Global Supply Chain Competition in Acrylic Fibers in the New Millennium:
Solutia, Acrilan Division & the Asian Crisis Case*†

Brad Lopez, director of Solutia’s Acrilan Acrylic Fiber division, stood at his office in Saint Louis looking through the window. He was preoccupied, as sales had been declining and the outlook was not encouraging. Again and again he went over each minor detail. Their only factory in Decatur, Alabama was running well below capacity and any continuous improvement efforts could not counteract the drastic price decline as a result of the massive Asian imports that followed the Asian crisis of 1997. Their North American supply chain was not competitive. The main problem was with the forward part of the acrylic fiber supply chain. The competitiveness of their fiber prices was not an issue to ignore either.

Solutia sells to the apparel manufacturers through key yarn spinners who continue to see their customer base erode. The customers of the yarn spinners, the knitters and cut & sewing operators, are mostly undercapitalized small businesses that are facing stiff competition from Asian imports to the US. The long term viability of such labor intensive operations in the US is under question. Even though the production of cotton and poly/cotton has seen a dramatic shift from Pacific-Rim to Mexico production, the “Mom & Pop” acrylic knitting operations, located mostly in New York and California, were reluctant to put family money into a Mexican venture, especially with their lack of experience and knowledge of management in a foreign culture.

Lopez recalled a recent conversation with Gary Berkeley, a twenty-year veteran in the fiber business, and also an influential member of the strategy advising team formed to address the long-term viability of the acrylic fiber business:

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† This represents an actual decision situation that the author consulted for, with numbers fully representative and accurate of the late 1990’s picture in the textile industry. Only names of decision makers have been disguised.
“Brad we must take a leadership role in helping acrylic garments manufacturers to establish lower production cost facilities in North America. Look what Chuck Hayes and Guilford Mills did with Nustart. They developed a giant apparel complex in Mexico at which garments will be sewn primarily from US-made fabrics. They got in the real estate business, building plants, then leasing them to their customers. Such textile cities will find more imitators throughout Mexico. We got to move fast. We have 100 million lbs. of unused capacity in our Alabama plant and the price per lb. of fiber has dropped more than 50% since the Asian crisis started.”

Brad Lopez knew that it was time to reach a decision. An outside consulting report with all the relevant cost numbers was sitting on his desk. A semi-finished draft of the recommended actions by the strategy advising team had been recently circulated by Gary Berkeley. It had to be completed and presented to an executive board in two weeks. September 30, 1999 was a hard deadline. One point that all on the strategy advising team agreed on was that in order to stay competitive strategic changes have to take place in the North American acrylic supply chain, and the role of Solutia within it needs to be redefined. Inaction could prove as costly as any other alternative. However, there was considerable disagreement on how to proceed next.

Solutia’s sales for home furnishing and industrial applications have been stable and the outlook does not show any challenges in the future. Solutia’s problems are in the acrylic sweater business which represents 45% of the division’s sales, and that seems it will continue to lose sales to imports. This trend has been occurring for several years and has strengthened recently due to the Asian crisis. Devaluation in the Asian countries created a more competitive environment for those countries. The crisis eroded the local markets for Asian producers, which then started to look overseas to sell their products. Asian overcapacity combined with devalued Asian currencies resulted in cheap exports from Asia to USA, Europe and the other parts of the world. Among the acrylic supply players, the outlook is particularly bleak for the US knitters and cut and sewers which are in labor intensive businesses. Labor in the Asian countries is up to ten times cheaper than that in the US. Cost figures mentioned by knowledgeable international business experts quote cost of labor as low as $0.01 per hour in Bangladesh, $1.30 in Honduras, $2.40 in Mexico, $7.10 in Los Angeles and $9.00 in the New York Area. US apparel imports from Asia are expected to increase 25% in 1999. At the same time, apparel employment has declined 25% over the last 6 years, and the trend has lately accelerated.

The possibility of an industry recovery and the potential to overcome the Asian competition lies in the success of the North American Free Trade Agreement (NAFTA). With the elimination of tariffs the industry is hoping that the knitters and cut and sewers will cross the borders installing facilities in Mexico, which will then allow American companies to compete more efficiently with Asian companies since wages are more competitive in Mexico. A well known consultant was quoted as saying:

“Textile companies cannot afford to lose focus on one fundamental change affecting the U.S. apparel industry. The ongoing shift of production to Mexico. The Asian crisis has put a significant damper on the efforts to move production to
Mexico and Latin America. We were really in a proactive position of taking back market share at the time of the economic melt down in the summer of 1997. But as the Asian economies stabilize the speed advantage of having factories close to the US market will pay of.”

