

ABSTRACT

HARTMAN, LISA MARIAN. Strategic Analysis of Speed and Flexibility in Sourcing Textile Products. (Under the direction of Dr. Kristin Thoney and Dr. Jeff Joines.)

It is becoming increasingly difficult for textile companies in the United States to compete with companies around the world. Each company needs to determine ways that their company can compete on a global level. One way that textile companies can compete is by taking advantage of their proximity to the home market. This research looked at three types of garments: basic, seasonal, and fashion items and the advantages and disadvantages of sourcing these garments in four regions of the world: Domestic (manufacturers in the United States), American (manufacturers in Central and South America and the Caribbean), Far East (manufacturers in Asia other than Pakistan and India), and Pakistan/India (manufacturers in Pakistan and India). This research was divided into two parts: computer simulations and surveys.

Computer simulations performed on the Sourcing Simulator™ looked at case studies and the effect of forecasting error, drift, lead times, and seasonality on the type of garments based on the criteria of service levels, gross margins, and inventory levels. The simulations were used to determine the amount of merchandise that should be initially ordered and the number of weeks of supply the retailer should carry in the store in order to meet desired service levels. From the simulations performed, it was determined that as the lead time of suppliers increases, the inventory levels that are needed in order to meet desired service levels also increase. Longer lead times require more inventory between reorders and initially to meet service levels. With longer lead times more inventory is needed to account for any variations in demand since it would take a retailer longer to receive a replenishment.

Two surveys were administered, one to apparel manufacturers and one to apparel

retailers. The purpose of the surveys was to collect supplemental data for the simulations performed. From the simulations, numerical data was collected. The surveys data expresses opinions, thoughts, and feelings that are to be used to better understand the significance of the simulations results. The surveys looked at the relationships between apparel manufacturers and apparel retailers and any concerns or problems experienced by members in the supply chain. The surveys also served the purpose of obtaining information about how sourcing decisions are made. The information can then be applied to future research to reflect the industry's methods of making decisions.

From the apparel manufacturer's survey, the criteria that are most important when choosing a manufacturer were revealed. Also what factors are taken into consideration when choosing to use a manufacturer from a specific region were determined. The advantages and disadvantages of using a manufacturer from a specific region were also identified. From the questions about each region, it was shown what costs, concerns, and lead times are associated with each region.

From the apparel retailer's survey, the criteria that are considered most important when choosing a manufacturer were found. The effect that the region of the world that the manufacturer is located has on their being chosen as a manufacturer was also studied. The survey also determined how retailers make decisions about purchasing, if retailers have replenishments on items, and how replenishments are handled. The performance measures used to evaluate a selling season were identified as well as what customer service levels retailers try to maintain.

STRATEGIC ANALYSIS OF SPEED AND FLEXIBILITY IN SOURCING TEXTILE PRODUCTS

by

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DEDICATION

I would like to dedicate my thesis to all my family and friends that were supportive of me in attaining my Masters of Science in Textiles. I would not have been able to do it without your help.

BIOGRAPHY

Lisa Hartman is from Seneca, South Carolina. She received her undergraduate degree from Georgia Southern University where she earned a Bachelor of Science in Fashion Merchandising and Apparel Design. She graduated in May of 2003 with honors. While attending Georgia Southern, she was on the Dean's List five times, and was a member of Omicron Delta Kappa and Phi Upsilon Omicron Honor Societies. She also served as President of Latter-Day Saints Single Adults (LDSSA) for a year and a half. Lisa interned at Walt-Disney World where she was a Costuming Hostess. Before entering the Institute of Textile Technology Fellows Program, she worked at B.C. Moore and Sons, Inc. Lisa's research interests include how color affects people's moods and personalities and the effect of lead times on sourcing textile products. Upon graduation, she wants to use her knowledge of Textiles and Apparel Design to design maternity or women's size clothing, or work in a supply chain management, merchandising, sales, or sourcing position.

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1.0 Introduction

It is becoming increasingly difficult for textile companies in the United States to compete with companies around the world. Each company needs to determine ways that their company can compete on a global level. In order for buyers and decisions makers in the textile industry to make intelligent decisions, they need to know what sourcing method would best fit their company's needs; whether they should use dual sourcing in which an order is placed with a low cost supplier before the season begins and then a replenishment order is made mid-season using a quick response manufacturer, or if they should use a more traditional method of one order being placed before the start of the season, with no replenishments. Buyers need to know the differences between these methods, and how their performance will impact their company financially and in relation to customer service levels, etc.

1.1 Statement of Problem

When trying to make important decisions about the sourcing of merchandise, many buyers base their decisions on what supplier can provide them with the merchandise at the cheapest cost in an attempt to improve their gross margin. Gross margin is revenue minus cost of goods sold. Many buyers and decision makers believe that the choice of supplier does not affect the revenue in the gross margin calculation; it only affects the cost of goods sold. But this is not always the case. A manufacturer that is more expensive, but faster, can provide a mid-season replenishment of items that have sold well based on Point-of-Sale (POS) data

which helps to cut down on forecasting error. Forecasts are difficult to calculate with accuracy in advance, which is often needed when using a foreign supplier to accommodate their long lead times. To prevent stockouts and forecasting error, retailers usually order large amounts of merchandise, which must often be marked down in order for it to sell. Under these conditions, the retailer often loses revenue and profits. Having large amounts of merchandise does not necessarily ensure high service levels. If the inventory is wrong, owing to a poor SKU mix, some popular styles of garments may sell quickly while others will not. Some data has shown that if the SKU mix is based on current, mid-season sales, then the amount of unsold merchandise is reduced. But this will require the use of a quick response supplier in close proximity to the market. Many foreign suppliers could not get a replenishment order to the retailer before the end of the selling season.

Based on this limited analysis, it seems that United States retailers are sourcing the wrong type of merchandise from the wrong parts of the world. Retailers in the United States purchase basic goods from Central and South America and the Caribbean, and seasonal and fashion goods from the Far East, Pakistan and India. It seems logical that U. S. retailers should be purchasing basic goods from regions of the world that can give them a garment that is low priced and has reasonable quality, where having longer lead times will not affect the availability of the garment. Such regions include the Far East, Pakistan and India. Similarly, it seems that retailers should be purchasing seasonal and fashion goods from companies in or near the U. S. to capitalize on speed to market and allow retailers the chance to change the product mix according to actual demand, even if the cost is not the absolute lowest. Examples of such regions are Central and South America and the Caribbean.

According to Smith (2005), and Velazquez (2004), companies in Central and South

America, CBI, and United States are not capable of competing with other Asian countries on price. Domestic and American companies should capitalize on their proximity to the U. S. market. Instead of focusing on creating basic garments that can be produced cheaper elsewhere, companies in these regions need to start focusing on manufacturing fashion garments that can then be quickly shipped to or in the U. S. Other regions of the world are not capable of producing fashion garments and getting them to the U. S. markets faster than Domestic and American companies. For fashion garments, speed to market is one of the most important components.

1.2 Statement of Results and Benefits

This research will investigate the differences between suppliers concerning profitability, customer service levels, and lead times using a quantitative model. The analysis will determine when using fast, more expensive suppliers, over low cost, slow suppliers is beneficial to a company (i.e., under what conditions or characteristics). In addition, both manufacturers and retailers will be surveyed to determine their views on sourcing. This research will focus on basic, seasonal, and fashion items from four different regions of the world: Domestic (manufacturers in the United States), Americas (manufacturers in Central and South America and the Caribbean), Far East (manufacturers in Asia other than Pakistan and India), and Pakistan/India (manufacturers in Pakistan and India).

In Chapter 2, a literature review of material about supply chain management, sourcing, decision making, just-in-time manufacturing, and quick response manufacturing will be presented. Chapter 3 will discuss different ordering strategies for basic items and

some of the factors that affect the amount of inventory needed for different ordering strategies. Chapter 4 will present different ordering strategies for seasonal items and the benefits of multiple replenishments. The methodology and results of the apparel manufacturers' survey will be explored in Chapter 5. The methodology and results of the apparel retailers' survey will be analyzed in Chapter 6. Chapter 7 will discuss conclusions made from this research. Chapter 8 will explain future research directions based on the results of this project.

2.0 Literature Review

There are many decisions that need to be made when considering sourcing out a component of your business strategy. Some of these decisions include: Should I outsource versus insource; What supplier should I use; Should I use a domestic or a foreign supplier; What are some of the costs of using a foreign supplier; Should I have one or multiple suppliers? All of these things and more need to be taken into consideration when making sourcing decisions and will be discussed in the following sections. In addition, ways of making manufacturing companies more efficient and profitable, through Just-In-Time and Quick Response manufacturing, which will benefit everyone in the supply chain, will be discussed. A stochastic sourcing model the Sourcing Simulator™ which helps retailers make decisions on the amount of inventory needed and when they need replenishments will be explained.

2.1 State of U.S. Textile and Apparel Markets

A poll done by World Trade of government officials, industry consultants and corporate executives and software makers that specialize in the textile and apparel fields found that:

“U.S. apparel makers will continue to outsource more and more of their manufacturing work from overseas sources. The bulk of clothes made overseas will be sold in the U.S. but some will go to markets in Europe, Japan, and elsewhere. While much outsourcing will be based in the Western Hemisphere, Asia should capture more production in the future as quotas come down”...“That means expanding opportunities in this global field are

there for those who can bring new data modeling, ecommerce, logistics, market forecasting, and related skills to the market” (Levaux, 2000).

In the 90’s a considerable amount of apparel production moved out of the U.S. U.S. based sourcing accounted for almost 50% of the U.S. apparel market in 1992, but as of 1999 only about 12% is still in the U.S. Most of the business went to Mexico and the Caribbean. Production in China is believed to increase after the elimination of the trade quotas. Some people think that the only way for U.S. manufacturing plants to survive is to become vertically integrated and shift production to countries with cheaper labor (Levaux, 2000).

2.2 Types of Sourcing Methods

When manufacturing a product, there are many methods manufacturers can use which include insourcing or outsourcing. When insourcing, does a company want to have a plant in their country of origin or do they want to have a foreign plant? Does the company want to outsource, and if so, should they outsource to a domestic or foreign supplier?

Insourcing is believed to be a sound decision when the role of technology used is said to be very high compared to the company’s competitors and when the product is just beginning in the product life cycle. Although labor costs only make up a small portion of a company’s sales revenues (i.e. cost of goods) and purchasing makes up a majority of sales revenues, many companies base their decision to outsource solely on the labor costs. They do not take into consideration other key factors such as strategic and technological issues. The gains from concentrating on purchasing issues are far better than those that accumulate by attacking labor costs.

Welch (1992) states reasons for deciding to outsource include: “Convert fixed costs

to variable costs, thereby providing flexibility in an economic downturn, balance work force requirements, reduce capital investment requirements, accelerate new product development, reduce costs via suppliers' economies of scale and lower wage structures, gain access to invention and innovation from suppliers, focus resources on high value-added activities.” Some companies lost sight of the long-term risks associated with outsourcing; they did not expect that low labor cost suppliers would learn how to use their competencies against them and become their competitors.

When deciding to outsource, companies should look at their cost models to determine if outsourcing is the best solution. Some of the things a company should look at are their overhead costs and how they are determined, what effect outsourcing would have on their products that are still being insourced, and how will it affect their cost structure. Managers should also know how it will affect their R&D, manufacturing, and engineering. Also how will their outsourcing affect the technology of their competitors? Quality is a key criterion in deciding to outsource. How will the quality of the product be affected, and what is the cost of a quality change? How will outsourcing affect service and inventory levels as well as selling at first price? Companies should determine some way of quantifying these costs so that they can be included in a cost analysis model.

Ultimately the decision to outsource is up to the company but some advice to keep in mind is if you are manufacturing a product with relatively new technology, keep the product insourced, to prevent others from stealing it from the company. However, if the technology is weak then the company must decide if they want to incur the extra costs of bringing the technology up-to-date, or if they want to incur the extra purchasing costs.

Swamidass and Kotabe, (1993) discussed eight determinants to whether a company

should have a plant in a foreign location. These determinants can be applied to deciding when to outsource as well. These determinants were: tariff and non-tariff trade barriers, nationality, stage in the production life cycle, exchange rate, transportation costs, production costs, growth in sales of foreign country, and current profitability in the foreign country. Trade barriers are described as barriers that are meant to limit the amount of goods brought into a country. These include quotas, (which as of January 1, 2005 no longer apply), voluntary export restraints, multinational trade agreements, and other regulations. Having a thorough knowledge of these components is essential to having a successful plant. Without this knowledge, the company would be ignorant of conditions that could lead to the downfall of their production.

Davidson (1989) states “There exists a strong correlation between the nationality of a corporation and its operating strategy.” Different countries have different sourcing patterns. For example, European firms often do not use foreign production on things that will be brought back into the country. Japanese firms do a considerable amount of foreign production that will be sent to other countries. U.S. apparel companies and retailers source a large amount of products from other countries to be used in the U.S. Whether the culture is collectivist or individualist is also important. In collectivist societies, individual’s needs are not as important as the needs of the group while individualist societies are the opposite. Collectivist cultures are usually in eastern countries and individualist cultures are usually in western countries. These mentalities will affect how people do business (Anderson, 2003).

Often products that are newer in their product life cycle will not be manufactured overseas for fear that others will learn their technological secrets. Products that are in the mature stage of the product life cycle are often produced overseas since this fear does not

exist.

Cost is encompassed by tariff costs, exchange rate, transportation costs and production costs. These play a big role in deciding where to source from. Often to be successful a company must minimize these costs in order to make a profit. Market covers the growth in sales and profitability of the foreign country. When growth of the foreign country is expected many companies will decide to get their products from that country because it will be more economical (Swamidass, 1993).

A study by Zeng (2000), determined what type of outsourcing a company should use: multiple sourcing, single sourcing, single/dual hybrid or network sourcing, and global sourcing, according to what the company considers the most important aspects of purchasing. Zeng defines multiple sourcing when a company has a business relationship with multiple suppliers and each supplier responds to demands and specifications of a particular product from the buyer, which allows buyers to set suppliers against each other in order to get the best price and shipping costs. More flexibility and better protection against stockouts is often associated with a multiple supplier system. The system has advantages and disadvantages for the supplier and buyer as well. The supplier is responsible for maintaining up-to-date equipment, and having good quality products, good delivery times, and low costs. The buyer often spends a considerable amount of time negotiating, which can affect their production schedules. If the company is not interested in a long term partnership with the supplier, or if the initial price is more important than the total price, then this is an appropriate strategy.

Single sourcing is defined as reducing the number of suppliers a company uses. This requires that the buyer and supplier have an excellent working relationship. Both companies

must be looking for a long-term commitment. Some of the reasons for single sourcing are cost reduction, flexibility, stability, and improved communication. Choosing between single sourcing and multiple sourcing can be a very difficult process that can require a considerable amount of time and energy. “The decision making process involves an assessment of the risks of single sourcing by not only the buyer, but by a team of supplier qualifiers who individually and collectively evaluate the potential supplier. The team may include members coming from quality assurance, design, engineering, manufacturing engineering, purchasing, industrial engineering, and accounting” (Newman, 1988). The team should have criteria on which to evaluate the suppliers to determine which one would be best. The study showed that when the supplier’s availability of technical support, the reliability of the product, and the total cost of the product are the most important characteristics, then single sourcing is the best option.

“Single/dual hybrid-network sourcing is classified as a system in which companies maximize the bought in content of their final product, relying on the skills and specialized knowledge of the subcontractors” (Zeng, 2000). Network sourcing is shown as a hierarchical pyramid with the top tiered suppliers being the most skilled and having the most up-to-date technologies. Communication is encouraged through all levels of the pyramid. The suppliers that are lower on the pyramid are subcontractors to suppliers above them. This system helps to reduce the number of supply sources. It relies on multiple sourcing for parts and services purchased. This system is most useful for assembly-type of manufacturing organizations, especially for custom orders. Network sourcing allows for flow of technology between tiers of the pyramid.

Global sourcing is thought of as buying components and inputs. Johnson and Wood

(1996) “define international sourcing as buying components and inputs anywhere in the world in such a way that the manufacturer casts out a much wider net in search of sources rather than relying solely on its local Yellow Pages.” Monczka and Trent define global sourcing as “the integration and coordination of procurement requirements across worldwide business units, looking at common items, processes, technologies, and suppliers.” Many companies feel the need for this type of sourcing because of increasing competitive pressure, shorter life cycles and quick technological changes. “Several major obstacles that influence the success of international sourcing have also been identified as transportation delays, foreign exchange fluctuations, travel costs, quality assurance, language, paper work, inspection procedures, contract terms, culture/customs, political stability, trade barriers, company integrity, and nationalism” (Zeng, 2000).

Quayle (2001) suggests six types of sourcing methods: single sourcing, multiple sourcing, parallel sourcing, backward vertical integration, make in, and sole sourcing. Single and multiple sourcing have similar definitions as those previously stated while parallel sourcing is a combination of single and multiple sourcing. Backward vertical integration is buying the source, while “make in” is when you make the product yourself. Sole sourcing is only having one possible supplier to purchase the product. Quayle (2001) focused on two types of sourcing: single and multiple. Through Quayle’s literature review, he found that “... the decision to multiple source was influenced by variables such as economics, geography, organizational policy, culture, quality and trust, protection of supply source, price competition and possibly buyer inertia. The literature also indicated that the perceptions of suppliers were influenced by market conditions, product traits and socio-demographics” (Quayle, 2001). Quayle found that there are eight variables that affect sourcing decisions:

individual, organization, product, market, power, social, risk, and economics (Quayle, 2001).

The decision of what sourcing method to use ultimately depends on the company and the situation. No one method is said to be best, or can only be used by companies in a set situation. Quayle believes that “Attention has turned, rightly, in many organizations to reducing operational costs. Purchasing needs to become a source of capital rather than a drain on the organization’s cash” (Quayle, 2001).

Quayle found that with the ever increasing need to reduce purchasing costs; many companies feel the need to move from multiple to single sourcing. Increased price demands are also leading companies to go from multiple to single sourcing. Quayle’s research suggested that buyers are more likely to single source when they feel that they are in a buyer’s market, when their suppliers have poor delivery, they believe price is increasing, and when the organization’s policy is to single source. The decision to move from single sourcing to multiple sourcing is often based on the risk, delivery and supply of only having one supplier. Many companies feel that the best way to decrease the risk is to spread out the risk by having many suppliers. Also in multiple sourcing, companies can make suppliers compete for their business. Buyers are more likely to multiple source when trying to reduce prices, reduce purchasing costs, and when continuity and security of goods are important.

Lowson (2003) discusses some of the operational costs of outsourcing. There are many hidden costs associated with apparel outsourcing (e.g. delays, quality costs, use of airfreight, etc.) There are also the costs from being inflexible which include longer lead times, lack of flexibility, and ability to respond to changes in demand. Lowson did a study to determine how lead-time, inventory, supplier performance, and customer service levels affect sourcing. Flexibility and speed in a supply chain can compensate for the uncertainty of

production. In the study, Lawson found some of the variables that were a source of uncertainty for retailers and the percentage of retailers that listed the variable as a source of uncertainty for them. Uncertainty for retailers consists of forecasting demand (87%), reliability and quality of manufacturer (85%), reliability of logistics (77%), the complexity of the manufacturing supply process (68%), and inaccuracy of POS data or bar codes (57%). A system was developed to quantify lead times (i.e., long 1-50%, medium 51-80%, short 81-100%). For example, at 25% along the lead time contour, inventory levels are high, and the goal is to decrease the holding level to match the real customer demand. Customer service levels are also low. When performance is at 75%, the reduction in lead times should be proportional to the customer service levels and inventory. With shorter lead times (90%), customer service levels and inventory should improve (Lawson, 2003). This is the point of optimum level of improvement. Any reduction of lead times after that will be at a great expense.

Figure 2.1 shows the interaction between customer service levels and supplier performance by decreasing the lead time to the next level. This shows an improvement in inventory and customer service levels. Again there is a point, 90%, when increasing the levels would be at a great cost to the retailer.

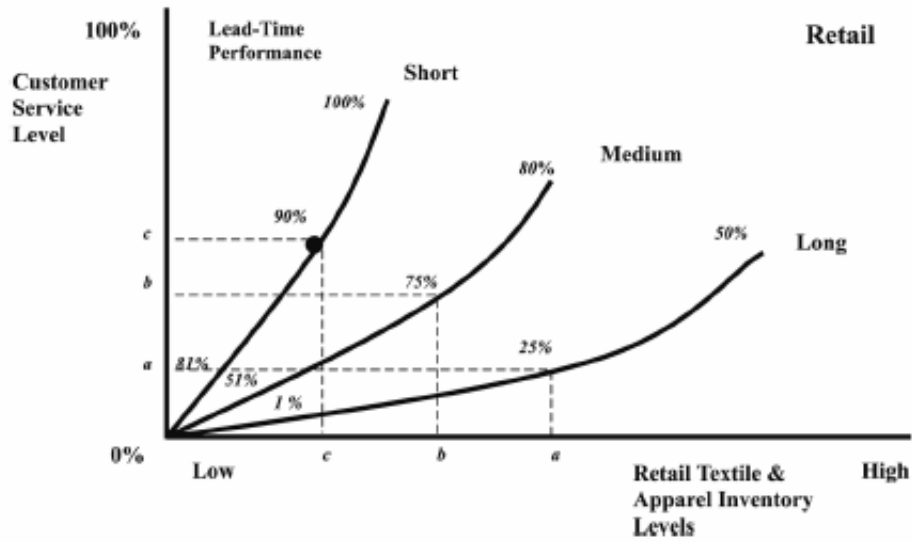


Figure 2.1: Customer Service Levels Affect Re-Order Lead Times (Lowson, 2003)

Figure 2.2 shows the interaction between customer service levels and inventory. As the service level improves, there is a reduction in inventory levels and customer service levels increase. At the optimum point, 90%, any further improvement will be at the expense of the retailer.

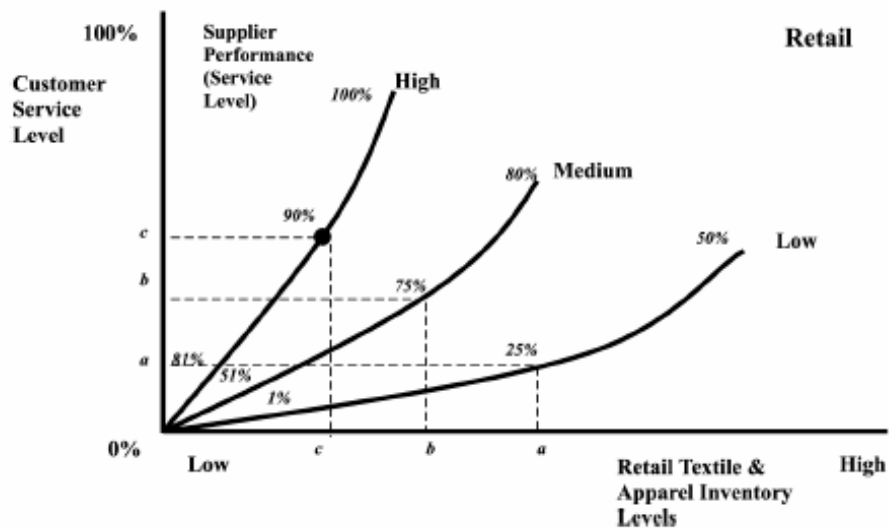


Figure 2.2: Customer Service Levels Affect Supplier Performance (Lowson, 2003)

Figure 2.3 shows the interaction between the customer service levels and the inventory. As the process time improves, there is a reduction in inventory levels and customer service levels increase. At the optimum point, 90%, any further improvement will be at the expense of the retailer.

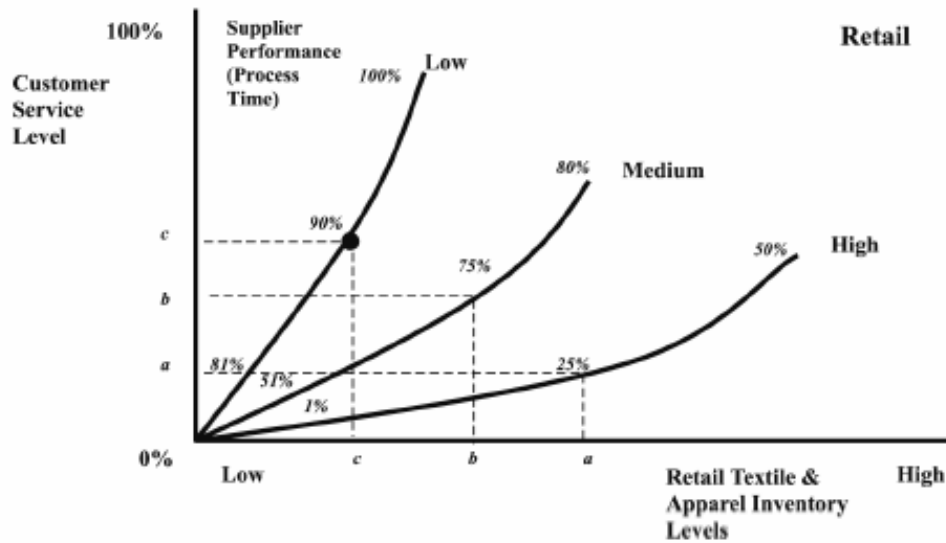


Figure 2.3: Customer Service Levels Affects Inventory (Lowson, 2003)

This strategy was then applied to a case study that included a retailer that has basic, seasonal, and fashion items who agreed to participate in the study. An item was studied from each category. For the fashion category, a women’s summer shirt, for seasonal a pair of women’s denim jeans, and for basic women’s underwear was chosen. These items were applied to two types of sourcing strategies: offshore, low cost (OLC) and domestic, responsive and flexible (DRF). Case 1 looked at the interaction between lead time, customer service levels, and inventory. Case 2 looked at the interaction between supplier service levels, customer service levels, and inventory. Case 3 looked at the interaction between supplier process time, customer service levels, and inventory.

For the women's shirts, for Case 1, the performance of the DRF was almost twice as efficient as the OLC as well as for the supplier service level. The supplier service time score, for Case 1, was 44% higher with the DRF than the OLC, while for Case 3, the DRF outperformed the OLC. For women's denim jeans in all case studies, the DRF scored higher than the OLC by at least 57%. For women's underwear, the OLC outperformed the DRF for Case 1 and Case 2. It is thought that the volatility of the product might be what caused the difference. This shows that the low cost manufacturer is not always the best choice.

Table 2.1 shows the results of the performance scoring while Table 2.2 looks at the women's shirts in comparison to the two strategies and the weights that were placed on each component to come up with the overall score, with 100 being the highest.

Table 2.1: Results of Performance Scoring (Lowson, 2003)

LISP interactions	Main sourcing strategy performance (per cent)					
	Women's styled summer shirts (short season)		Women's denim jeans (seasonal)		Women's underwear (basic)	
	Domestic, responsive, flexible	Offshore, low cost	Domestic, responsive, flexible	Offshore, low cost	Domestic, responsive, flexible	Offshore, low cost
<i>Case 1.</i> Lead-time performance (dependent variable); customer service level and inventory (independent variables)	87	47	60	33	47	52
<i>Case 2.</i> Supplier service level performance (dependent variable); customer service level and inventory (independent variables)	73	40	80	30	30	40
<i>Case 3.</i> Supplier process time performance (dependent variable); customer service level and inventory (independent variables)	83	47	80	63	47	11
Total performance (per cent)	81	45	73	42	41	34

Table 2.2: Comparison of Women's Shirts Compared to DRF and OLC (Lowson, 2003)

Product group women's styled summer shirts (SS)								
LISP three-dimensional performance interactions for particular sourcing strategy used (offshore or onshore)								
Operations strategy components	<i>Case 1. Lead-time (DV), customer service level and inventory (IV)</i>		<i>Case 2. Supplier service level (DV), customer service level and inventory (IV)</i>		<i>Case 3. Supplier process time (DV), customer service level and inventory (IV)</i>		Component weighting bands (per cent)	
	DRF 92 (per cent)	OLC 55 (per cent)	Factor weighting		DRF 72 (per cent)	OLC 38 (per cent)	DRF (per cent)	OLC (per cent)
			DRF 88 (per cent)	OLC 64 (per cent)				
Fast re-estimation and re-order systems	87	61	78	65	74	63	80	63
Continual replenishment	67	44	80	48	67	46	71	46
Electronic reorder	72	57	60	59	52	65	61	60
Compressing open-to-buy dates	86	70	87	66	66	72	80	69
Shared and open inventory management systems	55	33	66	44	58	32	60	36
Container shipping codes	45	42	34	49	23	41	34	44
Consumer demographic information systems	33	12	15	15	0	1	16	9
Internet connectivity	60	23	24	30	34	17	39	23
Store ready deliveries	78	62	55	49	43	37	59	49
Universal product codes	62	55	76	60	55	41	64	52
PoS data sharing between customers and suppliers	81	63	75	60	78	65	78	63
Total (per cent)	66	46	59	49	50	44	OSIR 58	OSIR 47

Notes: SS = Short season product group; DV = Dependent variable; IV = Independent variable; DRF = Domestic, responsive, flexible; OLC = Offshore low cost; OSIR = Operations strategy importance ranking

2.3 Supply Chain Management

A reoccurring theme throughout the literature is the need to have strong management in a supply chain who can make important decisions about supply chain strategies. One definition of a supply chain is "... a method for managing material flow from strategic, tactical, and operational perspectives by achieving a high degree of functional, internal, and external integration." (Narasimhan and Jayaram, 1998). Another definition is "...the strategic philosophy of selecting vendors in a manner that makes them an integral part of the buying firm for a particular component or part they are to supply" (Zeng, 2000). It is commonly believed that supply chain management decisions are based on cost, quality, dependability, delivery, and flexibility. These decisions should be consistent with the company's business strategy. One trend in decision making is the move from purchasing being operational to strategic. Management is starting to realize the importance of good purchasing decisions. These decisions are based on the need to reduce costs, and lead times, and to increase quality, variety of products, and flexibility.

Good supply chain decisions can have internal benefits as well. Many studies have found that a good working relationship between firms and their suppliers improves the firm's performance in many areas: total costs reduction, better product quality, and faster delivery. It can also reduce inventory, waste, and rework and can increase customer satisfaction, which will have an impact on a company's sales, improve forecasting, and improve scheduling and planning. There is also a strong relationship between shareholder value and expansion spawned by supply chain improvements. Xerox lowered their material costs by 50% by making better sourcing decisions (Narasimhan and Jayaram, 1998). The quality of the raw

materials purchased has a significant impact on the product's price and quality. Many companies depend on their suppliers to improve the quality and price of their product. The compound average growth rate of companies with decreasing supply chain performance fell an average 25% (Albright, 2003). Careful sourcing decisions need to be made, since purchasing requires a lot of capital investment and time.

In order for a supply chain to survive, it is imperative that all members be focused on trying to improve the supply chain. Companies like Caterpillar, General Motors, ICL, Phillips, and Rank Xerox have shown that focusing on fast, reliable delivery and responsiveness to changing customer needs is important to integration of the supply chain (Narasimham, and Jayaram, 1998). This includes having the right supplier in the supply chain. Hewlett Packard assesses the capability of its suppliers through many factors: technology, quality, responsiveness, dependability, and cost. Asea Brown Boveri expects its suppliers to have error-free quality and delivery, compressed cycle times, reasonable price, innovative engineering capability, and a portion of total cost improvement (Narasimhan and Jayaram, 1998).

