

CREATING AGILE SUPPLY CHAINS IN THE FASHION INDUSTRY

by

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ABSTRACT

Fashion markets are synonymous with rapid change and, as a result, commercial success or failure in those markets is largely determined by the organisation's flexibility and responsiveness.

Responsiveness is characterised by short time-to-market, the ability to scale up (or down) quickly and the rapid incorporation of consumer preferences into the design process.

In this paper it is argued that conventional organisational structures and forecast-driven supply chains are not adequate to meet the challenges of volatile and turbulent demand which typify fashion markets today. Instead, the requirement is for the creation of an agile organisation embedded within an agile supply chain

INTRODUCTION

Fashion markets have long attracted the interest of researchers. More often the focus of their work was the psychology and sociology of fashion and with the process by which fashions were adopted across populations (see for example Wills and Midgley, 1973). In parallel with this, a body of work has developed seeking to identify cycles in fashions (e.g. Carman, 1966). Much of this earlier work was intended to create insights and even tools to help improve the demand forecasting of fashion products. However, the reality that is now gradually being accepted both by those who work in the industry and those who study it, is that the demand for fashion products cannot be forecast. Instead, we need to recognise that fashion markets are complex open systems that frequently demonstrate high levels of 'chaos'. In such conditions managerial effort may be better expended on devising strategies

and structures that enable products to be created, manufactured and delivered on the basis of 'real-time' demand. This is the context that has spawned the emerging domain of the agile supply chain (See for example, Harrison, Christopher & van Hoek, 1999, Christopher & Towill, 2001) and the philosophy of Quick Response (Lowson, King & Hunter 1999).

1. THE NATURE OF FASHION MARKETS

Fashion is a broad term which typically encompasses any product or market where there is an element of style which is likely to be short-lived. We have defined fashion markets as typically exhibiting the following characteristics:

1. Short life-cycles – the product is often ephemeral, designed to capture the mood of the moment: consequently, the period in which it will be saleable is likely to be very short and seasonal, measured in months or even weeks.
2. 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.
3. Low predictability – because of the 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.
4. 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'.

Today's fashion market place is highly competitive and the constant need to 'refresh' product ranges means that there is an inevitable move by many retailers to extend the number of 'seasons' i.e. the frequency with which the entire merchandise within a store is changed. In extreme cases, typified by the successful fashion retailer Zara, there might be twenty seasons in a year. The implications of this trend for supply chain management are clearly profound.

The combined effect of these pressures clearly provides a challenge to logistics management. Traditional ways of responding to customer demand have been forecast-based, with the resultant risk of over-stocked or under-stocked situations.

More recently there has emerged another trend that has added further complexity and difficulty to the management of fashion logistics. The growing tendency to source product and materials off-shore has led in many cases to significantly longer lead-times. While there is usually a substantial cost advantage to be gained, particularly in manufacturing, through sourcing in low labour cost areas, the effect on lead-times can be severe. It is not only distance that causes replenishment lead-times to lengthen in global sourcing. It is the delays and variability caused by internal processes at both ends of the chain as well as the import/export procedures in between. The end result is longer 'pipelines' with more inventory in them with the consequent risks of obsolescence that arise.

Much of the pressure for seeking low cost manufacturing solutions has come from retailers. At the same time there have been moves by many retailers in the apparel business to reduce significantly the number of suppliers with whom they do business. This supply-base rationalisation has been driven by a number of considerations, but in particular by the need to develop more responsive replenishment systems - something that is not possible when sourcing is spread over hundreds, if not thousands, of suppliers.

2. MANAGING THE FASHION LOGISTICS PIPELINE

Conventional wisdom holds that the way to cope with uncertainty is to improve the quality of the forecast. Yet, by definition, the volatility of demand and the short life-cycles found in many fashion markets make it highly unlikely that forecasting methods will ever be developed that can consistently and accurately predict sales at the item level. Instead ways

must be found of reducing the reliance that organisations place upon the forecast and instead to focus on lead-time reduction. Shorter lead-times mean, by definition that the forecasting horizon is shorter - hence the risk of error is lower. In the same way that the Captain of a super-tanker has a planning horizon that is determined by the vessel's stopping distance (many miles) so too in business the forecast period is determined by the time it takes to design, make and ship the product - lead-times in other words.

There are three critical lead-times that must be managed by organisations that seek to compete successfully in fashion markets:

Time-to-Market - how long does it take the business to recognise a market opportunity and to translate this into a product or service and to bring it to the market?

