y. and Hong, Y. (2002), 'Unveiling the structure of supply networks: case studies in Honda, Acura, DaimlerChrysler', Journal of Operations Management, 20 (5), pp. 469–493

Chopra, S. and Meindle, P. (2001), *'Supply chain management: Strategy, planning and operation'*, Prentice Hall, Inc., Upper Saddle River, NJ, pp.1-24.

Christopher, M. (1992), 'Logistics and supply chain management: Strategies for reducing costs and improving services', Financial Times, Pitman Publishers, London.

Christopher, M. (1998a), Logistics and Supply Chain Management, Pitmans, London.

Christopher, M. (1998b), '*Relationships and alliances: Embracing the era of network competition*', Gattorna, J., Strategic Supply Chain Alignment, Gower Press, Aldershot.

Christopher, M. (1999), 'Global logistics: The role of agility', Logistics and Transport Focus, vol.1, issue 1.

Christopher, M. (2000), 'The Agile Supply Chain – Competing in Volatile Markets', Industrial Marketing Management, vol.29, issue1, pp.37-44.

Christopher, M. and Juttner, U. (2000), 'Achieving supply chain excellence: The role of relationship management', International Journal of Logistics, vol.3, no.1, pp.5-23.

Christopher, M. and Lee, H. (2001), 'Supply chain confidence – The key to effective supply chains through improved visibility and reliability', Global Trade Management, Vastera, Inc.

Christopher, M. and Lee, H. (2004), 'Mitigating supply chain risk through improved confidence', International Journal of Physical Distribution & Logistics Management, vol.34, no.5.

Christopher, M. and Ryals, L. (1999), 'Supply chain strategy: Its impact on shareholder value', The International Journal of Logistics Management, vol.10, no.1, pp.1-10.

Christopher, M. and Towill, D.R. (2000), 'Supply chain migration from lean and functional to agile and customised', Supply Chain Management: An International Journal, vol.5, no.4, pp.206-213.

Christopher, M. and Towill, D.R. (2002), 'Developing market specific supply chain strategies', International Journal of Logistics Management, vol.13, no.1, pp.1-14.

Christopher, M., Peck, H., Rutherford, C., Juttner, U. (2003), 'Supply chain resilience', Cranfield Centre for Logistics and Supply Chain Management, Cranfield, November.

Christopher, M. and Peck, H. (2004), 'Building the resilient supply chain', The International Journal of Logistics Management, vol.15, issue 2, pp.1-14.

Christopher, M., Lowson, R. and Peck, H. (2004), 'Creating agile supply chains in the fashion industry", International Journal of Retail & Distribution Management, vol.32, no. 8/9, p. 367.

Chudy, B. and Sant, R., (1993) 'Customer-driven competitive positioning – An approach towards developing an effective customer service strategy', Marketing and Research Today, vol.21, pp.155-169.

Chung, W., Yam, A. and Chan, M. (2004), 'Networked enterprise: A new business model for global sourcing', International Journal of Production Economics, vol.87, pp.267-280.

Clark, K.B. and Fujimoto, T. (1991), Product development performance: Strategy, organization and management in the world auto industry, Harvard Business School Press, Boston, MA.

Clemons, E. and Row, M. (1993), 'Information, power and control of the distribution channel', Chief Executive, vol.85, May, pp.64-67

Clinton, S.R. and Closs, D.J. (1997), 'Logistics Strategy: Does It Exist?', Journal of Business Logistics, vol.18, no.1, pp.19-44.

Collins, R., Bechler, K. and Pires, S. (1997), 'Outsourcing in the automotive industry: from JIT to modular consortia', European Management Journal, vol.15, no.5, pp. 498-507.

Collins, R.S. and Schmenner, R.W. (1993), 'Achieving rigid flexibility: Factory focus for the 1990s', European Management Journal, vol.11, no.4, pp.443-7.

Collis, J. and Hussey, R. (2003), 'Business research - A practical guide for undergraduate and postgraduate students', 2nd Ed., Basingstoke, Hampshire, Palgrave MacMillan.

Cooper, M.C. and Gardner, J.T. (1993), 'Building good business relationships: More than just partnering or strategic alliances?', International Journal of Physical Distribution & Logistics Management, vol.23, no.6, pp.14-26.

Cooper, M.C., Lambert, D.M., Pagh, J.D. (1997), 'Supply Chain Management: More Than a New Name for Logistics', The International Journal of Logistics Management, vol.8, no.1, pp.1-13.

Cooper, R.G. and Kleinschmidt, E.J. (1994), `Determinants of timeliness in product development', Journal of Product Innovation Management, vol.11, pp.381-96.

Corbett, C.J., Blackburn, J.D., Wassenhove, L.N.V. (1999), 'Case study partnerships to improve supply chains', Sloan Management Review, vol.40, no.4, pp.71-82.

Cousins, P. and Lawson, B. (2008), 'Performance measurement in strategic buyer-supplier relationships', International Journal of Operations & Production Management, vol.28, Issue 3, pp.238-258.

Cousins, P.D. (2002), "A conceptual model for managing long-term inter-organisational relationships", European Journal of Purchasing & Supply Management, vol.8, pp.71-82.

Cox, J. and Blackstone, T. (1998), APICS Dictionary, 9th Ed., APICS, Alexandria.

Cox, A. (1999), 'Power, value and supply chain management', Supply Chain Management: An International Journal, vol.4, issue 4, pp.167-75.

Creswell, J. W. (1998) 'Qualitative inquiry and research design: Choosing among five traditions', Thousand Oaks, CA: Sage.

Creswell, J.W. (1994), 'Research design: Qualitative and quantitative approaches', Sage Publications, Newbury Park, CA.

Croom, S., Romano, P., Giannakis, M. (2000), 'Supply chain management: An analytical framework for critical literature review', European Journal of Purchasing & Supply Management, vo.6, pp.67-83.

Crowley M. and E. Domb (1997), 'Beyond strategic vision: Effective corporate action with Hoshin planning', Boston: Butterworth-Heinemann.

Croxton, K., García-Dastugue, S., Lambert, D. (2001), 'The supply chain management process', The International Journal of Logistics Management, vol.12, no.2.

Da Silveira, G., Borenstein, D. and Fogliatto, F.S. (2001), 'Mass customization: Literature review and research directions', International Journal of Production Economics, vol.72, no.1, pp.1-13.

da Silveira, J.C. Giovani, and Cagliano, R. (2006), 'The relationship between interorganizational information systems and operations performance', International Journal of Operations and Production Management, 26 (3), 232-253.

Dabbiere, A. (1999), 'Business process and supply chain synchronization', www.ascet.com/ascet/wp/wpDabbiere.html.

Dale, B. (1999), 'Managing Quality', Blackwell, London.

Danese, P., Romano, P. and Vinelli, A. (2004), 'Managing business processes across supply networks: The role of coordination mechanisms', Journal of Purchasing & Supply Management, vol.10, pp.165-177.

Das, S. and Malek, L. (2003), 'Modeling the flexibility of order quantities and lead-times in supply chains', International Journal of Production Economics, vol.85, no.2, pp.171-81.

Davenport, T.H. (1998), 'Putting the enterprise into the enterprise system', Harvard Business Review 76 (4), 121–131.

Davis, M. and O'Sullivan, D. (1999), 'Systems design framework for the extended enterprise', Production Planning & Control, vol.10, no.1, pp.3-18.

Davis, T. (1993), 'Effective Supply Chain Management', Sloan Management Review, Summer, pp.35-46.

de Toni, A.F. and Zamolo, E. (2005), 'From a traditional replenishment system to vendor-managed inventory: A case study from the household electrical appliances sector', International Journal of Production Economics, vol.96, pp.63-79.

DeJonge, J.O. (1984), 'The design process', in Watkins, S.M. (Ed.), Clothing the Portable Environment, Iowa State University Press, Ames, IA, pp. vii-vxi.

DeVor, R., Graves, R. and Mills, J. (1997) 'Agile manufacturing research: Accomplishments and opportunities', IIE Transactions, vol.29, pp.813-23.

Diamond, J. and Diamond, E. (2002), The World of Fashion, Fairchild, New York, NY.

Dickerson, K. (2003), 'Inside the fashion business,' Prentice-Hall, Upper Saddle River, NJ.

DiRomualdo, A. and Gurbaxani, V. (1998), 'Strategic intent for IT outsourcing", Sloan Management Review, vol.39, no.4, Summer, pp.67-80.

Disney, S.M. and Towill, D.R. (2003), 'The effect of vendor managed inventory (VMI) dynamics on the bullwhip effect in supply chains', International Journal of Production Economics, vol.85 pp.199-215.

Dodgson, M. (2001), 'Strategic research partnerships: Their role, and some issues of measuring their extent and outcomes experiences from Europe and Asia', Retrieved June 18, 2007 from http://www.nsf.gov/sbe/srs/nsf01336/p1s8.htm.