Gould describes five steps that companies can use to determine the right supplier(s) for their company. The five steps focus on understanding the business' needs prior to beginning the sourcing process. For the first step, Gould suggests putting together a profile of each supplier that is being considered. The profile should include scope of services needed, shipment and production volume, service level requirements, expected dollar value of the contracts, etc. The second step is to use the correct sourcing model. Gould recommends using the model that fits the company's needs not what is the most cost effective. The four models that Gould talks about are spot, leveraged, critical, and strategic

purchasing. Spot purchasing is used for services/products that have multiple possible suppliers, with little differences between the suppliers other than cost. Leveraged purchasing minimizes cost of a service/product by putting similar needs of the buyer together to increase the worth to the supplier. Usually the supplier will increase the discount level for the extra business. Critical Purchasing is used to reduce risk when there are few suppliers that can fit the buyer's needs, and the service/product is critical to the business. Strategic Purchasing can maximize cost reductions, minimize risk and create competitive advantages. Gould suggests also taking into consideration the character and financial health of the supplier. If the supplier begins to perform badly, this issue must be resolved immediately which leads to step three analyzing the supply base. Make certain that the supply base of the supplier is thoroughly understood, and they fit the company's requirements. Step four states to use standardized processes and procedures to make sourcing decisions. If the company has a set procedure for selecting services/products, then it will ensure that the company is getting the best supplier. Finally step five is establish effective performance metrics for managing suppliers. Have a set of performance expectations, and monitor the supplier to ensure they are meeting the expectations. Be sure that the data collected is accurate and best fits the criteria for determining the performance of the supplier (Gould, 2003).

Narasimhan and Jayaram (1998) believe that "finding and building strong positions in selected supply chains with selected customers will become the future focus for supply chain management (Narasimhan and Jayaram, 1998). A study by Narasimhan and Jayaram (1998) found that flexibility, cost and quality have a significant relationship with the degree of manufacturing goal achievement. In the firms analyzed, the sourcing decisions had an impact on the level of manufacturing goal achievement in terms of quality, cost, flexibility,

and dependability. The degree of manufacturing goal achievement was operationalized as the comparative evaluation of a firm's performance on dependability, cost, quality, and flexibility (Narasimhan and Jayaram). Table 2.3, 2.4, and 2.5 show the results of the study and are taken from Narasimhan and Jayaram (1998).

Table 2.3: Descriptive Statistics and Correlations (Narasimhan and Jayaram, 1998)

Variables	1	2	3	4	5	6	7	8
Dependability	1							
Flexibility	0.1034	1						
Cost	0.2369	0.0411	1					
Quality	0.2642	0.1207	0.0804	1				
Customer Responsiveness	0.2284	0.0971	-0.008	0.1356	1			
Return on Production Assets	-	0.0901	0.0518	0.0448	0.0697	1		
Growth in Productivity	0.743	0.1182	0.0048	0.1648	0.0697	0.0311	1	
Strategic Outsourcing	0.0661	0.0162	0.1471	0.0151	0.0408	0.0381	0.1062	1
Supplier Capability	0.1963	0.1336	-0.267	0.0659	0.0944	-0.685	0.0824	0.0044

p<.10 Statistically significant figures appear in boldface.

Table 2.4: Description of the Items and Reliabilities of the Indicators (Narasimhan and Jayaram, 1998)

Indicator	Standardized Alpha	Representative Items	Question Number in GMRG Survey*
1. Dependability	0.8411 (2 items)	Performance, as compared to competitors, on: a). delivery speed b). delivery reliability	1.18 (item 4) 1.18 (item 5)
2. Flexibility	0.6493 (3 items)	Performance, as compared to competitors, on: a). mix flexibility b). volume flexibility c). product design time	1.18 (item 6) 1.18 (item 7) 1.18 (item 8)
3. Cost	1.0000 (1 item)	Performance, as compared to competitors, on a). unit cost of manufacturing	1.18 (item 1)
4. Quality	1.0000 (1 item)	Performance, as compared to competitors, on a). quality of products	1.18 (item 2)
5. Customer Responsiveness	0.9695 (2 items)	a). minimum days to Future delivery promised date (Reverse coded) b). minimum days from customer Order to shipment date (Reverse coded)	4.08 (item 1) 4.18 (item 1)
6. Return on Production Assets	0.9936 (2 items)	a). ratio of gross margin to investment in production Equipment b). ratio of sales to investment in production equipment	Gross margin= 1-(Qn. # 1.16) Investment=Qn # 1.14 Sales=Qn # 1.06 (item 1 + item 2) Investment=Qn # 1.14
7. Growth in Productivity	0.9126 (2 items)	a). percentage change in output b). percentage change in productivity	4.22 (item 1) 4.22 (item 2)
8. Strategic Outsourcing	0.7843 (4 items)	Use of subcontracting for strategic reasons: a). lower costs b). higher quality c). lower delivery lead times d). production difficulty	3.11 (item 5) 3.11 (item 6) 3.11 (item 4) 3.11 (item 2)

Table 2.4 (continued)

9. Supplier Capability (2 items)	0.7845	Evaluation of suppliers on the basis of:	
		a). higher quality	5.01 (item 11)
		b). delivery reliability	5.01 (item 12)
*GMRG survey can be found in Whybark and Vastag (1993), pp.435-455.			

Table 2.5: Rotated Factor Loadings for the Four Structural Factors (Narasimhan and Jayaram, 1998)

Variables	Factor 1	Factor 2	Factor 3	Factor 4
Dependability	0.7684	-0.0383	0.1118	0.0632
Flexibility	0.7219	0.0748	-0.1384	-0.0764
Cost	0.5042	-0.1806	0.1286	0.2287
Quality	0.6674	0.2007	0.0205	-0.1097
Strategic Outsourcing	-0.0729	0.7843	-0.1131	0.0320
Supplier Capability	0.1317	0.6372	0.1344	0.0112
Customer Responsiveness	-0.0363	-0.0066	0.9326	0.0348
Return on Production Assets	0.0474	0.0609	0.0001	0.9362
Growth in Productivity	0.2819	0.0927	0.2992	-0.2569
Eigenvalue	1.9560	1.1121	1.0227	0.9970
Cumulative proportion of total variance explained	0.2170	0.3410	0.4550	0.5650

It is also important for manufacturers and retailers to work together. “In a recent study by the consumer packaged goods industry, PRTM found that manufacturers are using the supply chain to strengthen their financial position. Manufacturers are more closely collaborating with their retail-customers to improve supply chain performance and gain a better understanding of consumer demand.” (Albright, 2003).

PRTM has created a four-stage supply chain maturity model to help companies measure their performance. “Stage 1: Processes that cut across multiple functions or divisions are not well defined or understood, resulting in limited effectiveness of complex supply chain processes. Stage 2: Division- or company-wide processes are defined, allowing those performing individual functions to understand their roles in complex supply chain processes. Stage 3: The company has identified strategic customers and suppliers, as well as the key information it needs from them to support its business processes. Stage 4:

Customers and suppliers work strategically to define a mutually beneficial strategy and set real-time performance targets. Information technology automates the integration of business processes across these enterprises in support of an explicit supply chain strategy” (Albright, 2003).

“Studies show that companies with mature practices out-perform their peers in delivery, flexibility, responsiveness and cost. The organizations with more advanced practices are better at predicting market demand and meeting customer expectations, achieving a 10% advantage in unit forecasting accuracy and delivery performance” (Albright, 2003).

Swamidass and Kotabe (1993) discussed the benefits of using four different types of markets: home, host country, other developed countries (DC’s), and developing and less developed countries (LDC’s). LDC sourcing has certain advantages: low labor costs, and access to inexpensive raw materials. These are classified as oil, agriculture, etc. Mostly standardized products and things that do not require a lot of technology are produced in LDC’s. DC’s are good when a company wishes to capitalize on economies of scale, or they need a high technology product. Host country sourcing allows for proximity to assembly operations, which can cut down on costs. Home sourcing may be advantageous when wanting to control quality, cost, and technology of the product being produced. Also it is very time consuming to set up foreign supply chain operations (Swamidass and Kotabe, 1993).

2.4 Just-In-Time Manufacturing

One method that manufacturers use to improve their processes and efficiency is Just-In-Time

Manufacturing (JIT). JIT advocates smaller size, but more frequent purchasing orders. JIT tries to eliminate the need for large warehouse spacing because it does not manufacture until a demand triggers a pull in the system.

Manufacturers are starting to focus more on developing a relationship with the customer that is beneficial to both. It is important for the manufacturer to talk to their customer and understand what their needs are, and how they can meet those needs. Customers can also give the manufacturer important feedback that will help both of them. JIT brought about a change of mindset "...from managing the direct labor content of a part and the variances in component costs to managing throughput and quality was a key to making the results quickly" (O'Halloran and Wagner, 2001). Companies need to concentrate on lead time, quality, and cost; not just on one of them. JIT manufacturers changed to manufacturing cells that help to cut down on queues, and build up of inventory, which leads to decreases in lead times. Instead of focusing on optimizing throughput, manufacturers started focusing on individual steps and ways to cut out any unnecessary steps. This helps get the products through the cells more quickly and with better quality. Manufacturers also started developing a better relationship with their suppliers. This allows them to share information that would improve quality by eliminating waste between the companies. Just-In-Time also brought about a change from push to pull scheduling. This eliminates the manufacturing of goods until an order is placed for the goods. This helps to eliminate waste, and the need to have a perfect forecasting plan (O'Halloran and Wagner, 2001).

Through survey data and case studies, it has been proven that Just-In-Time manufacturing can be financially beneficial. It helps to reduce inventory costs, material handling, warehouse costs, and work in process. It can also increase revenue and profits by

increasing customer satisfaction through decreasing lead times. It is believed that JIT manufacturing is more profitable than traditional manufacturing. There are two explanations for this assumption. One explanation is that by minimizing WIP and finished goods, companies are at higher operating risks and that companies will not adopt JIT manufacturing unless the benefits outweigh the risks. The second explanation is that JIT manufacturing dominates traditional manufacturing by reducing costs and increasing revenue and that risk is not important. In a study done by Callen, et al (2003), it was found that JIT manufacturing is more profitable than traditional manufacturing. Second, JIT manufacturers are more profitable than traditional manufacturers not because JIT compensates for the extra risk, but that JIT manufacturers are more profitable after they adjust for the extra risk. Also, even after adjusting for risk, profitability is inversely related to risk. This discredits the assumption that excess profitability of JIT is compensation for the additional risk. Callen showed that JIT is more profitable than traditional manufacturing because it minimizes costs and maximized revenues.

With JIT manufacturing, supply chains are able to pull merchandise through the supply chain that better meet the needs of their customers. This helps to cut down on the amount of merchandise that is unsold or sold at discounts and the amount of customer dissatisfaction with a store not having what they want. “Industry estimates have revealed that more than 33 percent of all merchandise is sold at markdown prices, while about one of three customers with specific purchases in mind is not able to find what her or she wants in stock upon reaching the retail store” (King, 2001).

2.5 Quick Response Manufacturing

“Quick Response Manufacturing (QRM) enables organizations to meet demand quickly, permitting businesses to continually evaluate and react to competitive pressures. QRM eliminates non-value added activities and waste through continual reduction of lead times within the supply chain and manufacturing process” (Johnson and Harrison, 2004). “QR uses a combination of strategies to reduce inventory levels, improve merchandise quality, increase worker productivity, increase stock turnover, and reduce merchandise markdowns and inventory costs”(Kurt Salmon Associates Inc., 1990). QR is also a way of improving returns, flexibility, and customer satisfaction, therefore giving manufacturers a bigger profit.

The objective of quick response is to remove inventory buffers that generate waste and costs throughout the supply chain. Manufacturers that use quick response do not operate on a fixed schedule, as with the traditional method. They wait to determine production until an order is placed. More companies are turning to QR because of the increasing number of trade agreements, the ability to order, reorder and track products over the internet, and trade liberalization (Levaux, 2000).

Some of QRM’s key benefits are concurrent and time-compressed processes, flexible manufacturing processes, accurate and detailed scheduling, reducing setup time and use of group technology, process analysis to identify NVA activities, and user-targeted tools and technology (Johnson and Harrison, 2004). Concurrent and time-compressed processes are the ability to identify product and process information as the product is being created. This allows for quicker product introduction. This is done through computer systems such as CAD. Flexible manufacturing allows for easier movement of products from machine to machine or from plant to plant by focusing on the product instead of the machine

preparations. Workcells become product centered and the employees have more control over what is produced. Accurate and detailed scheduling is the capability to evaluate production requirements against resource demands continuously. This allows for more accuracy in production planning, and less time depleted reacting to production problems. Reducing setup time and use of group technology can cut down on lead times. Slow setup times consistently cause increased lead times. Computer programs have been developed that can reduce setup times and still meet operational demands. Process analysis to identify non-value added (NVA), activities is making key decisions with accurate and current information in real-time, without wasting time. User-targeted tools and technology is the ability for users to have the information they need wherever they may be (Johnson and Harrison, 2004).

Many companies are trying to find ways to compete in this ever changing industry, so they turn to QR. In order for QR to be effective, companies throughout the supply chain must cooperate and communicate with each other. Those supply chains that do work together will succeed when supply chains that do not work together will fail. Tom Orłowski, VP of IS at the National Association of Manufacturers said, “It is no longer about manufacturer competing against manufacturer. It’s a supply chain competing against a supply chain” (Gilbert, 2000).

One article about Griffin Manufacturing Co discussed how Griffin used quick response manufacturing to survive when faced with being eliminated from the supply chain. Griffin originally sewed basic and fashion style garments. Then the basic styles were sent offshore to Honduras. When a multinational company acquired their customer, the multinational company wanted to eliminate Griffin from the supply chain. Griffin convinced the multinational company to let them remain in the chain, continue handling their fashion

style garments, and to cut garments to be shipped offshore for sewing. Griffin started using QR to better meet their customer's needs. They purchased more advanced machinery and started inventorying some fabrics to have on hand. One day, they were asked to produce 500 pairs of shorts in 48 hours so a shipment could be sent out. Through their QR preparations, Griffin was able to meet this demand for their customer. After that day, the multinational corporation saw the need to keep Griffin in their supply chain.

It is customary for retailers and manufacturers to make forecasting errors in the range of 25%. This is when quick response is beneficial. Quick response helps to cut down on the losses incurred from forecasting errors. With quick response, retailers are able to reorder styles that sold well mid-season, which reduces the number of missed sales from stockouts. Missed sales can often be a significant amount. In Griffin's case the customer would have lost a \$950,000 in sales (Warburton and Stratton, 2002).

In Korea, the men's wear industry is using quick response manufacturing to compensate for poor forecasting results. The men's wear industry is manufacturing 80% of the forecasted demand in advance and then waiting until the selling season is in process to determine what styles of garments need to be replenished. The quick response ratio that is being used to determine the amount of goods needed is about 40% for brands on the high end and 15% for brands on the low end. Then through short delivery manufacturing systems the additional garments needed are produced. Using this method, the men's wear industry hopes to decrease the number of garments that are unsold (Korea, 2003).

“One key to success will be balancing the flow of cheaper goods from, say, Southeast Asia, with the flow of high fashion goods from other parts of Asia and Europe. Perhaps even more important will be management of the supply

chain of goods sensitive to quick changes in inventory and fashion swings- such as jeans with special details or clothing made in special sizes. Such items, experts stress, demand quick-response-or QR manufacturing. And where that production will take place in the future is a matter of some debate” (Levaux, 2000).

2.6 Cost Analysis Model

There are many variables that should be included in a cost analysis model that is used to help buyers make decisions. Often there are hidden costs that many people do not consider when making sourcing decisions. This section will discuss two types of costs, costs to the retailer when purchasing a product and costs to the manufacturer when producing a product. Four costs that were consistently mentioned in the literature were price, quality, delivery performance, and transportation (logistics). These four costs apply to both retailers and manufacturers.

2.6.1 Retailer Costs

One of these costs is landed costs. Landed costs include logistics cost as well as production and duties. All the costs incurred through the product entering the U.S. Determining landed costs can be very difficult. “Even Amazon.com, the world’s largest electronic commerce site, warns customers on its “Help” page that “additional charges for customs clearance must be borne by you; we have no control over these charges and cannot predict what they will be” (Field, 2004). Software packages can now be purchased to help predict what the landed costs will be. Even though a worker in Mexico makes three to four times what a

Chinese workers makes, once you add in shipping costs the equation is more balanced. A cell phone company found “that one of its models was 50 cents cheaper to build in China but incurred 14 cents in transportation costs when shipped to the United States by ocean freight and 71 cents by air, compared to just 5 cents when shipped from Mexico by truck. The added time taken to ship from China by ocean freight also requires manufacturers to carry more buffer inventory, another indirect cost” ...”tighter customs regulations could add as much as two days to outbound deliveries from China. Additionally, ocean freight rates have risen by 30% this year, while air rates are seen climbing 10% to 20% in the next year” (MacLellan, 2003).

Some things to consider about transportation costs are transportation costs increase disproportionately as the size of an order decreases. As the delivery time decreases, the shipping price increases. The forms of transportation that will deliver the order the fastest are also the most expensive. Recently as prices for different forms of transportation have increased, this has become a bigger concern. Within the past year, freight rates and gas prices have increased significantly and that directly affects the cost of shipping. This is making some companies reconsider their move overseas (Tyworth and Ruiz-Torres, 2000).

A hidden factor that companies need to consider is indirect costs such as support costs. Another hidden cost is operator efficiency. For example in Caribbean factories, operator efficiency is significantly lower than in the U.S. and turnover is high. Once the operators are correctly trained, they leave. It is not unusual for them to have a 40% turnover rate (Warburton, and Stratton). This affects the quality and amount of production. Also allowances must be made for additional staff to supervise the import and export of the goods; including monitoring that all parts of the garments arrive when expected. Many times staff

will have to travel to other countries to correct problems. This is a significant expense.

Often countries will have their own extra costs. “For example, under the Caribbean Basin Trade Partnership Act (CBTPA), a duty of 32.2% is added to the top of the cost of a men’s polyester T-shirt imported from the Dominican Republic if the retailer does not qualify for the country’s rules of origin” (Cutting, 2003). It is essential that buyers understand all information and costs associated with global sourcing. There are computer programs that can be purchased to help calculate some of the hidden costs.

A hidden cost that most companies do not take into consideration is the exchange rate. The exchange rate includes currency exchange rate, import and export restrictions, expropriation and/or confiscation. The exchange rate varies greatly, especially in time of economic and political uncertainty. The exchange rate can affect the price of goods, especially the currency exchange rate which is constantly changing.

2.6.2 Manufacturer Costs

According to King (2001), there are five types of costs to produce a product: materials, labor, gross profit, logistics, and overhead. Then there are eight types of logistics costs: (1) Forecasting is planning, scheduling, and purchasing which include: systems, staffing and communication; (2) Inbound cost is freight, taxes, tariffs, and gains and losses from rebates, returns etc.; (3) Receiving is equipment and labor, (4) Inspection is labor and equipment needed to do inspections; (5) Warehousing is space, staffing, and equipment for raw materials; (6) Inventory is losses/damages and obsolescence costs; (7) Internal material movement in-process losses/damages; and (8) Outbound cost is freight, tariffs, duties, etc. All of these costs could be reduced (King, 2001).

Manufacturers need to concentrate on decreasing logistics costs to combat the insecurities and discrepancies connected with constantly changing consumer demand. Many companies moved production overseas without thoroughly considering the extra logistics costs that would also accompany the move. For example, one apparel company purchased girl's christening gowns and boys rompers. The logistics costs ranged from sixteen to eighteen percent, and if they had been produced offshore, logistics could have been twice as much. An increase of logistics costs and markdowns negate any advantage of using cheaper labor. Many companies think that the amount of revenue they receive will not be affected by the production source. So they choose the least expensive source so they can increase their gross margin (King, 2001).

One manufacturer cost is the cost of quality. Juran and Gryna (Starbird, 2003) feel that there are four important quality costs: prevention, internal failure, appraisal, and external failure. Prevention cost is the cost of improving quality by preventing inferior products from being fabricated. Techniques for improving quality are superior raw materials, and more inspections. Internal failure cost is the cost of fabricating an inferior product that is not distributed to the customer. These include scrap and rework. Appraisal cost is the cost of examining the quality of the goods received from the supplier through to the customer. This can be a very expensive cost. External failure is the cost of fabricating and shipping an inferior product to the customer. This includes warranties and service costs (Starbird, 2003).

If a company is using JIT manufacturing, then they can exclude overhead costs in their cost model. Companies where inventory is a major cost component of the total cost would benefit from JIT ordering systems. JIT can reduce costs by decreasing the number of vendors. However, shipping costs can be greater because JIT focuses on small multiple

orders (Schniederjans, 2001).

2.7 Three Competitive Strategies for Supply Chains

Many studies have been conducted on supply chains and the relationships between members of the supply chains. One study found that a good working relationship between firms and their suppliers improves the firm's performance in many areas: total costs reduction, better product quality, and faster delivery (Narasimhan and Jayaram, 1998). However, very little research has been done on looking at different regions of the world to determine the best areas to source basic, seasonal, and fashion items (Rinehart et al, 2004; Handfield and Bechtel, 2004; and Handfield and Nichols, Jr., 2004). The choice of where to purchase merchandise is important when developing a supply chain.

“In the new quota free environment, we will have no choice but to be very discriminating about our suppliers, selecting only those who can provide real value to our customers. Value does not mean the product with the cheapest price. It means a supplier that is able to provide a quality product and service, including speed to market and supply chain efficiency and reliability”
(Flanagan, 2005).

Often the choice of location is based on the type of merchandise that is being purchased. There are three general types of merchandise: basic, seasonal, and fashion oriented merchandise. To help companies improve their supply chain analysis decisions, a number of tools have been developed: Secure sharing of data over the internet, inventory analysis, scheduling, advanced planning, supply chain analysis, inter-enterprise architecture and sourcing decisions using simulations (Cranwell).

Some other influences of sourcing from a specific region are: the infrastructure that is in place in the country (such as clustering of members in a supply chain), lead times, quality, purchasing costs, and logistics costs. These factors will change among the different regions of the world, which is why these and many other factors need to be considered before making purchasing decisions.

“Our world of apparel has changed, and likely forever. China will remain a major trading power, as will Pakistan and India, no matter what fleeting mechanisms might be triggered to slow down Asia’s manufacturing influence. And Central America, with its proximity to the U. S. market, will undoubtedly continue be coveted as a key partner” (Cole, 2005).

Many retailers, in the drive for greater profits, are increasing the amount of sourcing of merchandise to China, India and other low cost areas. According to an Accenture study released in March of 2005, retailers are going to increase the amount of goods sourced from low-cost countries by 85% within the next two to three years (Sullivan, 2005). However, retailers are starting to learn the downfalls of using this sourcing strategy. Retailers are experiencing longer lead times, unreliable delivery and slower inventory turnovers. When retailers have suppliers with longer lead times, they must carry more inventory in order to avoid low product availability and accommodate greater risks of delays or undeliverables (Sullivan, 2005).

2.7.1 Basics Strategy

With little change in demand, it is easier to forecast the amount needed for a specific basic garment than for other types of garments. According to Chris Moses, an expert on Central and South American textile relations, many companies in this area base their existence in

apparel manufacturing on their ability to make basic garments. They are equipped to handle the special needs of this type of product (Moses, 2005). This is not the best strategy for them to follow. The nature of basic garments allows for them to be sourced from essentially any region of the world, according to the desired criteria (i.e. costs, quality, reliability, etc.) put in place by the retailer. Given the nature of basic items, it makes sense to source these products in areas such as Asia or Pakistan and India where the lead times of the company will have little influence on the availability of the product. In addition, these countries have reasonable quality and cheap prices. Retailers are easily able to forecast the number of basic goods needed between reorders and are able to make purchasing orders based on their needs, without much risk of suffering any consequences from changing demand. They are also able to use companies with longer lead times, but have cheap prices without any fear of stockouts on goods between shipments. Lead times for products from China range from 6 weeks to 5 months (King, 2004; and Sternfels, 2004).

Carlos Arias, top strategist at Koramsa, says “There’s little doubt here that Asia will soon grab most of what’s known as the ‘basics’ business: the huge runs of standard jeans and khakis that made up a large chunk of what the region produces. For that business, cost is all that matters” (King, 2004). Supply chains in Asia, specifically China, are based on a cluster strategy. All the components needed to make an apparel garment are in close proximity to each other. They will have fabric, notions, and manufacturing clusters. The cluster strategy helps to cut down on the time required to source the needed components for a garment. The components can be gathered quickly, which helps to cut down on the cycle time of the garment. Pakistan and India also have a form of cluster strategy, but it is not as well developed as the Chinese cluster strategy.

2.7.2 Seasonal Strategy

Seasonal items have a short selling season, often based on a specific holiday or selling period and that makes it imperative that retailers have the merchandise in the stores on-time. If retailers do not have the merchandise in the stores on-time, then they may miss a considerable amount of their selling season and therefore lose profits. This also necessitates some suppliers having to air freight their goods to get the merchandise in the stores on-time, which decreases the supplier's profits. Ellen Martin, Vice-President of Supply Chain Systems at VF Corporation says that their business is very seasonal. She also says that not having their factory near their distribution center makes it more difficult to make changes to their production orders and have them complete in a short period of time (Garbato, 2004). A wrong mix of merchandise can be detrimental to a retailer's profits. Seasonal items should be sourced from a region that is close to the target market. Therefore, if there needs to be any changes to the product mix, they can be made quickly and the retailers can get the merchandise while the good is still in-season. Seasonal items for the U. S. should be sourced within the U. S. or the Americas (Central and South America and CBI). Companies in these regions have short lead times and good quality. Lead times range from a few days to four weeks (Moran, 2005; King, 2004). While the prices are more expensive than in other areas of the world, sometimes the retailer must choose to either have no product in their stores, or pay more money for items in order to have merchandise that their customers want. From an apparel manufacturer's point-of-view, they can earn more money by being able to produce seasonal or fashion items than if they produced basic goods. Retailers are willing to pay more for seasonal or fashion goods than they are basic items, and when in a "crisis", retailers will pay essentially whatever the manufacturer asks for below selling price, in order to have

the garments.

For supply chains in Central and South America, all the steps through fabric production are mostly performed in the U. S. Then companies in Central and South America will source the fabric from the U. S, cut and sew the garments together, and then ship the finished goods back to the United States for U. S. customers' consumption. Some parts of Central and South America also operate on the cluster strategy.

Domestic and American apparel manufacturers that want to market seasonal goods for retailers need to change their infrastructure in order to meet the requirements needed to be a seasonal manufacturer and operate on Just-In-Time manufacturing. Domestic and American companies should have the ability to deliver full package services. This will make them more valuable to retailers that want to limit the number of suppliers that they use. Also companies in the Far East already offer full package services to retailers. Domestic and American manufacturers should be able to do product development, cutting, and sewing (2004; Velazquez, 2004).

With DR-CAFTA being passed, countries affected by this bill will be able to better compete with Chinese, Pakistan, and Indian companies on price (Smith, 2005). However, the companies in these countries will still have to meet the requirements for shipping goods to the U. S. duty free. One of the requirements is that fabric must be purchased from companies in the United States.

2.7.3 Fashion Strategy

An industry definition of a fashion item is “goods that are hard to forecast the demand; have high fashion level and seasonality, and have varied style change” (Lee and Kincade, 2003).

For this research, fashion items are considered to be merchandise with a short product life

cycle that are usually only in style or popular for one season. Some examples of fashion items are women's blouses or juniors jeans.

Fashion garments should be sourced from companies in the U. S. or Americas (Central and South America, and Caribbean). This will allow them to make any changes to the product mix based on Point of Sale data obtained by retailers and receive mid-season replenishments on items that have sold well.

“Supply chains supporting fashion must build in flexibility to align and fine-tune output to align to demand...The point is that apparel supply chains offer opportunity to postpone decisions that improve alignment of supply to demand, until critical in the manufacturing process, giving apparel firms opportunity to adjust supply to best meet consumer needs” (Baker, 2004).

Zara, a retailer known in the apparel industry for its fast fashion, has developed some strategies that have made them very successful for them. Zara is a vertical, lean manufacturer. This allows them to accomplish many things such as being flexible in their manufacturing. They delay decision making until the last possible moment in order to have a better understanding of the style of garments that have sold well, and this allows them to make any necessary changes in production. Zara's garments product lifecycle is about one month (Hochman, 2005). They intentionally minimize their orders so that they run out of garments and do not have to sell garments at marked down prices. They are constantly introducing new styles throughout the selling season to make up for low volume on styles and due to the nature of the fashion industry. Zara has the ability to change almost half its stock in season, if it is needed, which necessitates good working relationships with its manufacturers. Eighty percent of all merchandise is manufactured in Europe, mostly in

Spain (Zara, 2005).

People who buy fashion items want the latest “popular” style, and are willing to pay more to have the latest popular style. Also with low volumes on styles, if a garment does not sell well, then they have only lost a small amount of money. If the garment sells well, then they can produce more of that style of garment and capitalize on the trend. When New Balance operated on a supply chain system like Zara’s, they were able to slash inventory by double-digit percentages and have few lost sales and made more profit (Hochman, 2005). One of the reasons Zara is so successful is that they do not operate many stores outside of Europe, which is in proximity to their manufacturing facilities in Spain. They are able to capitalize on the proximity to market. It is more difficult for Zara to be a successful, fast fashion retailer in the U. S. because they have to increase their logistics costs and change their logistics strategies for their U. S. stores, in order to have the same results as their stores in Europe (Zara, 2005).

Liz Claiborne, another fashion retailer, has started cutting back on the amount of merchandise that they purchase from China. The main reason for making this change in their sourcing strategies is that with the condition of the United States and China’s talks on the imposing of restrictions on Chinese goods, they do not feel that this area is a safe market to purchase merchandise (Rozhon, 2005). With safeguards between China and the U. S. being passed, U. S. retailers are not able to import as much merchandise. Also retailers might not be able to get merchandise into the country that has already been ordered. This creates problems for retailers in their trying to have a large assortment of SKUs and keep up with the demands of the market. There is also instability in Chinese business. China has low labor rates, which leads to lower prices; however they get them through questionable business

practices. Some examples are: government funding through subsidies, government financing loans that do not have to be repaid, undervaluing their currency, and not being environmentally responsible (Velazquez, 2004).

Many U.K. fast fashion retailers are moving production away from China to countries in Eastern Europe, Turkey, and India. This is due, in part, to possible import restrictions in China. Many fast fashion retailers are moving away from China because of the long lead times. They want and need to be near the market to accommodate the market's demanding needs. Retailers could lose money from lost sales if they do not have the new merchandise in the stores when they need them. A shipment of merchandise from China to the U.K. can take twenty-two days by water, but it can only takes five days to get the merchandise from Turkey (Rigby, 2005).

Many fashion retailers, such as Abercrombie and Fitch, will have their goods flown in from different countries instead of shipping by boat (Vlaserzich, 2005). When retailers decide to use airfreight instead of shipping by boat, they greatly increase their costs. Airfreight is about 20% higher than ocean-freight (Forrest, 2004). Companies are starting to switch from airfreight to ocean-freight to save money. When switching from airfreight to ocean-freight, a company needs to make changes to their supply chain in the product development, raw materials sourcing, shipment to the factory, and lead time to utilize the ocean trade lanes without disrupting product flow (Forrest, 2004).

Supply chains for fashion goods made in Central and South America operate on essentially the same strategy as seasonal items. Fabric is made in the U. S. It is cut and sewn in Central and South America. Then the finished good is shipped back to the U. S. Luis Gadala, director of the Salvadoran Association of the Garment Industry, says "The time

factor is our only way to compete with China” (Smith, 2005).

Domestic and American apparel manufacturers that want to market to fashion retailers need to change their infrastructure in order to meet the requirements needed to be a fashion manufacturer and operate on Just In Time manufacturing. Some requirements are a synchronized supply chain, supply chain visibility, discipline to calendar, better communication channels, flexibility, better logistics, and the ability to make garments quickly and accurately (Zara, 2005). Domestic and American countries should also be able to provide full package services to retailers.

2.8 Sourcing Simulator

The underlying question about global sourcing is “Where the cost advantage of a cheaper supplier is offset by a faster supply chain that decreases logistics costs and reduces lost sales and markdowns. Where this breakdown point falls is dependent upon the product” (King, 2001). To help buyers answer this question, the Sourcing Simulator has been created. “Studies using this tool have shown that a manufacturer capable of responding quickly to customer orders based on point-of-sale data can provide a significant advantage over suppliers with long lead times” (King, 2001).