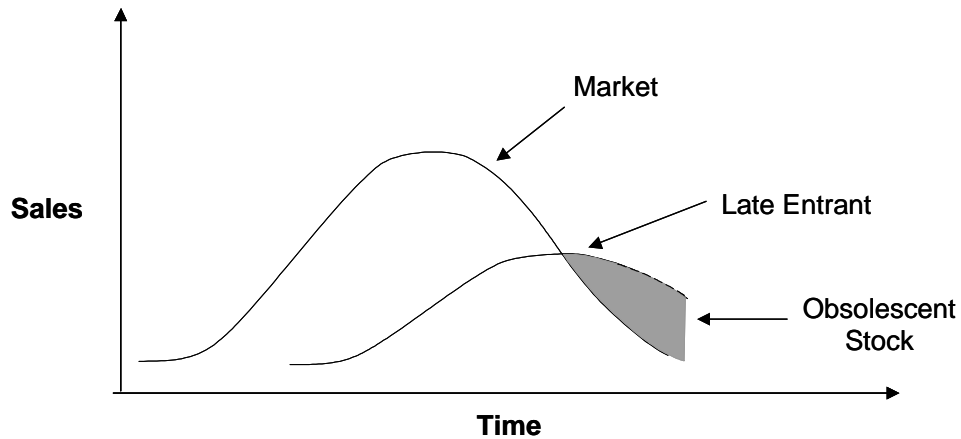
Time-to-Serve - how long does it take to capture a customer's order and to deliver the product to the retail customer's satisfaction?

Time-to-React - how long does it take to adjust the output of the business in response to volatile demand? Can the 'tap' be turned on or off quickly?

2.1 Time-to- Market

In these short life-cycle markets, 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. Companies that are slow to market can suffer in two ways. Firstly they miss a significant sales opportunity that probably will not be repeated. Secondly the supplier is likely to find that when the product finally arrives in the market place, demand is starting to fall away leading to the likelihood of markdowns. Figure 1 illustrates the double jeopardy confronting those organisations that are slow to market. New thinking in manufacturing strategy which has focused on flexibility and batch size reduction has clearly helped organisations reduce time-to-market. The use of highly automated processes such as computer aided design (CAD) and computer aided manufacturing (CAM) have revolutionised the ability to make product changes as the season or the life cycle progresses.

Figure 1 : Shorter Life-cycles making timing crucial



- Less time to make profit
- Higher risk of obsolescence

2.2 Time-to-Serve

Traditionally in fashion industries orders from retailers have had to be placed on suppliers many months ahead of the season. Nine months was not unusual as a typical lead-time. Clearly, in such an environment the risk of both obsolescence and stock-outs is high as well as the significant inventory carrying cost that inevitably is incurred somewhere in the supply chain as a result of the lengthy pipeline.

Why should the order to delivery cycle be so long? It is not the time it takes to make or ship the product. More often the problem lies in the multiple steps that occur from the point at which a decision is taken to place an order, through the generation of the accompanying documentation (particularly in overseas transactions involving quota approvals, letters of credit and so forth), even before the order enters into the suppliers' processes - which themselves are likely to be equally lengthy. Often the total time in manufacture is considerable because of the traditional, batch-based production methods. In other words each step in the total manufacturing cycle is managed separately from each other and the quantities processed at

each step are determined by so-called economic batch quantities. Furthermore, when manufacture takes place off-shore, considerable time is consumed in preparing documentation, in consolidating full container loads and in-bound customs clearance after lengthy, surface transportation.

The underpinning philosophy that has led to this way of doing things is cost-minimisation. Primarily the costs that are minimised are the costs of manufacture and secondly the costs of shipping. In fact, this view of cost is too narrow and ultimately self-defeating. The real issue is the total supply chain cost, the costs of obsolescence, forced markdowns and inventory carrying costs.

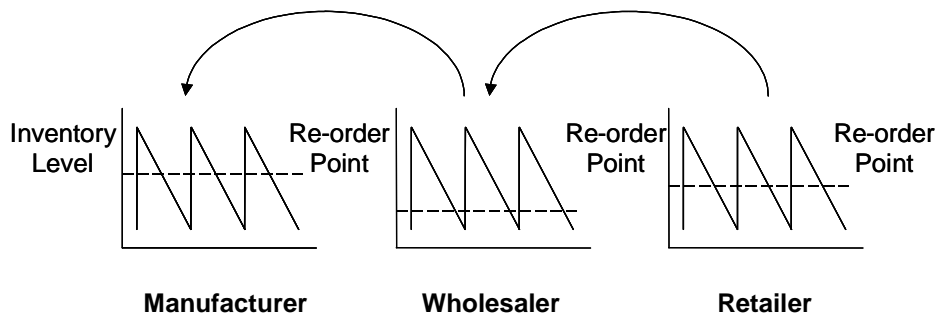
2.3 Time-to-React

Ideally, in any market, an organisation would want to be able to meet any customer requirement for the products on offer at the time and place the customer needs them.