Doeringer, P. and Crean, S. (20040, 'Can fashion save the US Apparel Industry?', Harvard University Centre for Textile & Apparel research, Cambridge, MA.

Domberger, S. (1998), 'The contracting organisation: A strategic guide to outsourcing', Oxford University Press, Oxford.

Dornier, P.P., Ernst, R., Fender, M. and Kouvelis, P. (1998), 'Global operations and logistics: Text and cases, John Wiley & Sons, Inc., New York.

Dow, S. (1996), 'The methodology of macroeconomic thought', Aldershot, Elgar.

Dowlatshahi, S. (1999), 'Early supplier involvement: Theory versus practice', International Journal of Production Research, vol.37, no.18, pp.4119-39.

Doyle, S., Moore, C. and Morgan, L. (2006), 'Supplier management in fast moving fashion retailing', Journal of Fashion Marketing and Management, vol.10, no.3, pp.272-281.

Droge, C., Jayaram, J. and Vickery, S.K. (2004), 'The effects of internal versus external integration practices on time-based performance and overall firm performance', Journal of Operations Management, vol.22, no.6, pp.557-73.

Duclos, L., Vokurka, R. and Lummus, R. (2003), 'A conceptual model of supply chain flexibility', Industrial Management & Data Systems, vol.103, issue 6, pp.446-456.

Dunn, S., Seaker, R. and Waller, M. (1994), 'Latent variables in business logistics research: Scale development and validation', Journal of Business Logistics, vol.15, no.2, pp. 145-173.

Duray, R. (2002), 'Mass customization origins: Mass or custom manufacturing?', International Journal of Operations & Production Management, vol. 22, no.3, pp.314-28.

Dwyer, F.R., Schurr, P. and Sejo, Oh., (1987), 'Developing buyer-seller relationships', Journal of Marketing, vol.51, pp.11-27.

Dyer, J. and Ouchi, W. (1993), 'Japanese-style partnerships: Giving companies a competitive edge', Sloan Management Review, vol.35, pp.51-64.

Dyer, J. H. (2000), 'Collaborative advantage', New York, New York Oxford University Press.

Dyer, J., Cho, D. and Chu, W. (1998), 'Strategic supplier segmentation: The next best practice in supply chain management', California Management Review, vol.40, no.2, pp.57-77.

Earl, M.J. (1996), 'The risks of outsourcing IT', Sloan Management Review, Spring, pp.26-32.

Easterby-Smith, M., Thorpe, R. and Lowe, A. (1991), 'Management research: An introduction', Sage Publications, London.

Easton, G. and Quayle, M. (1990), 'Single and multiple network sourcing – Network implications', Research and Developments in International Industrial Marketing and Purchasing: Proceedings of 6th IMP Conference.

Easton, G. and Rothschild, R. (1987), 'The influence of product and production flexibility on marketing strategy', In Pettigrew, A., The Management of Strategic Change, Basil Blackwell Limited, Oxford.

Edwards, P., Peters, M. and Sharman, G. (2001), 'The effectiveness of information systems in supporting the extended supply chain', Journal of Business Logistics, vol.22, no.1, pp.1-27.

Eisenhardt, K. M. (1989) 'Building theories from case study research', The Academy of Management Review, Oct.

Elfing, T. and Baven, G. (1994), 'Outsourcing technical services: Stages of development'', Long Range Planning, vol.27, no.5, pp. 42-51.

Ellram, L. (1990), 'The supplier selection decision in strategic partnerships', Journal of Purchasing and Materials Management, vol.26, no.4, pp.8-14.

Ellram, L. (1995), 'Total cost of ownership: An analysis approach for purchasing', International Journal of Physical Distribution & Logistics, vol.25, no.8, pp.4-23.

Ellram, L. (1996), 'The use of the case study method in logistics research', Journal of Business Logistics, vol.17, no.2.

Ellram, L. and Carr, A. (1994), 'Strategic purchasing: A history and review of the literature', International Journal of Purchasing and Materials Management, vol.30, no.2, pp.10-19.

Ellram, L. and Cooper, M. (1993), 'Characteristics of supply chain management and the implications for purchasing and logistics strategy', International Journal of Logistics Management, vol.4, issue 2, pp.1-10.

EMAP Fashion (1998/1999), 'The UK Fashion Report', Market Tracking International, London.

Euromonitor International (2007), 'Clothing and footwear – United Kingdom', available at: www.portal.euromonitor.com.

Fabbe-Costes, N. and Colin, J. (2007), 'Formulating logistics strategy', in Walters, D. (2007), 'Global logistics – New directions in supply chain management', Kogan Page, London.

Factor, R. (1996), 'Logistics Trends', Materials Management and Distribution, June, pp.17-21.

Faisal, M., Banwet, D. and Shankar, R. (20060, 'Mapping Supply Chains on Risk and Customer Sensitivity Dimensions', Industrial Management and Data Systems, vol.106 (6).

Fawcett, S. and Cooper, B. (2001), 'Process integration for competitive success', Benchmarking: An International Journal, vol.8, no.5, pp. 396-412.

Fawcett, S., Magnan, G. and McCarter, M. (2008), 'Benefits, barriers, and bridges to effective supply chain management', Supply Chain Management: An International Journal, vol.13 , issue 1, pp. 35 – 48.

Ferdows, K. (1997), 'Making the most of foreign factories', Harvard Business Review, vol.75, pp. 73–88.

Fernie, J. and Azuma, N. (2004), ,The changing nature of Japanese fashion', European Journal of Marketing, vol.38, no.7.

Fidel, R. (1984), 'The case study method: A case study', Library and Information Science, vol. 6.

Fine, C.H. (1998), 'Clockspeeed: Winning industry control in the age of temporary advantage', Perseus Books, Reading, MA.

Fisher, M, Raman, A. and McClelland, A. (2000), 'Rocket-science retailing is almost here: Are you ready?'' Harvard Business Review, vol. 78, no. 4, pp.115-124.

Fisher, M.L. (1997), 'What is the right supply chain for your product?', Harvard Business Review, 105-16.

Flanagan, M. (20050, 'How retailers source apparel', Just-Style, January, ABI/INFORM Global.

Flanagan, M. and Leffman, L. (2001), 'Global apparel sourcing: Options for the future', Textile Outlook International, July, pp.129-161.

Fletcher, R. and Nigel, B. (2001), 'Embeddedness and the evolution of global networks: An Australian case study', Industrial Marketing Management, vol.30, issue 7, pp.561-73.

Fliender, G. and Vokurka, R. (1997), 'Agility: The next competitive weapon', APICS, The Performance Advantage, January, pp.56-9.

Flint, D. (2004), 'Strategic marketing in global supply chains: Four challenges', Industrial Marketing Management, vol.33, pp.45-50.

Fombrun, C. and Wally, S. (1992), 'Global entanglements: The structure of corporate transnationalisation' in Pucik, V., Tichy, N. and Barnett, C. (Eds), Globalising Management: Creating and Leading the Competitive Organisation, Wiley, New York.

Forrester, J. (1958), 'Industrial dynamics, a major breakthrough for decision makers', Harvard Business Review, March-April, 37-66.

Forrester, J. (1961), Industrial Dynamics, MIT Press, Cambridge, MA.

Forza, C. and Vinelli, A. (1996), 'An analytical framework for the change of the apparel design processes towards Quick Response', International Journal of Clothing Science and Technology, vol.8, no.4, pp.28-43.

Forza, C. and Vinelli, A. (1997), 'Quick response in the textile-apparel industry and the support of information technologies', Integrated Manufacturing Systems, vol.8, no.3, pp. 125-36.

Frankel, R., Naslund, D. And Bolumole, Y. (2005), 'The 'white space' of logistics research: A look at the role of methods usage', Journal of Business Logistics, vol.26, no.2, pp.185-209.

Frayret, J.M., D'Amours, S., Montreuil, B. and Cloutier, L. (2001), "A network approach to operate agile manufacturing systems", International Journal of Production Economics, vol.74, no.1-3, pp.239-59.

Fredericks, E. (2005), "Infusing flexibility into business-to-business firms: a contingency theory and resource-based view perspective and practical implications", Industrial Marketing Management, vol.34 pp.555-65.

Freed, A.O. (1988), 'Interviewing through an interpreter', Social Work, July-August, pp.315-319.

Frohlich, M.T. and Westbrook, R. (20010, 'Arcs of integration: An international study of supply chain strategies', Journal of Operations Management, vol.19, pp.185-200.

Fruin, W.M. (1992), 'The Japanese enterprise system', Clarendon Press, Oxford.

Frutos, J.D., Santos, E.R. and Borenstein, D. (2004), 'Decision support system for product configuration in mass customization environments", Concurrent Engineering: Research and Applications, vol.12, no.2, pp.131-44.

Fujimoto, T. (1997), 'The Japanese automobile supplier system framework, facts, and reinterpretation', 3rd International Symposium on Logistics, Padova, pp. 3-50.