Sourcing Simulator is a stochastic modeling system that allows the user to assess how various operating conditions will affect retail and manufacturing operations, and give buyers and managers a training tool. “The Sourcing Simulator is an interactive software package that provides the capability to: Simulate retailing and retailing/manufacturing scenarios for a line of product; and model the relationship between selected operational parameters and/or environmental factors and retail performance measures” (Lovejoy). Sourcing Simulator

helps to reduce the impact that a forecasting error would have on the selling season. There are three types of forecasting errors: volume error, which is a difference in the expected demand and the actual demand; mix error, which is a difference in the expected and actual demand by style, color, and size; seasonality error is a difference in the expected and actual demand each week. Forecasting errors can cause an overabundance of merchandise, which necessitates using markdowns or can cause a shortage which results in missed sales, and unhappy customers (Lovejoy).

The user is able to set the conditions that they want the simulation to run under. They can choose for the orders to be completely filled or partially filled, lead time, capacity, and quality of the merchandise among other things. The user enters the buyer's plan which includes selling cycle, expected demand, SKU mix, and seasonality. Then users enter how they want replenishment to be calculated, and managed. They have six options to choose from: two from the buyer's plan figures, three by complete POS and one by limited POS. It also allows for any inputs of promotions or markdowns that will be used during the selling season.

As a customer arrives, the customer is given a SKU preference. It randomly assigns the customer a style of garment, size and color preference according to the merchandise mix that is carried in the store. If the store has the SKU preference that the customer wants, then a sale is recorded and one garment is deducted from the inventory. If the store does not have the SKU mix, then two things happen: a stockout is reported, the customer is assigned a new SKU preference that is similar to the first, and the simulation decides if the customer accepts the new SKU preference and a sale is made or if the customer does not accept the new SKU and the customer leaves without making a purchase. The simulation is run for a set amount

of time, usually equivalent to a normal selling season. The simulation is replicated several times, to ensure the most accurate data. Then the information from the replications is analyzed and recommendations are made (King, 2005b). It collects such information as a break-even analysis, inventory, the amount of lost sales, the number of items sold at each price change, and customer satisfaction that can be compared among the various modeled simulations.

“On the strategic side, the Sourcing Simulator allows quantification of financial, inventory, and service performance at retail for a line of garments. Analysis with this tool has supported quantitatively what QR proponents have touted for years, i.e. a flexible and rapid apparel supply system leads to superior performance at retail” (King, 2001).

Sourcing Simulator is stochastic in that it uses Poisson distribution when assigning customer arrival times, and it randomly assigns SKU preferences, style, color, and size, to each customer as the customer arrives (King, 2005b). Sourcing simulator is beginning to be used as a tool to help determine the optimum amount of merchandise that should be produced pre-season, possibly using a foreign supplier, and the amount that should be produced during the season after receiving POS data. POS is used to determine which styles have sold well and need to be replenished. Then a domestic quick response manufacturer makes the orders and gets them in the stores prior to the end of the current selling season. Studies are currently being conducted in allowing a low cost foreign manufacturer to produce the pre-season order then using a domestic quick response manufacturer to fill the mid-season order. The studies are looking at the advantages that can be received from using this system instead of using the traditional method of having one order manufactured prior to the start of the selling season. (King, 2005a). From the data that has been collected thus far, “retailers can

reduce sales lost through inadequate inventory by both estimating demand again as a season progresses and using quick response suppliers (even at 50% higher wholesale costs). The gross margin is still good, customer demand is satisfied, and fewer garments have to be liquidated” (Cranwell).

A study done by King and Maddalena (1998) in association with Dillard’s and Warren Featherbone Co. tested how the Sourcing Simulator could be used to determine the appropriate replenishment schedule for children’s apparel. The study answered the questions “What are the financial and service benefits of in-season replenishment? How many replenishment orders should be made and when? What stock should be replenished in each store in the chain? and What is the impact of forecasting error on the replenishment strategy” (King and Maddalena, 1998). Eight styles of infant dresses and rompers in three to four sizes were tested. The selling season was forty weeks with an expected 1,000 units to be sold. A pre-season analysis was done to define the constraints of the replenishment program. It was decided that fifty percent of the order would be delivered prior to the start of the selling season and one reorder, at week twelve, would be made during the season to replenish any needed items (King and Maddalena, 1998). Sales were higher than the previous year, but not as high as expected. However, the retailer and manufacturer had fewer losses and smaller surplus than with the traditional method. It is believed that the mid-season reorder helped to move the merchandise. Three strategies were developed to lessen the amount of surplus inventory at the end of the season. 1. Improve the accuracy of the forecast by adding in seasonality (this study was done prior to allocations for seasonality being added to the Sourcing Simulator). 2. Use a weighted demand that mixes POS data with historical data. 3. Determine the needs of each store at the time that the reorder arrives, and distribute

accordingly (King et al 1999).

A case study done by King and Moon (1999) was used to determine the best method of quick response manufacturing using different stages of dyed goods and the traditional method using the Sourcing Simulator. There are four options: 1. Yarn Stock requires the Vertical Integrations Manufacturer (VIM) to manufacture finished goods that are kept in yarn form until an order is placed. This process takes eight weeks, seven weeks to knit and sew the fabric and one week to ship it to the customer. The yarn stock does not have a restocking lead time. 2. Greige Stock requires that finished goods be made from goods that are kept in greige stock, undyed and unfinished fabric, until an order is placed. This has a five week lead time, four weeks to dye and finish the fabric and one week to ship. It also has a three week lead time to restock the fabric and greater chance of not being used. 3. Dyed Stock requires that the fabric already be dyed and finished and ready for production. It has a three week lead time. Two weeks to finish the goods and one week to ship it to the customer. It also has a five week lead time to restock. This is also the most expensive option of the three raw materials. 4. Traditional manufacturing which requires a thirteen week lead time. Sourcing Simulator was used to run simulations according to the buyer's plan. An expected demand of 10,000 units was modeled. Of the 10,000 units 65% or 6,500 units were initially produced. It is best for the VIM to carry enough raw materials to meet any level of production. The costs of the materials are: Yarn Stock is \$1.00, Greige Stock is \$1.60, and Dyed Stock is 2.60 per unit of inventory. The simulations were run using different reorder points and reorder quantities based on POS data. All three forms of raw material production were superior to the traditional method. It was determined that the best median for meeting the buyers requirements of Gross Margin, reorder weeks, service levels, lead times,

replenishment of raw materials and risk levels was Greige Stock (King and Moon, 1999).

“Sourcing Simulator helps retailers answer the questions: How much more can the retailer afford to pay a Quick Response vendor for a garment and still achieve better performance than a traditional source? or What is the value of reducing the supply lead time by two weeks? Sourcing Simulator helps the manufacturer answer the questions What is the value to me and my customer if the mill can reduce order minimums? or How does POS data shared by the retailer impact the amount of inventory carried” (King, et al)?

“The term ‘simulation’ is normally used to describe the process of executing such a program with user-selected parameters and input data so as to simulate the system under prescribed conditions” (Crosbie). When creating a simulation, a conceptual model must be created that will represent the behavior of the environment that is trying to be simulated. Then it must be converted to a computer program that will accurately solve the equations, or follow the rules and procedures. The data must be inputted in a manner that the computer can understand. Then the parameters for the case can be set. Through verification and validation, it can be determined if the simulation accurately represents the environment it is being modeled.

Sourcing Simulator is different from other simulators in that it can be run off of Windows 95/98 and NT. Sourcing Simulator is less expensive than most simulators. It is also relatively easy to operate for the power and amount of data that it can simulate. Many simulations are deterministic whereas Sourcing Simulator is stochastic.

Sourcing Simulator was developed through the Demand Activated Manufacturing Architecture (DAMA) Project under the AMTEX project; which is designed to help U.S.

businesses be more competitive through developing new technologies and integrating them with available technologies. “The vision of DAMA is to identify and demonstrate, by the year 2000, ways for the U.S. ITC to reduce time in its product manufacturing pipelines by 50% ... DAMA is studying specific pipelines to identify changes that will strengthen their competitiveness and in turn improve the competitiveness of textile industry supply chains” (Washington, et al). DAMA supporters work together to recognize and exhibit improvements that can eradicate surplus inventory, diminish lead times, and give more value to the customer. The members of the Textile supply chains lose over \$45 billion in revenue each year (Washington, et al). DAMA works to recognize chances to save money by looking at the supply chains carefully.

In conclusion, this chapter has done an extensively reviewed the literature about the different types of sourcing methods, how sourcing decisions are made and how they should be made, the needs of a supply chain, and the Sourcing Simulator. It has also answered the questions should I outsource or insource? What supplier should I use? Should I use a domestic or foreign supplier? What are the costs of using a foreign supplier? and Should I have one or multiple suppliers? Two reoccurring themes through out the literature: the need for supply chains to work together and communicate with each other, and the need to have strong management in a supply chain that can make important decisions about the supply chain were discussed. The paper also mentioned ways for manufacturers to be more efficient and profitable through the use of Just-In-Time and Quick Response manufacturing.

3.0 Methodology and Results for Basic Simulations

An industry definition of basic items are “goods that are relatively easy to forecast the demand, have low fashion level and limited seasonality, and have a basic garment style that remains constant” (Lee and Kincade, 2003). For this study, basic items are considered to be merchandise that is carried in a store all year with little change in color, style, size, or price. Examples of basic items include bras and men’s white button down shirts.

Although demand for basic goods is easier to forecast than for seasonal or fashion goods, when retailers place orders for basic merchandise, it is difficult to forecast the types of garments needed and the amount of each garment to order according to SKU (color, style, and size of the garment). Many factors must be taken into consideration when determining the number of SKUs to order such as: the number of customers that may visit the store, the predicted popularity of the SKU, the service levels that are trying to be met as well as past point-of-sale data for the SKU or a similar SKU. Any errors in the ordering of merchandise can be very costly to the retailer in the form of lost sales or markdowns on excess merchandise, which will cut into the profitability of the retailer. Many calculations and computer programs have been developed to help retailers forecast the amount of merchandise needed for a selling season. Some of those programs help to simulate a typical selling season and the factors that affect the selling season to determine the affect of an ordering strategy.

This research will evaluate several ordering strategies using the Sourcing Simulator™ as detailed in Chapter 2. It will focus on determining how the lead times of Domestic, American, Far East, and Pakistan/India manufacturers affect the average inventory levels retailers must carry to meet desired customer service levels. As will be seen later in the

surveys in chapters five and six, there is a lack of agreement on lead times that are typical for each region. Consequently, lead times for the simulation experiments were varied from 1 to 25 weeks, which is the range which most thought the lead times fell. This will allow the results to be applicable for most, regardless of their specific lead time beliefs for a particular region.

To determine the average inventory levels, experiments were undertaken to figure out the amount of merchandise that should be initially ordered and the number of weeks of supply the retailer should carry in the store in order to meet desired service levels for a basic product. The target weeks of supply is the “optimal number” of weeks of inventory that the retailer needs to carry between reorders in order to meet service levels, but not have an excess or shortage of merchandise. For example, if one wants a ten week target, the average inventory needed is the sum of the next ten weeks of forecasted demand. To determine the best inventory targets, two different service levels were used: the service level before the first reorder and the service level before the first markdown. The “optimal” initial weeks of inventory ordered as well as the target weeks of supply were determined by systematically changing the specified number of initial weeks of inventory and weeks of supply and the simulating the scenario until the desired service levels were met.

A men’s basic pant was simulated over a five year period. Experiments were performed for target service levels of 80%, 85%, 90%, 95%, and 97% and supplier lead times of 1, 5, 10, 15, 20, and 25 weeks. The simulations were run using two different customer demand patterns. One assumed flat demand while the other demand had a seasonal pattern and will be shown in section 3.1. Initially, the forecasted trend was assumed equal to the actual trend, and there was no volume error. Therefore, the first experiment assumed perfect

forecasted demand which rarely happens but will produce the most optimistic view for longer lead times.

3.1 Ordering Strategy One

Several different ordering strategies were analyzed as well. In the first strategy, reorders were placed every four weeks, regardless of supplier lead time. Demand was assumed to be flat over the five year period. The average inventory needed to achieve each target service level was determined for each lead time. Then, to normalize demand, the average weeks of inventory required was calculated by dividing each average inventory by the weekly average demand. The results in Figure 3.1 and Table 3.1 demonstrate that the longer the lead time of the supplier, the more inventory the retailer must carry to meet the desired service level. This pattern was observed for all target service levels tested. For example, if a retailer has a supplier with a thirteen week lead time, then the retailer must carry about 6.94 weeks of inventory in order to meet a 95% service level. In contrast, if the supplier had a three week lead time, then the retailer has to carry only 3.76 weeks of inventory to meet that same service level. The results represent an average of several replications of the simulation. Also by reordering frequently, the affect of longer lead times smoothes out, effectively reducing the impact of longer lead times.

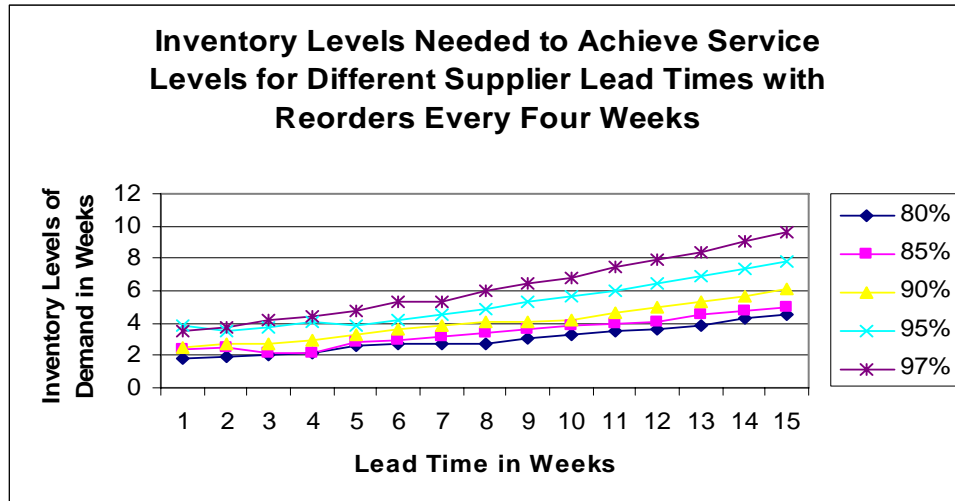


Figure 3.1: Inventory Levels of Demand Needed to Achieve Service Levels for Different Supplier Lead Times with Reorders Every Four Weeks

Table 3.1: Inventory Levels of Demand Needed to Achieve Service Levels for Different Supplier Lead Times with Reorders Every Four Weeks

Lead Time in Weeks	Service Levels				
	80%	85%	90%	95%	97%
1	1.77	2.42	2.49	3.87	3.51
2	1.95	2.50	2.67	3.52	3.75
3	2.02	2.19	2.76	3.76	4.15
4	2.19	2.19	2.97	4.03	4.44
5	2.56	2.78	3.33	3.85	4.78
6	2.76	2.99	3.59	4.16	5.27
7	2.76	3.12	3.87	4.47	5.27
8	2.72	3.37	4.02	4.81	6.01
9	3.08	3.67	4.12	5.28	6.42
10	3.32	3.87	4.22	5.65	6.82
11	3.52	3.96	4.66	6.04	7.46
12	3.67	4.11	5.00	6.44	7.91
13	3.89	4.52	5.30	6.94	8.39
14	4.29	4.78	5.71	7.37	9.10
15	4.50	5.00	6.11	7.82	9.61

3.2 Ordering Strategy Two – No Drift

In the second ordering strategy, simulations were run with the weeks between reorders equaling the supplier lead time, which is more realistic. For example, if the supplier has a ten week lead time, then reorders are made every ten weeks. This strategy was used since it is

more representative of industry, where typically an order is not made until the previous one has been received (i.e. no multiple outstanding orders). Therefore, it was used for the rest of the simulations on basic goods.

Both a flat demand pattern, as well as a demand with a seasonal pattern were considered. Figure 3.2 shows the seasonal pattern which takes into consideration the back to school and Christmas selling seasons. Again, the simulations were run such that the forecasted pattern or trend was equal to the actual trend and there was no volume (demand) error, which represents the best possible scenario.

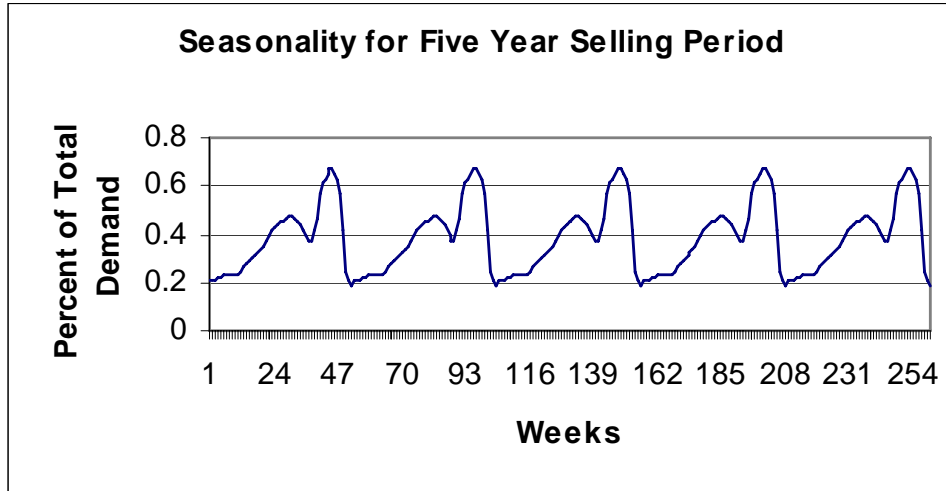


Figure 3.2: Seasonality of Demand for Five Year Selling Period

3.2.1 Flat Demand

The results for the amount of inventory needed to achieve the desired service levels with flat demand are given in Figure 3.3. The pattern of results is similar to that seen for the results of the first ordering strategy; except that the slope of each of the target service level lines is steeper indicating even more inventory is needed when supplier lead times are long. This is the result of ordering less frequently under the second ordering strategy than in the first (i.e.

the more frequent ordering effectively reduces the lead times). The takeaway is that suppliers with longer lead times should encourage their customers to order more often.

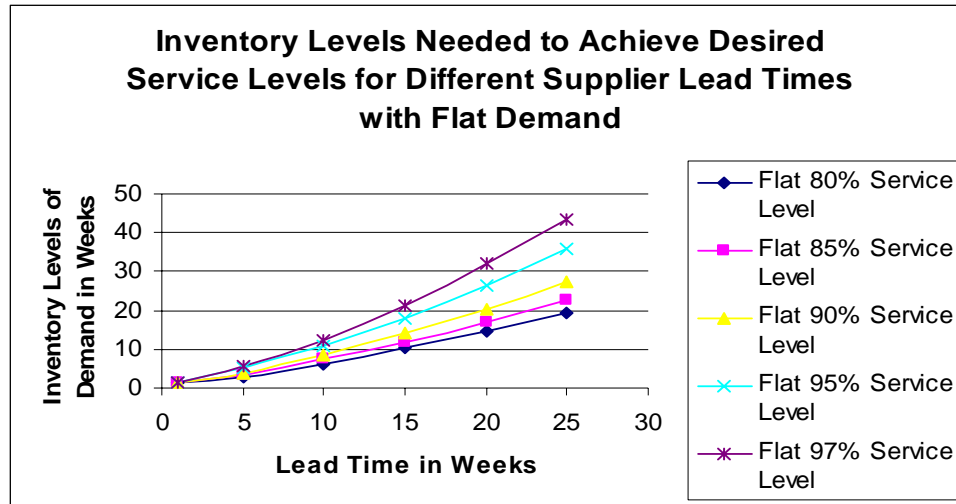


Figure 3.3: Inventory Levels Needed to Achieve Desired Service Levels for Different Supplier Lead Times with Flat Demand

When investigating this ordering strategy with flat demand, little trends or patterns would start to develop in the lower service levels: 80%, 85%, and 90%, for the individual lead times, when determining the best values for the initial weeks of inventory or target weeks of supply. A separate pattern or trend would develop for different lead times. These patterns or trends were not found for all simulations run; however they did occur often enough to take note. The patterns or trends showed a set number of weeks between the optimal initial inventory and target weeks of supply. An example is that the best target weeks of supply for each service level in a particular lead time would have a one week increase in increments between the service levels. The optimal target week of supply for the 80% service levels would be six weeks, the 85% service level would have the optimal target weeks of supply being seven weeks, and the 90% service level would have the optimal target weeks of supply being eight weeks. Another example is the optimal initial inventory for an 80% service level was 24 weeks while the optimal initial inventory for an 85% service level

was 28 weeks and the optimal initial inventory for a 90% service level was 32 weeks.

This pattern or trend would usually stop when determining the best values for the 95% and 97% service levels. This is believed to be a result of trying to attain such a high service level. To accommodate the high service levels, larger amounts of inventory are needed to account for any variances in demand. Also after the ten week lead time, patterns or trends were unable to be identified. These patterns or trends were normally only found in the lower lead times: 1, 5, and 10 weeks. This is believed to be the result of accommodating the longer lead times. With longer lead times more inventory is needed to account for any variances in demand, since it would take a retailer longer to receive a replenishment. Another pattern that occurred is that larger amounts of inventory are needed when using suppliers with longer lead times. The longer the lead time the more inventory that would need to be carried between reorders and initially in order to meet service levels. This was true with all target weeks of supply and all initial inventories. Table 3.2 shows an example of the pattern of trends found when performing the simulations.

Table 3.2: Pattern of Trends in Simulations

Service Levels	Initial Weeks of Supply	Lead Time	Target Weeks of Supply	Service Level before Reorder	Service Level before Markdown
80%	24	10	6	80.0%	79.9%
85%	28	10	7	85.5%	85.0%
90%	32	10	8	89.9%	90.1%
95%	40	10	9	95.0%	95.1%
97%	46	10	9	96.9%	95.3%

3.2.2 Demand with Seasonal Pattern

The previous section looked at the affects of lead time when the demand pattern was flat. Figure 3.4 shows the inventory levels needed to achieve the desired service levels for different supplier lead times with seasonal demand. A comparison between the necessary

inventory levels for flat demand and demand with a seasonal pattern is shown in Figure 3.5.

With perfect information and the long selling season of a basic good, the small difference can be explained by the lack of volume error and forecasting error in these simulations.

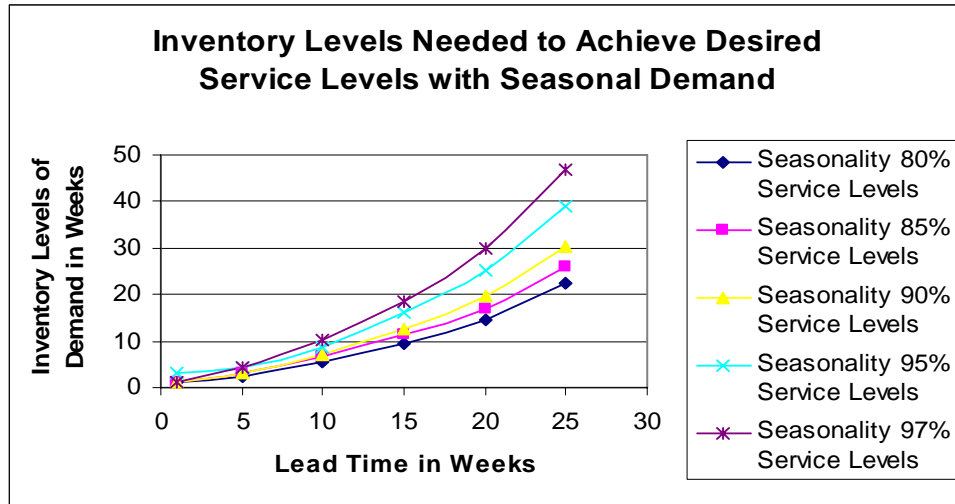


Figure 3.4: Inventory Levels Needed to Achieve Desired Service Levels for Different Supplier Lead Times with Seasonal Demand

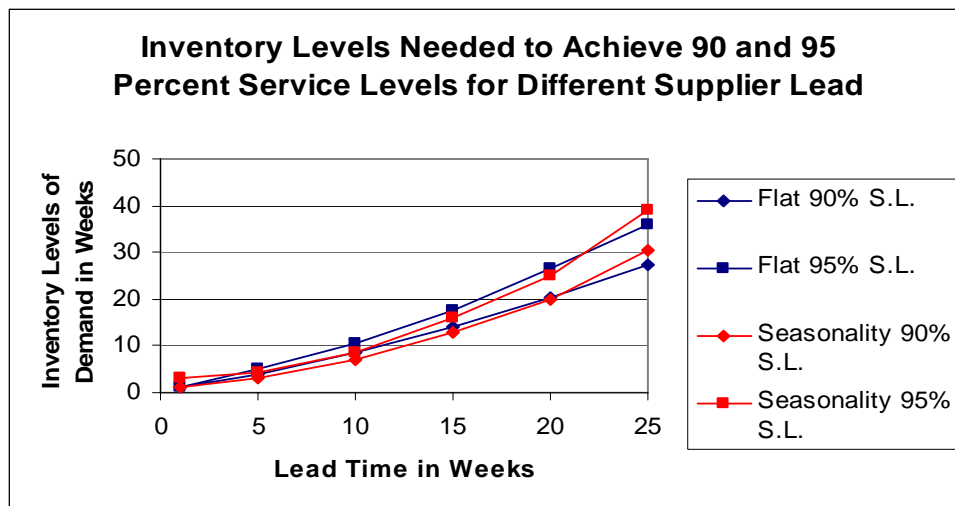


Figure 3.5: Inventory Levels Needed to Achieve Service Levels for Different Supplier Lead Times

3.2.3 Comparison of the Two Ordering Strategies

Figures 3.6 and 3.7 show the comparison of the two ordering strategies. Ordering strategy one, reorders being made every four weeks, neutralized the effect of supplier lead times on the amount of inventory needed to meet service levels. With this strategy retailers would

have outstanding orders on merchandise when the next reorder was placed. Ordering strategy two requires more inventory to be ordered at one time and therefore shows the effect of supplier lead times on inventory levels of demand.

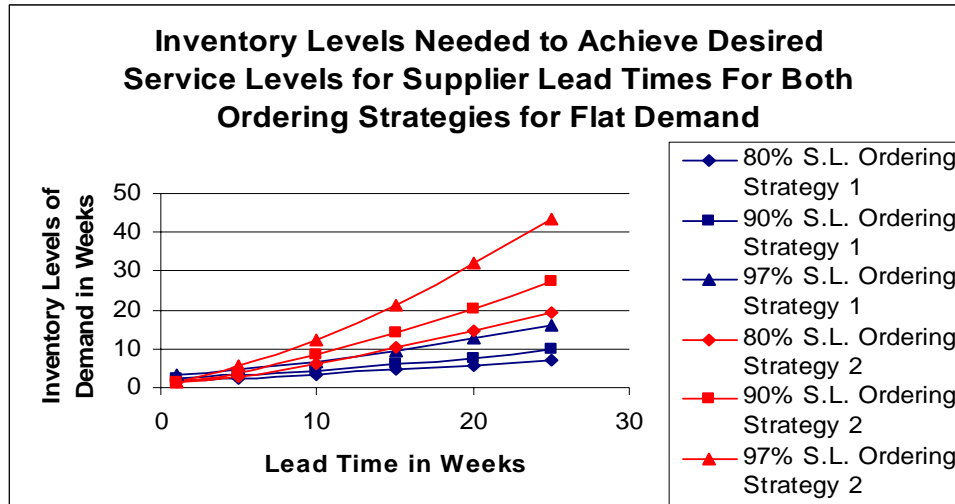


Figure 3.6: Inventory Levels Needed to Achieve Desired Service Levels for Supplier Lead Times for Both Ordering Strategies for Flat Demand

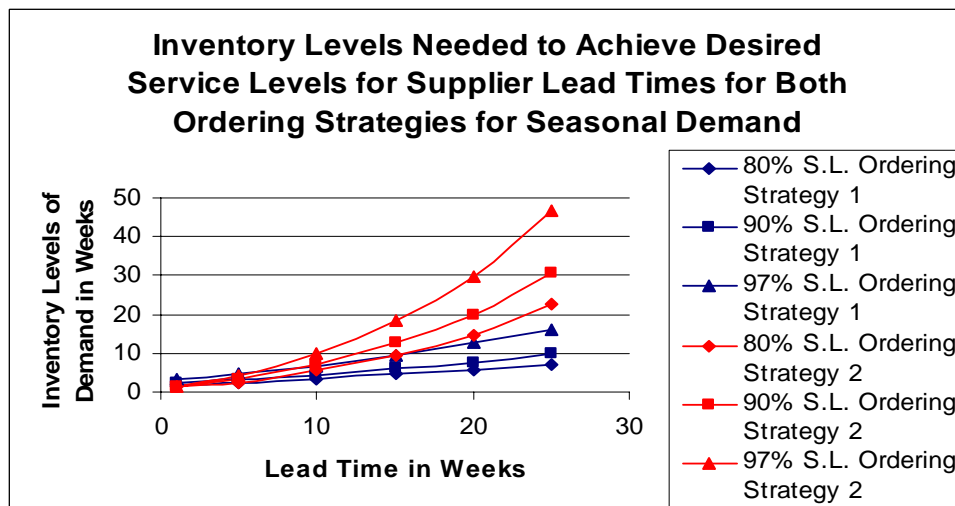


Figure 3.7: Inventory Levels Needed to Achieve Desired Service Levels for Supplier Lead Times for Both Ordering Strategies for Seasonal Demand

3.2.3 Breakeven Cost Analysis

A cost analysis was performed for retailers with suppliers of varying lead times.

Specifically, a formula was used to calculate how much more a retailer could pay a supplier

with shorter lead times in landed costs and still achieve the same margins if fixed ordering costs are negligible. The cost increase is possible because the retailer is paying less to carry inventory with a shorter lead time supplier.

Notation required for this analysis is as follows:

i = inventory carrying costs in \$/\$ of inventory/year

C_j = landed cost (procurement costs) for strategy j

D = yearly demand

I_j = average inventory levels for strategy j

Thus, the total annual inventory carrying costs plus the total annual procurement cost is

$$iC_jI_j + C_jD.$$

Let Strategy 1 be a higher cost, shorter lead time option and Strategy 2 be a lesser cost, longer lead time option. The breakeven point between Strategy 1 and 2 can be expressed as follows:

$$iC_1I_1 + C_1D = iC_2I_2 + C_2D.$$

Rearranging the terms yields

$$C_1(iI_1 + D) = C_2(iI_2 + D),$$

which is equivalent to

$$C_1/C_2 = (iI_2 + D)/(iI_1 + D).$$

Therefore, the percent increase in landed costs for Strategy 1 is

$$(C_1/C_2) - 1 = (iI_2 + D)/(iI_1 + D) - 1$$

Assuming that inventory cost is 20% (i.e. $i=.20$), Figure 3.8 and Table 3.3 show the results of the breakeven analysis for a 90% service level. If a retailer had a supplier with a 25 week lead time, they could pay 10% more per garment for a supplier with a one week lead time or 8.9% more in landed costs per garment for the same garment for a supplier with a

five week lead time and still achieve the same margins. The same trend is also true if a retailer had a supplier with a 15 week lead time and wanted to switch to a supplier with a five week lead time. The retailer could pay 3.9% more in landed costs per garment for the same garment and still achieve the same margins.