Clearly, some of the major barriers to this are those highlighted in the previous paragraphs, i.e. time-to-market and time-to-serve. However, a further problem that organisations face as they seek to become more responsive to demand is that they are typically slow to recognise changes in real demand in the final market place. The challenge to any business in a fashion market is to be able to see 'real' demand. Real demand is what consumers are buying or requesting hour-by-hour, day-by-day. Because most supply chains are driven by orders (i.e. batched demand) which themselves are driven by forecasts and inventory replenishment, individual parties in the chain will have no real visibility of the final market place. As Figure 2 suggests, inventory hides demand. In other words the fact that there will usually be multiple, independent decisions on re-ordering policies and inventory levels from the retail shelf back through wholesalers, to suppliers means that up-stream parties in the chain are unable to anticipate

the changing needs of the customers other than through a forecast based as much upon judgment and guess-work as it is upon actual consumer demand.

Figure 2 : Inventory hides demand



The fundamental problem that faces many companies - not just those in fashion industries - is that the time it takes to source materials, convert them into products and move them into the market place is invariably longer than the time the customer is prepared to wait. This difference between what might be called the 'logistics pipeline' and the customers' order cycle time is termed the 'lead-time gap'. Conventionally, this gap was filled with a forecast-based inventory - there was no other way of attempting to ensure that there would be product available as and when customers demanded it.

These lengthy supply pipelines often result in revenue losses in the final market. Table 1 provides an indication of the size of these losses and of note is the cost of carrying inventory. The biggest item is forced markdowns - mainly at retail - with the total losses amounting to over 14% of retail sales. A distinction is made between promotional markdowns, e.g., special sales, and the marking-down that occurs out of necessity when a season ends and unwanted goods must be moved to make way for new merchandise - forced markdowns.

Table 1 –Revenue losses in the apparel pipeline (% retail sales)

It is against this background that the Quick Response (QR) movement originated in 1984 from a textile industry research programme in the US. Studies at the time revealed a clothing industry pipeline in which inventories and work-in-progress had reached alarming levels and it is a situation that can still be seen in many industries. The nature of Quick Response will be explored later. More information concerning its history can be found in Hunter, (1990) and Gunston and Harding, (1986).

3. THE AGILE SUPPLY CHAIN

In recent years there has been a growing interest in the design and implementation of agile supply chain strategies (Christopher, 2000).

The idea of agility in the context of supply chain management focuses around 'responsiveness'. Conventional supply chains have been lengthy with long lead-times and hence, of necessity, have been forecast-driven. By contrast, agile supply chains are shorter and seek to be demand-driven. A further distinction is that because conventional supply chains are forecast-driven that implies that they are inventory-based. Agile supply chains are more likely to be information-based.

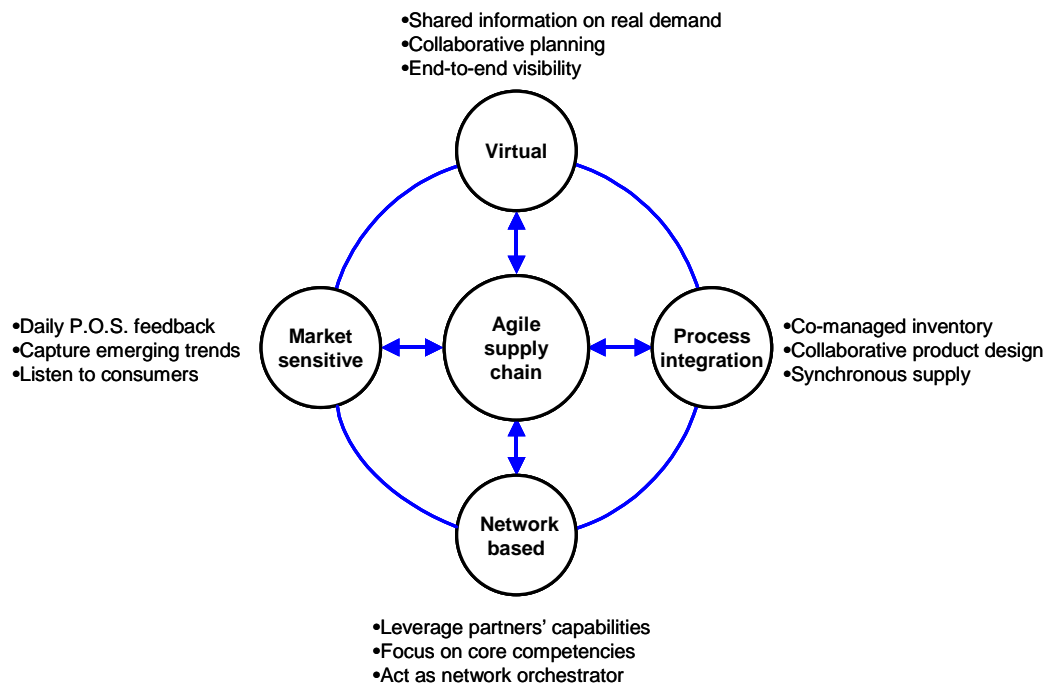
By their very nature, fashion markets are volatile and difficult to predict. Hence the need for agility.