Fynes, B., Voss, C. and de Burca, S. (2005), 'The impact of supply chain relationships dynamics on manufacturing performance', International Journal of Operations and Production Management, vol.25, no.1, pp. 6-19.

Gao, T., Sirgy, M.J. and Bird, M.M. (2005), 'Reducing buyer decision-making uncertainty in organizational purchasing: can supplier trust, commitment, and dependence help?', Journal of Business Research, vol.58, pp.397-405.

Garber, R. and Sarkar, S. (2007), 'Want a more flexible supply chain?', Supply Chain Management Review, vol.11, issue1.

Gatta, J. (2001), 'The ever changing textile market', Newsletter: Textile and Needle Trades Division of ASQ, vol.12, no.1, pp. 1-4.

Gattona, J.L. (1998), 'Strategic Supply Chain Alignment', Gower, Aldershot.

Gattorna, J., Ogulin, R. and Reynolds, M. (2002), 'Gower handbook of supply chain management', Gower Publishing Ltd, 5th Ed.

Gehani, R.R. (1995), '*Time-based management of technology: A taxonomic integration of tactical strategic roles*', International Journal of Operations and Production Management, vol.15, issue2, pp.19-35.

Gereffi, G. (1994), 'The organisation of buyer-driven global commodity chains: How US retailers shape global production networks', in Gereffi, G. and Korzeniewicz, M., 'Commodity Chains and Global Capitalism', Greenwood Press, Westport, CT, pp.95-122.

Gereffi, G. (1999), 'International trade and industrial upgrading in the apparel commodity chain', Journal of International Economics, vol.48, no.1, pp.37-70.

Giachetti, R., Martinez, L., Saenz, O. and Chen, C. (2003), 'Analysis of the structural measures of flexibility and agility using a measurement theoretical framework', International Journal of Production Economics, vol.86, no.1, pp.47-62.

Glaser, I. (1983),' Guidelines for using an interpreter in social work', Child Welfare, pp.468-470.

Golden, W. and Powell, P. (1999), 'Exploring inter-organisational systems and flexibility in Ireland: A case of two value chains', International Journal of Agile Management Systems, vol.1 no.3, pp.169-76.

Goldman, S.L., Nagel, R.N., Preiss, K. (1995), 'Agile competitors and virtual organisations: Strategies for enriching the customer', Van Nostrand Reinhold, New York.

Goles, T. And Hirschheim, R. (2000), 'The paradigm is dead, the paradigm is dead... long live the paradigm – The legacy of Burrell and Morgan', Omega: The International Journal of Management Science, vol.28, no.3, pp.249-268.

Gosain, S., Malhotra, A. and El Sawy, O.A. (2005), 'Coordinating for flexibility in e-business supply chains', Journal of Management Information Systems, 21 (3), 7-45.

Grandori, A., 1997, 'An Organisational Assessment of Interfirm Coordination Modes', Organisation Studies, vol.18, issue 6, pp.897-925.

Grant, R. (1995), 'Contemporary strategy analysis', Blackwell Business, Cambridge.

Grünbaum, N. (2007), 'Identification of ambiguity in the case study research typology: what is a unit of analysis?', Qualitative Market Research: An International Journal, vol.10, no.1, pp. 78-97.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), 'Handbook of qualitative research', London: Sage.

Gunasekaran, A. and Yusuf, Y. (2002), 'Agile manufacturing: a taxonomy of strategic and technological imperatives', International Journal of Production Research, vol.40, no.6, pp.1357-85.

Gunneson, A. (1997), 'Transitioning to agility: Creating the 21st Century enterprise', Addison-Wesley, Reading, MA.

Guy, C.M. (1998), 'Classification of retail stores and shopping centres: Some methodological issues', Geo Journal, vol.45, pp.255–264.

Haines, P. (1990), 'Improving the link between fabric suppliers and garment manufacturers', Clothing Technology Centre, 11.

Håkansson, H. (1982), 'International marketing and purchasing of industrial goods: An interaction approach', Wiley, Chichester.

Hakim, C. (1987), 'Research design – Strategies and choices in the design of social research', Allen and Unwin, Boston.

Halldorsson, A. and Aastrup, J. (2003). Quality criteria for qualitative inquiries in logistics. European Journal of Operational Research, vol. 144, nr. 2, 321-332.

Hambrick, D. (2005), 'Upper echalons theory: Origins, twists and turns, and lessons learned', In k.G. Smith & M. A. Hitt (Eds), 'Great minds in management: The process of theory development', pp.109-127, Oxford University Press.

Hammond, J.H. and Kelly, M. (1991), 'Quick Response in the apparel industry', Harvard Business School Teaching Note #9-690-038.

Handfield, R. and Bechtel, C.,(2002), 'The role of trust and relationship structure in improving supply chain responsiveness', Industrial Marketing Management, vol.31, pp.367-382.

Handfield, R. and Nichols, E. (2004), 'Key issues in global supply base management', Industrial Marketing Mnagement, vol.33, 29-35.

Handfield, R., Krause, D., Scannell, T. and Monczka, R. (2000), 'Avoid the pitfalls in supplier development', Sloan Management Review, vol.41, no.2, pp.37-49.

Handfield, R.B. (1995), 'Effects of concurrent engineering on make-to-order products", IEEE, Transactions on Engineering Management, vol. 41, no.4, pp.384-93.

Handfield, R.B. and Nichols, E.L. (1999), Introduction to supply chain management, Prentice-Hall, Englewood Cliffs, NJ.

Handfield, R.B. and Pannesi, R.T. (1995), 'Antecedents of lead-time competitiveness in make-to order manufacturing firms', International Journal of Production Research, vol.33, no.2, pp.511-37.

Harland, C, Lamming, R. And Cousins, P (1999), 'Developing the supply strategy concept', International Journal of Operations & Production Management, vol.19, pp.650-73.

Harland, C. (1995), 'Networks and globalisation – A review of research', EPSRC GRK 53178.

Harland, C. (1996), 'Supply chain management – Relationships, chains and networks', British Journal of Management, vol.7, pp.63-80, March.

Harland, C., Brenchley, R. and Walker, H. (2003), 'Risk in supply networks', Journal of Purchasing & Supply Management, vol.9, pp.51-62.

Harland, C., Jurong, Z., Johnsen, T. and Lamming, R. (2004), A conceptual model for researching the creation and operation of supply networks', British Journal of Management, vol.15, issue 1, p1-21.

Harris, L. and Cohen, G. (2003), 'Marketing in the Internet age: What can we learn from the past? , Management Decision, vol.41, Issue 9, pp.944 - 956

Harrison, A. (1996), 'An investigation of the impact of schedule stability on supplier responsiveness', International Journal of Logistics Management, vol.7, no.1, pp.83-91.

Harrison, B.T. (1994), 'Lean and mean: The changing landscape of corporate power in the age of flexibility', Basic Books, New York, NY.

Harrison, T.P. (2001), 'Global supply chain design', Information Systems Frontiers, vol.3, No.4, pp.2001.

Hartley, J.R. (1990), 'Concurrent engineering', Productivity Press, Cambridge, MA.

Hayes, G. S. and Jones, N., (2006), 'Fast fashion: A financial snapshot', Journal of Fashion Marketing and Management, vol.10, no.3.

Heckert, J. and Miner, R. (1940), 'Distribution costs', The Ronald Press Company, New York.

Heikkila, J. (2002), 'From supply to demand chain management: Efficiency and customer satisfaction', Journal of Operations Management, vol.20, pp.747–767.

Helms, M.M., Ettkin, L.P. and Chapman, S. (2000), 'Supply chain forecasting – Collaborative forecasting supports supply chain management', Business Process Management Journal, vol.6, no.5, pp.392-407.

Helo, P. (2004), 'Managing agility and productivity in the electronic industry', Industrial Management and Data Systems, vol.104, no.7, pp.567-577.

Henderson, J.C. (1990), 'Plugging into strategic partnership: The critical IS connection", Sloan Management Review, vol.31, no.1, pp.7-18.

Herer, Y.T., Tzur, M., and Yűcesan, E. (2002), 'Transshipments: An emerging inventory recourse to achieve supply chain leagility', International Journal of Production Economics, 80, 201-212.

Hiebelar, R., Kelly, T. and Katteman, C. (1998), 'Best practices building your business with customer focussed solutions', Simon and Schuster, New York, NY.

Hill, C.A. and Scudder, G.D. (2002), "The use of electronic data interchange for supply chain coordination in the food industry", Journal of Operations Management, vol.20, pp.375-87.

Hill, T. and Chambers, S. (1991), 'Flexibility – A manufacturing conundrum', International Journal of Operations & Production Management, vol.11, no.2, pp.5-13.

Hines, P. (1996), 'Purchasing for lean production: The new strategic agenda', International Journal of Purchasing and Materials Management, January, pp. 2-8.