But, as Brad Lopez knew very well, they have to act fast, and probably they should keep all options open. Aggressive facilitation of the moving of textile production to Mexico, Latin America, is an option. Alliances with Asian firms in Mexico and Latin America should not be excluded. He recalled a recent conversation with a textile consultant.

“Latin America and Mexico will continue to grow in importance as a garment making region. It currently costs about $5 million to build a garment factory in Latin America. Textile companies who want to setup a shop in the region need to act fast, because Asian competitors are already turning their eyes into the area. About 70% of the apparel industry in Guatemala is owned or controlled by Korean interests, and Thailand based concerns also have a large presence in that country. In Mexico 15 to 20 percent of the facilities are owned or backed by Asians. American firms wanting to setup a shop in that area need to seek for Join Ventures or alliances with Asian competitors.”

Of all the options Brad had heard, he was interested in two of them. The first one involved totally changing the strategy of the division; Solutia would act as a trader taking orders from the retailers for "full package" solutions, and then would manage the supply chain to guarantee quality and on-time delivery. Proponents of this alternative favored integration via appropriate alliances with details still to be decided. The more likely alliance will be with one of the major US yarn spinners. Acrilan and its partner(s) will then pursue capital investments in Mexico to build needed knitting and cut & sew capacity. The motivation of the alternative was coming from recent strategic investments of Crystal Kobe, an Asian garment producer. A more conservative version of the alternative would have Solutia alone, trying to convince and help the garment cutters and sewers to move their facilities to Mexico in order to better compete with the Asians, following a parallel path to the Nustart development. The second alternative was a variation of the first, with Solutia involved in a partnership with a trading company which had ultimate knowledge and ability to interface with Mexican and Latin American garment manufacturers for delivering a full package to the retailer. A recent study on the global supply chain model used by the Li & Fung trading company for the Hong Kong, and Asian region overall, motivated the alternative. Many questions still remained. Could Li & Fung do the same for the Mexican and Latin America region? Was there another trading company available for that region with acrylic fiber sourcing knowledge? What kind of a partnership with Solutia will work?

Of course, shutting down part of the acrylic fiber capacity was always a solution. But Brad had preferred not to think of it so far. However, some others were already thinking of it. Just two weeks ago, he had to dismiss an idea, offered half jokingly by a senior Solutia executive, to shut down one third of the Decatur factory capacity. Brad knew that next time the idea resurfaced, he had to put forward some hard numbers on the viability of the acrylic fiber operations. Time was of essence, and Brad was running out of it.
Solutia History

Solutia was formerly the chemical business of Monsanto. In 1997 Monsanto shareholders decided to spin-off Solutia. Monsanto would concentrate on the pharmaceutical, agricultural and biotechnology business. Solutia would concentrate on the chemical part of the business, with emphasis on carpet fibers, automotive plastics and industrial chemicals. The reason for the separation was a strategic one. The nature of the businesses was so different that the shareholders decided that it would be in the best interest of the company not to have both businesses under the same umbrella. Robert G. Potter, Solutia’s chairman and chief executive, and John C. Hunter III, Solutia’s president and chief operating officer, found the spin-off a liberating act. In the past investment needs of the chemical division were given lower priority to the research and marketing needs of the life sciences division. And even though the spin-off created a logical separation between product categories, it also left Solutia with a disproportionate amount of debt for its size of capitalization and 70% of the previous company’s retirees.

The Acrilan division is one of Solutia’s 10 business units, and it was contributing in 1998 an estimated 35-40 million dollars to the company’s operating income net of overhead and R&D expenses. The Acrilan division is the largest producer of acrylic fiber in North America. Acrylonitrile, which is produced in house as well as bought from external suppliers, is the raw material used to manufacture the fiber. The main attributes of the fiber are its low specific gravity (warmth without weight), its ability to dye easily, and its sunlight and mildew resistance. Consumers seemed to like the fact that acrylic garments are washable. Acrylic fiber has a variety of uses in apparel, home furnishing and industrial settings.

Even though the acrylic fiber manufacturing process is mainly automated, Solutia’s production process is more flexible than the average competitor. Solutia’s manufacturing process permits dyeing the fiber in a variety of colors at rather small batches at the end of the line (see Exhibit 1 Acrilan Manufacturing Process). Solutia’s flexible process is an advantage for more custom driven acrylic fiber applications in home furnishings and industrial uses. However, the majority of acrylic uses are in the commodity apparel markets with acrylic sweaters being a big portion of it. For such commodity market applications Solutia’s fiber production costs were putting it at a slight disadvantage, which combined with transportation costs made it impossible to consider shipping fiber from their US plants to major markets in Asia or Europe, thus only leaving North and Latin America and the Caribbean nations as the potentially viable markets. In a recent plant tour Gary Berkeley commented:

“If we were building a Decatur factory now it would have been a much more high volume inflexible facility. The current acrylic fiber business is commodity business. And it looks like it is going to stay that way. Marketing efforts currently undertaken could grow the custom applications, but the cost competitiveness of the North American acrylic supply chain will determine the viability of the commodity business.”