It has been suggested (Harrison, Christopher & van Hoek, 1999) that an agile supply chain has a number of characteristics. Specifically the agile supply chain is:

- market sensitive – it is closely connected to end-user trends
- virtual – it relies on shared information across all supply chain partners
- network-based – it gains flexibility by using the strengths of specialist players
- process aligned – it has a high degree of process interconnectivity between the network members

Figure 3 suggests that there are a number of practical ways in which these four key dimensions can be brought into play to create an agile supply chain for organisations competing in fashion industries.

Figure 3 : The foundations for agility in a fashion business



Based on the model originally developed by Harrison, Christopher & van Hoek (1999)

Considering each of these four dimensions in turn, a number of observations can be made.

3.1 Market sensitivity

Being close to the customer has always been a goal of any market-oriented business, but in fashion retailing it is vital. Successful fashion retailers capture trends as they emerge using a variety of means. Point-of-sale data is analysed daily and is used to determine replenishment requirements where the intention is to continue to make the product available. Often though the

selling season is only intended to be short and product will not be replenished, in such situations the data is used to analyse trends.

Beyond point-of-sale data are real consumers and identifying their preferences and changing requirements should be a continuing priority. Zara, the Spanish-based fashion retailer, has teams of fashion 'scouts' who seek out new ideas and trends across the markets in which they compete. They also use their own salespeople to identify customers' likes and dislikes and to feed this information back to the design team. Using computer aided design and computer aided manufacturing (CAD/CAM), these ideas can quickly be converted into tangible products and be in the marketplace in a matter of weeks.

3.2 Virtual integration

The agile supply chain is virtual in the sense that it is connected and integrated through shared information on real demand so that all the players in the chain, from the fabric manufacturers to the garment makers to the retailer, are all working to the same set of numbers.

Retailers and their suppliers need to be more closely connected through shared information than was the case in the past. Until very recently, few retailers in any sector would share point-of-sale data with their suppliers. Now, however, there is a growing realisation that shared information can enable higher levels of on-the-shelf availability to be achieved with less inventory. Simultaneously, transaction costs can be reduced particularly if the co-operating parties are prepared to move to co-managed inventory (CMI).

CMI is a process through which the supplier collaborates with the retailer to manage the flow of product into the customer's distribution system. The supplier and the customer jointly agree the desired stock levels that need to be maintained in the retailer's operation. The customer feedback sales data

is sent on a regular basis to the supplier who then uses that information to plan replenishments. Typically such arrangements work best where the demand for the product is relatively stable and replenishments within the season are possible.

3. 3 Network based

A distinguishing feature of agile companies is their use of flexible arrangements with a wide supply base. Zara and Benetton are two fashion companies that have achieved high levels of customer responsiveness by working closely with specialist, often small, manufacturers. The strategy at Zara is that only those operations which enhance cost efficiency through economies of scale are conducted in-house (such as dyeing, cutting, labelling and packaging). All other manufacturing activities, including the labour-intensive finishing stages, are completed by networks of more than 300 small subcontractors, each specialising in one particular part of the production process or garment type. These subcontractors work exclusively for Zara's parent, Inditex S.A. In return, they receive the necessary technological, financial and logistical support required to achieve stringent time and quality targets. The system is flexible enough to cope with sudden changes in demand.

Benetton, likewise, have long used a myriad of small manufacturers to give them additional capacity in activities such as knitting and final assembly.

The principle behind an agile network in some ways runs counter to the prevailing idea that organisations should work with a smaller number of suppliers, but on a longer term basis. Instead in an agile network there is a tendency for the focal firm to act as the 'orchestrator' of the network, the membership of which will change according to requirements. There is a good analogy with the director of a theatre play. For the specific season during which the play is being performed, the director will work very closely with a relatively small group of actors and actresses. Probably he or she has

chosen this team from a much bigger pool of players who he or she has also worked with in the past. However, for the next play or season, that team will be disbanded and a new one assembled from the pool. Even though these relationships are not permanent, they are close.

3.4 Process alignment

Responsive supply chains require a high level of process alignment both within the company and externally with upstream and downstream partners. By process alignment is meant the ability to create 'seamless' or 'boundaryless' connections, in other words there are no delays caused by hand-offs or buffers between the different stages in the chain and transactions are likely to be paperless. The underpinning processes will also probably be managed by 'horizontal' and cross-functional teams.

In an agile network, process alignment is critical and is enabled by the new generation of web-based software that enables different entities to be connected even though their internal systems may be quite different. Now it is possible for organisations that are geographically dispersed and independent of each other in terms of ownership to act as if they were one business.