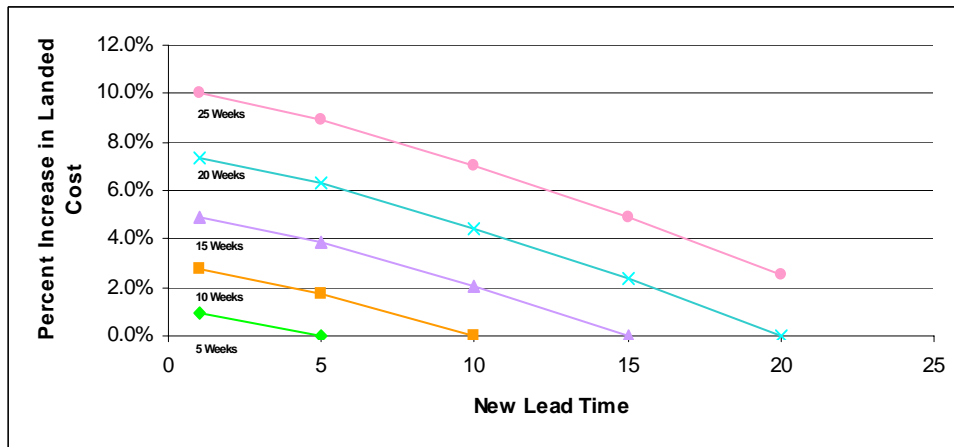


Figure 3.8: Breakeven Analysis of the Increase in Costs Per Garment Retailers Could Pay for Shorter Lead Times for a 90% Service Level

Table 3.3: Breakeven Analysis of the Increase in Costs Per Garment Retailers Could Pay for Shorter Lead Times for a 90% Service Level

New Lead Time	Current Lead Time				
	5 Weeks	10 Weeks	15 Weeks	20 Weeks	25 Weeks
1	1.0%	2.8%	4.9%	7.3%	10.0%
5	0.0%	1.8%	3.9%	6.3%	8.9%
10		0.0%	2.1%	4.4%	7.0%
15			0.0%	2.3%	4.9%
20				0.0%	2.5%

All the results show conservative numbers for inventory levels for various lead times in idealized conditions. This means that the actual percentage increases represent best case scenario. The simulations were run under perfect “idealized” conditions. Such factors as drift and forecasting error were not taken into consideration.

3.3 Drift

The simulations assumed idealized conditions (i.e. no forecasting error, no demand error, or SKU errors). Drift is the variation in SKU mix demanded by the customer from week to week. The next set of experiments looked at the effect of drift on the inventory levels of demand. Simulations were run looking at a drift of 1%, 2.5%, 5%, and 10%. The 1% and 2.5% drift were applied to seasonal and flat demand, and the 5% and 10% were only applied to flat demand. For the 1% drift a 0% range of deviation was applied. For the 2.5%, 5%, and 10% drift, a 2.5% range of drift deviation was applied to the simulations. The range of drift deviation would allow the simulations to look at the effect of drift with 2.5% deviation from the base case. For example with a 5% drift and a 2.5% range of deviation, simulations would allow the actual drift to be between 2.5% and 7.5%.

3.3.1 1% Drift with Flat Demand

For the simulations with a 1% drift and flat demand, Figures 3.9, 3.10, 3.11 and Table 3.4 show that if a retailer has a supplier with longer lead times then they will need to carry more inventory in order to achieve desired service levels. A pattern that developed showed that the higher the service levels and the longer the lead times combine to have more of an effect on the drift. For example, for the 80% service levels, the inventory levels needed were about the same for the drift and the base case (no drift) until the 20 week lead time. Then the inventory levels needed for the drift were slightly lower than the base case. For the 97% service level, at a lead time of 10 weeks the inventory levels needed for the drift start to exceed the levels needed for the base case.

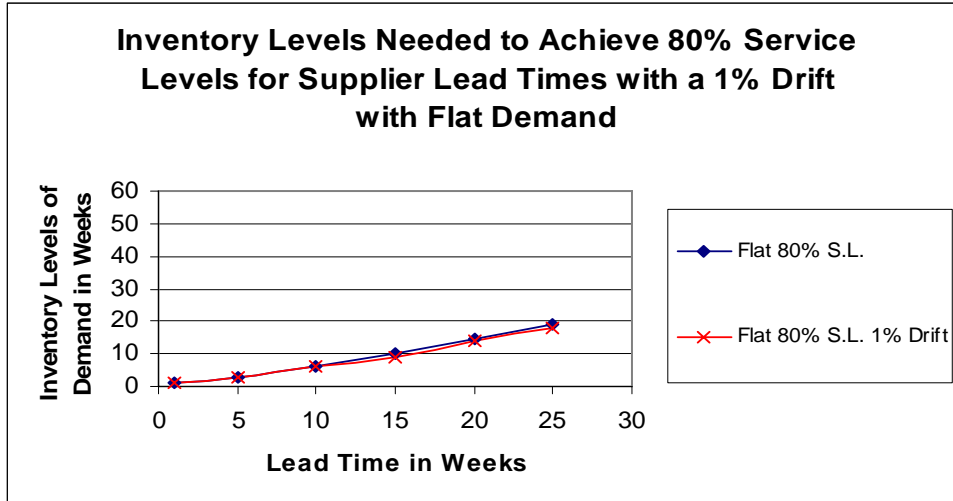


Figure 3.9: Inventory Levels Needed to Achieve 80% Service Levels for Supplier Lead Times with a 1% Drift with Flat Demand

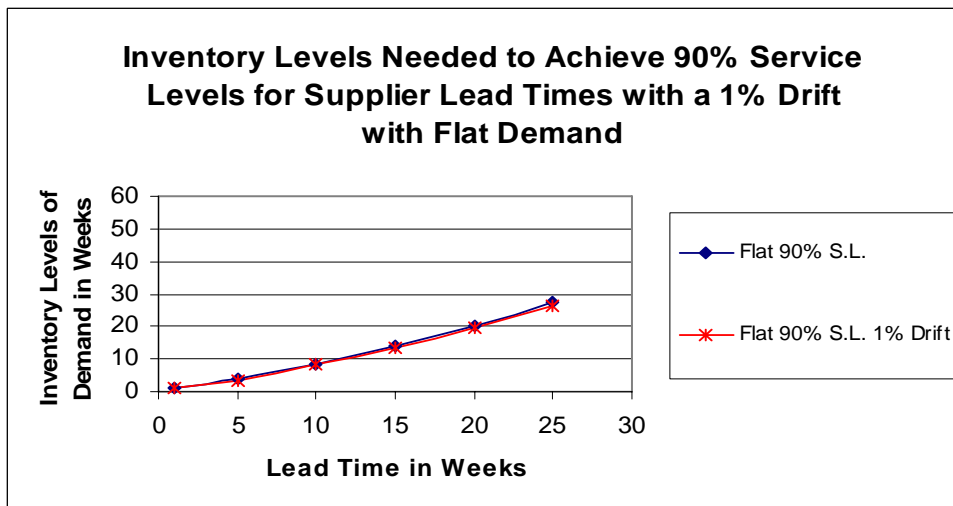


Figure 3.10: Inventory Levels Needed to Achieve 90% Service Levels for Supplier Lead Times with a 1% Drift with Flat Demand

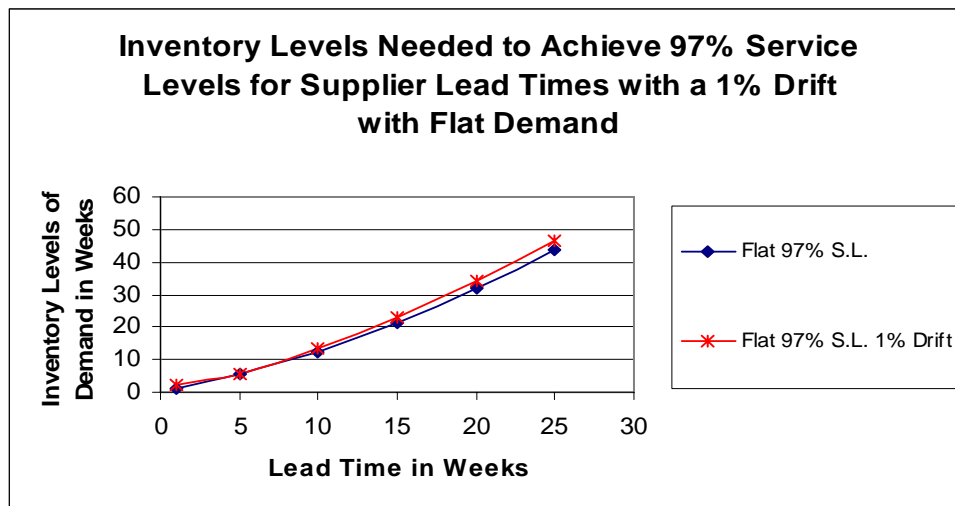


Figure 3.11: Inventory Levels Needed to Achieve 97% Service Levels for Supplier Lead Times with a 1% Drift with Flat Demand

Table 3.4: Inventory Levels Needed to Achieve Desired Service Levels for Supplier Lead Times with a 1% Drift with Flat Demand

Lead Time in Weeks	Inventory Levels of Demand		
	80%	90%	97%
1	1.29	1.31	2.25
5	2.69	3.57	5.83
10	6.08	8.36	13.47
15	9.20	13.49	22.84
20	13.76	19.71	34.14
25	17.83	26.59	46.40

3.3.2 1% Drift with Seasonal Demand

For the simulations with a 1% drift with seasonality, Figures 3.12, 3.13, 3.14 and Table 3.5 shows that if a retailer has a supplier with longer lead times then they will need to carry more inventory in order to meet desired service levels. A pattern that developed showed that the higher the service levels and the longer the lead times combine to have more of an effect on the drift. This can be seen on the difference between the 80% and 97% service levels for a ten week lead time. At the 80% service level the amount of inventory needed for the drift is lower than the standard. At the 97% service level the amount of inventory needed for the drift exceeds the inventory needed for the standard. Also the

seasonality of demand has an effect on the drift. More inventory is needed when there is a seasonality of demand. In general, with only 1% drift there is no real difference.

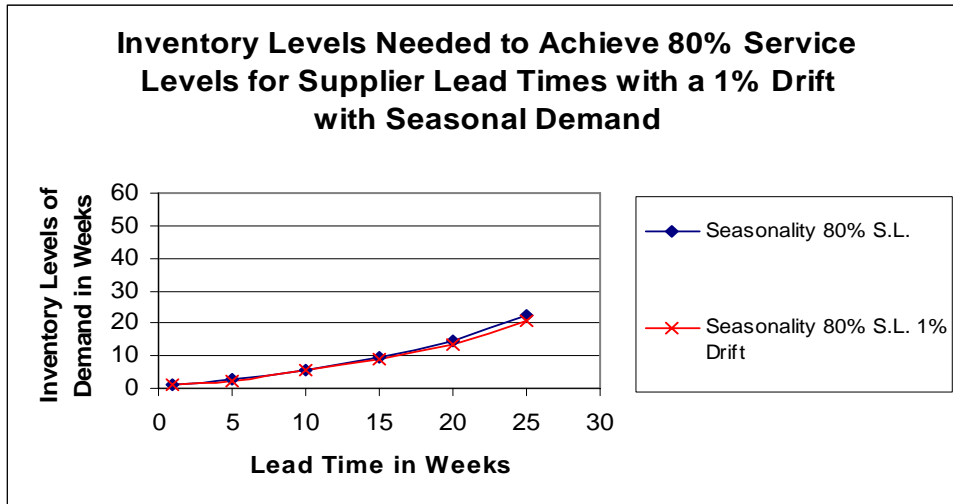


Figure 3.12: Inventory Levels Needed to Achieve 80% Service Levels for Supplier Lead Times with a 1% Drift with Seasonal Demand

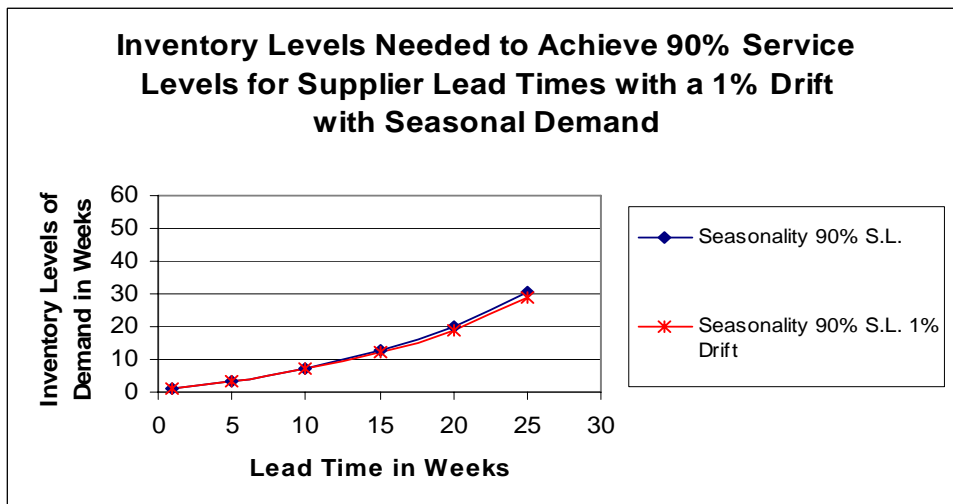


Figure 3.13: Inventory Levels Needed to Achieve 90% Service Levels for Supplier Lead Times with a 1% Drift with Seasonal Demand

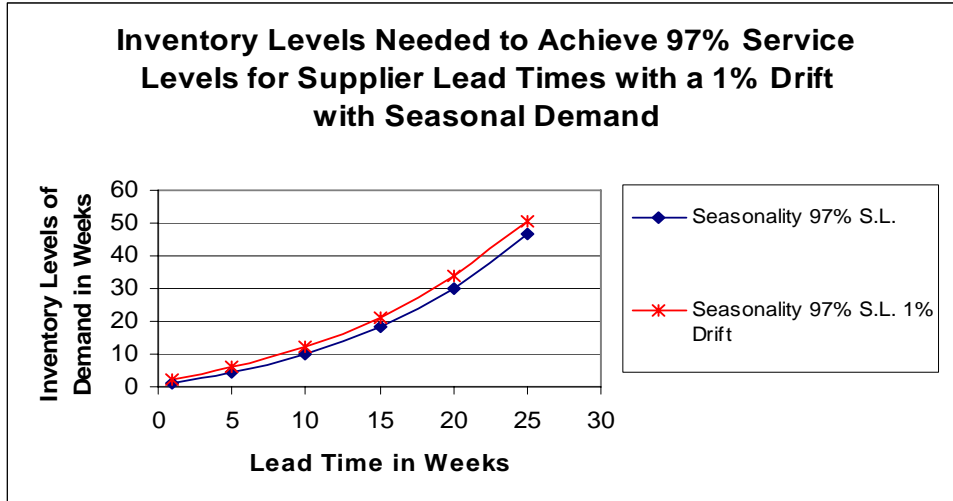


Figure 3.14: Inventory Levels Needed to Achieve 97% Service Levels for Supplier Lead Times with a 1% Drift with Seasonal Demand

Table 3.5: Inventory Levels Needed to Achieve Desired Service Levels for Supplier Lead Times with a 1% Drift with Seasonal Demand

Lead Time in Weeks	Inventory Levels of Demand		
	80%	90%	97%
1	1.29	1.30	2.23
5	2.50	3.22	6.12
10	5.67	7.28	12.04
15	9.14	12.37	21.19
20	13.74	19.07	33.71
25	20.83	28.61	50.45

3.3.3 2.5% Drift with Flat Demand

Figures 3.15, 3.16, 3.17 and Table 3.6 show the results of the simulations for a 2.5% drift with flat demand. As seen in Figure 3.17, inventory levels were not able to be obtained for a 97% service level for lead times of 20 and 25 weeks. The inventory levels that would be required to meet these conditions were so high that it would not be worthwhile for a retailer to try and meet these conditions. The retailer would not be able to make enough of a profit to make it worth trying to meet these conditions. As the amount of drift increases, the inventory levels required increases. Also the drift shows more of a variance from the standard as the amount of drift increases. As can be seen in Figures 3.16 and 3.17, the inventory levels required for the base case for a 97% service level are closer in amount to the

inventory levels required for a 90% service level taking into consideration drift. These figures start to show the significant effect that drift has on inventory levels.

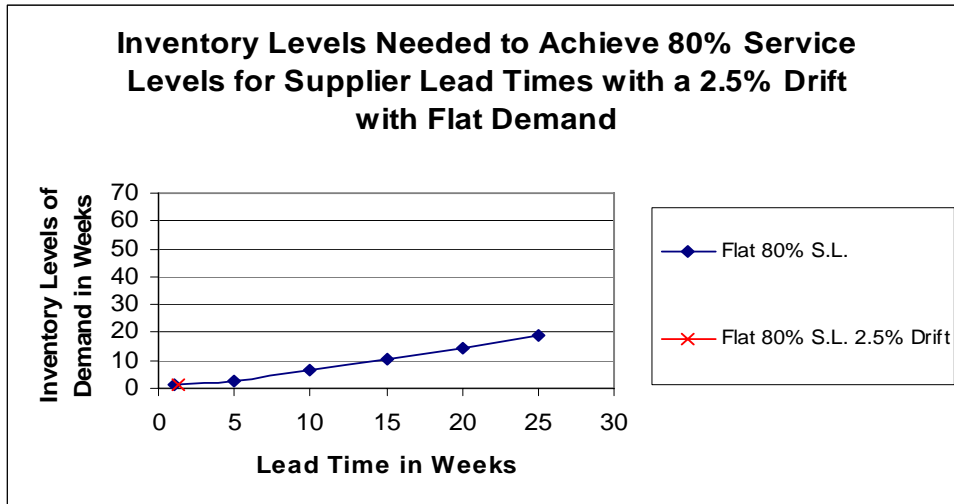


Figure 3.15: Inventory Levels Needed to Achieve 80% Service Levels for Supplier Lead Times with a 2.5% Drift with Flat Demand

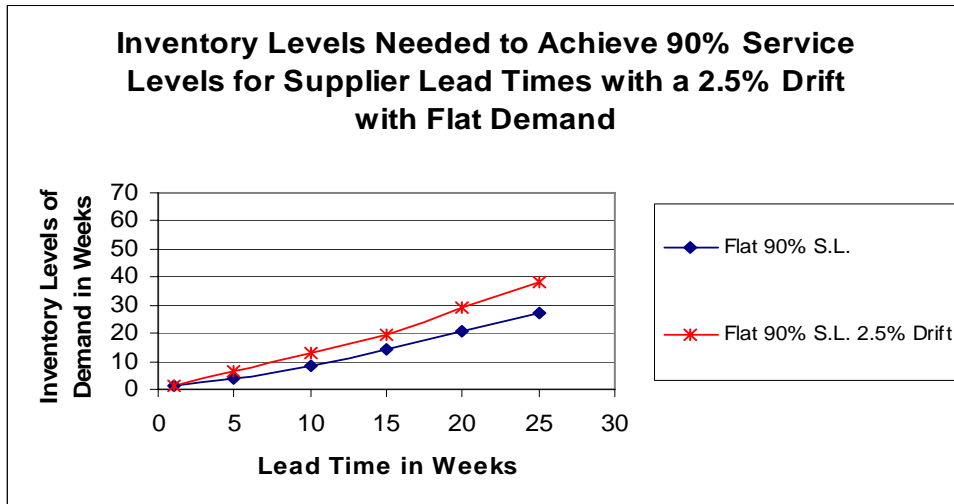


Figure 3.16: Inventory Levels Needed to Achieve 90% Service Levels for Supplier Lead Times with a 2.5% Drift with Flat Demand

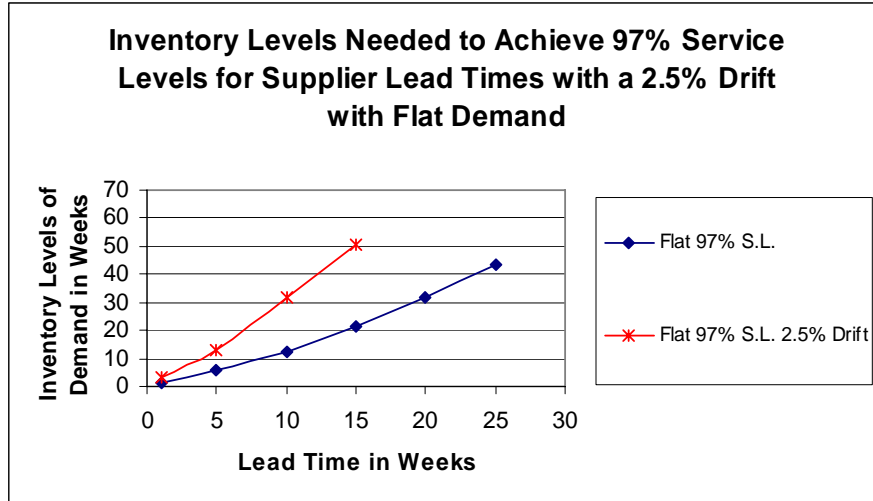


Figure 3.17: Inventory Levels Needed to Achieve 97% Service Levels for Supplier Lead Times with a 2.5% Drift with Flat Demand

Table 3.6: Inventory Levels Needed to Achieve Desired Service Levels for Supplier Lead Times with a 2.5% Drift with Flat Demand

Lead Time in Weeks	Inventory Levels of Demand		
	80%	90%	97%
1	1.36	1.36	3.32
5	3.46	6.19	12.73
10	7.80	12.71	31.44
15	11.99	19.56	50.37
20	16.93	29.18	*
25	22.10	38.07	*

* Signifies that Inventory Levels of Demand Were Unable to Be Obtained

3.3.4 2.5% Drift with Seasonal Demand

Figures 3.18, 3.19, 3.20 and Table 3.7 show the effect of 2.5% drift with seasonal demand. For Figures 3.20, the inventory levels for a 97% service level for 20 and 25 week lead times were not able to be obtained. The inventory levels that would be required to meet these conditions would be too high to make it worth the retailer trying to meet these conditions. They would not be able to make enough of a profit to make it worth trying to attain these levels. These figures also illustrate the significant effect that seasonality has on the inventory levels. Again, the results show the inventory levels required for the base case for a 97% service level are closer in amount to the inventory levels required for a 90%

service level taking into consideration drift.

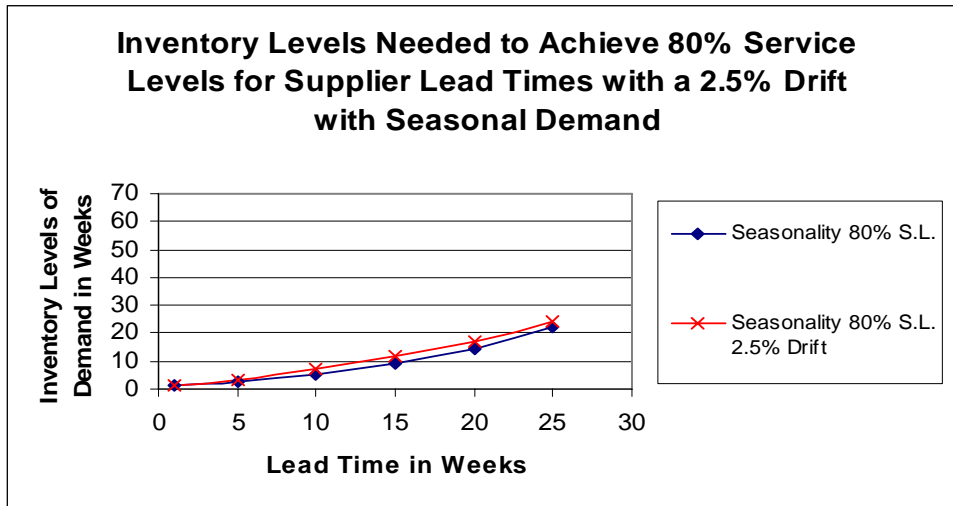


Figure 3.18: Inventory Levels Needed to Achieve 80% Service Levels for Supplier Lead Times with a 2.5% Drift with Seasonal Demand

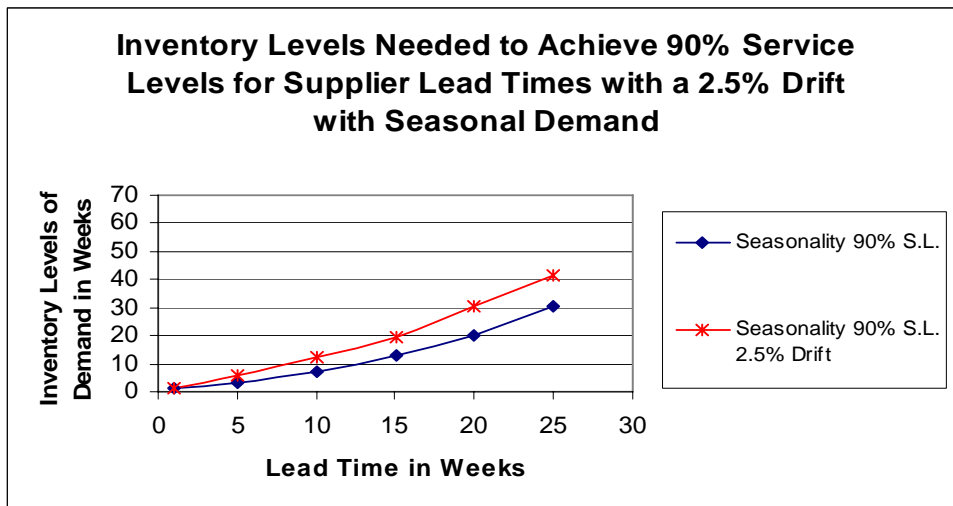


Figure 3.19: Inventory Levels Needed to Achieve 90% Service Levels for Supplier Lead Times with a 2.5% Drift with Seasonal Demand

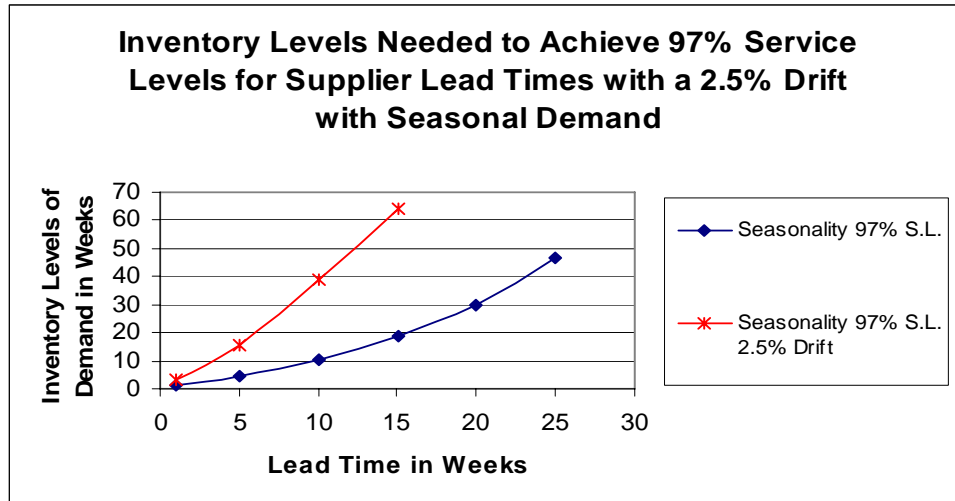


Figure 3.20: Inventory Levels Needed to Achieve 97% Service Levels for Supplier Lead Times with a 2.5% Drift with Seasonal Demand

Table 3.7: Inventory Levels Needed to Achieve Desired Service Levels for Supplier Lead Times with a 2.5% Drift with Seasonal Demand

Lead Time in Weeks	Inventory Levels of Demand		
	80%	90%	97%
1	1.35	1.35	3.33
5	3.37	6.07	15.56
10	7.43	12.19	38.91
15	11.59	19.56	64.10
20	16.73	30.58	*
25	23.89	41.42	*

* Signifies that Inventory Levels of Demand Were Unable to Be Obtained

3.3.5 5% Drift with Flat Demand

Figures 3.21, 3.22, 3.23 and Table 3.8 show the inventory levels needed to achieve desired service levels for supplier lead times with a 5% drift with flat demand. Inventory levels were unable to be obtained for 97% service levels for 10, 15, 20, and 25 week lead times using the Sourcing Simulator™. The inventory levels that would be required to meet these conditions would be too high to make it worth the retailer trying to meet these conditions. They would not be able to make enough of a profit to make it worth trying to attain these provisions. Through the use of regression, extrapolation was performed to calculate the inventory levels that would be required to meet a 97% service level. The

change in marker and line color signify the numbers that were extrapolated using regression. Figure 3.23 shows that it would take over 300 weeks of inventory in order to meet a 97% service level for a 25 week lead time. Again, the results show the inventory levels required for the base case for a 97% service level are closer in amount to the inventory levels required for an 80% service level taking into consideration drift.

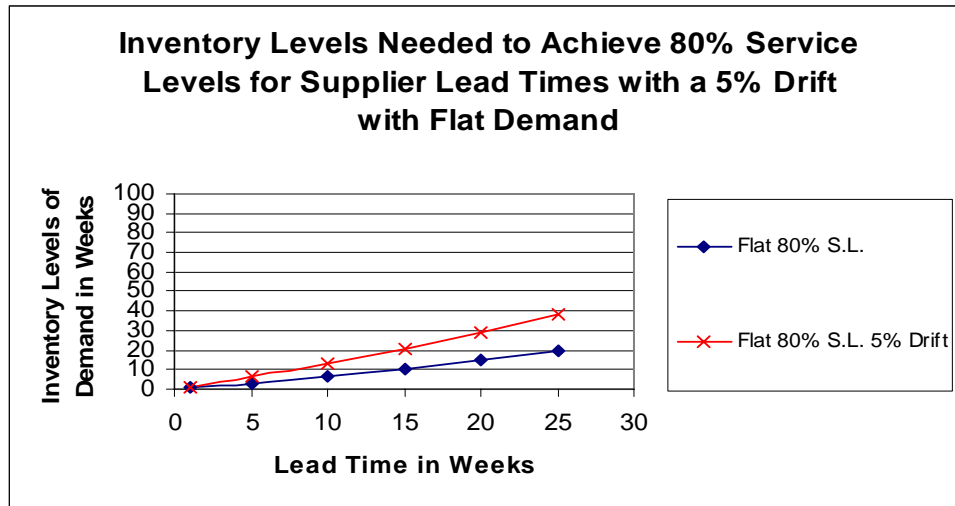


Figure 3.21: Inventory Levels Needed to Achieve 80% Service Levels for Supplier Lead Times with a 5% Drift with Flat Demand

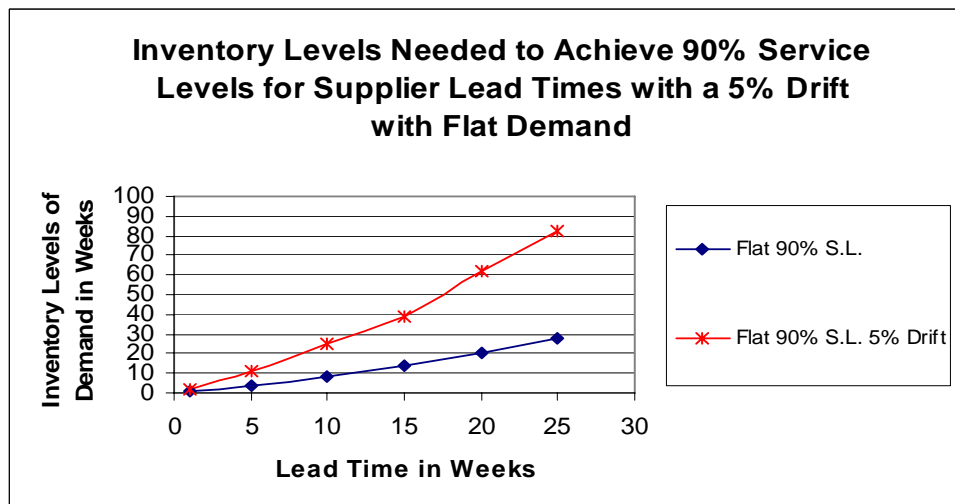


Figure 3.22: Inventory Levels Needed to Achieve 90% Service Levels for Supplier Lead Times with a 5% Drift with Flat Demand

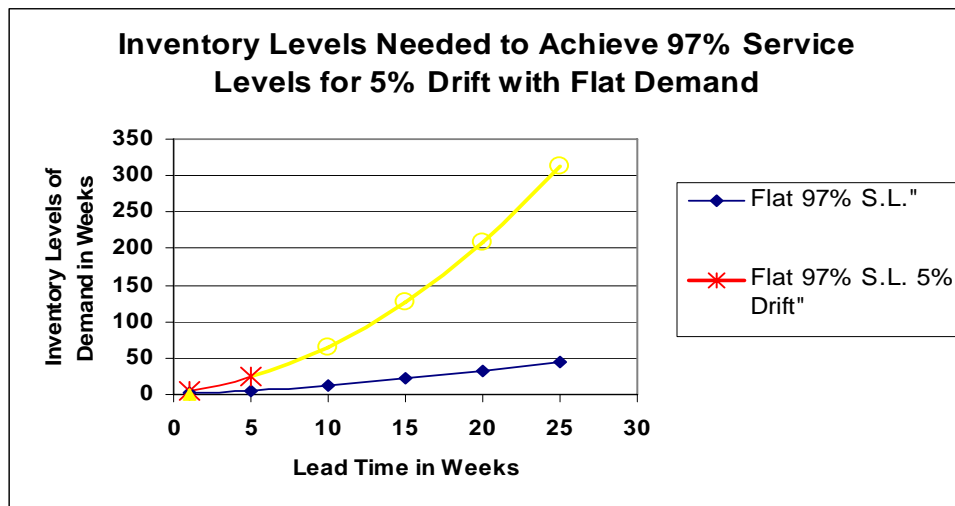


Figure 3.23: Inventory Levels Needed to Achieve 97% Service Levels for Supplier Lead Times with a 5% Drift with Flat Demand

Table 3.8: Inventory Levels Needed to Achieve Desired Service Levels for Supplier Lead Times with a 5% Drift with Flat Demand

Lead Time in Weeks	Inventory Levels of Demand		
	80%	90%	97%
1	1.36	2.24	4.39
5	6.15	11.15	25.88
10	13.22	25.19	63.70
15	20.73	39.22	126.30
20	29.43	61.99	209.40
25	38.38	82.69	313.00

Number Signifies Inventory Levels of Demand That Were Extrapolated

A cost analysis was performed for retailers with suppliers of varying lead times, similar to that described in Section 3.2.3. Figure 3.24 and Table 3.9 show if a retailer had a supplier with a 25 week lead time they could pay 30.7% more per garment for a supplier with a one week lead time to meet a 90% service level or 26.4% more in landed costs per garment for a supplier with a five week lead time to meet a 90% service level and still achieve the same margins. The same pattern is also true if a retailer had a supplier with a 15 week lead time and wanted to switch to a supplier with a five week lead time. The retailer could pay 10.3% more in landed costs per garment for the same garment and still achieve the same margins. Note these numbers are higher than the base case in Table 3.3.