Factory capacity is 300 million pounds, but currently running at two thirds of it. After looking at demand trends Brad Lopez realized that would be complicated if not impossible running the factory at full capacity at least in the short run. Overall world demand was well
below total capacity and Solutia already had more than two thirds of the American sourced fiber market. Sterling was the other notable American company survivor in the acrylic fiber business. He went over some solutions for the factory, but he knew that these solutions would be short lived. Any improvements in manufacturing capabilities or reduction of manufacturing costs would be rapidly eroded by Asian competition and the incredible low Asian wages. With the current state of automation, the cost of labor in fabric manufacturing is now a very small part of the total cost. Any fiber cost disadvantages were compensated in the North American market by the market proximity (“quick response”) and transportation cost savings. Furthermore, upper management did not like to hear on any capital-intensive investment solutions in the acrylic fiber business. Extremely hard to justify any such investments in a commodity business with slim margins, which seemed destined for further squeezing. Brad knew this was an important consideration in evaluating all alternatives.

The Acrylic Fiber Market

Acrylic fibers have different product end uses. The fibers are used in apparel for sweaters, socks, craft yarns and jerseys; in home furnishings for blankets and drapery; in industrial uses for felts and non-wovens. The main markets for Solutia’s acrylic fiber are socks and sweaters.

A typical acrylic fiber supply chain starts with raw material (Acrylonitrile) being converted into fiber (see Exhibit 2, Typical Acrylic Fiber Value Chain). Solutia produces most of the needed acrylonitrile, and within the last two years had expanded its capacity of it. Unfortunately, the acrylonitrile market has proved quite disastrous recently. Once the process is concluded the fiber is delivered to the Yarn Spinner that will dye and yarn the product (e.g. companies such as Glen Raven and National Spinning). Most of the output of the Yarn Spinners is shipped to the Knitters, Cut and Sewers (for example, Fashion Avenue knits, Grand Knitting Mills, Kellwood). Finally, the product is finished at the garment producer (for example, Donnkenny, Liz Claiborne) who is typically the one that takes the order from the retailer (for example, Dillards, Federated, Mervyn’s, Wal-Mart, JC Penney, Sears etc.). Some knitters also take orders directly from retailers. Production characteristics are different at the different stages of the supply chain. Fiber producers and yarn spinners are capital intensive operations (yarn spinning has more labor cost percentage than fiber production), while the rest of the chain is labor intensive, and in particular so at the cut and sewing end. Solutia’s product is mostly a commodity, and interaction between Solutia and retailers is minimal. There is no product branding at the fiber or yarn level.

Substitute products of acrylic fiber are cotton, polyester and nylon. Acrylic fiber’s advantages are its vibrant colors, fabric handle and U (ultraviolet) stability. Cotton’s advantages are its consumer perception, hot/wet properties and absorption. Nylon’s material strength is best used for the production of carpets. Polyester has the lowest cost of production.

One third of the US acrylic fiber production is sold in the local markets and the rest is exported (see Exhibit 3, Domestic Acrylic Utilization Rates). Acrylic imports in the US are mainly finished products and most of them are Sweaters (Exhibit 4, US Retail Sweater Consumption). Seventy percent of the US consumed acrylic sweaters are imported (Exhibit 9
shows acrylic sweater imports by country of origin). Solutia is the biggest producer in the United States having increased its market share of American sourced acrylic fibers to 70% after DuPont divested its acrylic business in the late 1980’s.

Solutia has the fourth biggest production capacity in the world but in terms of capacity per factory only AKSA, a producer from Turkey, surpasses Solutia (Exhibit 5, 1997 Actual Capacity). It is interesting to note that the market is characterized with a worldwide overcapacity (see Exhibit 6, Global Acrylic Demand/Supply Balance). Looking at it from a regional perspective demand exceeds capacity only in Africa and Asia, and Latin America has a projected under supply in the future (see Exhibit 7 on regional demand/supply balance in Latin America).

Prices for acrylic fiber have steadily declined over the past few years. The decrease in price has been caused by a global oversupply and by the Chinese producers reducing their prices 47% (see Exhibit 8, Chinese Pricing) during 1998. The situation has further intensified in 1999, a rough year for many acrylic markets, and in particular sweaters. The US sweater market has been cyclical, depending on fashion trends, weather conditions and other factors.