In the fashion business there can often be many different entities involved in the process that begins with product design and ends with the physical movement of the product onto the retailer's shelf. Co-ordinating and integrating the flow of information and material is critical if quick response to changing fashion is to be achieved.

In conventional fashion supply chains, it can take twelve months from product design to the final sale. By contrast by creating 'virtual teams' across the network where information is shared in real-time, a much higher degree of synchronisation can be achieved (see for example Johnson, 2002).

We now turn to a particular approach that has gained much popularity in fashion industries as a method by which to seek agility and speed of response. It is also a strategy that has begun to challenge the accepted wisdom of sourcing goods and other inputs from less well-developed economies.

4. The Road to Quick Response (QR) in Fashion Industries

Today, QR is recognised as an operations strategy (Lowson, 2002) and as such, it attracts considerable interest for two additional, yet closely related reasons. First, the ability of this strategy to cope with the complexity of fashion logistics; and, second, as a method to combat the relentless shift toward offshore sourcing from low wage economies.

In all fast moving industries, demand is now more fragmented and the consumer more discerning about quality and choice. There is also an increasing fashion influence; no single style or fashion has dominated for any length of time. For many consumer sectors, demand is approaching the chaotic in its insatiable appetite for diverse services and goods. 'Mass-customisation' and individualised products with shorter season lengths; micro merchandising and markets segmented at the individual level; large numbers of products chasing a diminishing market share; are all evidence of the inexorable movement toward a 'sea change' and mark the folly of firms expecting to operate as they have in the past. One of the most fundamental Quick Response philosophies is the ability to compress time in the supply system. If the pipeline is condensed to about one third of its traditional length, not only does the design of goods better reflect more accurate consumer information, it is possible for the retailer to re-assess the demand for products while the season is under way and receive small, frequent reorders from the supplier, provided reorder lead times are short enough, (of the order of 2 - 4 weeks), Harding, (1985).

Quick Response (QR) can be defined as:

A state of responsiveness and flexibility in which an organisation seeks to provide a highly diverse range of products and services to a customer/consumer in the exact quantity, variety and quality, and at the right time, place and price as dictated by real-time customer/consumer demand. QR provides the ability to make demand-information driven decisions at the last possible moment in time ensuring that diversity of offering is maximised and lead-times, expenditure, cost and inventory minimised. QR places an emphasis upon flexibility and product velocity in order to meet the changing requirements of a highly competitive, volatile and dynamic marketplace. QR encompasses an operations strategy, structure, culture and set of operational procedures aimed at integrating enterprises in a mutual network through rapid information transfer and profitable exchange of activity, (Lowson, King and Hunter, 1999).

QR has a number of strategic implications for the organisation. Research has shown that mere implementation of technology or particular procedures without the strategic underpinning leads to sub-optimal performance, (Lowson 2002).

- *The alignment of organisational activity to demand.* This is a fundamental principle of QR. All activities within an enterprise should be paced to demand and customer behaviour. Products and services are produced and delivered in the variety and volume that match demand. The activity within a company moves to the beat of this drum.
- *Linkages between demand and supply.* Given the importance of the alignment activity above, a strategic understanding of the drivers of demand and its synchronised connection with supply is imperative for QR.
- *Demand Relationships.* QR recognises that both *customers/consumers* and *products* are dynamic and place unique demands on the

organisation. Identical products will have unique product flows depending upon customer/consumer buying behaviour and QR needs. Similarly, product attributes will vary by product type.

- *Resource Configuration.* In the QR world, this strategic architecture is inter-organisational. Strategy and strategic thinking are at a network level, encompassing many external interconnections. In addition, within this configuration must fit the mapping of customer/consumer values and perceived benefits onto operations, in order to underpin the link between demand and activity (as above).
- *Time.* Time as a strategic weapon is vital to QR operation, but like any weapon its effectiveness depends upon the circumstances of its use. As with demand, time-based competition requires careful assessment as to where best it can serve customers/consumers. Fast and accurate adaptation to market change is perhaps the most important element of the QR strategy.
- *Primacy of information.* Data and information are the foundation of QR – every business is an information business. Timely and accurate flows will enable fast and accurate responses without waste and unnecessary cost.
- *Partnerships and Alliances.* Perhaps one of the most significant developments in recent management and business thinking has been externalisation; the recognition that performance relies increasingly upon a series of alliances and relationships with other enterprises in the environment as the most effective way to deal with constantly changing market conditions.

Apart from the strategic implications, Quick Response also requires a number of operational building blocks that have to be integrated and aligned for efficient and effective reaction to 'real'-time demand (see Lawson, King and Hunter, 1999). Mere possession, however, of the various technologies, processes and activities will be insufficient for an agile response; close

linkages are required across the whole supply system in order to provide a QR capability.