Hines, P. and Jones, O. (1996), 'Achieving mutual trust', Purchasing & Supply Management(Jan): p 4.

Hines, T. (1994), 'Globalisation and the seductive search for competitive advantage – Myth or Reality?', 75th Textile Institute World Conference Proceedings, September, Atlanta.

Hines, T. (2001), 'Globalisation: An introduction to fashion markets and fashion marketing' in Fashion Marketing – Contemporary Issues, Butterworth-Heinemann, Oxford.

Hines, T. (2005), 'Supply chain strategies in the UK fashion industry – The rethoric of partnership and realities of power', International Entrepreneurship and Management Journal, vol.1, no.14, pp.519-537.

Hines, T. (2007), 'Supply chain strategies, structures and relationships', in Hines, T. and Bruce, M. (eds.) 'Fashion Marketing: Contemporary Issues', 2nd Ed., Elsevier Ltd, Oxford.

Hines, T. and Bruce, M. (2001), 'Fashion marketing – Contemporary issues', Butterworth-Heinemann, Oxford.

Ho, C.J. (1992), 'An examination of a distribution resource planning problem: DRP system nervousness', Journal of Business Logistics, vol.13, pp.125-52.

Hoek, R.I., Cammandeur, H.C., Vos, B. (1998), 'Reconfiguring logistics systems through postponement strategies', Journal of Business Logistics, vol.19, issue1, pp.33-54.

Holliday, A. (2002), 'Doing and writing qualitative research', London, Sage.

Holmstrom, J., Framling, K., Kaipia, R. and Saranen, J. (2002), 'Collaborative planning forecasting and replenishment: New solutions needed for mass collaboration', Supply Chain Management, vol.7, no.3, pp.136-45.

Holsapple, C. and Jones, K. (2004), "Exploring primary activities of the knowledge chain", Knowledge and Process Management, vol.11 No.3, pp.155-74.

Holweg, M. (2005), 'The three dimensions of responsiveness', International Journal of Operations & Production Management, vol.25, no.7, pp.603-622.

Holweg, M., Disney, S., Holmstrom, J. and Smaros, J. (2005), 'Supply chain collaboration: Making sense of the strategy continuum", European Management Journal, vol.23, no.2, pp.170-81.

Hoole, R. (2005), 'Five ways to simplify your supply chain', Supply Chain Management: An International Journal, vol.10/1, pp.3-6.

Houlihan, J. (1984), 'Supply Chain Management', Proceedings of the 19th International Technical Conference, BPICS, pp.101-110, quoted in Lamming, R., Johnsen, T., Zheng, J. and Harland, C. (2000), 'An Initial Classification of Supply Networks', International Journal of Operations & Production Management, vol.20, no.6, pp.675-691.

Huang, G. Q., Lau, J. S. K., and Mak, K. L. (2003), 'The impact of sharing production information on supply chain dynamics: A review of the literature', International Journal of Production Research, vol.41, issue 7, pp.1483-1517.

Huff, A.S. (2000), 'Changes in organizational knowledge production', Academy of Management Review, vol.25, pp.288-93.

Hunter, N.A. (1990), 'Quick response in apparel manufacturing', The Textile Institute, Manchester.

Hussey, J. and Hussey, R. (1997), 'Business research: A practical guide for undergraduate and postgraduate students', Macmillan Press, London.

Iacovou, C.L., Benbasat, I., Dexter, A,S. (1995), 'Electronic data interchange and small organisations: Adoption and impact of technology', MIS Quarterly, vol.19, issue 4, pp.465-485.

Ikeda, M. (2000), 'The new product development system of the Japanese automobile industry', in Jürgens, U. (Eds), 'New Product Development and Production Networks', Springer-Verlag, Berlin, .

Imai, M. (1986), 'Kaizen: The key to Japanese competitive success', Random House, New York.

Jackson, T. and Shaw, D. (2001), Mastering fashion buying and merchandising management, Palgrave, Basingstoke.

Jayaram, J., Vickery, S. and Droge, C. (2000), 'The effects of information system infrastructure and process improvements on supply-chain time performance', International Journal of Physical Distribution & Logistics Management, vol.30, no.3/4, pp. 314-330.

Jin, B. (2004), 'Achieving an optimal global versus domestic sourcing balance under demand uncertainty', International Journal of Operations & Production Management', vol.24, no.12, pp.1292-1305.

Jones, R. (2006), 'The apparel industry', Blackwell Publishing Ltd., Oxford.

Jones, R. and Hayes, S. (2002) 'The economic determinants of clothing consumption in the UK 1987-2000', Journal of Fashion Marketing and Management, vol.6, issue 4.

Jordan, J.A. and Michel, F.J. (2000), 'Next generation manufacturing: Methods and techniques', John Wiley and Sons, New York, NY.

Kacen, J. and Lee, J. (2002), 'The influence of culture on consumer impulse buying behaviour', Journal of Consumer Psychology, vol.12, issue 2, pp.163-176.

Kakabadse, N. and Kakabadse, A. (2000), 'Critical review – Outsourcing: A Paradigm Shift', Journal of Management development, vol.19, issue 8.

Kalwani, M. and Narayandas, N. (1995), 'Long term manufacturer-supplier relationships: Do they pay off for supplier firms?', Journal of Marketing, vol.59, issue 1, pp.1-16.

Kanter, R.M. (1994), 'Collaborative advantage', Harvard Business Review, July/August, pp.96-108.

Kaplan, R. and Norton, D. (1992), 'The Balanced Scorecard – Measures that drive performance', The Harvard Business Review, January/February, pp.71-79.

Kasarda, J.D. and Rondinelli, D.A. (1998), 'Innovative infrastructure for agile manufacturers', Sloan Management Review, vol.39, no.3, pp.73-82.

Kehoe, D.F. and Boughton, N.J. (2001), 'New paradigms in planning and control across manufacturing supply chains – The utilisation of Internet technologies', International Journal of Operations & Production Management', vol.21, no.5/6, pp.582-593.

Kilduff, P. (2000), 'Evolving strategies, structures and relationships in complex and turbulent business environments: The Textile and Apparel Industries of the New Millenium', Journal of Textile and Apparel, Technology and Management, vol.1, issue 1.

Kincade, D., Regan, C. and Gibson, F. (2007), 'Concurrent engineering for product development in mass customization for the apparel industry', International Journal of Operations & Production Management, vol.27, no.6, pp.627-649.

Kinder, T. (2003), 'Go with the flow – A conceptual framework for supply relations in the era of the extended enterprise', Res Pol, vol.32, issue 3, 503-523.

Kopczak, L and Johnson, M. (2003), 'The supply-chain management effect', MIT Sloan Management Review, vol.44, no.3, Spring.

Krajewski, L., Wei, J.C. and Tang, L-L. (2005), "Responding to schedule changes in build-to-order supply chains", Journal of Operations Management, vol.23, pp.452-69.

Kraljic, P. (1983), 'Purchasing must become supply management', Harvard Business Review, pp. 109–117.

Krause, D.R., Ellram, L.M. (1997), 'Critical elements of supplier development: The buying firm perspective', European Journal of Purchasing and Supply Management, vol.3, issue1, pp.21-31.

KSA (1997), 'Quick Response meeting customer needs', Kurt Salmon Associates, Atlanta, GA. www.kurtsalmon.com [3 May 2006].

Kuhn, T. (1970), 'The structure of scientific revolutions', Chicago, University of Chicago Press.

Kumar, S. (2008), 'The clothing cycle', web reference: http://www.cmai.in/index.asp, accessed on 7/09/2008.

Kvale, S. (1996), 'InterViews: An Introduction to Qualitative Research Interviewing', Thousand Oaks, Sage.

Lalonde, B. J. & Masters, J. M. (1994), 'Emerging logistics strategies: Blueprints for the next century', International Journal of Physical Distribution and Logistics Management, vol.24, no.7, pp.35-47.

Lam, J. and Postle, R. (2006), 'Textile and apparel supply chain management in Hong Kong', International Journal of Clothing Science and Technology, vol.18, no.4, pp.265-277.

Lambert, D.M., Emmelhainz, M.A., Gardner, J.T. (1996), 'Developing and implementing supply chain partnership', International Journal of Logistics Management, vol.7, no.2, pp.1-11.

Lambert, D.M., Stock, J.R., Ellram, L.M. (1998), Fundamentals of Logistics Management, Irwin/McGraw-Hill, Boston, MA.

Lambert, D. and Cooper, M. (2000), 'Issues in supply chain management', Industrial Marketing Management, vol.29, pp.65-83.

Lambert, D.M. and Knemeyer, A.M. (2004), "We're in this together", Harvard Business Review, December, pp. 114-22.

Lamey, J. (1996), 'Supply Chain Management', FT Management Report, London.

Lamming, R. (1993), 'Beyond Partnership: Strategies for Innovation and Lean Supply', Prentice-Hall, Englewood Cliffs, NJ.