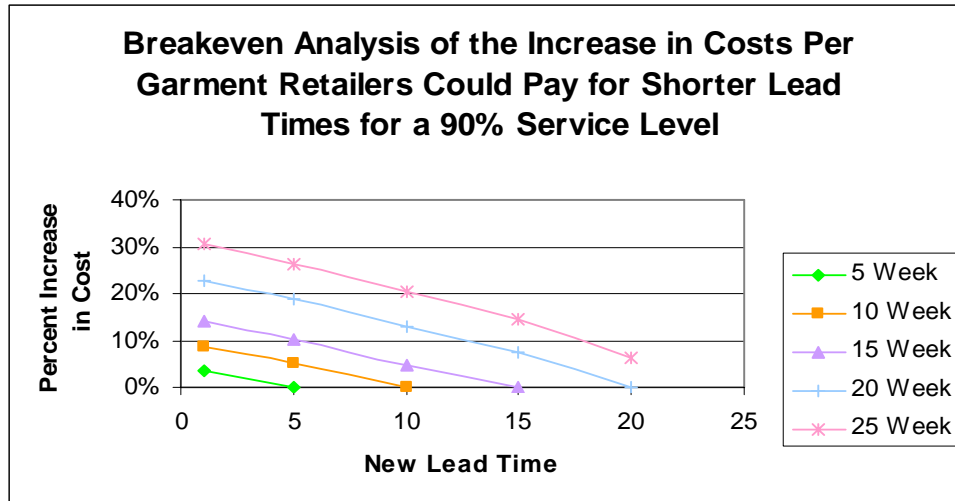


Figure 3.24: Breakeven Analysis of the Increase in Costs per Garment Retailers Could Pay for Shorter Lead Times for a 90% Service Level

Table 3.9: Breakeven Analysis of the Increase in Costs Per Garment Retailers Could Pay for Shorter Lead Times for a 90% Service Level

New Lead Time	Current Lead Time				
	5 Weeks	10 Weeks	15 Weeks	20 Weeks	25 Weeks
1	3.4%	8.7%	14.1%	22.8%	30.7%
5	0.0%	5.2%	10.3%	18.7%	26.4%
10		0.0%	4.9%	12.9%	20.2%
15			0.0%	7.6%	14.5%
20				0.0%	6.4%

3.3.6 10% Drift with Flat Demand

Figures 3.25, 3.26, 3.27 and Table 3.10 show the inventory levels needed to achieve desired service levels for supplier lead times with a 10% drift with flat demand. Service levels were unable to be obtained for a 90% service level for 15, 20, and 25 week lead times as well as the five to 25 week lead times for a 97% service level. The inventory levels that would be required to meet these conditions would be too high to make it worth the retailer trying to meet these conditions. They would not be able to make enough of a profit to make it worth trying to attain these provisions. The results for the 80% service level for a 10% drift far surpass the results for the 97% service level for the base case.

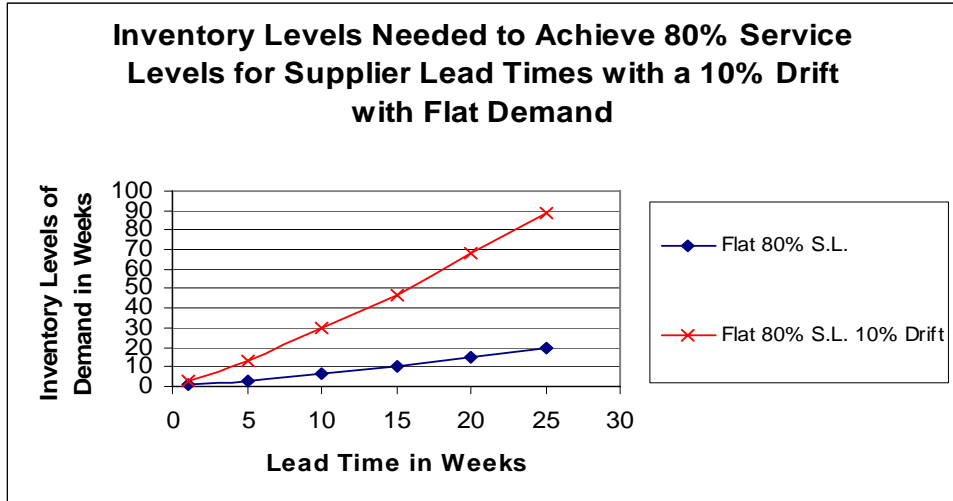


Figure 3.25: Inventory Levels Needed to Achieve 80% Service Levels for Supplier Lead Times with a 10% Drift with Flat Demand

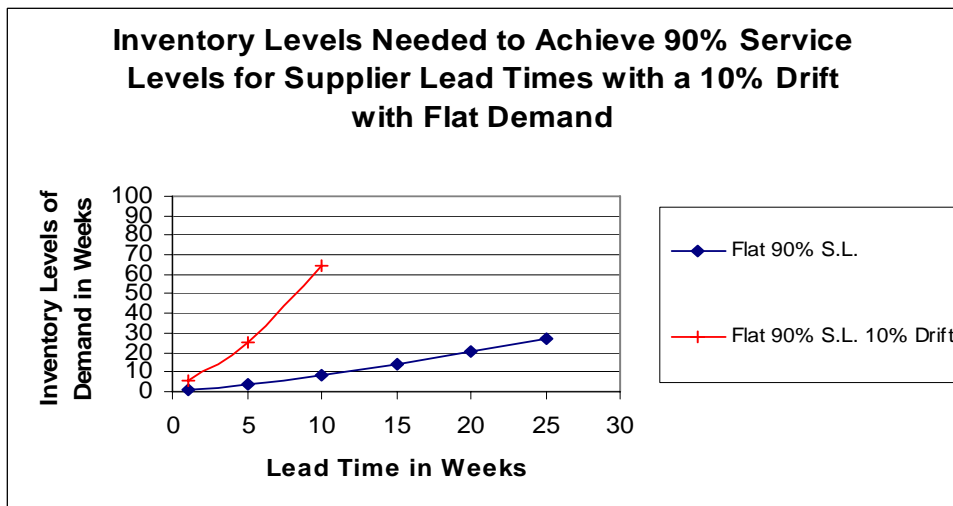


Figure 3.26: Inventory Levels Needed to Achieve 90% Service Levels for Supplier Lead Times with a 10% Drift with Flat Demand

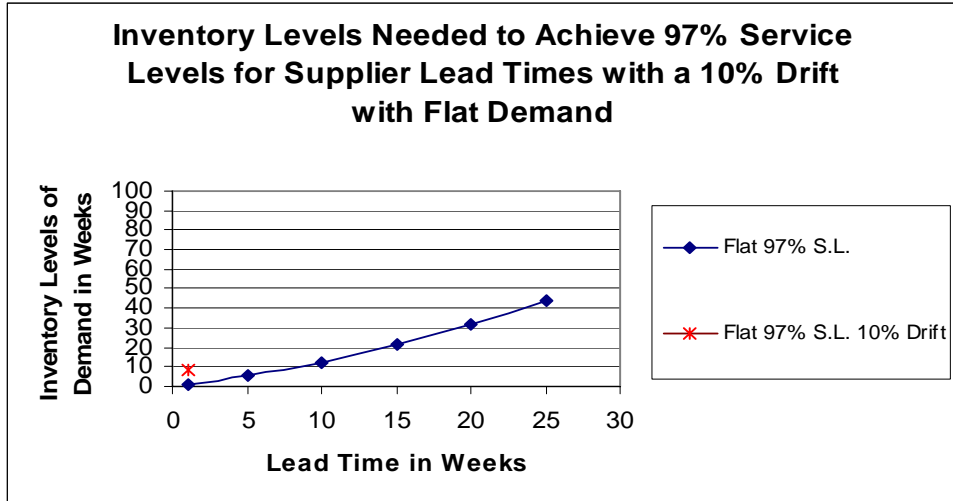


Figure 3.27: Inventory Levels Needed to Achieve 97% Service Levels for Supplier Lead Times with a 10% Drift with Flat Demand

Table 3.10: Inventory Levels Needed to Achieve Desired Service Levels for Supplier Lead Times with a 10% Drift with Flat Demand

Lead Time in Weeks	Inventory Levels of Demand		
	80%	90%	97%
1	3.24	5.43	8.75
5	13.07	25.40	*
10	29.58	64.42	*
15	46.32	*	*
20	67.79	*	*
25	88.89	*	*

* Signifies that Inventory Levels of Demand Were Unable to Be Obtained

3.4 Results of Simulations-Forecasting Error

Forecasting Error is the difference between the expected demand and the actual demand for a garment each week, (the weekly volume error). In the next experiment, four different forecasting error scenarios were analyzed: 10% forecasting error with flat demand, 10% forecasting error with seasonal demand, 20% forecasting error with flat demand, and 20% forecasting error with seasonal demand. A 10% forecasting error is an average 10% difference between the forecasted demand and the actual demand as seen in Figures 3.28 and 3.29. Seasonality was taken into consideration with two of the scenarios to see if seasonal demand plays a significant role in the amount of inventory needed to meet service levels.

The original forecast was used as the mean to a base case normal distribution to produce noise about the original point.

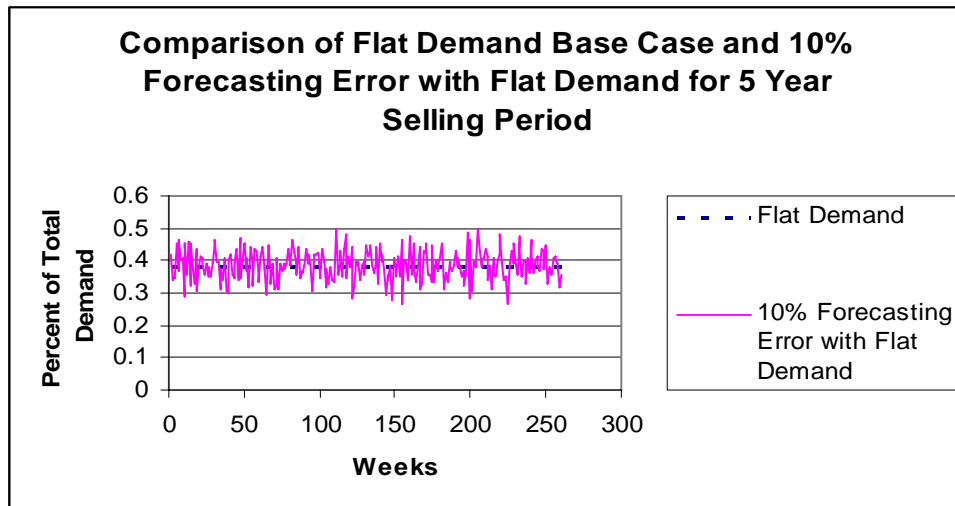


Figure 3.28: Comparison of Flat Demand Base Case and 10% Forecasting Error with Flat Demand for 5 Year Selling Period

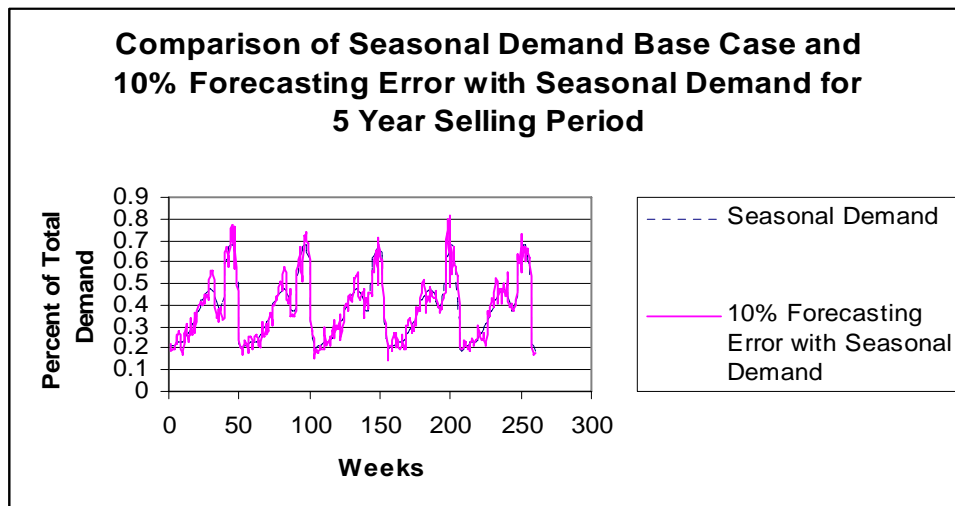


Figure 3.29: Comparison of Seasonal Demand Base Case and 10% Forecasting Error with Seasonal Demand for 5 Year Selling Period

The results of a 10% forecasting error with flat demand are shown in Figure 3.30. This shows there is not a significant difference between the 10% forecasting error and the base case, (the variance between forecasted demand and the actual demand). This is believed to be caused by the forecasting error being neutralized over the five year period. The

simulations took the average of the number over the five year period, and any positives or negatives in the forecasting error zeroed each other out.

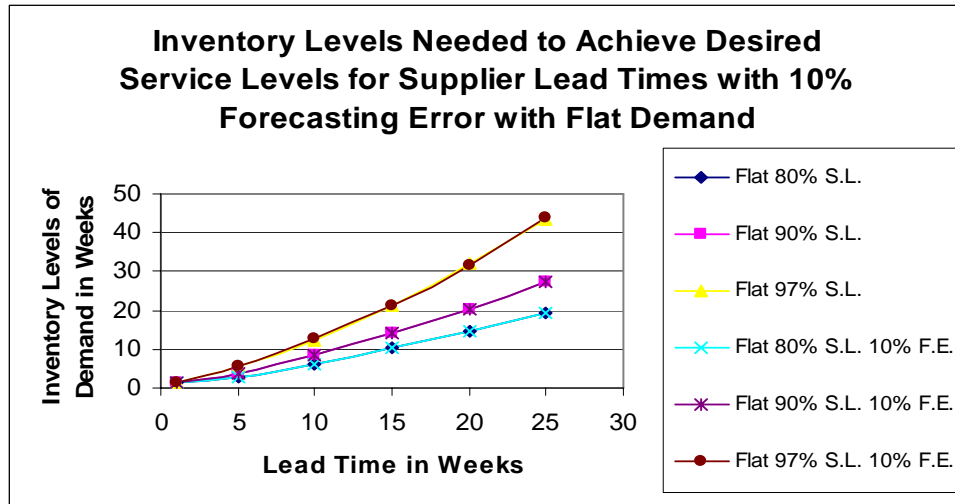


Figure 3.30: Inventory Levels Needed to Achieve Desired Service Levels for Supplier Lead Times with a 10% Forecasting Error with Flat Demand

With a 10% forecasting error with seasonal demand, as shown in Figure 3.31, there are some differences. For the 90% service level at the 10 and 15 week lead time, the 10% forecasting error case showed slightly better results than the base case. At the 25 week lead time, the base case had slightly better results. For the 97% service level at the 10, 15, and 20 week lead times, the forecasting error case had slightly better numbers than the base case. Then at the 25 week lead time, the base case had slightly better numbers. However, the numbers were not significant. These results are believed to be caused by the forecasting error being neutralized over the five year period. The simulations took the average of the number over the five year period, and any positives or negatives in the forecasting error zeroed each other out.

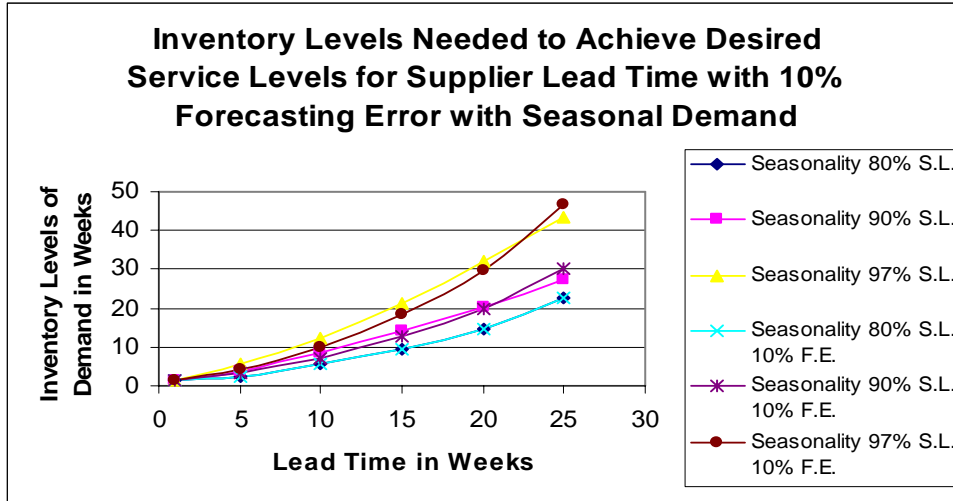


Figure 3.31: Inventory Levels Needed to Achieve Desired Service Levels for Supplier Lead Time with 10% Forecasting Error with Seasonal Demand

Figure 3.32 shows the results of a 20% forecasting error with flat demand. There are no significant difference between the 20% forecasting error and the base case. It is believed to be caused by the forecasting error being neutralized over the five year period. The simulations took the average of the number over the five year period, and any positives or negatives in the forecasting error zeroed each other out.

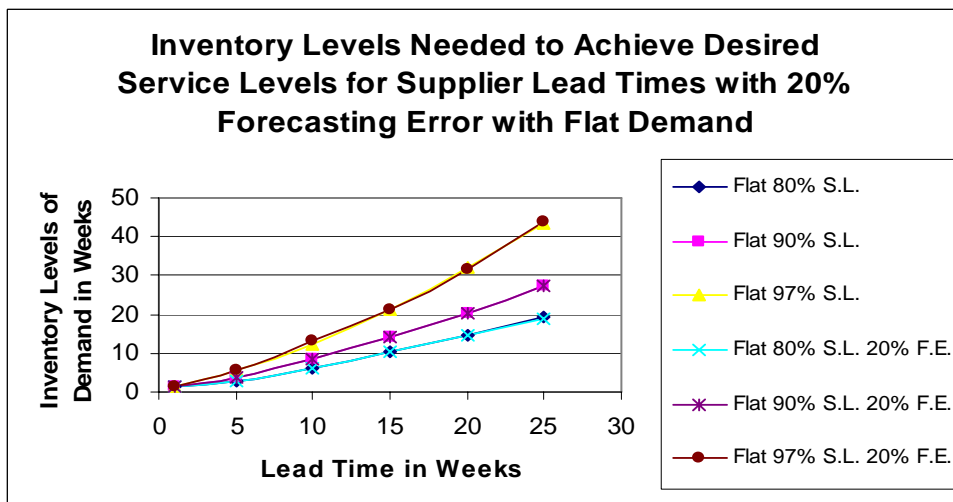


Figure 3.32: Inventory Levels Needed to Achieve Desired Service Levels for Supplier Lead Times with 20% Forecasting Error with Flat Demand

Figure 3.33 shows the results of a 20% forecasting error with seasonal demand.

There are no significant differences between the 20% forecasting error and the base case. This is a result of the forecasting error being neutralized over the five year period. The simulations took the average of the number over the five year period, and any positives or negatives in the forecasting error zeroed each other out.

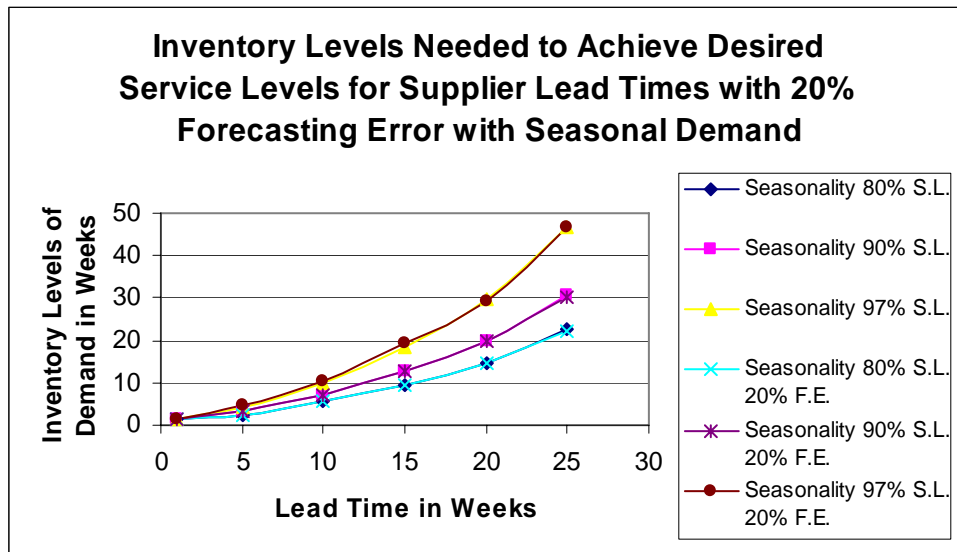


Figure 3.33: Inventory Levels Needed to Achieve Desired Service Levels for Supplier Lead Times with 20% Forecasting Error with Seasonal Demand

Since the previous forecast errors were created using the mean, no biases existed in the data. The demand generated was equally above and below the forecast. Therefore, the sum of the errors was affectively zero. Figure 3.34 shows a new demand pattern with biases introduced. This represents just one possible pattern.

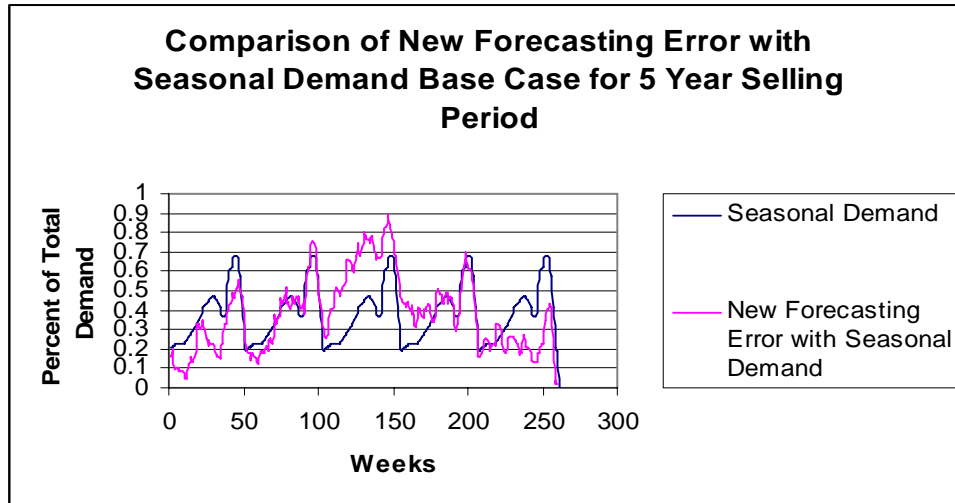


Figure 3.34: Comparison of New Forecasting Error with Seasonal Demand Base Case for 5 Year Selling Period

Figures 3.35, 3.36, and 3.37 show the results of forecasting error with seasonal demand. They reveal that if a retailer has a supplier with longer lead times then they will need to carry more inventory in order to meet the desired service levels. Figure 3.35 shows the inventory levels needed to achieve supplier lead times for an 80% service level with seasonal demand with forecasting error. For the 80% service level there is not a significant difference in the amount of inventory needed between the base case and the forecasting error case.

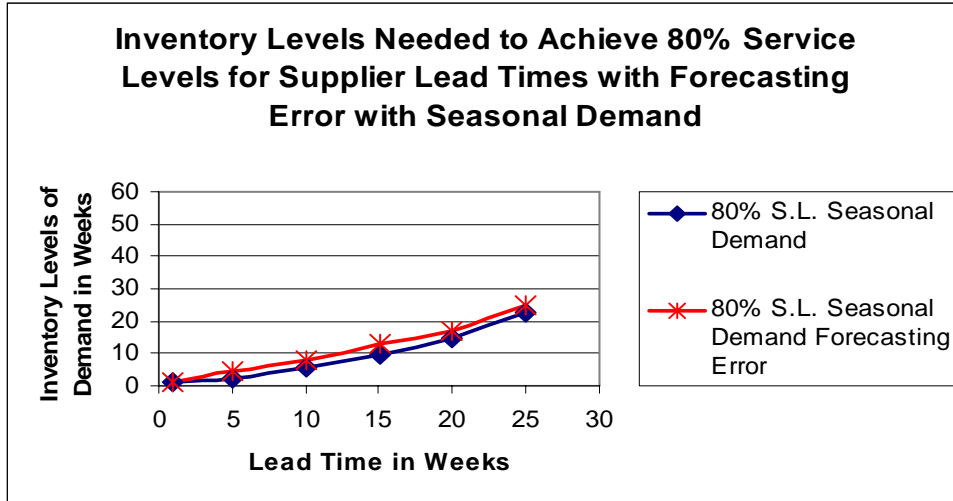


Figure 3.35: Inventory Levels Needed to Achieve 80% Service Levels for Supplier Lead Times with Forecasting Error with Seasonal Demand

Figure 3.36 shows the inventory levels needed to achieve 90% service levels for supplier lead times with forecasting error with seasonal demand. At a lead time of five weeks there is starting to be a difference between the base case and the forecasting error. As the lead time increases, more inventory is needed to achieve desired service levels. At the 20 week lead time, there is a slight dip in the amount of inventory needed, and then it goes back up for the 25 week lead time.

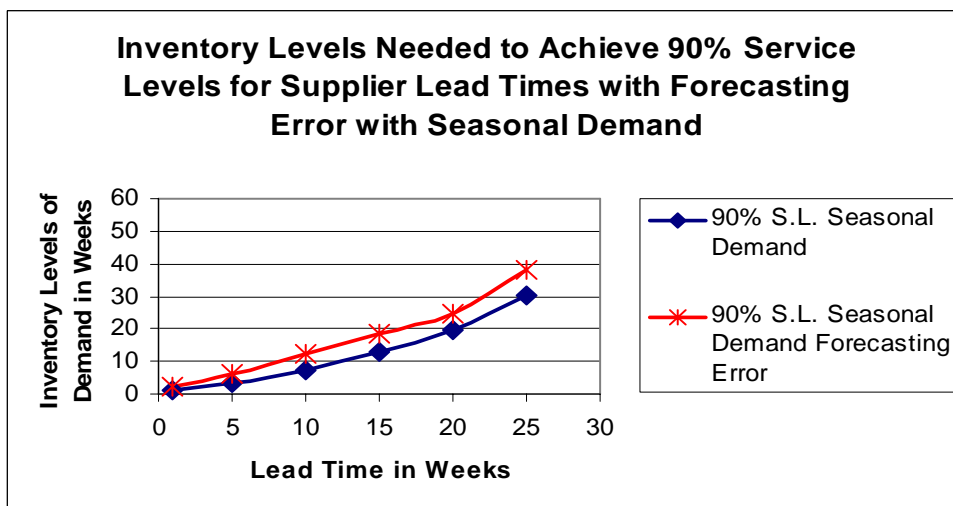


Figure 3.36: Inventory Levels Needed to Achieve 90% Service Levels for Supplier Lead Times with Forecasting Error with Seasonal Demand

Figure 3.37 shows the inventory levels needed to achieve 97% service levels for supplier lead times with forecasting error with seasonal demand. As the lead time increases, more inventory is needed in order to achieve service levels. This is because it would take longer to receive a replenishment from a supplier with a longer lead times. Therefore more initial inventory is carried in order to maintain service levels until the retailer can receive a replenishment. At the 20 week lead time, there is a slight dip in the amount of inventory needed, then it goes back up for the 25 week lead time.

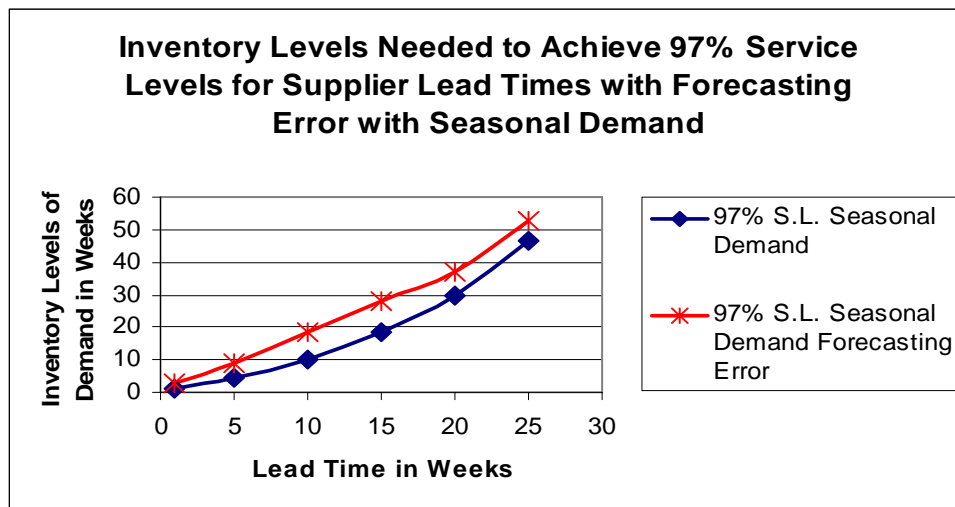


Figure 3.37: Inventory Levels Needed to Achieve 97% Service Levels for Supplier Lead Times with Forecasting Error with Seasonal Demand

The same cost analysis was performed for retailers with suppliers of varying lead times similar to that described in Section 3.2.3. Figure 3.38 and Table 3.11 show if a retailer had a supplier with a 25 week lead time they could pay 13.8% more per garment for a supplier with a one week lead time for a 90% service level or 12.0% more in landed costs per garment for the same garment for a supplier with a five week lead time for a 90% service level and still achieve the same margins. The same is also true if a retailer had a supplier with a 15 week lead time and wanted to switch to a supplier with a five week lead time. The retailer could pay 4.7% more in landed costs per garment for the same garment and still

achieve the same margins. Again, these numbers are higher than in the base case in Table 3.3.