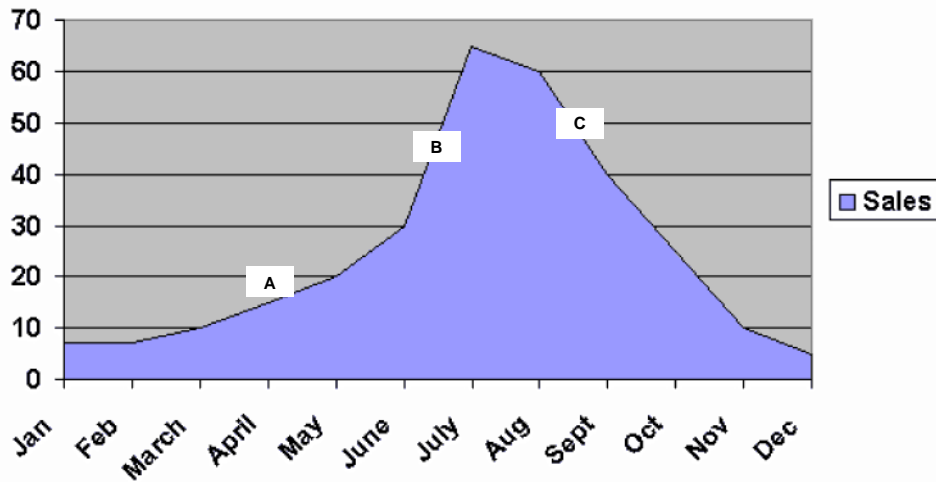
4.1 Quick Response and Offshore Sourcing

As highlighted earlier, consumer demand is becoming more volatile. QR is designed for such an environment. The fashion industry is, perhaps, one of the most demanding challenges for logistics management with hundreds of colours, thousands of styles and millions of SKU's on the retail shelves at any one time. Further, the average shelf lives of these merchandise items shortens with each passing year.

A key factor in the value of QR is its ability to deal with uncertainty or variance. There are numerous sources of uncertainty in a fashion supply pipeline starting with demand through to the reliability on the part of suppliers and shippers, etc, and Quick Response offers the ability to counter the negative impacts of uncertainty. Speed and flexibility are the key, but it is important to realise that the level of uncertainty associated with the product dictates the optimal level of speed and flexibility required. The type of supply chain needs to fit the characteristics of the product as well as the uncertainty associated with it.

Many fashion goods sell in distinct seasons and are on the shelf for just one season and almost totally replaced in the following year. Figure 4 represents sales of a typical product subject to pronounced seasonal fluctuation.

Figure 4 - Seasonality Profile



The normal practice is to manufacture as much as possible of the finished goods inventory required before the season starts and then deliver half to two-thirds of the necessary products before the beginning of the season (point A) and ship the balance of the inventory at pre-agreed times (e.g., point B), or await re-orders (points B to C). QR takes a different route. Although it may pose manufacturing capacity problems, as little as possible is made or shipped before the season. From day one, Point-of-Sale (PoS) data are gathered, analysed, and then used to understand demand preferences. Manufacturing is then guided by the continuing (daily or weekly) PoS data. Re-order and re-estimation and replenishment approaches are then used for frequent re-orders (points A to B). This QR approach can be better appreciated when applied to a particular demand situation such as global or offshore sourcing.

4.1 Quick Response and the Costs of Offshore Sourcing

Quick Response operations strategy offers a high degree of speed, flexibility and responsiveness in supply pipelines. This has substantial implications for sourcing decisions; particularly offshore sourcing. Empirical research has established that sourcing offshore to secure lower cost inputs (typically from low wage, underdeveloped regions) can have negative consequences; once the *hidden* and *inflexibility* costs are quantified, Lawson (2001).

Hidden costs are those that are not typically anticipated by the buying organisation, but almost always occur. Some examples include: the various initial investments to establish the new source of supply, control of quality and delivery variables; high initial training costs, coupled with a high staff turnover affecting both throughput and quality; significantly lower operator efficiency offshore; irrevocable letters of credit charges; delays at the port of entry, last minute use of air freight and other logistics costs; expensive administrative travel to correct problems; process inefficiencies and quality problems; long lead times and the need for large buffer inventories; and finally, the not insubstantial human cost involved in the conditions endured in many foreign factory environments often employing child labour and over-using natural resources.

Inflexibility costs are the costs of using suppliers that are inflexible and unresponsive to changes in demand (before, during and after a product selling season), leading to disproportionate levels of demand amplification across a longer supply network and a number of considerable cost implications.