Lamming, R. (1996), 'Squaring lean supply with supply chain management', International Journal of Operations & Production Management, vol.16, no.2, pp.183-196.

Lamming, R. (2000), 'Japanese supply chain relationships in recession', Long Range Planning, vol.33, no.6, pp.757-78.

Lamming, R., Johnsen, T., Zheng, J. and Harland, C. (2000), 'An initial classification of supply networks', International Journal of Operations & Production Management, vol.20, no.6, pp.93-102.

Larson, P. and Halldorsson, A. (2004), 'Logistics vs. supply chain management: An international survey', International Journal of Logistics: Research and Applications, vol.7, issue.1, pp.17-31.

Lasch, R. and Janker, C.G. (2005), 'Supplier selection and controlling using multivariate analysis', International Journal of Physical Distribution & Logistics Management, vol.35, no.6, pp.409-425.

Lau, R.S.M. (1994), 'Attaining strategic flexibility', 5th Annual Meeting of the Production and Operations Management Society, 8-11 October, Washington, DC.

Leavy, B. (1994), 'Two strategic perspectives on the buyer-supplier relationship', Production and Inventory Management Journal, 35 (2), 47-51.

Lee, H. and S. Whang (1999), 'Decentralized Multi-Echelon Supply Chain: Incentives and Information', Management Science,vol.45, no 5, pp 633-640.

Lee, H.L. (2000), 'Creating Value through Supply Chain Integration', Supply Chain Management Review, vol.4, no.4, pp.30-36.

Lee, H.L. (2004), "The triple-A supply chain", Harvard Business Review, October.

Lee, H.L. and Billington, C. (1995), "The evolution of supply chain models and practice at Hewlett Packard", Interfaces, vol. 25, no.5, pp.42-63.

Lee, H.L. and Ng, S.M. (1997), 'Introduction to the special issue on global supply chain management', Production and Operations Management, vol. 6, no.3, pp.191-2.

Lee, H.L., Padmanabhan, V., Whang, S. (1997a), 'The Bullwhip Effect in supply chains', Sloan Management Review, pp.93-102.

Lee, H.L., Padmanabhan, V., Whang, S. (1997b), 'Information distortion in a supply chain: The Bullwhip Effect', Management Science, vol.43, no.4, pp.546-58.

Lee, S-E., Kunz, G.I., Fiore, A.M. and Campbell, J.R. (2002), 'Acceptance of mass customization of apparel: merchandising issues associated with preference for product, process, and place', Clothing and Textiles Research Journal, vol.20, no.3, pp.138-46.

Lewis, C. A. (1950), 'The lion, the witch and the wardrobe', Bles, London.

Lewis, H. (1956), 'The role of air freight in physical distribution', Graduate School of Business Administration, Division of Research, Harvard University, Boston.

Li, J. and Liu, L. (2006), 'Supply chain coordination with quantity discount policy', International Journal of Production Economics, vol.101, no.1, pp.89-98.

Li, X., Chung, C., Goldsby, T. And Holsapple, C. (2008), 'A unified model of supply chain agility: The work-design perspective', International Journal of Logistics Management, vol.19, no.3, pp.408-435.

Liker, J.K. and Wu, Y.C. (2000), 'Japanese automakers, US suppliers and supply chain superiority', Sloan Management Review, vol.42, no.1, pp.81-93.

Lin, C. (2002), 'Segmenting customer brand preference: Demographic or psychographic', Journal of Product & Brand Management, vol.11, no.4, pp.249-268.

Lin, C., Lin, K., Huang, Y., and Kuo, W. (2006,)' Evaluation of electronic customer relationship management: The critical success factors', The Business Review, Cambridge, 6(2), 206-212.

Lincoln, Y. and Guba, E. (1985), 'Naturalistic inquiry', New York: Sage.

Liu, H. and McGoldrick, P. (1995), 'International retail sourcing: Trend, nature and process', Journal of International Marketing, vol.4, no.4, pp.9-33.

Loker, S., Cowie, L., Ashdown, S. and Lewis, V.D. (2004), 'Female consumers' reactions to body scanning', Clothing and Textiles Research Journal, vol.22, no.4, pp.151-60.

Lowson, R.H. (1999), 'The Impact of Quick Response in the Textile and Clothing Industry', PhD Thesis, Cardiff University.

Lummus, R., Duclos, L. and Vokurka, R. (2003), 'Supply chain flexibility: Building a new model', Global Journal of Flexible Systems Management, vol.4, no.4, pp.1-13.

Lummus, R., Vokurka, R.J., Alber, K.L. (1998), 'Strategic Supply Chain Planning', Production and Inventory Management Journal, vol.39, issue3, pp.49-58.

MacBeth, D.K. and Ferguson, N. (1994), Partnership sourcing: An integrated supply chain management approach , Pitman Publishing, London.

MacCarthy, B. And Jayarathne, P. (2009), 'Fast fashion: Achieving global Quick Response in the internationally Dispersed Clothing Industry', NUBS Research paper Series. Nottingham University.

MacCarthy, B.L. and Atthirawong, W. (2003), 'Factors affecting location decisions in international operations—a Delphi study', International Journal of Operations & Production Management, vol. 23, pp. 794–818.

MacCormack, A.D., Newmann, L.J.I. and Rosenfield, D.B. (1994), 'The new dynamics of global manufacturing site location', Sloan Management Review, vol.35, pp. 69–84.

Magretta, J. (1998), 'The power of virtual integration: An interview with Dell Computer's Michael Dell', Harvard Business Review (March-April): 72-85.

Maloni, M.J. and Benton, W.C (1997), 'Supply chain partnership: Opportunities for operations research', European Journal of Operations Research, pp.419-29.

Mariotti, J. L. (1999), 'Collaboration Is The Way To Go', Supply Chain Management Review, Spring.

Marshall, C. and Rossman, G.B. (1989), 'Designing qualitative research', Sage Publications, Beverly Hills, CA.

Mason-Jones, R. and Towill, D.R. (1999), 'Total cycle time compression and the agile supply chain', International Journal of Production Economics, vol.62, pp.61-73.

Maxcy, S.J. (2003), 'Pragmatic threads in mixed methods research in the social sciences: The search for multiple modes of inquiry and the end of the philosophy of formalism', In: A. Tashakkori and C. Teddlie, Editors, Handbook of Mixed Methods Research in Social and Behavioral Research, Sage, Thousand Oaks.

McCutcheon, D.M., Raturi, A.S. and Meredith, J.R. (1994), 'The customization-responsiveness Squeeze', Sloan Management Review, Winter, pp.89-99

McFarlan, F. and Nolan, R. (1995), 'How to manage an IT outsourcing alliance', Sloan Management Review, pp.9-23.

McGinnis, M.A. and Vallopra, R.M. (1999), ''Purchasing and supplier involvement in process improvement: a source of competitive advantage'', Journal of Supply Chain Management, vol.35, no.4, pp.42-52.

McLoughlin, D and Horan, C. (2000), 'Business marketing: Perspectives from the markets-as-networks approach', Industrial Marketing Management, vol.29, pp.285–292.

McMichael, H., Mackay, D. and Altman, G. (2000), 'Quick Response in the Australian TCF Industry – A case study of supplier response', International Journal of Physical Distribution & Logistics Management, vol.30, no.7/8, pp.611-626.

Meepetchdee, J. and Shah, N. (2007), 'Logistical network design with robustness and complexity considerations', International Journal of Physical Distribution Logistics Management, vol.37, issue 3, pp.201-222.

Meier, R.L., Williams, M.R. and Singley, R.B. (2004), 'Supply Chain Management: Strategic factors from the buyers perspective', Journal of Industrial Technology, vol.20, no.2, February to April.

Meijboom, B. (1999), 'Production-to-order and international operations – A case-study in the clothing industry', International Journal of Operations & Production Management, vol.19, no.5/6, pp.602-619.

Meixell, M. and Gargeya, V. (2005), 'Global supply chain design: A literature review and critique', Transportation Research Part E, vol.41, pp.531-550.

Mello, A. (2001), 'Bulletproof your supply chain', ZDNet Tech Update, 31 October 2001.

Mentzer, J. and Kahn, K. (1995), 'A framework for logistics research', Journal of Business Logistics, vol.16, no.1, pp.231-250.

Mentzer, J.T., Flint, D.J., Hult, G.T.M. (2001), 'Logistics service quality as a segment-customised process', Journal of Marketing, 65(4), pp.82-104.

Meredith, J. (1998), 'Building operations management theory through case and field research', Journal of Operations Management, vol.16, no.4, pp.441-451.

Miles, M. and Huberman, A. (1994), 'Qualitative data analysis', 2nd Ed, Sage, Thousand Oaks.

Milgate, M. (2001), 'Supply chain complexity and delivery performance: An international exploratory study', Supply Chain Management, vol.6, issue ¾, pg.106.