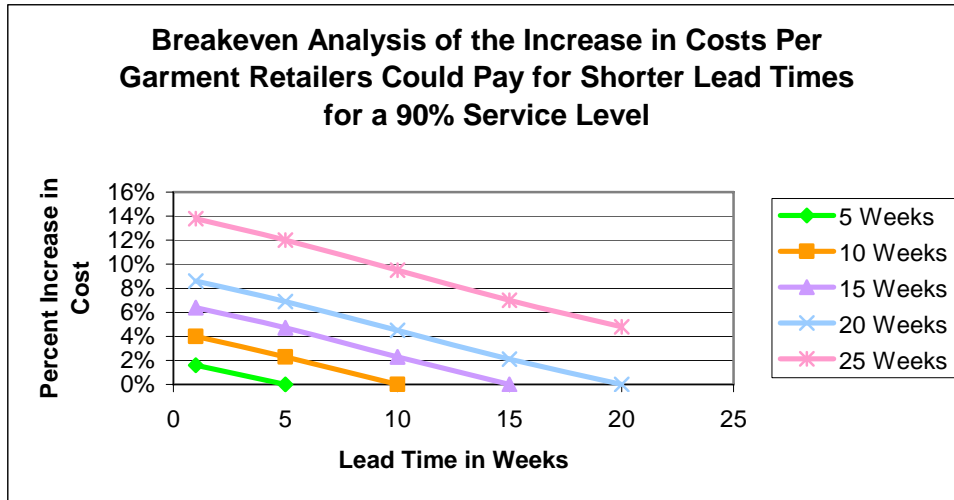


Figure 3.38: Breakeven Analysis of the Increase in Costs Per Garment Retailers Could Pay for Shorter Lead Times for a 90% Service Level

Table 3.11: Breakeven Analysis of the Increase in Costs Per Garment Retailers Could Pay for Shorter Lead Times for a 90% Service Level

New Lead Time	Current Lead Time				
	5 Weeks	10 Weeks	15 Weeks	20 Weeks	25 Weeks
1	1.6%	4.0%	6.4%	8.6%	13.8%
5	0.0%	2.3%	4.7%	6.9%	12.0%
10		0.0%	2.3%	4.5%	9.5%
15			0.0%	2.1%	7.0%
20				0.0%	4.8%

4.0 Methodology and Results for Seasonal Simulations

Seasonal merchandise is merchandise that has a limited selling season. Usually a seasonal item is based on a holiday or a time of year such as winter. Examples of seasonal items are bathing suits or parkas. Seasonal garments have different characteristics than basic garments. Therefore, it was important to study the effect of the special characteristics of seasonal garments. The main difference between seasonal and basic garments is that seasonal garments have a shorter selling season. This makes it imperative that retailers have a good forecasting plan. If the forecasting plan is inaccurate, then the retailer will lose money in the form of lost sales or markdowns on surplus merchandise. One way to counterbalance a poor forecasting plan is to have a supplier that can provide replenishments during the selling season. The supplier must be a quick response manufacturer and have shorter lead times in order to provide replenishments during the abbreviated selling season.

4.1 Ordering Strategy Methodology

A men's seasonal pant was studied with a selling season of 20 weeks. For the seasonal simulations, four ordering scenarios were studied. Ordering strategy one looked at the effect of no reorders during the selling season. This is a traditional method of ordering merchandise. All inventory is purchased and carried in the stores prior to the start of the selling season. The results from this ordering strategy are used as a base case when comparing the other strategies. With no reorders, lead times were not taken into consideration. The second ordering strategy looked at the effect of one reorder. Ordering strategy three studied the outcome of having two reorders. Ordering strategy four considered

the effect of having three reorders. It was trying to be determined if having a third reorder during the selling season would have a significant difference over having two reorders, or if the additional costs of a third reorder would offset any advantages gained.

With at least one reorder during the selling season, a retailer does not have to carry as much initial inventory. They can place a reorder during the selling season for merchandise that has sold well based on point-of-sale data. This helps to increase the margins and service levels by having a more accurate forecast of the SKUs that will sell well during the season. The retailer will have a better guess of what will sell well during the season, and they can order more of the needed inventory to help prevent lost sales. Also by carrying less initial inventory, they will not have as much merchandise to markdown from errors in the forecasting.

For each ordering strategy except the first, four different initial amounts of inventory were considered: 20%, 40%, 60%, and 80%. For a 60% initial inventory, 60% of the planned amount of merchandise was carried in the store prior to the start of the selling season, and the rest of the needed merchandise was ordered during the selling season. For the second, third, and fourth ordering strategies, three different supplier lead times were also studied: 1, 5, and 10 weeks. For each initial inventory, 20%, 40%, 60%, and 80%, the optimal week of reorder was found. The optimal week of first reorder was determined by systematically increasing the number of weeks, in increments of one, until the week that produced the highest overall service level was identified.

The metrics that were used to evaluate each ordering strategy were the overall service level, average inventory, gross margin, and adjusted gross margin produced under the given conditions. Gross margin is the total revenue-cost of goods. Adjusted gross margin is the

gross margin-inventory carrying costs-handling costs-shipping costs-ordering costs-program overhead.

4.2 Analysis of Service Levels

Table 4.1 presents the service levels obtained for each strategy. The first number in parenthesis indicates the best week of first reorder while the second number indicates the best number of weeks between reorders. For example, the best service level obtained for a 60% initial inventory with a one week lead time and 2 reorders was with the first reorder being placed on week one and four weeks between reorders. As seen in Table 4.1, the overall service level is considerably smaller for the traditional method than the service levels that are able to be obtained with at least one reorder. The only service levels that are lower than the service level obtained for the traditional method are the service levels for the 20% initial inventory with a lead time of 10 weeks, which is a strategy that is unlikely to be used since it plans to have less in stock during the first 10 weeks than the expected demand of 50%.

For ordering strategy two, for all initial inventories and all lead times, the optimal week to reorder was week one with the exception for the 60% initial inventory for a lead time of one week, and the 40% initial inventory for a lead time of one week. For the 60% initial inventory for one week, the best week to reorder was week five, while for the 40% initial inventory for one week, the best week to reorder was week two. For two reorders, the best week to reorder was in week one with four weeks between reorders. This was true for all initial inventories and all lead times except for the 20% initial inventory for lead times of 5 and 10. For these lead times the best weeks between reorders was one week. For ordering strategy four, with the exclusion of a 20% initial inventory with lead times of 5 and 10

weeks, all the initial inventories and lead times had the best week of first reorder as being week one and the best number of weeks between reorders being two. One explanation for week one being the best week of first reorder in most instances is that enough information was obtained in most situations about the actual demand during first week. Receiving an order that took into account actual demand information quickly outweighed obtaining additional information about the actual demand.

With one exclusion, the best service levels for a particular initial inventory level and lead time combination were obtained when using the third or fourth ordering strategy. In most cases, there was not a difference between the service levels obtained for these strategies. When there were any differences in the ordering strategies, ordering strategy four usually was slightly better. However, the differences were not significant.

Two patterns were also identified. One pattern was that the best service levels were attained with larger amounts of initial inventory, 80% and 60%. This can be explained by the fact that the lower initial inventory did not give the stores enough inventory to meet the demand for the merchandise leading to stockouts since the actual demand was higher than expected. Also the higher the lead time, the lower the service level that could be obtained. This is because the retailer would not be able to receive replenishments soon enough to prevent lost sales from not having the needed merchandise unless they carried a lot of initial inventory. For the 60%, 40%, and 20% initial inventories, a lead time of 10 weeks produced low service levels, which many would be considered unacceptable. The results followed the pattern that the service levels decreased as the initial inventory decreased and the lead times increased.

Table 4.1: Service Levels for Seasonal Product

Traditional	0 Reorders		
	58.3%		
	1 Reorder	2 Reorders	3 Reorders
80% Initial			
LT1	97.7% (1, 0)	99.1% (1, 4)	99.1% (1, 2)
LT5	93.9% (1, 0)	97.7% (1, 4)	97.7% (1, 2)
LT10	84.1% (1, 0)	85.5% (1, 4)	85.8% (1, 2)
60% Initial			
LT1	96.0% (5, 0)	98.9% (1, 4)	98.9% (1, 2)
LT5	92.4% (1, 0)	96.0% (1, 4)	96.0% (1, 2)
LT10	77.8% (1, 0)	78.6% (1, 4)	78.9% (1, 2)
40% Initial			
LT1	95.0% (2, 0)	98.8% (1, 4)	98.8% (1, 2)
LT5	89.5% (1, 0)	91.0% (1, 4)	91.0% (1, 2)
LT10	68.8% (1, 0)	69.2% (1, 4)	69.3% (1, 2)
20% Initial			
LT1	93.9% (1, 0)	98.2% (1, 4)	98.2% (1, 2)
LT5	83.4% (1, 0)	83.1% (1, 1)	82.4% (1, 1)
LT10	57.6% (1, 0)	57.7% (1, 1)	57.7% (1, 1)

4.3 Analysis of Inventory Levels of Demand

The previous section looked at the service levels obtained for the best replenishment strategy. Table 4.2 shows the average inventory levels of demand specified in weeks of supply is obtained by dividing the average inventory by the planned number of units to be sold. The basic trend which makes sense is that smaller initial inventory drops leads to smaller average weeks of supply. When looking at this table in isolation, it appears that longer lead times would enable the retailer to carry smaller inventory amounts which is counter intuitive. As seen from Table 4.1, the longer lead times had very poor service levels. The shorter lead times on average carried more inventory but they did so to satisfy their customers. Also, it was apparent that two and three reorders were basically identical. At the lower initial drops, two and three reorders carried smaller amounts of inventory each week.

Table 4.2: Inventory Levels of Demand in Weeks for Seasonal Product

Traditional	0 Reorders		
	10.04		
	1 Reorder	2 Reorders	3 Reorders
80% Initial			
LT1	12.75	13.71	13.71
LT5	12.11	11.38	11.38
LT10	10.64	9.72	9.70
60% Initial			
LT1	11.03	12.06	12.05
LT5	10.32	9.35	9.36
LT10	9.06	7.88	7.87
40% Initial			
LT1	11.11	10.77	10.76
LT5	9.42	7.90	7.90
LT10	8.25	6.60	6.60
20% Initial			
LT1	11.27	9.71	9.71
LT5	9.65	9.28	8.48
LT10	8.25	7.81	7.12

4.4 Analysis of Gross Margins

The smaller lead times were servicing their customers better but they were carrying more inventories. Therefore, the next two sections will compare the gross and adjusted gross margins. The gross margins were normalized by dividing the gross margin obtained by the gross margin for the traditional method. This was done in order to have a way to compare the numbers more systematically. Table 4.3 shows that the gross margin obtained for the traditional ordering strategy is much lower than those obtained with at least one reorder for most cases. The only occasions where the traditional method produced higher gross margins were for the 10 week lead times for the 40% and 20% initial inventories but this is due to the fact that you are shorting your customer and very poor service levels. Again, two and three reorders was basically the same. Also, with a one week lead time the retailer has the ability to only initially drop in 20% because the ordering process within one week can determine the

best. In terms of Gross Margin, the number of reorders does not seem to matter as much since the numbers are very similar. However, they are generally much better than the traditional method. With a couple of exclusions, overall, there were not any significant differences between ordering strategy three and ordering strategy four.

Table 4.3: Gross Margins for Seasonal Products

Traditional	0 Reorders	Normalized	
	905,642	1	
	1 Reorder	2 Reorders	3 Reorders
80% Initial			
LT1	1.66	1.70	1.70
LT5	1.67	1.66	1.66
LT10	1.30	1.27	1.27
60% Initial			
LT1	1.69	1.77	1.77
LT5	1.70	1.69	1.69
LT10	1.13	1.08	1.08
40% Initial			
LT1	1.81	1.81	1.81
LT5	1.64	1.63	1.63
LT10	0.84	0.82	0.82
20% Initial			
LT1	1.81	1.82	1.82
LT5	1.42	1.40	1.42
LT10	0.46	0.45	0.47

4.5 Analysis of Adjusted Gross Margins

The adjusted gross margins were normalized by dividing the adjusted gross margin obtained by the adjusted gross margin for the traditional method. This was done in order to have a way to compare the numbers. Table 4.4 shows that the adjusted gross margin for the traditional ordering strategy is much lower than those obtained with at least one reorder. The results are very similar to the previous section and therefore will not be repeated here.

Table 4.4: Adjusted Gross Margins for Seasonal Product

Traditional	0 Reorders	Normalized	
	720,918	1	
	1 Reorder	2 Reorders	3 Reorders
80% Initial			
LT1	1.73	1.78	1.78
LT5	1.75	1.74	1.74
LT10	1.30	1.25	1.26
60% Initial			
LT1	1.78	1.88	1.88
LT5	1.82	1.79	1.79
LT10	1.09	1.03	1.04
40% Initial			
LT1	1.95	1.94	1.94
LT5	1.75	1.73	1.73
LT10	0.74	0.72	0.72
20% Initial			
LT1	1.95	1.97	1.97
LT5	1.47	1.45	1.48
LT10	0.27	0.26	0.29

5.0 Methodology and Results for Apparel Manufacturer Survey

It was determined that a survey needed to be created and administered in order to understand the retail and manufacturing processes better and understand the relationships between a retailer and its apparel manufacturer. Two surveys were created, one for apparel manufacturers and one for apparel retailers. It was decided that the best method for administering the surveys was by telephone, with the questionnaire being sent to the participant by email or fax prior to the interview. It was felt that this would give the participants time to find answers to the questions that they did not know, and it would help to eliminate any confusion during the administration of the survey. A list of questions was developed for each survey keeping in mind the method of administration (Please see Appendix A and B for questionnaires). The questionnaires for the surveys underwent several revisions. Revisions were made to the questionnaire until it was felt to be in its most accurate form and had questions that would give answers to the information that was trying to be collected. Pre-testing was performed, the data was collected and analyzed, and any questions that needed to be reworded were changed. The manufacturers selected to participate in the survey were chosen by their meeting the criteria of being apparel manufacturers that were supplied fabric by members of the Institute of Textile Technology, ITT. The names of apparel manufacturers that should be given the manufacturers survey were obtained by speaking with ITT member companies that provide fabric for apparel manufacturers. Three ITT member companies were identified as suppliers to apparel manufacturers. From these three ITT member companies, a contact person was established.

The contact person was informed of the purpose of the research and asked to identify contact people from the apparel manufacturers that they supplied that would be willing to participate in the study. Information was obtained on the apparel manufacturers and the best person to contact at each company. The contact people for the apparel manufacturers were contacted and were asked if they would participate in the research. Three apparel manufacturers were identified for pre-testing and two of the companies participated. The apparel manufacturers were administered the survey first. Four additional apparel manufacturers were administered the survey. Then a list of retailers, was determined by collecting the names of retailers that the apparel manufacturers supply with merchandise. Three apparel retailers participated in the retailer's survey. The data collected from the surveys was analyzed. The data collected was used as supportive material to the simulations performed using the Sourcing Simulator™.

5.1 Introduction to Survey

The purpose of the surveys was to collect supplemental data for the simulations performed. From the simulations, numerical data was collected. The surveys data expresses opinions, thoughts, and feelings that are to be used to better understand the significance of the simulations results. The surveys looked at the relationships between apparel manufacturers and apparel retailers and any concerns or problems experienced by these members in the supply chain. The surveys also served the purpose of obtaining information about how sourcing decisions are made. The information can then be applied to future research to understand the industry's methods of making decisions. Please see Appendix A for a copy of the apparel manufacturer survey and the results obtained. The number underneath each

answer choice is the number of respondents that gave that response as the answer to the question. A total of six apparel manufacturers participated in the survey.

5.2 Results of Reasons for Choosing Manufacturers

For the purposes of this research, Domestic Manufacturers are considered to be manufacturers within the United States. American Manufacturers are classified as manufacturers in Central and South America and the Caribbean. Far East Manufacturers are considered to be manufacturers in Asia other than Pakistan and India. Pakistan/India Manufacturers are classified as manufacturers in Pakistan and India.

Two of the respondents answered that the main sourcing decision maker for their company is the Sourcing Manager. Three respondents had a title specific to their company as the person who made the majority of the sourcing decisions.

For Tables 5.1-5.4, the factors that influence a company’s decision to use different manufacturers is shown. The factors were ranked in order of importance. The most important factor was ranked number 1 and the least important factor was ranked number 6. Table 5.1 shows the results of the factors that influence a company’s decision to use a Domestic Manufacturer. Lead times and reliability were the factors that were chosen most often as the most important factors in the decision making process. Price had the most number of responses as being less important when using a Domestic Manufacturer.

Table 5.1: Factors that Influence A Company’s Decision to Use a Domestic Manufacturer

	Domestic						
	Price	Quality	Relationship	Lead Times	Reliability	Other	NA
Participant A	3	2	5	4	1	6	
Participant B	5	3	2	4	1	6	
Participant C	5	2	4	1	3	6	
Participant E							1
Participant F	4	5	3	1	2	6	
Participant G	5	1	4	3	2	6	

Table 5.2 shows the results of the factors that influence a company’s decision to use an American Manufacturer. Lead times had the most responses as being the most important factor. The rest of the responses were scattered among the different factors. No one factor was always considered most important or least important.

Table 5.2: Factors that Influence A Company's Decision to Use an American Manufacturer

	American						NA
	Price	Quality	Relationship	Lead Times	Reliability	Other	
Participant A	4	3	5	2	1	6	
Participant B	1	2	4	5	3	6	
Participant C	5	2	4	1	3	6	
Participant E	2	5	3	1	4	6	
Participant F	4	5	3	1	2	6	
Participant G							1

Table 5.3 shows the factors that influence a company’s decision to use a Far East Manufacturer. Three respondents said that price was the most important factor when using a Far East Manufacturer. Two companies stated that the most important factor influencing their decision to use a Far East Manufacturer was other. One respondent said that the most important factor was the manufacturer’s ability to have the correct product. The other respondent said the most important factor was availability. They are able to obtain items from the Far East that they would not be able to obtain from a Domestic Manufacturer. Lead time was considered to be less important than the other factors.

Table 5.3: Factors that Influence A Company's Decision to Use a Far East Manufacturer

	Far East						NA
	Price	Quality	Relationship	Lead Times	Reliability	Other	
Participant A	2	3	4	5	1	6	
Participant B	1	3	2	5	4	6	
Participant C	1	3	2	5	4	6	
Participant E	2	4	5	6	3	1 (Ability to have correct product)	
Participant F	1	3	4	5	2	6	
Participant G	6	2	5	4	3	1 (Availability-Cannot find Domestic)	

Table 5.4 shows the factors that influence a company’s decision to use a Pakistan/India Manufacturer. Two respondents said they do not use manufacturers in Pakistan/India. Price was also considered to be the most important by two manufacturers.

Again one respondent said that the manufacturer’s ability to have the correct product was the most important factor when deciding to use a manufacturer from these countries. Lead times were considered to be less important.

Table 5.4: Factors that Influence a Company's Decision to Use a Pakistan/India Manufacturer

	Pakistan/India						NA
	Price	Quality	Relationship	Lead Times	Reliability	Other	
Participant A	2	3	4	5	1	6	
Participant B	1	3	2	5	4	6	
Participant C	1	3	2	5	4	6	
Participant E	2	4	5	6	3	1 (Ability to have correct product)	
Participant F							1
Participant G							1

Table 5.5 shows the performance measures used to evaluate potential manufacturers. The performance measures were ranked in order of importance. Most respondents ranked cost as the most important performance factor when evaluating potential manufacturers. The next most important performance factor was considered to be quality. Company culture was considered to be one of the least important performance measures.

Table 5.5: Performance Measures Used to Evaluate Potential Manufacturers

	Potential Manufacturers					
	Costs	Quality	Reliability	Company Culture	Lead Times	Other
Participant A	3	2	1	5	4	6
Participant B	1	2	4	5	3	6
Participant C	1	3	4	5	2	6
Participant E	1	3	2	5	4	6
Participant F	2	1	3	5	4	6
Participant G	4	1	2	5	3	6

5.3 Results for Basic Items

One respondent said they do not have basic items. The majority of respondents said that the number of basics coming from the Domestic region was between 0 and 5%. Most respondents said that the majority of their basic items came from the American region. Also no respondents had the majority of their basic items coming from the Pakistan/India region.

For the Domestic region, most respondents said that they have experienced higher procurement costs for this region than in other regions. For the American region, the extra

costs were equally divided between higher shipping costs, procurement costs, and long lead times. The Far East region had the majority of extra costs coming from long lead times, and a few had higher shipping costs. The same was also true of the Pakistan/India region.

The main concern for using a Domestic manufacturer is higher costs. The main concerns for using American manufacturers were divided between reliability (2) and quality (2). Also an equal number of respondents (2) had no concerns with using manufacturers in this region. Respondents for the Far East had the most concerns with lead times (4), reliability (3), and quality (2). The same was also true of the Pakistan/India region.

For expected lead times for the Domestic and American regions, respondents were divided among the various answer choices, ranging from 0-3 weeks to 13-15 weeks. For the Far East and Pakistan/India region the lead times expected were on the higher end of the answer choices 13-15 weeks, or 16+ weeks.

5.4 Results for Seasonal Items

Two respondents said they do not have seasonal items; of the four respondents that did have seasonal items; two respondents said that they did not use Domestic Manufacturers to make seasonal items. Most seasonal items came from the Far East region. Then, the same amount of respondents replied that they obtain their merchandise from the American and Pakistan/India region.

Two respondents out of four said that they have not experienced any extra costs from using a Domestic Manufacturer. For the American region, the respondents said that their extra costs came in the form of higher procurement costs. For the Far East and Pakistan/India, the respondents replied that their extra costs came in the form of long lead

times and higher shipping costs.

The majority of concerns or problems with Domestic Manufacturers came in the form of costs. The main concern with using an American Manufacturer was reliability. Lead times were the main concern for using Far East and Pakistan/India Manufacturers. However, they were also concerned about reliability and quality.

The expected lead times for Domestic Manufacturers fell in the middle range of the answer choices, 7-9 weeks and 10-12 weeks. American Manufacturers had middle and high expected lead time 7-9 weeks and 13-15 weeks. Far East and Pakistan/India had high expected lead times, 13-15 weeks or 16+ weeks.

5.5 Results for Fashion Items

Three respondents said they do not have fashion items. Out of the three respondents that did produce fashion items, one respondent said they do not use American or Pakistan/India Manufacturers to make fashion items. Two respondents said that the majority of their fashion items came from the Far East region.

One respondent said they have no extra costs from using a Domestic Manufacturer, and two said their extra costs came in the form of procurement costs. Respondents that use American Manufacturers were divided between extra procurement costs and other which they said was extra labor costs. For the Far East, the majority of respondents said their extra costs came in the form of long lead times. Also for Pakistan/India the main extra costs was long lead times.

The concerns with using a Domestic Manufacturer came in the form of costs and other which was said to be the ability to sew complicated products and viability of provider.

Concerns with using an American Manufacturer were equally divided among costs, reliability, and other which they said was the manufacturer's ability to sew complicated products. The concerns for using a Far East Manufacturer were mostly in the form of long lead times, which was also the main concern in using Pakistan/India Manufacturers.

The expected lead times for Domestic Manufacturers were in the middle range of the answer choices. The expected lead times for Far East Manufacturers was on the high range of the answer choices. Only one respondent answered that they used American Manufacturers and Pakistan/India Manufacturers for fashion goods. The respondent said they expect lead times of 10-12 weeks for the American region and 13-15 weeks for the Pakistan/Indian region.

5.6 Results for Replenishments

All respondents said they offer a replenishment program for retailers. Half of the respondents said that they have used dual sourcing where one supplier provides them with merchandise prior to the start of the selling season and another supplier provides them with mid-season replenishments. Of the respondents that said they had used dual sourcing, two respondents said they had used it 21+ times and one said they had used it 6-10 times. When asked how much more, as a percentage of unit costs, would they charge a retailer for a mid-season replenishment of a product, two respondents said they would charge 16-25%, three respondents said they would charge 0-5% more, and one respondent answered not applicable. To the question "Assume it could be proven to you that you could pay more for a product from a manufacturer for an in-season replenishment of items, and still have greater margins. Are there any other barriers that would prevent you from using this manufacturer?" four

respondents said they would have no barriers. Two respondents listed other reasons as: financial implications, ability to manage a product, the cycle in selling season, and buying excess in case of sell through.

5.6.1 Results for Replenishments of Basic Items

One respondent said they do not carry basic items. Three respondents said that basic items make up 36%+ of their total merchandise. More respondents said they obtain replenishments from American Manufacturers than from any other region. Some respondents said they also get replenishments from Eastern Europe and the Middle East. Point of Sale Data had the highest number of responses on what method decision makers use to determine what needs to be replenished. One respondent said they base their replenishments on the planning and forecasting information they receive from retailers.

5.6.2 Results for Replenishments of Seasonal Items

Two respondents said they do not have seasonal items. Two respondents were asked the question of what percentage of their total merchandise were seasonal items. One respondent said that seasonal items make up 36%+ of their total merchandise and one respondent said that 6-15% of their total merchandise is seasonal items. All respondents that have seasonal merchandise said that they have a replenishment program on seasonal items. All respondents said that they get some of their replenishments from manufacturers in the American region. Only one respondent said they get replenishments from Domestic Manufacturers. Point of Sale Data, Historical Data, and Stockout on Items were all equally stated as methods used to determine what needs to be replenished. One respondent also said they use planning and forecasting information they receive from retailers.

5.6.3 Results for Replenishments of Fashion Items

Three respondents said they do not have fashion items. Two respondents were asked the question of what percentage of their total merchandise were fashion items. One respondent said that fashion items make up 36%+ of their total merchandise and one respondent said that 6-15% of their total merchandise is fashion items. Two respondents said they have replenishment programs for fashion items and one respondent said that they do not have a replenishment program for fashion items. The respondents said that they use manufacturers from all regions listed for replenishments of fashion items, however, the Domestic Manufacturers had the most respondents say they obtain replenishments from this region. All respondents with replenishments on fashion items said they use Point of Sale Data as the method to determine what needs to be replenished. The respondent that does not have replenishments on fashion items said that their reason for not having replenishments is that the items are one time sales.

5.7 Discussion of Apparel Manufacturer Survey Results

When administering the surveys, it was difficult to determine the best contact person for each company. Each company has their own titles and descriptions for various positions. At one company, the best person to speak with was the sourcing manager. At another company, the best person to speak with was a sales manager. This shows the complexity of the sourcing decision process. Each company has their own system for making sourcing decisions, and these systems are often not transferable from one company to another. One system may work for one company but might not work for another company. Each company needs to look at their own system and find ways to improve it.

Some results that were worthy of note were the percentages of where three types of garments were manufactured. It would seem to make sense for the basic items to be made in a region such as the Far East or Pakistan/India where the long lead times are not going to affect the selling season. Also it seems to make sense to make seasonal and fashion goods in regions that are closer to the home market and therefore would have shorter lead times. Then the retailers would be able to determine replenishments on items based on point of sale data during the selling season to accommodate for any forecasting errors. Many of the manufacturers had their seasonal and fashion goods being made in the Far East and Pakistan/India. Also many manufacturers did not even use Domestic Manufacturers for seasonal and fashion items.

Another attention-grabbing result from the survey was the expected lead times for the different regions for the different types of garments. One manufacturer said that for basic items their expected lead time for a Domestic Manufacturer was 13-15 weeks which was the same expected lead time stated by two respondents for a basic item from a Far East Manufacturer. Ideally, Domestic Manufacturer should not have lead times equivalent to a Far East Manufacturer. Domestic Manufacturers should have shorter lead times since they are in closer proximity to the home market.

It is expected that when using a Far East or Pakistan/India Manufacturer, the shipping costs are going to be higher because they are traveling farther. This was shown in the survey. Higher shipping costs were never mentioned to be an extra cost for Domestic Manufacturers. The main extra cost for Domestic Manufacturers is higher procurement costs which are expected since the cost of merchandise is usually higher in the Domestic region due to higher labor and overhead. Costs were also mentioned as the main concern/problem with using a

Domestic Manufacturer. Another interesting response was that one respondent said that a concern they had with using Domestic and American Manufacturers was their ability to sew complicated garments. One would not have expected this to be an issue only in these two regions. This was not a concern in the Far East or Pakistan/India. However, most other respondents did not have any concerns with using an American Manufacturer for basic, seasonal, or fashion items. Table 5.6 shows a summary of the results for Basic Items. Table 5.7 shows a summary of the results for Seasonal Items and Table 5.8 shows a summary of the results for Fashion Items.

Table 5.6: Results for Basic Items from Manufacturers Survey

<p>Percent of Basics from Regions</p> <ul style="list-style-type: none"> ■ 0-5% Basics from Domestic Region ■ Majority of Basics from American Region ■ No respondents said majority came from Pakistan/India 	<p>Extra Costs from Regions</p> <ul style="list-style-type: none"> ■ Domestic-Higher procurement costs ■ American-Shipping, Procurement, Long lead times ■ Far East and Pakistan/India-Long
<p>Main Concerns from Regions</p> <ul style="list-style-type: none"> ■ Domestic-Higher costs ■ American-Reliability and Quality, No concerns (2) ■ Far East and Pakistan/India-Lead times, Reliability, Quality 	<p>Expected Lead Times From Regions</p> <ul style="list-style-type: none"> ■ Domestic and American-Variied responses 0-3 weeks to 13-15 weeks ■ Far East and Pakistan/India-13-15 weeks, 16+ weeks

Table 5.6: Results for Seasonal Items from Manufacturers Survey

<p>Percent of Seasonal from Regions</p> <ul style="list-style-type: none"> ■ Only 2 of 4 respondents use Domestic ■ Majority of Seasonal from Far East Region ■ Same amount of respondents said they use American as Pakistan/India 	<p>Extra Costs from Regions</p> <ul style="list-style-type: none"> ■ 2 of 4 Respondents have had no extra costs from Domestic Region ■ American-Higher procurement costs ■ Far East and Pakistan/India-Long lead times, Higher shipping costs
<p>Main Concerns from Regions</p> <ul style="list-style-type: none"> ■ Domestic-Costs ■ American-Reliability ■ Far East and Pakistan/India-Lead times, Reliability, Quality 	<p>Expected Lead Times from Regions</p> <ul style="list-style-type: none"> ■ Domestic-7-9 weeks, 10-12 weeks ■ American-7-9 weeks, 13-15 weeks ■ Far East and Pakistan/India-13-15 weeks, 16+ weeks

Table 5.7: Results for Fashion Items from Manufacturers Survey

<p>Percent of Fashion from Regions</p> <ul style="list-style-type: none"> ■ 3 Respondents have fashion items ■ 1 Does not use American or Pakistan/India Region ■ 2 Respondents said majority comes from Far East Region 	<p>Extra Costs from Regions</p> <ul style="list-style-type: none"> ■ Domestic-Higher procurement costs ■ American-Procurement costs and Extra labor costs ■ Far East and Pakistan/India-Long lead times
<p>Main Concerns from Regions</p> <ul style="list-style-type: none"> ■ Domestic-Costs, Ability to sew complicated products, Viability of provider ■ American-Costs, Reliability, Ability to sew complicated products ■ Far East and Pakistan/India-Long lead times 	<p>Expected Lead Times from Regions</p> <ul style="list-style-type: none"> ■ Domestic-7-9 weeks, 10-12 weeks ■ American-10-12 weeks ■ Far East-13-15 weeks, 16+ weeks ■ Pakistan/India-13-15 weeks

The factors that influence a company’s decision to use different manufacturers also showed some interesting results. For Domestic Manufacturers, price was consistently considered to be a less important factor when choosing a manufacturer. Reliability was considered to one of the most important factors. Also lead times for Domestic Manufacturers were very important to some respondents and not important to others. For American Manufacturers, most respondents said that lead time was very important, first or second in importance. For the other factors there is no apparent consistency in the ranking of the factors. Price was considered an important factor when using Far East Manufacturers. Also one respondent mentioned them as a region to get hard to find items. Lead times were consistently considered unimportant when using a Far East Manufacturer. Most respondents ranked lead times as a five or six in the ranking of importance. This would seem to be a very important factor when choosing to purchase items with a short selling season. Also for Pakistan/India, lead times were considered less important, a five or six on the ranking. Price was also considered to be very important with a ranking of one or two. Price is believed to

be the influencing factor when choosing to use a Far East or Pakistan/India manufacturer. Manufacturers are willing to pay more in shipping costs in order to get the garments for a cheaper price. Table 5.9 shows the factors that affect a company's choice of manufacturers from the manufacturers survey.