International Trade Issues

On December 17, 1992, leaders of the United States, Canada and Mexico signed the North American Free Trade Agreement or NAFTA. Launched in January 1994, NAFTA eliminated all tariffs among its three member countries, creating as a result the largest free trade zone in the world. In addition to elimination of all North American tariff, NAFTA provided for a phased reduction of non-tariff barriers and a gradual convergence of economic regulation across the member's borders. The treaty's provisions also covered investment rights and intellectual property protection. The implication of NAFTA in the years 2000 and after on the actions of Solutia, and its main Asian and European competition, was one of the issues the strategy advising team had to address. Related issues were the effect of similar bilateral trade programs with the Caribbean nations (Caribbean Basin Initiative (CBI), and a potentially updated version after 2001 that will offer trade terms similar to NAFTA, (the so called CBI-parity agreement)), and the coming end of the quota imposed system as a part of the MultiFiber Agreement (MFA) by the year 2005.

The strategy advising team had spent a few hours with the international trade expert Hank Fong in an effort to better understand some of these issues. The main points of this interview were:

- All activities within the NAFTA trade zone are now quota and duty free. Solutia and other US acrylic fiber producers, should take advantage of the NAFTA rules of origin that specify both fiber and yarn forward for acrylic fiber, while for all other fibers it is just yarn forward.
- The Multifiber agreement goes away in January 2005 and there will be no more fiber quotas after that time. However, duties will remain.
- The current duties on sweaters into the US are around 34%, but it is a widespread expectation that these duties will be reduced during the "Millennium" round of trade negotiations. The question is by how much? Will they be at 20%? or 15%? Or 10%?
• In the near term the Caribbean and Central American nations will concentrate their efforts in obtaining parity in the trade term (the often referred CBI parity) as for Mexican sourced product (i.e. no quotas and duties).

• Congress was considering a “sub-Saharan Initiative”, which if it passes in a proposed form will allow garments with 40% country content in certain African nations to enter free of duties in the US market. In that case, the Chinese fiber producers will take advantage of it. Cut-and-sew capacity will develop in Africa, with the Chinese fiber and yarn spinners supplying it.

Brad remembered the expert saying that “the current quota limits in most apparel categories are quite generous, and most countries count only up to 80% of their limits in most cases.” However, almost all of the buying executives he had talked to mentioned the problems with quota limits in Asian countries, and particularly so for China. Transshipments of Chinese production via Hong Kong, Taiwan and other Asian countries in an effort to bypass quota limits were often mentioned, with trading companies serving as the coordinators of such activities. Examples of powerful middlemen with strong government connections purchasing and reallocating at a profit, quota allocation (“export permits”) were often mentioned. However, in a recent development a U.S. government sponsored website listed 314 Hong Kong companies that were found guilty of illegal transshipments.

The strategy advising team also spent time with the consulting company of Donerfield and Stevenson, which provided accounting and legal services to companies interested in relocation to Mexico. Some of the interesting insights were:

• By 2001 the "in-bond" arrangements end for Asian owned Mexican magniladoras. As a result, such factories will no longer be able to source non-NAFTA raw materials without paying duty. The US will charge "triple duties" on garments that do not meet NAFTA restrictions, and Asian non Mexican magniladoras will disappear, at least the way we know them now. As an example, it was mentioned the story of a Korean company that currently ships “in bond” to Long Beach, California, and then duty free to its Mexican magniladora. From there, shipments to US pay duty only on value added. They are in for a big surprise with the new program.

• Asians are building major textile facilities in Mexico for circular knitting and dyeing. Five operations are currently under construction at a cost of 8 to 20M$ each. Most of the activity takes place in the 7-8 Mexican states that have available suitable water reserves for textile dyeing and finishing plants.

• Trade parity with the Caribbean nations will occur in all likelihood by 2001 or 2002. These countries only have cut and sew capabilities, but there is limited textile mill capacity.

The strategy advising team frequently debated these issues. Brad Lopez vividly remembered such a discussion with Gary Berkeley and Kate Beckman:

"Brad, timing is critical. We have a 5-7 year window of opportunity to establish our presence in Mexico. The multi fiber act disappears in at most 7 years. We need to get cut and sew infrastructure in place and get yarn spinners to
participate. Ultimately for knitters to be successful in Mexico, their spinner base (i.e. National, Glen Raven etc.) needs to manufacture there as well. The sweater design will stay, and needs to stay, in Brooklyn, NY, where it has traditionally been. Even if the cut and sew is handled in Mexico, development and sales needs to stay close to the retailer.”