It is only when these two cost categories can be properly quantified that the advantages and disadvantages of low wage, foreign purchasing can be fully understood and a method for their true representation becomes apparent. Once the *hidden* costs are categorised, sourcing on the basis of low cost alone becomes far less attractive. Further, when the costs of *inflexibility* are added, it becomes clear that using a domestic Quick Response supplier may be a far better option due to the added velocity and flexibility that is provided.

Collapsing the product pipeline can reduce time and provide a more efficient response to rapidly changing consumer demand. In this way, a QR operations strategy will encourage the cross-enterprise re-engineering of

business processes, from product development to replenishment, with resulting improved stocking points, lower inventory, lower cost and increased sales. The value chain is reconfigured to reflect speed of response, flexibility and differentiation. Table 2 compares two different sourcing alternatives: the Quick Response domestic supplier and the offshore counterpart.

Table 2 - QR and Faster Turnover

In this initial scenario two possible buying decisions are reviewed using QR and then offshore sources of supply. First, *end-consumer* purchases, whether bought from a retailer or manufacturer, are assumed to be one-hundred thousand pounds. It is then assumed that the customer (a manufacturer or retailer) has bought the goods for the same price (£60k). An averaged gross margin is also assumed of 40% on these sales. The only difference between the two sourcing alternatives is the flexibility and speed of response. The ability of the QR supplier to rapidly replenish the stock of the customer (manufacturer or retailer) to real-time consumer demand allows the customer to turn inventory of the product 6 as opposed to 2.5 times a year. This faster turnover rapidly increases the customer's gross margin return¹ on each pound invested in inventory from £1.67 to £4.00, more than twice that of the offshore competition. Because of this inventory turnover advantage the manufacturer or retailer could afford to pay a premium for the product and still get a better return (Table 3).

Table 3 - QR and a Higher Cost of Goods

In the table the price paid for goods by the customer has increased by almost one-third, but because of the flexibility and responsiveness of the supplier, the return on inventory has increased by 1.2 percent or from 167% to 169%.

¹ GMROI is calculated as gross margin/average inventory

Table 4 views the sourcing decision from another perspective. The decision to move sourcing offshore to a competitor with lower unit cost but a slower response.

Table 4 - A Move to Offshore Supply

In this situation the foreign supplier would need to reduce the purchase price by nearly 35% to retain a comparative GMROI to that of the QR supplier. The more flexible and higher velocity supplier proves more competitive than the lower-cost; even without taking into account the other hidden and inflexibility costs.

Product velocity also produces other benefits. Replenishing stock in response to real-time demand ensures that the right goods are available reflecting what is being demanded. Revenue will rise as products in demand are sold at the expected price rather than marked down as unwanted. Table 5 shows the shows the combined effect of velocity, faster inventory turns and reduced markdowns.

Table 5 - The Effect of QR Velocity

As product velocity increases so too will revenue as there is less need to sell goods below optimum price points. The customer's (manufacturer or retailer) return on investment grows to over 3-times that of a competitor.

Finally, Quick Response also has an impact upon strategic pricing decisions. Velocity and flexibility in the supply system will allow an original equipment manufacturer (OEM) or retailer to reduce the price of the finished good below that of the competition and capture greater market share (Table 6).

Table 6 - QR and Strategic Pricing

Because of QR flexibility and responsiveness, the retailer or manufacturer can reduce the purchase price to the consumer by 32% and still earn a slightly better return in terms of GMROI than competitors.

5. CONCLUSION

This paper has provided a conceptual focus upon the main logistical issues involved in fashion retailing. The peculiar nature of the industry was discussed in terms of its volatility, complexity and dynamism. It is with these factors in mind, that the need for agility and responsiveness in the logistics pipeline has been identified.

Fashion supply systems are characterised by three critical lead-times: time-to-market, time-to-serve and time-to-react. All three of these factors stress the importance of agility in fashion supply networks. Agility does, however, necessitate radical changes in organisational structures and strategies and a move away from forecast-driven supply. Market sensitivity, virtual integration, networked logistical systems and process alignment all become fundamental prerequisites to achieving the ultimate agility, a Quick Response capability.

Quick Response (QR) offers a new dimension in fashion retailing. For both retailers and manufacturing suppliers it provides a new operational approach, one that is alien to many firms still operating with structures designed for a mass production era. The paper provided a review of QR, the agility it provides, its strategic implications and the building blocks necessary for its implementation. The final section of this work demonstrated how a Quick Response operations strategy provides a more viable and attractive sourcing option compared to the use of low cost inputs from under-developed economies. Once the various costs (hidden and inflexibility) are properly understood and computed, the impact of agility, flexibility and responsiveness in fashion supply systems becomes paramount.