Mills, J., Schmitz, J. and Frizelle, G. (2004), 'A strategic review of supply networks', International Journal of Operations & Production Management, vol.24, no.10, pp.1012-1036.

Mills, P. (1998), 'Price, cost, service buyers want it all', Industrial Distribution, vol.87, Issue 3, pp.11-12.

Millson, M.R., Raj, S.P. and Wilemon, D. (1992), 'A survey of major approaches for accelerating new product development', Journal of Product Innovation Management, vol.9, pp.53-69.

Mintel (2007), 'Market research report', available at http://academic.mintel.com.

Monczka, R.M. and Morgan, J. (1997), 'What's wrong with supply chain management?', Purchasing, vol.122, issue 1, pp.69-73.

Mondragon, A., Lyons, A. and Kehoe, D. (2004), 'Assessing the value of information systems in supporting agility in high-tech manufacturing enterprises', International Journal of Operations & Production Management, vol.24, no.12, pp.1219-1246.

Moore, C.M., Fernie,J. and Burt,S. (2000), 'Brands without boundaries: The internationalisation of the designer retailer's brand', European Journal of Marketing, vol.34(8), pp.919–937.

Morash, E.A. and Clinton, S.R. (1998), 'Supply chain integration: customer value through collaborative closeness versus operational excellence', Journal of Marketing Theory & Practice, vol.6, no.4, pp.104-20.

Myers, M. and Cheung, M. (2008), 'Sharing global supply chain knowledge', MIT Sloan Management Review, Summer, vol.49, Issue 4, pp.67-73.

Nagel, R.N. and Bhargava, P. (1994), 'Agility: The ultimate requirement for world-class manufacturing performance', National Productivity Review, vol.13, no.3, pp.331-40.

Naim, M. M., Childerhouse, P., Disney, S. and Towil, D. (2002), 'A supply chain diagnostic methodology: Determining the vector of change', Computers and Industrial Engineering, vol.43, pp.135-157.

Naim, M. M., Potter, A. T., Mason, R. J. and Bateman, N. (2006). The role of transport flexibility in logistics provision'. The International Journal of Logistics Management, 17 (3), 297-311.

Narasimhan, R. and Das, A. (2000), 'An empirical examination of sourcing's role in developing manufacturing flexibilities', International Journal of Production Research, vol.38, no.4, pp.875-93.

Narasimhan, R., Swink, M., and Kim, S.W., (2006), 'Disentangling leanness and agility: An empirical investigation', Journal of Operations Management, 24, 440-457.

Naylor, J.B., Naim, M.M., Berry, D. (1997), 'Leagility: Interfacing the Lean and Agile manufacturing paradigm in the total supply chain', International Journal of Production Economics, vol.62, pp.107-118.

Newman, R.G. (1989), 'Single sourcing: Short term savings vs. long term problems', Journal of Purchasing and Material Management, vol.25, issue 4, pp.20-25.

Nishiguchi, T., (1994), 'Strategic industrial sourcing: The Japanese advantage', New York: Oxford University Press.

Nordas, H.K. (2004), 'The Global Textile and Clothing Industry post the Agreement on Textiles and Clothing', Discussion paper 5, World Trade Organisation

Ohmae, K. (1989), 'The global logic of strategic alliances', Harvard Business Review, vol.67, issue 2, pp.143-155.

Oke, A. (2005), 'A framework for analysing manufacturing flexibility', International Journal of Operations & Production Management, vol.25, no.10, pp.973-96.

Oliver, R.K. and Webber, M.D. (1992), 'Supply chain management – Logistics catches up with strategy', in Christopher, M.G. (Ed), Logistics – Strategic Issues, Chapman and Hall, London, pp.63-75.

Olsen, R.F. and Ellram, L.M. (1997), 'A portfolio approach to supplier relationships", Industrial Marketing Management, vol.26, pp.101-13.

Oxborrow L (2000), "Changing practices in the UK apparel supply chain: Results of an industry survey", Research Project Paper for Harvard Business Center for Textile and Apparel Research, accessed via http://www.hctar.org/pdfs/GS04.pdf on 17th Oct 2008.

Palpacuer, F. (2002), 'Subcontracting networks in the New York garment industry: Changing characteristics in a global era', in G. Gereffi, D. Spener and J. Bair (eds.) Free Trade and Uneven Development: The North American Apparel Industry after NAFTA, Temple University Press: 53-73.

Pansiri, J. (2009), 'Evolution of a doctoral thesis research topic and methodology: A personal experience', Tourism Management, vol.30,pp.83-89.

Perona, M. and Saccani, N. (2004), 'Integration techniques in customer-supplier relationships: An empirical research in the Italian industry of household appliances', International Journal of Production Economics, vol.89, no.2, pp.189-205.

Perry, C. (1998), 'Processes of a case study methodology for post graduate research in marketing', European Journal of Marketing, vol.32, no.9/10, pp.785-802.

Perry, M. and Sohal, A.S. (2000), 'Quick Response practices and technologies in developing supply chains', International Journal of Physical Distribution & Logistics Management', vol.30, no.7/8, pp.627-639.

Perry, M. and Sohal, A.S. (2001), 'Effective Quick Response practices in a supply chain partnership – An australian case study', International Journal of Operations and production Management, vol.21, no.5/6, pp.840-854.

Petroni, A. and Bevilacqua, M. (2002), 'Identifying manufacturing flexibility best practices in small and medium enterprises', International Journal of Operations & Production Management, vol.22, no.8, pp.929-47.

Pettigrew, A. (1997), 'The double handles of management research', in Clarke, T. (Eds), 'Advancement in Organisational Behaviour: Essays in Honour of Derek S. Pugh', Dartmouth Press, London, pp.277-96.

Pine, B.J. (1993), 'Mass customisation: The new frontier in business competition', Harvard Business School Press, Boston, MA.

Pires, S. R., Bremer, C. F, De Santa Eulalia, L. A and Goulart ,C. P. (2001), 'Supply chain and virtual enterprises: Comparisons, migration and a case study', International Journal of Logistics, 4 (3), 297-311.

Pitimaneeyakul, U., LaBat, K.L. and DeLong, M.R. (2004), 'Knitwear product development process: a case study', Clothing and Textiles Research Journal, vol.22, no.3, pp.113-31.

Poirier, C.C. and Quinn, F.J. (2003), 'A survey of supply chain progress', Supply Chain Management Review, vol.7, no. 5, pp.40–48.

Popp, A. (2000), 'Swamped in information but starved of data: Information and intermediaries in clothing supply chains', Supply Chain Management: An International Journal, vol.5, no.3, pp.151-161.

Porter, M. E. (1980), 'Competitive strategy', The Free Press, New York.

Porter, M.E. (1985), 'Competitive advantage: Creating and sustaining superior performance', Free Press, New York, NY.

Porter, M.E. (1996), 'What is strategy?', Harvard Business Review, May-June, pp.79-91.

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', vol.31, issue 4, pp.247-265.

Prater, E., Bichl, M., Smith, M. (2001), 'International supply chain agility: tradeoffs between flexibility and uncertainty', International Journal of Operations & Production Management, vol. 21, no.5/6, pp.823.

Premus, R. and Sanders, N. (2008), 'Information sharing in global supply chain alliances', Journal of Asia-Pacific Business, vol.9, Issue 2, pp.174-192.

Priest, A. (2005), 'Uniformity and differentiation in fashion', International Journal of Clothing Science and Technology, vol.17, issue ¾, pp.253-263.

Quayle, M. (1998) 'Supplier development and supply chain management attitudes survey', CARISMO, University College Suffolk, University of East Anglia, U.

Quinn, F. J. (2000), 'The clockspeed chronicles', Supply Chain Management Review, vol.3, no. 4, pp.60-64.

Quinn, F.J. (1997), 'What's the buzz?', Logistics Management, vol.36, issue 2, pp.43-47.

Quinn, J.B. (1999), 'Strategic outsourcing: Leveraging knowledge capabilities', Sloan Management Review, vol. 40, no. 4, Summer, pp.9-22.

Quinn, J.B. and Hilmer, F.G. (1994), 'Strategic outsourcing', Sloan Management Review, vol.35 no.4, Summer, pp.43-55.

Radjou, N. (2002), 'Executive overview: Adaptive supply networks', Forrester TechStrategy, February.

Ragatz, G.L., Handfield, R.B., Petersen, K.J. (2002), 'Benefits associated with supplier integration into new product development under conditions of technology uncertainty', Journal of Business Research, vol.55, no.5, pp.389-400.

Rao, K. and Young, R.R. (1994), 'Global supply chains: Factors influencing outsourcing of logistics functions', International Journal of Physical Distribution and Logistics Management, vol.24, no.6, pp.11-19.

Reichhart, A. and Holweg, M. (2007), 'Creating the customer-responsive supply chain: A reconciliation of concepts', International Journal of Operations & Production Management, 27 (11), 1144-1172.