The Nustart Project

Nustart is a giant apparel complex in the Mexican state of Morelos. The facilities are owned by various garment manufacturers each having its own cut and sewing operation in its own building. This textile park has 2000 employees and over a five year span from 1997 to 2002 can accommodate a total of 10000 employees. The complex was developed through a partnership of Guilford Mills (and its mirror company, American Textile of which owns 75%), DuPont fibers, Alfa (a Mexican petrochemical company), Abra (the marketing company that sells the fiber produced via a JV between DuPont and Alfa), the federal Mexican government and the local government of the state of Morelos. Partner companies in Nustart put money in the range of $600,000 to $1,000,000. There was also a strong commitment from the Mexican government with $1,000,000 to offset the training costs and $500,000 in scholarship money to encourage manufacturers to take part in Nustart. High end brands such as Liz Claiborne, Tommy Hilfiger are cut and sew at Nustart. J C Penney, Wal-Mart, Sears and Target are retailers which have toured Nustart and liked the human working conditions they saw. This became particularly important recently as US manufacturers and retailers have been hit hard by negative publicity about foreign sweat shops increasing their profits unfairly. There have been very few complaints dealing with Nustart cut and sewers (there are currently seven companies on site, 2 Mexican, 4 US and 1 Canadian).

Brad Lopez was really interested in the Nustart project. Gary Berkeley and other textile veterans believed that this was a good idea to imitate. While major denim manufacturers such as Levi Strauss, Sara Lee or VF have the size and financial resources to establish a manufacturing facility in Mexico, Guilford business was built on customers whose sales, financial resources and management capabilities did not support a Mexican relocation. The Guilford situation is very similar to the one faced by Solutia and the acrylic distribution channel. Nevertheless both Brad and Gary knew that moving the cutters and sewers would not be easy. Many of Solutia’s customers were family businesses that were mainly located in New York and some of them would not be willing to relocate even if Solutia helped to finance the project. Vivid in Brad’s mind were the quotes from two recent interviews Gary Berkeley and Kate Beckman had with two of the larger Brooklyn knitters:

“I wish I had an executive who could go and set up something in Mexico. I don’t even know where to start. I recently tried to assemble some goods in Mexico. I sent the cut pieces down there, but the goods never arrived as promised

“Mexican knitters are too small to do business with them. We sometimes have only two months to prepare an order. I couldn’t do that with the current Mexican infrastructure. Delivery times are too long, and that has nothing to do with transportation. While, for example, Korea can handle the entire development
cycle in 1-2 weeks, Mexico can take 4-6 months. Delays can occur in yarn
development, yarn price negotiations, and fiber development. My company is too
small to look at Mexico. I have enough problems here in New York with
everything being so close. I will survive in the short run because I have faster
turnaround times and I am better positioned for reorders. In the long term, the US
garment production doesn’t look good. But my kids are not in the business, and I
will retire in 10 years or so.”

If Brad Lopez decided to go ahead with this venture he would need to solve several
problems. He needed to decide who would the partners for the project be, what would be the best
location of the facilities be, and how to approach the Mexican government. But more importantly
he needed to find out whether or not Solutia customers would be willing to move to Mexico and
for what incentives. And last, but not the least, how fast will such a transition take place, and
what portion of viable cut-and-sewing capacity to support at least a 50 million lbs. of fiber
surplus will come from relocation of US knitters. If not, who will provide the rest?

The strategy advising team visited the Nustart facility and talked to various influential
players in the Mexican textile industry. A brief report on Brad Lopez’s desk composed by two of
the strategy advising team members, Kate Beckman and Jose Gutierre (a Solutia employee with
full knowledge of the Mexican environment and its textile industry) summarized the relevant
information on the Mexico trip:

- There are existing knitters in Mexico and a few of them are acrylic. It is not clear if these
knitters can support a 100 million pounds of fiber business if shifted to Mexico.
- In implementing a Nustart like venture in Mexico four potential viable business models
can be used:
  1. Knitters and cut and sewers moved to a large industrial park in one location like
     Nustart.
  2. Knitters move independently to small towns where they are important to the locality.
  3. Knitters move to existing mixed use industrial park built by developers
  4. Knitters retain design and sales in the US and contract knitting, and cutting and
     sewing, in Mexico, with the US partner providing training and quality control.
- All the companies in the Nustart pay the same wage rates, $3 per hour but have slightly
different incentives. The incentives range from 20% higher to 20% lower pay than the
average. There is very little worker turnover, and if people leave they do so in the first
two weeks.