Table: 5.9: Factors That Affect Company's Choice of Manufacturer from Manufacturers Survey

<p style="text-align: center;">Domestic</p> <ul style="list-style-type: none"> ■ Reliability is most important ■ Quality and Lead times also important ■ 5 Respondents use Domestic 	<p style="text-align: center;">American</p> <ul style="list-style-type: none"> ■ Lead times is most important ■ Reliability second most important ■ 5 Respondents use American
<p style="text-align: center;">Far East</p> <ul style="list-style-type: none"> ■ 1 Respondent-Ability to have correct product ■ 1 Respondent-Cannot find product in Domestic region ■ 6 Respondents use Far East 	<p style="text-align: center;">Pakistan/India</p> <ul style="list-style-type: none"> ■ 1 Respondent-Cannot find product in Domestic region ■ Price is most important ■ 4 Respondents use Pakistan/India

Some other results that were expected were the methods for determining what items need to be replenished. Most respondents said they use a combination of methods with the most popular method being point of sale data, closely followed by historical data and stockouts on items.

Another interesting result was that the American region had the highest number of responses as the region where replenishments were obtained from for basic and seasonal items. Most replenishments for fashion items were obtained from the Domestic region.

The number of respondents that said they had used dual manufacturing was worthy of note. Half the respondents had said that they had used dual manufacturing, and two of the respondents said they had used it 21+ times. One result that was surprising was the response to the question, "Assume it could be proven to you that you could pay more for a product

from a manufacturer for an in-season replenishment of items, and still have greater margins. Are there any other barriers that would prevent you from using this manufacturer?" Most respondents said they would have no barriers, but two listed other barriers that would keep them from using this manufacturer: the financial implications, ability to manage complete product, cycle in selling season, and buy excess in case of sell through. It is hard to understand why these would be barriers to them using the manufacturer if they are already receiving replenishments on items during the selling season.

Also the ranking of the performance measures used to evaluate potential manufacturers showed some unusual results. The performance measures that many people consider to be most important: costs, lead times, and quality (in that order) were not always considered most important to the respondents of the survey. Costs were for most respondents ranked number one or two, however one ranked it number three and one ranked it number four. Lead times, also thought to be a major performance measure were consistently ranked number three or four. Only one respondent ranked it number two. Quality was equally considered to be number one, two, and three in the rankings. Company culture was always considered to be number five, which is consistent with what many people consider to be less important.

6.0 Methodology and Results for Apparel Retailer Survey

Please see Appendix B for a copy of the apparel retailer survey and the results obtained. The number underneath each answer choice is the number of respondents that gave that response as the answer to the question. A total of three apparel retailers participated in the survey.

6.1 Results of Apparel Retailer Survey

All three respondents said that the main sourcing decision makers in their company are the buyer and sourcing manager. One company said that the merchandiser also helps in the decision making. All three respondents also said that they use historical data and trend forecasters to forecast the merchandise mix for a season. One company also said they use simulation based tools.

For Tables 6.1-6.4 the factors that influence a company's decision to use different manufacturers is shown. The factors were ranked in order of importance. The most important factor was ranked number 1 and the least important factor was ranked number 6. Table 6.1 shows the results of the factors that influence a company's decision to use a Domestic Manufacturer. Price had the most number of responses as being most important when using a Domestic Manufacturer for 2 out of the 3 respondents. Lead times were also considered to be important. Relationship was considered one of the least important for the 2 respondents that ranked price highest, but it was the most important for the other retailer.

Table 6.1: Factors that Influence a Company's Decision to Use a Domestic Manufacturer

	Domestic						NA
	Price	Quality	Relationship	Lead Times	Reliability	Other	
Participant A	1	2	5	4	3	6	
Participant C	1	3	5	2	4	6	
Participant D	5	3	1	2	4	6	

Table 6.2 shows the factors that influence a company's decision to use an American Manufacturer. Price was considered to be the most important factor when deciding to use an American Manufacturer by all respondents. Relationship was considered to be less important.

Table 6.2: Factors that Influence a Company's Decision to Use an American Manufacturer

	American						NA
	Price	Quality	Relationship	Lead Times	Reliability	Other	
Participant A	1	2	5	4	3	6	
Participant C	1	3	5	2	4	6	
Participant D	1	3	5	2	4	6	

Tables 6.3 and 6.4 show the factors that influence a company's decision to use a Far East Manufacturer and Pakistan/India Manufacturer, respectively. For both regions, respondents had the same rankings for the importance of the factors.

Table 6.3: Factors that Influence a Company's Decision to Use a Far East Manufacturer

	Far East						NA
	Price	Quality	Relationship	Lead Times	Reliability	Other	
Participant A	1	2	5	4	3	6	
Participant C	1	2	5	4	3	6	
Participant D	1	2	5	4	3	6	

Table 6.4: Factors that Influence a Company's Decision to Use a Pakistan/India Manufacturer

	Pakistan/India						NA
	Price	Quality	Relationship	Lead Times	Reliability	Other	
Participant A	1	2	5	4	3	6	
Participant C	1	2	5	4	3	6	
Participant D	1	2	5	4	3	6	

Table 6.5 shows the performance characteristics used to evaluate potential manufacturers. The performance characteristics were ranked in order of importance. The most important characteristic was ranked number 1 and the least important characteristic was ranked number 5. Cost had the most responses as being the most important factor when

evaluating potential manufacturers. All respondents agree that quality was the second most important factor. Company culture was considered by all respondents to be the least important performance measure.

Table 6.5: Performance Measures Used to Evaluate Potential Manufacturers

	Potential Manufacturers				
	Costs	Quality	Reliability	Company Culture	Lead Times
Participant A	1	2	3	5	4
Participant C	1	2	4	5	3
Participant D	3	2	1	5	4

Gross margin, the number of stockouts, point of sale data, and the number of items sold were used by all respondents to evaluate the selling season of a product. One respondent said they also use the number of turns, GMROI, and the weeks of supply. Two respondents said they try to maintain 95%+ service levels. The other respondent said they try to maintain 90-94%.

6.2 Results for Basic Items

All three respondents said that they markdown 0-5% of their merchandise because they ordered too many. Two of the respondents said that their average markdown was 31-45% of the original price. Two respondents answered the question about the number of stockouts they have within a selling season. One respondent said that they have stockouts 0-5 times and one respondent said they have stockouts 6-10 times. All three respondents said they have 21+ replenishments on basic items. Two respondents said that 0-5% of their customers complain about not being able to find the item they are looking for in the store. One respondent said that 6-15% of their customers complain about not being able to find an item. All three respondents said they use Domestic, American, and Far East manufacturers. One respondent said they also use manufacturers in Pakistan/India. For the percentage of total

merchandise that was basic items, the respondents had various answers. One respondent said 16-25% was basics, one respondent said 26-35%, and the other respondent said 36%+.

One respondent said that 26-35% of their basic items come from Domestic Manufacturers. Two respondents said 36%+ come from this region. One respondent said 0-5% of their basics come from American Manufacturers, one respondent said 6-15% comes from this region and the third respondent said 26-35%. Two respondents replied that 16-25% of their basics come from the Far East region and one replied 36%+. Two respondents stated that 0-5% of their basics come from Pakistan/India and one said 16-25%.

One respondent said they have experienced higher shipping costs from using a Domestic Manufacturer. They have also experienced extra procurement costs and costs from long lead times. One company said that they have experienced extra costs from American Manufacturers for shorter lead times. Long lead times are also a concern from this region. Most respondents said that long lead times were an extra cost for manufacturers in the Far East region, and one respondent said they have not experienced any extra costs. All three respondents said that they have experienced extra costs from long lead times for Pakistan/India Manufacturers. Procurement costs are also an extra cost for that region.

All three respondents said that one of their concerns with using a Domestic Manufacturer is reliability. Two respondents also said lead times and costs were a problem. Reliability and lead times were also stated as a concern for using an American Manufacturer by two respondents. One respondent said they have no concerns with using an American Manufacturer. Lead times and quality were considered to be concerns for using a Far East Manufacturer. One respondent said they did not have any concerns with using a manufacturer in this region. Quality and lead times were also big concerns with using

Pakistan/India Manufacturers.

One respondent stated that they expect lead times of 0-3 weeks, 7-9 weeks, and one stated 10-12 week lead times for Domestic Manufacturers. Lead times for American Manufacturers were equally divided among the range. Lead times for Far East Manufacturers were stated by all three respondents to be 16+ weeks, and one respondent said some merchandise they can receive in 7-9 weeks. Most of the respondents said the lead times they expect from Pakistan/India Manufacturers were on the high side, 13-15 weeks or 16+ weeks.

6.3 Results for Seasonal Items

Two respondents said that 6-15% of SKUs had to be marked down because they ordered too many. One respondent replied 16-25%. Two respondents said that their average markdown as percentage of original price was 31-45% and the other respondent said 46-60%. Two respondents answered the question on the number of stockouts they have in a selling season. One respondent replied they had 0-5 times and the other respondent said 6-10 times. Two respondents stated they have replenishments 0-5 times and one respondent said 11-15 times. For the percentage of customers that complain about not being able to find an item in the store, two respondents said 0-5% and one replied 6-15%. All three manufacturers replied that they use manufacturers in all regions: Domestic, Americas, Far East, and Pakistan/India. For the percentage of total merchandise that is seasonal items the respondents had various answers. One respondent said 16-25%, one said 26-35%, and one replied 36%+.

The respondents were equally divided on the percentage of seasonal items that come from Domestic Manufacturers. Two respondents said 0-5% comes from American

Manufacturers. Two said 36%+ of their seasonal merchandise comes from Far East

Manufacturers. Also two respondents said 26-35% comes from Pakistan/India

Manufacturers.

Procurement costs and long lead times are extra costs experienced for Domestic Manufacturers. One respondent said they have not experienced any extra costs from using an American Manufacturer. The other respondents said they have experienced long lead time costs. One respondent stated quality was as an extra cost for Far East Manufacturers. Lead times is also an extra costs experienced. Also one respondent said they have not experienced any extra costs from manufacturers in this region. Long lead times were stated by all respondents to be an extra costs experienced with using Pakistan/India Manufacturers. Also one respondent said quality was an extra cost.

Costs, lead times, reliability, and quality were all equally stated as being concerns for using Domestic Manufacturers. Reliability was the main concern for using American Manufacturers. Lead times and quality were stated as concern for using Far East Manufacturers. One respondent said they have no concerns with using Far East Manufacturers. Quality and lead times were stated by all respondents as being concerns with using a Pakistan/India Manufacturer.

One respondent said they expect lead times of 0-3 weeks, 7-9 also and one said 16+ weeks for Domestic Manufacturers. Lead times were equally divided for American Manufacturers. All three respondents said they expect 16+ week lead times for Far East Manufacturers. However, one respondent said they can get some items from this region in 7-9 weeks. The lead times expected for Pakistan/India Manufacturers were usually on the long side 13-15 weeks or 16+ weeks.

6.4 Results for Fashion Items

One respondent stated that 6-15% of their SKUs must be marked down because they ordered too many. The other two respondents said 16-25%. The average markdown as a percentage of original price was 31-45% for one respondent and 46-60% for two respondents. The two respondents that answered the question about the number of stockouts they have in a selling season said they have stockouts 0-5 times. All three respondents said they have replenishments 0-5 times. The percentage of customers that complain about not being able to find an item in the store was 0-5% for one respondent and 6-15% for two respondents. All three respondents said they use manufacturers in all the regions: Domestic, Americas, Far East and Pakistan/India. Also all three respondents said that fashion items make up 36%+ of all their total merchandise.

The percentage of fashion items from the Domestic region was equally divided. Two respondents replied that 0-5% of the items come from American Manufacturers. Two respondents said 36%+ of their goods come from the Far East. Respondents were equally divided for the Pakistan/India region.

Procurement costs and long lead times were extra costs experienced when using Domestic Manufacturers. Long lead times were stated by two respondents as costs experienced with using American Manufacturers. One respondent said they had no extra costs from using an American Manufacturer. Long lead times were stated by two respondents as extra costs for Far East manufacturers. However, one respondent said they have experienced no extra costs from using a Far East Manufacturer. Long lead times were stated by all respondents as an extra cost when using Pakistan/India Manufacturers.

Costs, lead times, reliability, and quality were equally stated as concerns with using

Domestic Manufacturers. Reliability is the main concern with using an American Manufacturer. However, one respondent said they have no concerns with using American Manufacturers. Costs, lead times, and quality were equally seen as concerns with using Far East Manufacturers. One respondent said they have no concerns with using a Far East Manufacturer. Lead times and quality were said by all respondents to be concerns with using Pakistan/India Manufacturers.

Lead times expected for Domestic Manufacturers were equally divided. However, one respondent said they expect lead times of 0-3 weeks and one respondent said 16+ weeks. Expected lead times were also varied for American Manufacturers with one respondent saying they expected lead times of 16+ weeks. Two respondents said 16+ weeks was what they expected for Far East Manufacturers. For Pakistan/India Manufacturers expected lead times varied, but one respondent said they expected 16+ weeks.

6.5 Results for Replenishments

Two of the respondents said they have used dual sourcing. One respondent said they have use dual sourcing 0-5 times and the other respondent said they have used it 21+ times. All three respondents said that as a percentage of unit cost they would be willing to pay 0-5% more for an in-season replenishment of a product. For the question “Assume it could be proven to you that you could pay more for a product from a manufacturer for an in-season replenishment of items and still have greater margins. Are there any other barriers that would prevent you from using this manufacturer?” One respondent said that loyalty would be a barrier. The other two respondents said they would have no barriers.

6.5.1 Results for Replenishments of Basic Items

The respondent's answers on the percentage of their total merchandise that are basic items varied. All three respondents said they use Domestic Manufacturers and Far East Manufacturers for replenishments on basic items. Two respondents said they use American and Pakistan/India Manufacturers. All respondents also said they use point of sale data and stockouts on items as ways to determine what needs to be replenished.

6.5.2 Results for Replenishments of Seasonal Items

Again, the respondent's answers on the percentage of their total merchandise that are seasonal items varied. All respondents said they have mid-season replenishments on items that have sold well. All respondents said they use Domestic Manufacturers for replenishments. Two respondents said they use American and Far East Manufacturers. Only one respondent said they use Pakistan/India Manufacturers. All respondents said they use point of sale data and stockout on items as way to determine what needs to be replenished. Two respondents said they also use other methods. One respondent said they use VMI.

6.5.3 Results for Replenishments of Fashion Items

All three respondents said that fashion items make up 36%+ of their total merchandise. Two respondents said they have mid-season replenishments on items that have sold well. One respondent said they did not have replenishments. Both respondents that have replenishments said they use Domestic Manufacturers. The other regions, American, Far East, and Pakistan/Indian only had one respondent each to say they used manufacturers in the respective region. Both respondents use point of sale data and stockouts on items as ways to determine what needs to be replenished. The respondent that said they do not have

replenishments said this was because they could not get a replenishment before the end of the selling season.

6.6 Discussion of Apparel Retailers Survey Results

When administering the surveys it was difficult to determine the best contact person for each company. The buyer and sourcing manager were considered to be the main sourcing decision makers but it was different for each company. Again, this shows the complexity of the sourcing decision process.

Some interesting results were found in the responses to the questions about the three different types of merchandise. Two respondents stated that they have to mark down 16-25% of their fashion items because they ordered too many. That is a large forecasting error. Then of the merchandise marked down, three companies said they on average markdown their merchandise 46-60% of the original price. If they could forecast better or make better use of replenishments, then they might not need to markdown their merchandise so much, and they might have a greater profit. Also surprising is the number of times respondents said they had stockouts on items, especially basic items. One respondent said that for basic items they had stockouts 6-10 times during a selling season. Given the nature of basic items, with little fluctuation of demand, it would seem that they should be better able to forecast their demand and not have as many stockouts. It is more understandable for the respondent who said they have stockouts on seasonal items 6-10 times in a selling season. Seasonal items are harder to forecast the expected demand.

Another unexpected result was that only one respondent said they purchased basic goods from Pakistan/India. One would think that this would be one of the best areas to

purchase basic items since the long lead times will not have as much affect on the ability to receive a replenishment during the selling season. All respondents did say that they do use manufacturers in the four regions being studied. Another interesting result was that all respondents said that their fashion items make up 36%+ of their total merchandise. The majority of the merchandise in their stores is fashion.

Some results that were unexpected were the percentage of merchandise that comes from the different regions. Two respondents said that 36%+ of their basic items comes from the Domestic region. Only one respondent said that 36%+ of their basic items comes from the Far East region. One respondent said that 36%+ of their seasonal items come from the Domestic region. Two respondents said that 36%+ of their seasonal items come from the Far East. One respondent said that 36%+ of their fashion items come from the Domestic region and two respondents stated that 36%+ of their fashion goods comes from the Far East region. One would think that a company would want to purchase their basic items, with their long selling seasons, in a region such as the Far East and Pakistan/India where the long lead times are not going to affect the ability of the retailer to have the merchandise in the store during a selling season. One would also think that they would want to purchase their seasonal and fashion goods, which have a short selling season, from a region such as the Domestic and American region where the lead times are shorter and can then get them in the stores before the end of the selling season.

Some other interesting results were the costs associated with the different types of garments from the different regions. It was mentioned a few times that the respondents are experiencing higher shipping costs and long lead times from the Domestic region. Higher shipping costs and long lead times should not be mentioned as a concern for the Domestic

region. This should be reserved for the Far East and Pakistan/India region which should have higher shipping costs and lead times because the items are coming from farther away. The number of times that higher shipping costs were mentioned for the Far East region was surprising. One would expect higher shipping costs to be mentioned several times by the respondents as an extra cost for the Far East region, however it was only mentioned one time for each type of garment. One respondent also mentioned that quality was an extra cost that they are experiencing from the Far East and Pakistan/India region for seasonal items.

The concerns and problems that are considered to be associated with manufacturers from different regions were also interesting. It was mentioned that reliability is a concern with using Domestic Manufacturers. This should not be a concern for this region. It should be reserved for regions that are farther away and can be affected by more external sources such as overseas shipping delays. Also lead times were mentioned as a concern with using Domestic Manufacturers. This should not be a concern for this region. It should only be a concern for the Far East and Pakistan/India region that should have longer lead times due to their being farther away from the home market. Also a couple of times the respondents said they have no concerns with using an American or Far East Manufacturer.

Lead times for the different regions also produced some unusual results. Lead times for Domestic Manufacturers should not be in the 16+ weeks range. They are closer to the market and should have the shortest lead times. American Manufacturers should also not have 16+ week lead times. They are close to the market and should have the second shortest lead times. Table 6.6 shows a summary of the results for Basic Items. Table 6.7 shows a summary of the results for Seasonal Items. Table 6.7 shows a summary of the results for Fashion Items.

Table 6.6: Results for Basic Items from Retailers Survey

<p>Percent of Basics from Regions</p> <ul style="list-style-type: none"> ■ Domestic-2 Respondents said 36%+ ■ American-0-5%, 6-15%, 26-35% ■ Far East-2 Respondents said 16-25%, ■ Pakistan/India-2 Respondents said 0-5% 	<p>Extra Costs from Regions</p> <ul style="list-style-type: none"> ■ Domestic-Shipping, Procurement, Long lead times ■ American-Paying more for shorter lead times, Long lead times ■ Far East-Long lead times, No costs ■ Pakistan/India-Long lead times, Procurement
<p>Main Concerns from Regions</p> <ul style="list-style-type: none"> ■ Domestic-Reliability, Lead times, Costs ■ American-Reliability, Lead times, No concerns (1) ■ Far East-Lead Times, Quality, No concerns (1) ■ Pakistan/India-Lead times, Quality 	<p>Expected Lead Times From Regions</p> <ul style="list-style-type: none"> ■ Domestic-0-3 weeks, 7-9 weeks, 10-12 weeks ■ American-4-6 weeks, 10-12 weeks, 13-15 weeks ■ Far East-16+ weeks ■ Pakistan/India-13-15 weeks, 16+ weeks

Table 6.6: Results for Seasonal Items from Retailers Survey

<p>Percent of Seasonal from Regions</p> <ul style="list-style-type: none"> ■ Domestic-6-15%, 26-35%, 36%+ ■ American-2 Respondents said 0-5% ■ Far East- Majority said 36%+ ■ Pakistan/India-Majority said 26-35% 	<p>Extra Costs from Regions</p> <ul style="list-style-type: none"> ■ Domestic-Procurement, Long lead times ■ American-Long lead times, No costs ■ Far East-Quality, Long lead times, No costs ■ Pakistan/India-Long lead times, Quality
<p>Main Concerns from Regions</p> <ul style="list-style-type: none"> ■ Domestic-Costs, Lead times, Quality ■ American-Reliability ■ Far East-Lead times, Quality, No concerns ■ Pakistan/India-Quality, Lead times 	<p>Expected Lead Times from Regions</p> <ul style="list-style-type: none"> ■ Domestic-0-3, 7-9, 16+ weeks ■ American-4-6 weeks, 10-12 weeks, 16+ weeks ■ Far East-16+ weeks (3), some 7-9 weeks ■ Pakistan/India-13-15 weeks and 16+ weeks

Table 6.8: Results for Fashion Items from Retailers Survey

<p>Percent of Fashion from Regions</p> <ul style="list-style-type: none"> ■ Domestic-6-15%, 26-35%, 36%+ ■ American-Majority said 0-5% ■ Far East-Majority said 36%+ ■ Pakistan/India-6-15%, 16-25%, 26-35% 	<p>Extra Costs from Regions</p> <ul style="list-style-type: none"> ■ Domestic-Procurement, Long lead times ■ American-Long lead times, No costs ■ Far East-Long lead times, No costs ■ Pakistan/India-Long lead times
<p>Main Concerns from Regions</p> <ul style="list-style-type: none"> ■ Domestic-Costs, Lead times, Reliability, Quality ■ American-Reliability, No concerns ■ Far East-Costs, Lead times, Quality, No concerns ■ Pakistan/India-Lead times, Quality 	<p>Expected Lead Times from Regions</p> <ul style="list-style-type: none"> ■ Domestic-0-3 weeks, 7-9 weeks, 16+ weeks ■ American-4-6 weeks, 10-12 weeks, 16+ weeks ■ Far East-Majority 16+ weeks, 7-9 weeks ■ Pakistan/India-7-9 weeks, 13-15 weeks, 16+ weeks

The responses for the ranking of factors that influence a company's decision to use manufacturers from a specific region were unusual. One respondent mentioned that relationship was the number one reason for using a Domestic Manufacturer, and price was ranked number five. For the Domestic and American region price and lead times were usually mentioned as the first and second reason for using manufacturers in these regions. Lead time was expected to be an important factor when using manufacturers from these regions. However, price was not expected to be an important factor when choosing to use manufacturers from these regions. Often manufacturers from these regions are considered to have higher prices than manufacturers from the Far East and Pakistan/India. However, one respondent said lead times were ranked number four. For the Far East and Pakistan/India all

respondents had the same ranking order for all of the factors. Price and lead times were ranked number one and two and relationship was ranked number five. Table 6.9 shows the factors that affect a company's choice of manufacturer.

Table 6.9: Factors That Affect Company's Choice of Manufacturer from Retailers Survey

Domestic	American
<ul style="list-style-type: none"> ■ Price is most important ■ Quality and Lead times also important 	<ul style="list-style-type: none"> ■ Price is most important ■ Quality and Lead times also important
Far East	Pakistan/India
<ul style="list-style-type: none"> ■ Price is most important ■ Quality is second most important ■ Relationship is least important 	<ul style="list-style-type: none"> ■ Price is most important ■ Quality is second most important ■ Relationship is least important

Domestic and the Far East regions were mentioned most often as where replenishments were obtained for the three types of garments. One would not think that the region with the shortest lead times would be in competition with a region with the longest lead times when obtaining replenishments.

Point of sale data and stockout on items were the methods mentioned most often as the method used to determine what needed to be replenished. This is consistent with what is expected. However, two respondents mentioned other methods were also used. One respondent said they also use VMI to determine what needs to be replenished. One respondent said they do not have replenishments on fashion items because they are one time sales, and they could not get a replenishment before the end of the selling season.

Two respondents said they have used dual sourcing, and one respondent said they had used dual sourcing 21+ times. All respondents also replied they would only pay 0-5% more as a percentage of unit costs for an in-season replenishment. For the question, "Assume it

could be proven to you that you could pay more for a product from a manufacturer for an in-season replenishment of items and still have greater margins. Are there any other barriers that would prevent you from using this manufacturer?" Two respondents said they would have no barriers and one said loyalty would be a barrier.

The performance measures that are used to evaluate potential manufacturers had some unexpected results. Most respondents mentioned costs as the number one measure and quality as the number two measure. However, one company said cost was number three. Lead times which people would have thought to be ranked number one or two was most often ranked number four.

For the performance measures used to evaluate a selling season, all three respondents mentioned they use a combination of all the answer choices. However, one company also mentioned that they also take into consideration the number of turns, GMROI, and the weeks of supply. Two respondents said they try to maintain 95%+ service levels which is difficult to obtain. One respondent said they try to maintain a 90-94% service level. One respondent also thought the question what is the service level that is actually obtained should be asked. The respondent felt that the service level that was actually obtained would be lower than the service level that was trying to be maintained.

7.0 CONCLUSIONS

With the elimination of trade quotas in 2005, United States textile companies are having even more trouble competing with companies around the world. Textile companies in the United States will never be able to compete with countries such as China, or Pakistan and India on the criteria of the price of goods alone. These countries have lower overhead due to cheaper labor and sometimes have government subsidies which enable their goods to be less expensive. Companies in the United States need to determine ways that they can compete with global companies. One way U.S. textile companies can compete is by capitalizing on their close proximity to the U.S. market. The purpose of this research was to understand if there are any benefits from using suppliers with shorter lead times.

Through the use of computer simulations and surveys, this research looked at four regions of the world: Domestic (manufacturers in the United States), American (manufacturers in Central and South America and the Caribbean), Far East (manufacturers in Asia other than Pakistan and India), and Pakistan/India (manufacturers in Pakistan and India) to determine the advantages and disadvantages of using manufacturers in these regions. The research focused on the advantages and disadvantages of using manufacturers in these regions for the production of three types of garments: basic, seasonal, and fashion goods.

From the research, it was found that retailers can benefit from the use of suppliers with shorter lead times. When a retailer uses a supplier with a long lead time, the retailer must carry more inventory in order to be meet desired service levels. The retailer must carry more initial inventory because it takes longer to get a replenishment from a supplier with a long lead time. The retailer must also maintain higher inventory levels in order to have a

good selection of merchandise since when using a supplier with a long lead time, reorders may not be possible within the selling season or before the next “fashion trend” begins. Having a supplier with a shorter lead time may allow the retailer to reorder merchandise that has sold well based on point-of-sale data and receive the merchandise in the stores before the end of the selling season or while the “fashion trend” is still popular.

From the retailer survey, it was discovered that the lead time for a Domestic Manufacturer can be in the range of 7-9 weeks or 16+ weeks. One retailer said they could receive merchandise from a Domestic Manufacturer in 0-3 weeks. Some of these lead times for Domestic Manufacturers are equivalent to the lead times for Far East and Pakistan/India Manufacturers which are in the range of 7-16+ weeks. Some of the long lead times are due in part to the apparel manufacturer having long lead times from their suppliers. The apparel manufacturer survey found that a Domestic Manufacturer’s lead times can range from 7-12 weeks. Such long lead times throughout the supply chain makes it difficult for the members to get the goods through the chain in a timely manner which cuts into their profits. However, it is possible to still make a profit if you use a quick response manufacturer.

The results of the simulations showed that a retailer can pay more for an item in landed costs and still achieve the same margins. For a basic item with a 5% drift, a retailer can pay 30.7% more in landed cost to switch from a supplier with a 25 week lead time to a supplier with a 1 week lead time or 26.4% more for a supplier with a 5 week lead time for a 90% service level. The same trend is also true if a retailer changed from a supplier with a 15 week lead time to a supplier with a 5 week lead time. They could pay 10.3% more in landed costs and still achieve the same margins for a 90% service level.

Also using suppliers with shorter lead times helps to neutralize the effects of a poor

SKU mix error. If the retailer sees that they have poorly forecasted the SKU mix, then they can reorder merchandise to help cut down on the amount of lost sales. When using a supplier with shorter lead times, the retailer does not have to carry as much initial inventory. They can carry a minimum amount of inventory until they can see what SKUs are popular based on point of sale data, and then the retailer can reorder more of these SKUs. When the retailer carries too much initial inventory in the wrong SKU mix, then they must markdown the merchandise that has not sold. From the surveys, it was learned that an average of 6-25% of seasonal and fashion goods have to be marked down, with the average markdown on a seasonal or fashion item being 31-60% of the original price. Such high numbers for markdowns and the actual amount of markdown from the original price cut into the profitability of the company.

This research also looked at the effect of drift on inventory levels. Drift is the variation in the SKU mix demanded by the customer from week to week. Drift can play a significant role in the profitability of a retailer in the form of lost sales and markdowns. The results on the study of drift showed that as the lead times and the service levels increase, the inventory levels increase. If you also take into consideration the seasonality of demand, then the amount of inventory needed to meet a desired service level increases significantly. With a high drift, there is no way to respond when a retailer has a supplier with a long lead time. A 5% drift with a 15 week lead time for flat demand requires 40 weeks of inventory in order to meet a 90% service level. A 1% drift with a 15 week lead time for flat demand requires only about 12 weeks of inventory.

Forecasting error is another area that was researched. Forecasting error is the weekly volume error or the difference in the expected demand and the actual demand. Again with a

high forecasting error, it is critical to use suppliers with shorter lead times. It is hard to improve a forecasting plan. The best strategy is to have a medium amount of initial inventory, enough to meet customer demand and maintain service levels, until the retailer receives the next replenishment. Then use point of sale data to determine what SKUs are popular and need to be replenished. With a supplier with a long lead time, the retailer is not able to react to changes in demand fast enough. They will always be trying to play catch-up.

For seasonal items, it is imperative to have a supplier with a short lead time, in order to react to differences in expected versus actual demand. With a short selling season, a retailer would not be able to get a replenishment of goods in the store before the end of the selling season if they are using a supplier with a long lead time. Also retailers are willing to pay more for a replenishment of a seasonal garment if they are able to get it before the end of the selling season. It was also determined that service levels, average inventory, gross margin, and adjusted gross margin are best when a retailer has two replenishments. With one reorder, the best levels are not attained because retailers are not taking full advantage of the replenishment program. With three reorders, the results are only slightly better, but when taking into consideration the extra cost of a third reorder, the benefits are canceled out. Also the process of determining what items need to be replenished and the willingness of the apparel manufacturer to use dual sourcing were examined.

From the apparel manufacturer's survey, the criteria that are most important when choosing a manufacturer were revealed. Also what factors are taken into consideration when choosing to use a manufacturer from a specific region were determined. The advantages and disadvantages of using a manufacturer from a specific region were also identified. From the questions about each region, it was shown what costs, concerns, and lead times are associated

with each region.

From the apparel retailer's survey, the criteria that are considered most important when choosing a manufacturer were found. The effect that the region of the world that the manufacturer is located has on their being chosen as a manufacturer was also studied. The survey also determined how retailers make decisions about purchasing, if retailers have replenishments on items, and how replenishments are handled. The performance measures used to evaluate a selling season were identified as well as what customer service levels retailers try to maintain.

8.0 FUTURE WORKS

There are many opportunities for future research based on the study. This research focused on the advantages of proximity to market as a method for manufacturers in the United States to compete on a global level. Some other methods of differentiating the U.S. from other countries could also be studied. One example is the use of niche markets and niche strategies. For example, some markets such as maternity clothes and plus size clothing have not been fully utilized. There are very few retailers in these areas. Also many retailers do not identify the needs of customers in these markets. Another area that has been under utilized is petites and plus size women's petites. These areas have not been developed, and yet they are growing markets. Also niche strategies have not been fully examined. Zara with its ultra fast fashion has identified ways they can compete. While their strategies seem to go against the industries ideas of good business practices (such as intentionally running out of merchandise to create scarcity and not operating many stores outside of Europe, which is in close proximity to their manufacturers in Spain), Zara has developed their strategies and has become successful because of them. In some areas of the world, they have cornered the market for fast fashion. Companies need to step outside the box of what is considered good business practices, and they need to identify strategies that will set them apart from other companies and help them thrive in this industry.