Rich, N. and Hines, P. (1997), 'Supply-chain management and time-based competition: The role of the supplier association', International Journal of Physical Distribution and Logistics Management, vol.27, no.3, pp.210-225.

Richardson, J. (1996), 'Vertical integration and rapid response in fashion apparel', Organization Science, vol.7, no.4, pp.400-412.

Russ, M. and Camp, S.M. (1997), 'Strategic alliances and technology transfer: An extended paradigm', International Journal of Technology Management, 14 (5), 513–527.

Sabath, R. (1995), 'Volatile demand calls for Quick Response: The integrated supply chain', Logistics Information Management, vol.8, issue 2, pp.49-52.

Sabel, C., Herrigel, G., Kazis, R. and Deeg, R. (1987), 'How to keep mature industries innovative', Technology Review, vol. 90, no.3, pp.26-35.

Sachan, A. and Datta, S. (2005), 'Review of supply chain management and logistics research', International Journal of Physical Distribution and Logistics Management, vol.35, no.9, pp.664-705.

Sahin, F., and Robinson, E. P. (2002), 'Flow coordination and information sharing in supply chains: Review, implication, and directions for future research', Decision Science, 33(4), 505-536.

Samaddar, S., Nargundkar, S. and Daley, M. (2005), 'Inter-organizational information sharing: The role of supply network configuration and partner goal congruence', European Journal of Operational Research, vol.174, pp.744–765

Sambamurthy, V., Bharadwaj, A. and Grover, V. (2003), "Shaping agility through digital options: reconceptualizing the role of information technology in contemporary firms", MIS Quarterly, vol. 27, no.2, pp.237-63.

Sanchez, A.M. and Perez, M.P. (2005), 'Supply chain flexibility and firm performance: A conceptual model and empirical study in the automotive industry', International Journal of Operations & Production Management, 25 (7), 681-700.

Saunders, M., Lewis, P. and Thornhill, A. (2007), 'Research methods for business students', Pearson Education, Harlow, England.

Scheffer, M. (1994), 'Internationalisation of production by EC textile and clothing manufacturers', Textile Outlook International, January, pp.101-123.

Schmenner, R.W. and Tatikonda, M.V. (2005), 'Manufacturing process flexibility revisited', International Journal of Operations & Production Management, vol.25, no.12, pp.1183-9.

Schonsleben, P. (1999), 'With agility and adequate partnership strategies towards effective logistics networks', Computers in Industry, vol.42, pp.33-42.

Schweiger, D. M., and Goulet, P. M. (2000), 'Integrating mergers and acquisitions: An international research review', Advances in Mergers and Acquisitions, 1, 61-92.

Scott, C. and Westbrook, R. (1991), 'New strategic tools for supply chain management', International Journal of Physical Distribution & Logistics Management, vol.21, no.1, pp. 23-33.

Selznick, P. (1957), 'Leadership in administration', Harper & Row, New York.

Sen, A., 2008, 'The US fashion industry: A supply chain review', International Journal of Production Economics, vol.114, pp.571-593.

Sharifi, H. and Zhang, Z. (1999), 'A methodology for achieving agility in manufacturing organisations: An introduction', International Journal of Production Economics, vol.62, pp. 7–22.

Sharp, J.M., Irani, Z., Desai, S. (1999), 'Working towards agile manufacturing in the UK industry', International Journal of Production Economics, vol.62, pp.155-169.

Sharpe, M. (1997), 'Outsourcing, organisational competitiveness and work', Journal of Labour Research, vol.XVIII, no.4, pp.535-49.

Sheridan, J. H. (1999), 'Managing the chain', Industry Week. September, 6. pp. 50-66.

Simatupang, T., Wright, A. and Sridharan, R. (2002), 'The knowledge of coordination for supply chain integration', Business Process Management Journal, vol.8, no.3, pp. 289-308.

Simatupang, T.M. and Sridharan, R. (2002a), "The collaborative supply chain", International Journal of Logistics Management, vol.13, no.1, pp. 15-30.

Simchi-Levi, D., Kaminski, P., Simchi-Levi, E. (1999), Designing and managing the supply chain, McGraw-Hill, London.

Slack N. (1987), 'The flexibility of manufacturing systems', International Journal of Operations and Production Management, 7(4), 35-45.

Smith, W. (1956), 'Product differentiation and market segmentation as alternative marketing strategies', Journal of Marketing, vol.21, pp.3-8.

Sokolowski, R. (2000), 'Introduction to phenomenology', Cambridge University Press.

Song, L. and Nagi, R. (1997), 'Design and implementation of a virtual information system for agile manufacturing', IEE Transactions, vol.29, issue1, pp.839-857.

Speer, J. (2002), 'Full-Package Face-Off', Apparel, January.

Spekman, R.E., Kamauff, J.W. and Myhr, N. (1998), 'An empirical investigation into supply chain management: A perspective on partnerships", International Journal of Physical Distribution & Logistics Management, vol.28, no.8, pp. 630-50.

Spencer, M.S., Rogers, D.S. and Daugherty, P.J. (1994), 'JIT systems and external logistics suppliers', International Journal of Operations & Production Management, vol.14, no.6, pp.60-74.

Spring, M. and Dalrymple, J. (2000), 'Product customisation and manufacturing strategy', International Journal of Operations & Production Management, vol.20 , Issue 4 , pp.441 – 467.

Stalk, G. (1988), 'Time – the next source of competitive advantage', Harvard Business Review, vol.66, no. 4, pp.41-51.

Stank, T.; Daugherty, P. & Ellinger, A. E. (1999), 'Marketing/logistics integration and firm performance', International Journal of Logistics Management, vol.10, no.1, pp.11-24.

Sterman, J.D. (1989), "Modelling managerial behaviour: Misperceptions of feedback in a dynamic decision making environment", Management Science, vol.35, no.3, pp.321-38.

Stevens, G. (1989), 'Integration of the supply chain', International Journal of Physical Distribution and Logistics Management, vol.19, no.8, pp.3-8.

Stevenson, M. and Spring, M. (2007) Flexibility from a supply chain perspective: Definition and review, International Journal of Operations & Production Management, vol.27, no.7, pp.685-713.

Stewart, G. (1997), 'Supply-chain operations reference model (SCOR): The first cross-industry framework for integrated supply-chain management', Logistics Information Management, vol.10, Issue 2, pp. 62–67.

Storey, J., Emberson, C. and Reade, D. (2005), 'The barriers to customer responsive supply chain management', International Journal of Operations & Production Management, vol.25, issue 3, pp.242-260.

Strauss, A. And Corbin, J. (1990), 'Basics of qualitative research; Grounded theory procedures and techniques', London, sage Publications.

Stuart, I., McCutcheon, D., Handfield, R., McLachlin, R. and Samson, D. (2002), 'Effective case research in operations management – A process perspective', Journal of Operations Management, vol.20, no.5, pp.419-433.

Suarez, F.F., Cusumano, M.A. and Fine, C.H. (1995), 'An empirical study of flexibility in manufacturing', Sloan Management Review, vol.37, no.1, pp.25-32.

Subrahmanyan, S. (2000), 'Using quantitative models for setting retail prices', Journal of Product and Brand Management, vol.9, pp.304–315.

Suh, S.M., Hong, B.S. and Jin, B. (2002), 'Fashion business', Hyung-Sul Publication Co., Seoul.

Supply Chain Council (2009), https://www.supply-chain.org/node/69. [5 January 2010]

Swafford, P. M. Ghosh, S and Nagash, N. M. (2006), 'A framework for assessing value chain agility', International Journal of Operations and Production Management, 26 (2), 118-140.

Swafford, P., Ghosh, S., Murthy, N. (2000), "A model of global supply chain agility and its impact on competitive performance", Proceedings of the 31st National DSI Meeting, Orlando, Florida, pp.1037-39.

Swenseth, S.R. and Buffa, F.P. (1991), 'Implications of inbound lead time variability for just in time manufacturing', International Journal of Operations & Production Management, vol.11, pp.34-47.

Swink, M. and Hegarty, W.H. (1998), 'Core manufacturing capabilities and their links to product differentiation', International Journal of Operations & Production Management, vol.18, no.4, pp.374-94.

Tachizawa, E. M. and Thomsen, C. G. (2007), 'Drivers and sources of supply flexibility: An exploratory study', International Journal of Operations & Production Management, 27 (10), 1115-1136.

Tage, Skjoett-Larsen (2000), 'European logistics beyond 2000', International Journal of Physical Distribution & Logistics Management', vol.30, issue 5, pp. 377-387.

Tan, K.C., Kannan, V.R., Handfield, R.B. (1998), 'Supply chain management: Supplier performance and firm performance', International Journal of Purchasing and Materials Management, Summer, pp.2-9.

Taplin, I. (2006), 'Restructuring and reconfiguration – The EU textile and Clothing Industry adapts to change', European Business review, vol.18, no.3, pp.172-186.