Brad with the advising team vividly remembered the lively exchanges in the meeting that
followed the Mexican trip. Gary and Jose shared the optimism on the long term viability of a
Mexican cut and sew operation, and endorsed the idea for the development of a series if smaller
operations in small towns where the companies would have more importance to locality. Not
everyone, however, shared this view. Kate reminded them of the assessment of a textile
consultant, associated with a large CPA firm serving the textile industry, that Nustart is a failure.
The consultant’s opinion was that Nustart is only 20% utilized (2000 current employees versus
an initial target of 10000). He also thought that a large industrial park with high profile
companies and with one labor union is inherently risky, as a powerful union move can shut down
the whole operation. It will also require a substantial initial investment. And even if they succeeded to move 5-10 Brooklyn knitters, with their typical size of operations around 20-30 M$, would they provide enough cut-and-sew capacity even for 20 Mlbs. of fiber?

After the meeting, Lopez concluded that in order to be successful it would be necessary to pursue the project with a strategic alliance. He believed that Solutia would not be successful if the project was not developed in conjunction with its yarn spinning partners. Glen Raven and National were the two biggest yarn spinners for Acrylic fiber in the US, and two of the most significant Solutia customers. They differed, however, in their commitment to the acrylic fiber market. For National Spinning, it represented more than 70% of its business, while for Glen Raven was less than 20% of its business activity. Brad had as his next step to survey the U.S. spinners to determine their level of support.

The early interviews with National Spinning indicated a strong support to the Solutia initiatives for a move of cut and sew operation to Mexico. However, National was interested only in a joint Solutia/National efforts with no participation from their competitors. National also emphasized the need to think of Mexico not just as a sewing operation for North America but also for the Mexican and Central America markets.

Glen Raven’s viewpoint was substantially different. There was no interest in a Nustart like venture or any investments in infrastructure that will be leased and operated by their customers. They were less optimistic about the future prospects of the Mexican cut and sew business, supported by their feeling that Asia and Africa will dominate in the longer term. A senior executive expressed the view that in the long term the cut and sew businesses will be located in three areas with Asia being the largest, then Africa, and a smaller business in Central America and Mexico. In his opinion acrylic sweaters could not survive in Mexico and Central America due to the labor intensity of the production process. If Solutia wants to get the acrylic sweaters business away from Asia should make sure that the costs are globally competitive throughout the distribution chain, and in their opinion this will be difficult with the cut and sew in Mexico. Outlining the two keys behind a successful future strategy, the executive listed time to market and product innovation. Glen Raven executives indicated that the company is not committed to the acrylic business per se. However, they will entertain thoughts of joint capital investment in Mexico with Solutia if the operating control will remain with the Glen Raven/Solutia alliance.

**Li & Fung**

Li & Fung is the largest trading company in Hong Kong, and one of the largest in the world. It is thought as an innovator in the coordination of global supply chains. It has traditionally specialized in sourcing low-cost, labor intensive consumer goods from suppliers throughout East Asia. It has been extremely successful in linking Asian factories with US and European retailers who have their own design for merchandise and need them turned into physical product. A supply chain strategy consultant from a well-known private university in the Midwest had introduced Brad Lopez to the Li & Fung supply chain coordination model. Brad, and the strategy advising team, spend hours in understanding the building blocks of this new business model. A stack of published material on the Li & Fung model figured prominently on his desk. It was time to review his notes for one more time.
Brad looked at the diagram summarizing the conceptual elements of the Li & Fung supply chain management concept (see Exhibit 10). Their main emphasis is on providing the high-value-added front and back end tasks in the global supply chain, while organizing and coordinating the low-value added middle stages through a network of reliable suppliers. The front end was handled through customer-focused divisions. For large enough customers, such as Gymboree or The Limited, a whole division might be focused on serving just the needs of that customer. In other cases, a division might focus on serving a group of customers with similar needs. Many of the divisions have their office space within the Li & Fung building in Hong Kong. They are managed by autonomous entrepreneurial teams who have their highest priority to fulfill all customer needs by creating a customized value chain for every customer order. Divisions build and maintain Li & Fung’s relationships with customers by getting to know their needs; adjusting their procedures to enhance the customer's buying process; and having their staff form personal, working relationships with their counterparts on the customer's sides.