Also further simulations could be performed. More simulations could be run on the basic items, taking into consideration parameters that were not covered such as the effect of drift and forecasting error together on the amount of inventory needed to meet service levels. Also more research could be done on seasonal items. Research could be done on the effect

of drift and forecasting error on seasonal items. Also fashion items could be simulated.

Further surveys could also be administered. These surveys had few respondents. With more time, more respondents could be found. More statistical analysis could be performed with more respondents. Also some additional questions could be asked in the surveys. Retailers could be asked: What service levels do you actually maintain? When deciding between two manufacturers with similar items, what are the deciding factors in choosing a manufacturer? The manufacturers could be asked: Are there countries in the world where you will not purchase items, and why? What countries do you purchase items from the most, and why?

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APPENDIX A: MANUFACTURER SURVEY

Apparel Manufacturer Survey

**Institute of Textile Technology
Global Sourcing Experiment**

1. Who is the main sourcing decision maker in your company? (Choose all that apply)

- | | | | | |
|----------|-----------------|------------------|---------------------|---|
| a. Buyer | b. Merchandiser | c. Sales Manager | d. Sourcing Manager | e. Other (please specify) |
| 0 | 0 | 1 | 2 | 3 (Sr. VP of Global Sourcing, Director of Global Sourcing, and Product Manager) |

2. Who pays for the shipment of goods to your plants?

- | | | | |
|-----------------|-----------------|-----------|---------------------------|
| a. Your company | b. Manufacturer | c. Vendor | d. Other (please specify) |
| 4 | 2 | 0 | 0 |

The following questions will apply to your sourcing or manufacturing of items from specific regions.

The following questions will relate to basic items. Items that you produce year round, such as underwear.

	DOMESTIC Manufacturers within the U.S.	AMERICAN Manufacturers in Central and South America and the Caribbean	FAR EAST Manufacturers in Asia other than Pakistan and India	PAKISTAN/INDIA Manufacturers in Pakistan/India
3. What percentage of basic items come from this region?	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA
4. Have you experienced any of the following costs from using a manufacturer in these regions?	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA
5. Do you have any of the following concerns/problems with using a manufacturer in these regions? (Choose all that apply)	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns
6. What is the lead times you expect from these regions?	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks

The following questions will relate to seasonal items. Items that you produce that relate to a specific selling season or holiday, such as bathing suits or Christmas items.

	DOMESTIC Manufacturers within the U.S.	AMERICAN Manufacturers in Central and South America and the Caribbean	FAR EAST Manufacturers in Asia other than Pakistan and India	PAKISTAN/INDIA Manufacturers in Pakistan/India
7. What percentage of seasonal items come from this region?	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA
8. Have you experienced any of the following costs from using a manufacturer in these regions?	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA
9. Do you have any of the following concerns/problems with using a manufacturer in these regions? (Choose all that apply)	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns
10. What is the lead times you expect from these regions?	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks

The following questions will relate to fashion items. Items that you produce that are only current for one selling season such as women's blouses.

	DOMESTIC Manufacturers within the U.S.	AMERICAN Manufacturers in Central and South America and the Caribbean	FAR EAST Manufacturers in Asia other than Pakistan and India	PAKISTAN/INDIA Manufacturers in Pakistan/India
11. What percentage of fashion items come from this region?	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA
12. Have you experienced any of the following costs from using a manufacturer in these regions?	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA
13. Do you have any of the following concerns/problems with using a manufacturer in these regions? (Choose all that apply)	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns
14. What is the lead times you expect from these regions?	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks

3. What percentage of basic items come from this region?

Basic Items																								
Domestic						American					Far East					Pakistan/India								
0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA	
4	0	0	0	1	1	0	0	0	0	5	1	1	3	0	0	1	1	2	2	1	0	0	0	1

4. Have you experienced any of the following costs from using a manufacturer in these regions?

Basic Items									
Domestic					American				
Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA
0	4	0	0	2	2	2	2	1 Higher labor costs	1

Basic Items									
Far East					Pakistan/India				
Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA
3	1	5	0	1	3	1	5	0	1

5. Do you have any of the following concerns/problems with using a manufacturer in these regions?

Basic Items										
Domestic						American				
Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	No Concerns
5	0	0	0	1 Versatility	0	0	1	2	2	0

Basic Items										
Far East						Pakistan/India				
Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	No Concerns
1	4	3	2	1	0	1	4	3	2	0

6. What is the lead time you expect from these regions?

Basic Items											
Domestic						American					
0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks
1	0	1	0	1	0	0	1	1	0	1	0

Basic Items											
Far East						Pakistan/India					
0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks
0	0	0	0	2	1	0	0	0	0	2	1

7. What percentage of seasonal items come from this region?

Seasonal Items																		
Domestic					American					Far East				Pakistan/India				
0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA	
2				1	3	1	1		2	2		1	3	2	1	1	2	2

8. Have you experienced any of the following costs from using a manufacturer in these regions?

Seasonal Items									
Domestic					American				
Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA
0	1	0	1 (Flexibility)	4	1	3	1	1 (Flexibility)	2

Seasonal Items									
Far East					Pakistan/India				
Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA
3	1	3	0	2	3	1	3	0	2

9. Do you have any of the following concerns/problems with using a manufacturer in these regions?

Domestic						Seasonal Items						American					
Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	Other	No Concerns
3	0	0	0	1 (Flexibility)	1	1	1	2	1	1 (Flexibility)	1	1	2	1	1 (Flexibility)	1	1

Far East						Seasonal Items						Pakistan/India					
Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	Other	No Concerns
1	4	2	2	0	0	1	4	2	2	0	0	1	4	2	2	0	0

10. What is the lead time you expect from these regions?

Domestic						Seasonal Items						American					
0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks
0	0	1	1	0	0	0	0	1	0	1	0	0	0	1	0	1	0

Far East						Seasonal Items						Pakistan/India					
0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks
0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	1	1

11. What percentage of fashion items come from this region?

Domestic							American							Far East							Pakistan/India						
0-5%	6-15%	16-25%	26-35%	36+%	NA		0-5%	6-15%	16-25%	26-35%	36+%	NA		0-5%	6-15%	16-25%	26-35%	36+%	NA		0-5%	6-15%	16-25%	26-35%	36+%	NA	
2	0	0	0	1	3		1	0	1	0	0	4		0	0	1	0	2	3		0	0	1	0	1	4	

12. Have you experienced any of the following costs from using a manufacturer in these regions?

Fashion Items									
Domestic					American				
Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA
0	2	0	0	1	0	1	0	1 (Labor)	1

Fashion Items									
Far East					Pakistan/India				
Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA
1	0	3	0	0	0	0	2	0	1

13. Do you have any of the following concerns/problems with using a manufacturer in these regions?

Fashion Items						
Domestic						
Costs	Lead Times	Reliability	Quality	Other		No Concerns
2	0	0	0	2 (Ability to sew complicated products, Viability of provider)		0

Fashion Items						
American						
Costs	Lead Times	Reliability	Quality	Other		No Concerns
1	0	1	0	1 (Ability to sew complicated products)		0

Fashion Items						
Far East						
Costs	Lead Times	Reliability	Quality	Other		No Concerns
0	3	1	1	0		0

Fashion Items						
Pakistan/India						
Costs	Lead Times	Reliability	Quality	Other		No Concerns
0	2	0	0	0		0

14. What is the lead time you expect from these regions?

Domestic						Fashion Items						American					
0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks
0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0

Far East						Fashion Items						Pakistan/India					
0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks
0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	1	0

For question 15-18 please rank the factors in order of importance. The factor that is most important assign number 1, the second most important factor assign number 2 until you have ranked all the factors. The least important factor should be number 6.

15. What influenced your company's decision to use Domestic manufacturers?

a. Price b. Quality c. Relationship d. Lead times e. Reliability f. Other (please specify) g. NA

	Domestic						NA
	Price	Quality	Relationship	Lead Times	Reliability	Other	
Participant A	3	2	5	4	1	6	
Participant B	5	3	2	4	1	6	
Participant C	5	2	4	1	3	6	
Participant E							1
Participant F	4	5	3	1	2	6	
Participant G	5	1	4	3	2	6	

16. What influenced your company's decision to use American manufacturers?

a. Price b. Quality c. Relationship d. Lead times e. Reliability f. Other (please specify) g. NA

	American						
	Price	Quality	Relationship	Lead Times	Reliability	Other	NA
Participant A	4	3	5	2	1	6	
Participant B	1	2	4	5	3	6	
Participant C	5	2	4	1	3	6	
Participant E	2	5	3	1	4	6	
Participant F	4	5	3	1	2	6	
Participant G							1

17. What influenced your company's decision to use Far East manufacturers?

a. Price b. Quality c. Relationship d. Lead times e. Reliability f. Other (please specify) g. NA

	Far East						
	Price	Quality	Relationship	Lead Times	Reliability	Other	NA
Participant A	2	3	4	5	1	6	
Participant B	1	3	2	5	4	6	
Participant C	1	3	2	5	4	6	
Participant E	2	4	5	6	3	1 (Ability to have correct product)	
Participant F	1	3	4	5	2	6	
Participant G	6	2	5	4	3	1 (Availability-Cannot find Domestic)	

22. Do you have mid-season replenishments on items that have sold well?

- a. Yes 5 b. No (If no, skip to question 25) 0

23. **If you do have replenishments**, what kind of manufacturer do you use? (Choose all that apply)

- a. Domestic 3 b. American 5 c. Far East 3 d. Pakistan/Indian 3 e. Other (please specify) 2 (Eastern Europe and Middle East)

24. **If you do have replenishments**, how do you determine what needs to be replenished? (Choose all that apply)

- a. Point of Sale Data 4 b. Historical Data 3 c. Stockout on Items 3 d. Other (please specify) 1 (Planning and forecasting information from retailers)

25. **If you do not have replenishments**, why do you not have them?

- a. Items are one time sales 0 b. Could not get replenishment before end of selling season 0 c. Do not want upkeep of tracking items 0
d. Other (please specify) 0

The following questions relate to your use of replenishments for SEASONAL items.

26. What percentage of your total merchandise are seasonal items?

- a. 0-5% 0 b. 6-15% 1 c. 16-25% 0 d. 26-35% 0 e. 36%+ 1 f. NA 2

27. Do you have mid-season replenishments on items that have sold well?

- a. Yes 4 b. No (If no, skip to question 30) 0

28. **If you do have replenishments**, what kind of manufacturer do you use? (Choose all that apply)

- a. Domestic b. American c. Far East d. Pakistan/Indian e. Other (please specify)
1 4 3 3 0

29. **If you do have replenishments**, how do you determine what needs to be replenished? (Choose all that apply)

- a. Point of Sale Data b. Historical Data c. Stockout on Items d. Other (please specify)
3 3 3 1 (Planning and forecasting information from
retailers)

30. **If you do not have replenishments**, why do you not have them?

- a. Items are one time sales b. Could not get replenishment before end of selling season c. Do not want upkeep of tracking items
0 0 0
d. Other (please specify)
0

The following questions relate to your use of replenishments for FASHION items.

31. What percentage of your total merchandise are fashion items?

- a. 0-5% b. 6-15% c. 16-25% d. 26-35% e. 36%+ f. NA
0 1 0 0 1 3

32. Do you have mid-season replenishments on items that have sold well?

- a. Yes b. No (**If no, skip to question 35**)
2 1

33. **If you do have replenishments**, what kind of manufacturer do you use? (Choose all that apply)

- a. Domestic b. American c. Far East d. Pakistan/Indian e. Other (please specify)
2 1 1 1 1

34. **If you do have replenishments**, how do you determine what needs to be replenished? (Choose all that apply)

- a. Point of Sale Data b. Historical Data c. Stockout on Items d. Other (please specify)
2 1 0 0

For question 40 please rank the factors in order of importance. The factor that is most important assign number 1, the second most important factor assign number 2 until you have ranked all the factors. The least important factor should be number 6.

40. What performance measures do you use to evaluate potential manufacturers?

- a. Costs b. Quality c. Reliability d. Company Culture e. Lead times f. Other (please specify)

	Potential Manufacturers					
	Costs	Quality	Reliability	Company Culture	Lead Times	Other
Participant A	3	2	1	5	4	6
Participant B	1	2	4	5	3	6
Participant C	1	3	4	5	2	6
Participant E	1	3	2	5	4	6
Participant F	2	1	3	5	4	6
Participant G	4	1	2	5	3	6

41. Is there anything else that you would like to tell me?

One company said they want to use Domestic manufacturers but the number of Domestic manufacturers is decreasing. The one Domestic manufacturer they use is not changing to meet their business needs. They are not adapting to change. In five years, they will probably have to broaden their sourcing to more international companies to get components. They will probably use all international companies.

One company said that for their sourcing strategy, they use a combination of things such as duties and trade agreements to create a balance. They always want quality, reliability, and good lead times. For the shortest lead times they sacrifice costs. Cheapest costs come from Asia. The best lead times are in our hemisphere. They want a balance-a blend of the best sourcing strategy for best cost. They don't want to hold a lot of inventory. They want the quality to always be good and the retailer expects reliability. Their company culture is that compliance is important. Human rights must be met. Also all the components of cost, quality, reliability, company culture, and lead times are important when making decisions.

One company said that they are different from other manufacturers because they are a private company and they own their plants in the Americas. They have CMT contracts with plants to start sourcing more. CMT companies provide raw materials. Then their plant assembles the trim and cloth and then ships to the desired location. Public companies use American and Far East manufacturers for full package. They also said that when evaluating potential manufacturers the region's infrastructure, the country's politics and the country's logistics are important.

APPENDIX B: RETAILER SURVEY

Apparel Retailer Survey

Institute of Textile Technology Global Sourcing Experiment

1. Who is the main sourcing decision maker in your company? (Choose all that apply)

- a. Buyer b. Merchandiser c. Sales Manager d. Sourcing Manager e. Other (please specify)
- 3 1 0 3 0

2. How does your company forecast the merchandise mix for a season? (Choose all that apply)

- a. Simulation based tools b. Historical data c. Trend forecasters (such as Donneger Group) d. Other (please specify)
- 1 3 3 0

3. Who pays for the shipment of goods to your stores?

- a. Your company b. Manufacturer c. Vendor d. Other (please specify)
- 3 2 2 0

The following questions will relate to your use of three types of merchandise

	BASIC Items carried in your store all year with little change to sku mix . ex. bras and white men's button down shirts	SEASONAL Items usually based on a holiday or a time of year. ex. bathing suits or parkas	FASHION Items with a short product life cycle, and are usually in style one season. ex. women's blouses or junior's jeans
4. What percentage of your skus must be marked down because you ordered too many?	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f.NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f.NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f.NA
5. For those skus that are marked down, what is the average markdown as a percentage of the original price?	a.0-15% b.16-30% c.31-45% d.46-60% e.61%+ f.NA	a.0-15% b.16-30% c.31-45% d.46-60% e.61%+ f.NA	a.0-15% b.16-30% c.31-45% d.46-60% e.61%+ f.NA
6. How often do you have stockouts within a selling season?	a.0-5 times b.6-10 times c.11-15 times d.16-20 times e.21+ times	a.0-5 times b.6-10 times c.11-15 times d.16-20 times e.21+ times	a.0-5 times b.6-10 times c.11-15 times d.16-20 times e.21+ times
7. How often do you have replenishments?	a.0-5 times b.6-10 times c.11-15 times d.16-20 times e.21+ times f. NA	a.0-5 times b.6-10 times c.11-15 times d.16-20 times e.21+ times f. NA	a.0-5 times b.6-10 times c.11-15 times d.16-20 times e.21+ times f.NA
8. What percentage of your customers complain about not being able to find the item they are looking for in your stores?	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+
9. In what regions are the manufacturers that your company uses located? (Choose all that apply)	a.Domestic b.Americas c.Far East d.Pakistan/India e.Other (please specify)	a.Domestic b.Americas c.Far East d.Pakistan/India e.Other (please specify)	a.Domestic b.Americas c.Far East d.Pakistan/India e.Other (please specify)
10. What percentage of your total merchandise are ?	a. 0-5% b. 6-15% c. 16-25% d. 26-35% e. 36%+ f. NA	a. 0-5% b. 6-15% c. 16-25% d. 26-35% e. 36%+ f. NA	a. 0-5% b. 6-15% c. 16-25% d. 26-35% e. 36%+ f. NA

4. What percentage of your skus must be marked down because you ordered too many?

Basic Items						Seasonal Items						Fashion Items					
0-5%	6-15%	16-25%	26-35%	36%+	NA	0-5%	6-15%	16-25%	26-35%	36%+	NA	0-5%	6-15%	16-25%	26-35%	36%+	NA
3	0	0	0	0	0	0	2	1	0	0	0	0	1	2	0	0	0

5. For those skus that are marked down, what is the average markdown as a percentage of the original price?

Basic Items						Seasonal Items						Fashion Items					
0-15%	16-30%	31-45%	46-60%	61%+	NA	0-15%	16-30%	31-45%	46-60%	61%+	NA	0-15%	16-30%	31-45%	46-60%	61%+	NA
0	1	2	0	0	0	0	0	2	1	0	0	0	0	1	2	0	0

6. How often do you have stockouts within a selling season?

Basic Items					Seasonal Items					Fashion Items				
0-5 times	6-10 times	11-15 times	16-20 times	21+ times	0-5 times	6-10 times	11-15 times	16-20 times	21+ times	0-5 times	6-10 times	11-15 times	16-20 times	21+ times
1	1	0	0	0	1	1	0	0	0	2	0	0	0	0

7. How often do you have replenishments?

Basic Items						Seasonal Items						Fashion Items					
0-5 times	6-10 times	11-15 times	16-20 times	21+ times	NA	0-5 times	6-10 times	11-15 times	16-20 times	21+ times	NA	0-5 times	6-10 times	11-15 times	16-20 times	21+ times	NA
0	0	0	0	3	0	2	0	1	0	0	0	3	0	0	0	0	0

8. What percentage of your customers complain about not being able to find the item they are looking for in your stores?

Basic Items						Seasonal Items						Fashion Items					
0-5%	6-15%	16-25%	26-35%	36%+	NA	0-5%	6-15%	16-25%	26-35%	36%+	NA	0-5%	6-15%	16-25%	26-35%	36%+	NA
2	1	0	0	0	0	2	1	0	0	0	0	1	2	0	0	0	0

9. In what regions are the manufacturers that your company uses located?

Basic Items					Seasonal Items					Fashion Items				
Domestic	Americas	Far East	Pakistan/India	Other	Domestic	Americas	Far East	Pakistan/India	Other	Domestic	Americas	Far East	Pakistan/India	Other
3	3	3	1	0	3	3	3	3	0	3	3	3	3	0

10. What percentage of your total merchandise are...?

Basic Items						Seasonal Items						Fashion Items					
0-5%	6-15%	16-25%	26-35%	36%+	NA	0-5%	6-15%	16-25%	26-35%	36%+	NA	0-5%	6-15%	16-25%	26-35%	36%+	NA
0	0	1	1	1	0	0	0	1	1	1	0	0	0	0	0	3	0

The following questions will apply to your sourcing of items from specific regions.

The following questions will relate to basic items. Items that you produce year round, such as underwear.

	DOMESTIC Manufacturers within the U.S.	AMERICAN Manufacturers in Central and South America and the Caribbean	FAR EAST Manufacturers in Asia other than Pakistan and India	PAKISTAN/INDIA Manufacturers in Pakistan/India
11. What percentage of basic items come from this region?	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA
12. Have you experienced any of the following costs from using a manufacturer in these regions?	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA
13. Do you have any of the following concerns/problems with using a manufacturer in these regions? (Choose all that apply)	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns
14. What is the lead times you expect from these regions?	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks

The following questions will relate to seasonal items. Items that you produce that relate to a specific selling season or holiday, such as bathing suits or Christmas items.

	DOMESTIC Manufacturers within the U.S.	AMERICAN Manufacturers in Central and South America and the Caribbean	FAR EAST Manufacturers in Asia other than Pakistan and India	PAKISTAN/INDIA Manufacturers in Pakistan/India
15. What percentage of seasonal items come from this region?	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA
16. Have you experienced any of the following costs from using a manufacturer in these regions?	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA
17. Do you have any of the following concerns/problems with using a manufacturer in these regions? (Choose all that apply)	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns
18. What is the lead times you expect from these regions?	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks

The following questions will relate to fashion items. Items that you produce that are only current for one selling season such as women's blouses.

	DOMESTIC Manufacturers within the U.S.	AMERICAN Manufacturers in Central and South America and the Caribbean	FAR EAST Manufacturers in Asia other than Pakistan and India	PAKISTAN/INDIA Manufacturers in Pakistan/India
19. What percentage of fashion items come from this region?	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA	a.0-5% b.6-15% c.16-25% d.26-35% e.36%+ f. NA
20. Have you experienced any of the following costs from using a manufacturer in these regions?	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA	a. Higher shipping costs b. Procurement costs c. Long lead times d. Other (please specify) e. NA
21. Do you have any of the following concerns/problems with using a manufacturer in these regions? (Choose all that apply)	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns	a. Costs b. Lead times c. Reliability d. Quality e. Other (please specify) f. No Concerns
22. What is the lead times you expect from these regions?	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks	a. 0-3 weeks b. 4-6 weeks c. 7-9 weeks d. 10-12 weeks e.13-15 weeks f. 16+ weeks

11. What percentage of basic items come from this region?

Domestic						Basic Items						American					
0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA
0	0	0	1	2	0	1	1	0	1	0	0	1	1	0	1	0	0

Far East						Basic Items						Pakistan/India					
0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA
0	0	2	0	1	0	2	0	1	0	0	0	2	0	1	0	0	0

12. Have you experienced any of the following costs from using a manufacturer in these regions?

Domestic					Basic Items					American				
Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA
1	2	2	0	0	1	1	2	1 shorter lead times	0	1	1	2	1 shorter lead times	0

Far East					Basic Items					Pakistan/India				
Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA
1	1	2	0	1	1	2	3	0	0	1	2	3	0	0

13. Do you have any of the following concerns/problems with using a manufacturer in these regions?

Domestic						Basic Items						American					
Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	Other	No Concerns
2	2	3	1	0	0	1	2	2	1	0	1	1	2	2	1	0	1

Far East						Basic Items						Pakistan/India					
Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	Other	No Concerns
1	2	1	2	0	1	1	2	1	3	0	0	1	2	1	3	0	0

14. What is the lead time you expect from these regions?

Domestic						Basic Items						American					
0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks
1	0	1	1	0	0	0	1	0	1	1	0	0	1	0	1	1	0

Far East						Basic Items						Pakistan/India					
0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks
0	0	1	0	0	3	0	0	1	0	1	1	0	0	1	0	1	1

15. What percentage of seasonal items come from this region?

Domestic						Seasonal Items						American					
0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA
0	1	0	1	1	0	2	0	1	0	0	0	0	0	1	0	0	0

Far East						Seasonal Items						Pakistan/India					
0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA
0	0	1	0	2	0	0	1	0	2	0	0	0	1	0	2	0	0

16. Have you experienced any of the following costs from using a manufacturer in these regions?

Domestic					Seasonal Items					American				
Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA
1	2	2	0	0	1	1	2	0	0	1	1	2	0	1

Far East					Seasonal Items					Pakistan/India				
Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA
1	1	2	1 (Quality)	1	1	1	3	1 (Quality)	0	1	1	3	1 (Quality)	0

17. Do you have any of the following concerns/problems with using a manufacturer in these regions?

Domestic						Seasonal Items						American					
Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	Other	No Concerns
2	2	2	2	0	0	1	1	2	1	0	1	1	1	2	1	0	1

Far East						Seasonal Items						Pakistan/India					
Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	Other	No Concerns
1	2	1	2	0	1	1	3	1	3	0	0	1	3	1	3	0	0

18. What is the lead time you expect from these regions?

Domestic						Seasonal Items						American					
0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks
1	0	1	0	0	1	0	1	0	1	0	1	0	1	0	1	0	1

Far East						Seasonal Items						Pakistan/India					
0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks
0	0	1	0	0	3	0	0	1	0	1	1	0	0	1	0	1	1

19. What percentage of fashion items come from this region?

Domestic						Fashion Items						American					
0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA
0	1	0	1	1	0	2	0	1	0	0	0	2	0	1	0	0	0

Far East						Fashion Items						Pakistan/India					
0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA	0-5%	6-15%	16-25%	26-35%	36+%	NA
0	0	1	0	2	0	0	1	1	1	0	0	0	1	1	1	0	0

20. Have you experienced any of the following costs from using a manufacturer in these regions?

Domestic					Fashion Items					American				
Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA
1	2	2	0	0	1	1	2	0	1	1	1	2	0	1

Far East					Fashion Items					Pakistan/India				
Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA	Higher Shipping Costs	Procurement Costs	Long Lead Times	Other	NA
1	1	2	0	1	1	1	3	0	1	1	1	3	0	0

21. Do you have any of the following concerns/problems with using a manufacturer in these regions?

Domestic						Fashion Items						American					
Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	Other	No Concerns
2	2	2	2	0	0	1	1	2	1	0	1	1	1	2	1	0	1

Far East						Fashion Items						Pakistan/India					
Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	Other	No Concerns	Costs	Lead Times	Reliability	Quality	Other	No Concerns
2	2	1	2	0	1	1	3	1	3	0	1	1	3	1	3	0	0

22. What is the lead time you expect from these regions?

Domestic						Fashion Items						American					
0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks
1	0	1	0	0	1	0	1	0	1	0	1	0	1	0	1	0	1

Far East						Fashion Items						Pakistan/India					
0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks	0-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks	13-15 weeks	16+ weeks
0	0	1	0	0	2	0	0	1	0	1	1	0	0	1	0	1	1

For questions 23-26 please rank the factors in order of importance. The factor that is most important assign the number 1, the second most important factor assign the number 2 until you have ranked all the factors. The least important factor should be number 6.

23. What influenced your company's decision to use Domestic manufacturers?

- a. Price b. Quality c. Relationship d. Lead times e. Reliability f. Other (please specify) g. NA

	Domestic						
	Price	Quality	Relationship	Lead Times	Reliability	Other	NA
Participant A	1	2	5	4	3	6	
Participant C	1	3	5	2	4	6	
Participant D	5	3	1	2	4	6	

24. What influenced your company's decision to use American manufacturers?

- a. Price b. Quality c. Relationship d. Lead times e. Reliability f. Other (please specify) g. NA

	American						
	Price	Quality	Relationship	Lead Times	Reliability	Other	NA
Participant A	1	2	5	4	3	6	
Participant C	1	3	5	2	4	6	
Participant D	1	3	5	2	4	6	

25. What influenced your company's decision to use Far East manufacturers?

- a. Price b. Quality c. Relationship d. Lead times e. Reliability f. Other (please specify) g. NA

	Far East						
	Price	Quality	Relationship	Lead Times	Reliability	Other	NA
Participant A	1	2	5	4	3	6	
Participant C	1	2	5	4	3	6	
Participant D	1	2	5	4	3	6	

26. What influenced your company's decision to use Pakistan/Indian manufacturers?

- a. Price b. Quality c. Relationship d. Lead times e. Reliability f. Other (please specify) g. NA

	Pakistan/India						NA
	Price	Quality	Relationship	Lead Times	Reliability	Other	
Participant A	1	2	5	4	3	6	
Participant C	1	2	5	4	3	6	
Participant D	1	2	5	4	3	6	

The following questions relate to your use of replenishments for BASIC items.

27. What percentage of your total merchandise are basic items?

- a. 0-5% b. 6-15% c. 16-25% d. 26-35% e. 36%+ f. NA
 0 0 1 1 1 0

28. What kind of manufacturer do you use? (Choose all that apply)

- a. Domestic b. American c. Far East d. Pakistan/Indian e. Other (please specify)
 3 2 3 2 0

29. How do you determine what needs to be replenished? (Choose all that apply)

- a. Point of Sale Data b. Historical Data c. Stockout on Items d. Other (please specify)
 3 2 3 0

The following questions relate to your use of replenishments for SEASONAL items.

30. What percentage of your total merchandise are seasonal items?

- a. 0-5% b. 6-15% c. 16-25% d. 26-35% e. 36%+ f. NA
 0 0 1 1 1 0

31. Do you have mid-season replenishments on items that have sold well?

- a. Yes 3 b. No (If no, skip to question 34) 0

32. **If you do have replenishments**, what kind of manufacturer do you use? (Choose all that apply)

- a. Domestic 3 b. American 2 c. Far East 2 d. Pakistan/Indian 1 e. Other (please specify) 0

33. **If you do have replenishments**, how do you determine what needs to be replenished? (Choose all that apply)

- a. Point of Sale Data 3 b. Historical Data 2 c. Stockout on Items 3 d. Other (please specify) 2 (VMI)

34. **If you do not have replenishments**, why do you not have them?

- a. Items are one time sales 0 b. Could not get replenishment before end of selling season 0 c. Do not want upkeep of tracking items 0
d. Other (please specify) 0

The following questions relate to your use of replenishments for FASHION items.

35. What percentage of your total merchandise are fashion items?

- a. 0-5% 0 b. 6-15% 0 c. 16-25% 0 d. 26-35% 0 e. 36%+ 3 f. NA 0

36. Do you have mid-season replenishments on items that have sold well?

- a. Yes 2 b. No (If no, skip to question 39) 1

37. **If you do have replenishments**, what kind of manufacturer do you use? (Choose all that apply)

- a. Domestic 2 b. American 1 c. Far East 1 d. Pakistan/Indian 1 e. Other (please specify) 0

38. **If you do have replenishments**, how do you determine what needs to be replenished? (Choose all that apply)

- a. Point of Sale Data b. Historical Data c. Stockout on Items d. Other (please specify)

2

0

2

0

39. **If you do not have replenishments**, why do you not have them?

- a. Items are one time sales b. Could not get replenishment before end of selling season c. Do not want upkeep of tracking items

1

1

0

d. Other (please specify)

0

The following questions relate to your purchasing decisions in general.

40. Have you ever used dual sourcing, where one supplier provides you with merchandise prior to the start of the selling season, and you used another supplier to provide mid-season replenishments?

- a. Yes b. No (If no, skip to question 42)

2

1

41. How many times have you used dual sourcing?

- a. 0-5 times b. 6-10 times c. 11-15 times d. 16-20 times e. 21+times

1

0

0

0

1

42. How much more (as a percentage of unit cost) would you be willing to pay a manufacturer in order to get an in-season replenishment of a product?

- a. 0-5% b. 6-15% c. 16-25% d. 26-35% e. Other (please specify)

3

0

0

0

0

43. Assume it could be proven to you that you could pay more for a product from a manufacturer for an in-season replenishment of items, and still have greater margins. Are there any other barriers that would prevent you from using this manufacturer?

- a. Loyalty b. Company Culture c. Other (please specify) d. No Barriers

1

0

0

2 (Dual approval process by different manufacturers)

For question 44 please rank the factors in order of importance. The factor that is most important assign the number 1, the second most important factor assign the number 2 until you have ranked all the factors. The least important factor should be number 5.

44. What performance measures do you use to evaluate potential manufacturers?

- a. Costs b. Quality c. Reliability d. Company Culture e. Lead times

	Potential Manufacturers				
	Costs	Quality	Reliability	Company Culture	Lead Times
Participant A	1	2	3	5	4
Participant C	1	2	4	5	3
Participant D	3	2	1	5	4

45. What performance measures do you use to evaluate the selling season of a product?

- a. Gross Margin b. Number of stockouts c. Point of Sale data d. Number of items sold e. Other (please specify)
3 3 3 3 1 (number of turns,
GMROI, weeks of supply)

46. What service levels do you try to maintain?

- a. 80-84% b. 85-89% c. 90-94% d. 95%+ e. Other (please specify)
0 0 1 2 0

47. Is there anything else that you would like to tell me?

One retailer said some decisions vary. What is paramount is price and quality. Sometimes they are very close in these areas, and there is not a significant difference. Performance characteristics are interwoven in decision making.

Another retailer said that the cultural questions were good questions. There are basically three types of garments, and these are general across the board. Fashion it is best to have replenishments. You have more chances to react, and there is more risk in fashion items.