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Table 1 –Revenue losses in the apparel pipeline (% retail sales)

	Fibre & Textile	Apparel	Retail	Total
Forced Markdowns.	0.6%	4.0%	10.0%	14.6%
Stock-Outs.	0.1	0.4	3.5	4.0
Inventory @ 15% carrying cost	1.0	2.5	2.9	6.4
Total	1.7%	6.9%	16.4%	25.0%

Source: Lawson RH, King R and Hunter NA (1999)

Table 2 - QR and Faster Turnover

	QR Supplier	Offshore Supplier
Consumer Purchase Price (£)	100,000	100,000
Customer Purchase Price (£)	60,000	60,000
Gross Margin (£)	40,000	40,000
Average Inventory (£)	10,000	24,000
Gross Margin (%)	40.00	40.00
Inventory Turns (p.a.)	6.02	2.5
GMROI (%)	400	167

Source: Lawson RH, King R and Hunter NA (1999)

Table 3 - QR and a Higher Cost of Goods

	QR Supplier	Offshore Supplier	Cost Advantage Applicable
Consumer Purchase Price (£)	100,000	100,000	
Customer Purchase Price (£)	78,000	60,000	30.33%
Gross Margin (£)	22,000	40,000	
Average Inventory (£)	13,033	24,000	
Gross Margin (%)	22.00	40.00	
Inventory Turns (p.a.)	6.02	2.5	
GMROI (%)	169	167	

Source: Lawson RH, King R and Hunter NA (1999)

Table 4 - A Move to Offshore Supply

	QR Supplier	Offshore Supplier	Cost reduction Applicable
Consumer Purchase Price (£)	100,000	100,000	
Customer Purchase Price (£)	60,000	38,448	35.92%
Gross Margin (£)	40,000	61,552	
Average Inventory (£)	10,000	15,379	
Gross Margin (%)	40.00	61.55	
Inventory Turns (p.a.)	6.02	2.5	
GMROI (%)	400	400	

Source: Lawson RH, King R and Hunter NA (1999)

Table 5 - The Effect of QR Velocity

	QR Supplier	Offshore Supplier
Consumer Purchase Price (£)	113,000	100,000
Customer Purchase Price (£)	60,000	60,000
Gross Margin (£)	53,000	40,000
Average Inventory (£)	10,000	24,000
Gross Margin (%)	40.00	40.00
Inventory Turns (p.a.)	6.02	2.5
GMROI (%)	530	167

Source: Lawson RH, King R and Hunter NA (1999)

Table 6 - QR and Strategic Pricing

	QR Supplier	Offshore Supplier	Possible price Reduction %*
Consumer Purchase Price (£)	76,840	100,000	-32.00
Customer Purchase Price (£)	60,000	60,000	
Gross Margin (£)	16,840	40,000	
Average Inventory (£)	10,000	24,000	
Gross Margin (%)	21.91	40.00	
Inventory Turns (p.a.)	6.0	2.5	
GMROI (%)	168	167	

* Based upon purchase price of £113,000 as seen in table 5

Source: Lawson RH, King R and Hunter NA (1999)

Biographies

Martin Christopher

Martin Christopher is Professor of Marketing and Logistics at Cranfield School of Management. His work in the field of logistics and supply chain management has gained international recognition. He has published widely and his recent books include *Logistics and Supply Chain Management* and *Marketing Logistics*. Martin Christopher is also co-editor of the *International Journal of Logistics Management* and is a regular contributor to conferences and workshops around the world.

At Cranfield, Martin Christopher chairs the Centre for Logistics and Supply Chain Management, the largest activity of its type in Europe. The work of the centre covers all aspects of transportation and logistics and offers both full-time and part-time Masters degree courses as well as extensive management development programmes. Research plays a key role in the work of the Centre and contributes to its international standing.

Robert Lawson

Dr Robert Lawson is the Director of the *Strategic Operations Management Centre* at UEA and a Senior Lecturer. As a current Leverhulme Trust and UEA Research Fellow, his research interests include operations strategies and operational management approaches that offer flexibility and responsiveness for retailers and manufacturers in fast moving consumer good sectors, and the role of the SME in these supply systems.

Dr Lawson has published widely on operations strategy and general management issues in a number of international journals and he was awarded the best paper in 2001 for his publication in the *International Journal of Logistics*. His latest book, *Strategic Operations Management: the new competitive advantage* has recently been published by Routledge. He works as a consultant in various sectors and has management and business experience; including an advisory role with a number of international retailers and manufacturers.

Helen Peck

Dr Helen Peck is a Senior Research Fellow in Marketing and Logistics. She joined Cranfield in 1983, from a major UK retail bank, working initially with the School's Library and Information Services and Management Development Unit, before taking up a research post within the Marketing and Logistics Group. Her research interests are in supply chain management, particularly supply chain risk and vulnerability. Her published work to date includes papers and journal articles, joint editor and authorship of several books with contributions to many others. She is also an award-winning writer of management case studies, whose work is used extensively on marketing and logistics programmes at Cranfield and by other teaching institutions in Europe, North America and Australasia.

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