The back-end services were provided mostly through a network of branch offices near concentrations of its suppliers. The company had over 20 such offices in more than 10 countries, including 7 in the People's Republic of China. These branches enabled all divisions, no matter where they were based, to use suppliers all over its network of suppliers. Most staff in branch offices was native-born, because they could more easily identify the best factories in the area and form relationships with them. Staff in branch offices either belonged to one or more particular divisions, or were shared in common and available to serve any division that needed them. Divisions stationed their own staff permanently in the branch offices in countries to which they sent many orders. When they used suppliers located near other branch offices- in which they had none of their own staff divisions, they used common staff to supervise the order. The branch staff is responsible for buying and inspecting raw materials, setting up and planning production, balancing the lines, and ensuring acceptable qualities for all orders. Li & Fung has a network of 7,500 suppliers in more than 30 countries. This network of suppliers constituted the most powerful tool for serving customers. Two important intangible assets were embedded in the network: relationships with factory owners and managers, and knowledge of the manufacturing capabilities, special skills, and business practices of each country and each supplier. Through this network, the company is able to maintain high quality (constantly reviewing its manufacturers) and lower cost without the added difficulty of managing workers. The company does not own any portion of the value chain that deals with running factories. The company is, however, able to provide an incredible array of sourcing options for a variety of products (see, example of a regional sourcing matrix in Exhibit 11). Li & Fung is able to extract value from international differences in labor cost (based primarily on wage rates and exchange rates) and from the volatility of these differences. At the same time, through its powerful government relationships and knowledge of quota systems in Asian countries, it is able to circumvent any difficulties of the current quota limits, and eliminate quota anxieties for its customers and suppliers. Thus, it deserves the often-used title of a "labor market arbitrage company" and that of a “global supply chain integrator.” Li & Fung also obtains substantial transportation cost savings via the logistics coordination of the high volume orders it processes through its vast network of suppliers and customers. Furthermore, through its customer and supplier relationships, it facilitates the planning of supply capacity and the on time procurement of raw materials, while facilitating the financing of such procurement for undercapitalized suppliers.
In a recent interview to Harvard Business review, Victor Fung provided an excellent example of the life of a typical order in the Li & Fung supply chains:

"Say we get an order from a European retailer to produce 10,000 garments. It's not a simple matter of our Korean office sourcing Korean products or our Indonesian office sourcing Indonesian products. For this customer, we might decide to buy yarn from a Korean producer but have it woven and dyed in Taiwan. So, we pick the yarn and ship it to Taiwan. The Japanese have the best zippers and buttons, but they mostly manufacture them in China. Okay, so we go to YKK, a big Japanese zipper manufacturer, and we use the right zippers from their Chinese plants. Then we determine that, because of quotas and labor conditions, the best place to make the garments is Thailand. Effectively, we are customizing the value chain to best meet the customer's order"

Brad Lopez carefully read the highlighted portion of a Harvard Business School case on Li & Fung:

"Because of their proximity to the US market, Mexico and the Caribbean Basin represented important expansion opportunities for Li & Fung. Attracted by cheap labor and rapid turnaround issues, US companies were looking for manufacturing opportunities in the region. Of particular importance was 807 manufacturing: textile pieces were sent from the United states to Mexico or the Caribbean where complete apparel units were assembled and exported back into the United States. Duty for these finished pieces was only on the labor portion completed outside of the United States. Upon the signing of NAFTA, Mexican 807 apparel products became duty free. Duties on other apparel imports from Mexico were gradually being lowered. Leading exporters within the Caribbean were the Dominican Republic, Honduras, Costa Rica, Haiti, and Nicaragua. In mid-1997 congressional lobbyists were pushing for textile export parity with Mexico for the Caribbean basin. With Caribbean wage rates of 60% to 70% of Mexico, Mexico's no-duty advantage was offset, although full package manufacturing was still generally unavailable in the Caribbean region. Li & Fung was looking to provide sourcing through non-807 manufacturers in the region."

Brad knew that Li & Fung had started operating an office in New York City with an emphasis on developing the operational network using Mexican and CBI sources to serve better North American customers. Still it was not clear how they would go about it. What it was not clear in Brad's mind was the source of the advantage of Li & Fung in supplying textile customers via Mexican and CBI suppliers rather than through their established east and South Asia Network. For what type of acrylic products will they prefer to use the Mexican-CBI supply chain? There was definitely a time advantage, and potentially some cost advantage, of the Caribbean basin and Mexican manufacturing. However, the infrastructure and technological capabilities of the Asia/Pacific region were still higher than those of Mexico. It was, of course, only a matter of time before Mexican manufacturers took advantage of the benefits of computer-aided design and manufacturing the way their Asian counterparts already had. But, the question
still remained, on how much time was needed for them to build such infrastructure. Was Li & Fung’s presence in the Mexican and CBI region a blessing for Solutia’s plans, or a threat? Was there an opportunity for a partnership there?

Brad Lopez had a Guatemalan origin. He had a soft spot in his heart for the region. But after all, he was a businessman, and needed facts and numbers. He was intrigued by Li & Fung’s search for “non-807 manufacturers”, and he commissioned a limited study of the CBI region. The interesting numbers were now lying on his desk (see Exhibits 12-13). The CBI had the most apparel exports to the US, and they seemed to be increasing over time (see Exhibit 12). The wages were really cheap (see Exhibit 13), and the Asians knew it (the Koreans owned 43% of Guatemalan garment factories). Could it be their whole project focus on Mexico rather than CBI was misguided? If CBI parity passes, Central America and the Caribbean will be excellent alternatives (for garment production) if there was an acrylic knitting infrastructure developed there. But even in the absence of CBI parity, it might be sometimes cheaper to import fabrics from Asia to CB (more than 50% of the value of the garment is fabric), and take advantage of the Asian fabric cost advantage and the Central American low wages. Probably, that was what Li & Fung had in mind. How could Solutia and the US yarn spinners counteract such Asian investment moves?