Tashakkori, A., & Teddlie, C. (1998), 'Mixed methodology: Combining qualitative and quantitative approaches', Applied Social Research Methods, no.46, Thousand Oaks, CA: Sage.

Thatte, A., Muhammed, S. and Agrawal, V. (2008), 'Effect of information sharing and supplier network responsiveness on time-to-market capability of a firm', Review of Business research, March.

Timme, S. G. & Williams-Timme, C. (2000), 'The financial SCM connection' Supply Chain Management Review, vol.4, no.4, pp.32-40.

Torres, L., Miller, J. (1998), 'Aligned logistics operations: Tailoring logistics to the needs of customers", Strategic Supply Chain Alignment: Best Practice in Supply Chain Management, Gower, Aldershot.

Taylor, T. A. (2006), 'Sale timing in a supply chain: When to sell to the retailer', Manufacturing and Service Operations Management, Vol. 8, No. 1, 23-42.

Towill, D.R. (1997), 'The seamless supply chain – The predators of strategic advantage', International Journal of the Techniques of Manufacturing, vol.13, issue 1, pp.37-56.

Tranfield, D. and Starkey, K. (1998), 'The nature, social organisation and promotion of management research: Towards policy', British Journal of Management, vol.9, pp.341-353 .

Trent, R. and Monczka, R. (1998), 'Purchasing and supply management: Trends and changes throughout the 1990s', Journal of Supply Chain Management, vol.34, no.4, pp.2-11.

Trochim, W. (2002), 'Research methods knowledge base', 2nd Ed, Atomic Dog, Cinncinatti.

Tyler, D., Heeley, J. and Bhamra, T. (2006), 'Supply chain influences on new product development in fashion clothing', Journal of Fashion Marketing and Management, vol.10, no.3, pp.316-328.

Ulrich, P.V., Anderson-Connell, L.J. and Wu, W. (2003), 'Consumer co-design of apparel for mass customization', Journal of Fashion Marketing & Management, vol.7, no.4, pp.398-412.

Upton, D. (1994), 'The management of manufacturing flexibility', California Management Review, 36 (2), 72-89.

van der Zee, D. J. and van der Vorst, A. J. (2005), 'A modeling framework for supply chain simulation: Opportunities for improved decision making', Decision Sciences, vol.36, Issue 1, pp. 65 – 95.

Van Hoek, R., Harrison, A. and Christopher, M. (2001), 'Measuring agile capabilities in the supply chain', International Journal of Operations & Production Management, vol.21, no.1/2, pp. 126-147.

van Hoek, R.I. (2000), 'The thesis of leagility revisited', International Journal of Agile Management Systems, vol.2, issue3, pp.196-201.

Venkatraman, N. (1997), 'Beyond outsourcing: Managing IT resources as a value centre", Sloan Management Review, vol. 38, no. 3, Spring, pp. 51-64.

Verdict (2007), 'UK Value Clothing Retailers', www.verdict.co.uk [2 August 2008].

Vokurka, R.J., Choobineth, J. and Vadi, L. (1996), 'A prototype expert system for the evaluation and selection of potential suppliers', International Journal of Operations & Production Management, vol.16, no.12, pp.106-127.

Vollmann, T.E. and Cordon, C. (1998), "Building successful customer-supplier alliances", Long Range Planning, vol.31, no.5.

Vonderembse, M. A. Uppal, M. Huang, S. H and Dismukes, J. P., (2006), Designing supply chains: Towards theory development', International Journal of Production Economics, 100, 223-238.

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

Wacker, J. (1998), 'A definition of theory: Research guidelines for different theory-building research methods in operations management', Journal of Operations Management, vol.16, no.4, pp. 361-385.

Walters, D. (2006), 'Effectiveness and efficiency: The role of demand chain management', International Journal of Logistics Management, vol.17, no.1, pp. 75-94.

Walters, D. (2007), 'Global logistics – New directions in supply chain management', Kogan Page, London.

Watson, K. (1997), 'Benefits of supply chain partnerships', paper presented at Putting Energy into the Supply Chain, Textile Conference, Birmingham, 19 March.

Watts, C., Kim, K. and Hahn, C. (1992), 'Linking purchasing to corporate competitive strategy', International Journal of Purchasing & Materials management, vol.28, no.4, pp.2-8.

Webster, F.E. (1992), 'The changing role of marketing in the corporation', Journal of Marketing, vol.56, no.4, pp.1-17.

Welch, J. and Ranganath Nayak, P. (1992), 'Strategic sourcing: A progressive approach to the make-or-buy Decision', Academy of Management Executive, vol.6, no.1, pp.23-31.

Werner, S. (2001), 'The textile and clothing industry in the Eu: A survey', Enterprise papers, June 2.

Westermeyer, J. (1990), 'Working with an interpreter in psychiatric assessment and treatment', The Journal of Nervous and Mental Disease, 178(12), pp.745-749.

Wheelwright, S.C. and Clark, K.B. (1992), 'Creating project plans to focus product development', Harvard Business Review, March-April, pp.70-82.

Whitefield, E. (2001), 'Vertical inclination', Drapers Record, 4 August, pp.43-44.

Whitley, R. (1988), "The management sciences and managerial skills", Organization Studies, vol.9, no.1, pp.47-68.

Wickett, J.L., Gaskill, L.R. and Damhorst, M.L. (1999), "Apparel retail product development: model testing and expansion", Clothing and Textiles Research Journal, vol.17, no.1, pp. 21-35.

Wikner, J., Naim, M.M. and Towill, D.R. (1992), 'The system simplification approach in understanding the dynamic behaviour of a manufacturing supply chain', Journal of Systems Engineering 4, pp. 164–178.

Wikstrom, S. (1996), Value creation by company-consumer interaction', Journal of Marketing Management, 12: 339–374.

Wilding, R. (1998), 'The supply chain complexity triangle: Uncertainty generation in the supply chain', International Journal of Physical Distribution and Logistics Management, 28 (8), pp. 599–616.

Willcocks, L. and Fitzgerald, G. (1994), 'A business guide to IT outsourcing', Business Intelligence, London.

Willmott, H. (1993), 'Strength is ignorance; Slavery is freedom: Managing culture in modern organizations', Journal of Management Studies, 30(4) pp515-552

Wilson, E. (1994), 'The relative importance of supplier selection criteria – A review and update', International Journal of Purchasing & Materials Management, vol.30, no.3, pp.35-42.

Win, A. (2008), 'The value a 4PL provider can contribute to an organisation', International Journal of Physical Distribution & Logistics Management, vol.38, No.9, pp.674-684.

Wood, D.F., Barone, A.P., Murphy, P.R. and Wardlow, D.L. (2002), 'International logistics', AMACOM, New York.

Yin, R. K. (2003) Case study research: Design and methods. Applied Social Research Methods Series, Thousand Oaks, California, Sage Publications.

Yu, Z., Yan, H. and Cheng, E. (2001), 'Benefits of information sharing with supply chain partnerships', Industrial Management & Data Systems, vol.101, issue 3, pp.114-121.

Yusuf, Y., Gunasekaran, A., Adeleye, e. and Sivayoganathan, K. (2004), 'Agile supply chain capabilities: Determinants of competitive objectives', European Journal of Operational Research, vol.159, pp.379-392.

Yusuf, Y., Sarhadi, M., Gunasekaran, A. (1999), 'Agile manufacturing: The drivers, concepts and attributes', International Journal of Production Economics, vol.62, pp.33-43.

Zineldin, M. (2005), 'Quality and customer relationship management as competitive strategy in the Swedish banking industry', The TQM Magazine, vol.17, no.4, pp. 329-344.

Zineldin, M. and Bredenlow, T. (2001), 'Performance measurement and management control positioning strategies, quality and productivity: A case study of a Swedish bank', Managerial Auditing Journal, vol.16, Issue 9, pp.484 – 499.

Appendix I
Agile Supply Chain Management Practices – Case Study Protocol

Company Background	Business nature ; Competitive environment Size of business; History; Structure Key Customers / Suppliers		
Agile Supply Chain Management Practices	Market sensitivity		Season structure; Market segments; New product / mix / volume flexibility measures End customer relationships
	Sourcing Flexibility	Reconfiguration Flexibility	Size of supplier / customer base; Locations; Nature of contract Supplier selection process
		Supplier Flexibility	New product / mix / volume flexibility considerations Level of supplier involvement Replenishment frequency Performance measures
		Supplier relationships	History / duration Nature of relationship Risk / benefit sharing Conflict resolution Performance monitoring
	Process Integration	Coordination	Organisational / goal alignment Decision making process Internal / external resource sharing
		Information Integration	Communication (nature, type, content) with suppliers / customers; Systems used; Implementation issues; Frequency of exchange
		Organisational Linkages	Resource re-deployment / consolidation / sharing Early supplier / customer involvement Performance monitoring

Is archival data available?

Any follow-up comments?

Potential follow-up contacts?