**Comparative Cost Study of Acrylic Sweaters**

Brad Lopez had commissioned with the consulting company All Sweater Knowledge (ASK) a comparative cost study of acrylic sweaters landed in the US from alternative locations. Six alternatives had been considered: USA, Korea, Indonesia, Mexico (with Mexican fiber), Honduras (with U.S. yarn) and China. Representative results of the study are presented in Exhibit 14 (“Acrylic Sweater Costs: Current Duty Rates).

Gary Berkeley quickly commented: “It makes perfect sense why the Koreans are investing heavily in Central America and Mexico. They need cheap cut & sew capacity like we do. What scares me in these numbers is the cost advantage of the Indonesian and Chinese sourced products. Even though the “All Mexican” sourced scenario appears competitive at current rates, the ‘US yarn-Mexican rest’, is the current scenario, and that suffers a cost disadvantage at current duty rates. Actually even this scenario is not currently feasible as we are lacking all the needed cut & sew capacity in Mexico. And we are definitely far away from the “All-Mexican” sourced. Unless Solutia, Glen Raven, National and some knitters put their act together in a lightning fast speed, our margins will be squeezed further the next two years or so.”

Brad replied: “That is the purpose of our team’s project. We need to communicate to our supply chain partners our current cost disadvantages and the opportunities of a Mexican relocation of yarn and cut & sew activities. But if the current numbers scare you, look at the numbers for the scenario of CBI parity. In that case the ‘US yarn-rest Honduras sourced’ will have landed cost of $2.95/garment, slightly less than the ‘US yarn-rest Mexican sourced’. And I would actually prefer to bet that the Honduran wages and currency will stay weak relative to their Mexican counterparts. However, the ASK consultants base their recommendation on current trade rumors that the CBI parity will not pass. I am pretty convinced that some manufacturers are sitting on the fence between locating cut & sew capacity in Mexico versus the
Caribbean region. In a year or so, they will see the outcome of the CBI parity soap opera, and they will decide.”

Kate Beckman interjected into the discussion: “I am not very sure where all this discussion is leading. I thought our purpose was to examine the long-term viability of Mexican sourced garment. In my mind that means what happens after 2005 when the quotas are not there and the World Trade Organization has reduced the duty rate.”

Brad replied: “Kate, just turn to the next page of the consulting report (see Exhibit 15). You choose how bad you want to hear the news: at 25% duty rate, or the 15%. The message is clear. If within the next five-to-seven years there is not adequate yarn spinning and cut & sew capacity in Mexico for a reliable North American acrylic fiber supply chain, the acrylic sweater business will migrate to China and Indonesia and in all likelihood for good. You could argue that the exchange rates will affect the scenario outcome, but I am not sure if they will change anything else but the relative magnitude of our current cost disadvantage. A relative appreciation of 20-30% of the Asian currencies to the Mexican peso, might allow a ‘US yarn – rest Mexico’ sourced supply chain to compete. But I am curious if in that state of the world the Honduran alternative with Asian fabric is not the dominant one.”

Gary interjected with a quick remark: “Brad, I am less pessimistic than you are in the long run. The time-to-market advantage will become handy and cover our cost disadvantages even in the absence of favorable currency movements. However, for that we have to ensure that the Mexican infrastructure becomes sophisticated enough to provide development cycles of 1 to 2 weeks. And that is where Solutia, National Spinning and Glen Raven have to come in as part of an expanded alliance. Such an alliance could become the ‘one stop-JIT-shopping’ solution.”

Brad nodded his head in disbelief: “I wish I could believe that. But as the consultants told us both China and Indonesia are filling out their quotas at and over 95% on acrylic sweaters. When the quotas are not there, firms in those countries will aggressively price. You know better than anyone else does that China firms price to sell garments rather than fully recover the cost of the product. The numbers we are looking at are cost numbers, not profit margins. I can feel the squeeze already.”

The Asians Are Coming With Committed Investment Strategies

In the July 1999 acrylic sweater conference, Brad Lopez met Ernesto Chai of Crystal Kobe, a Hong Kong based sweater producer. Crystal Kobe’s major manufacturing plant is located in Hong Kong. However, the firm is not just a manufacturer, but maintains a strong sales and marketing network in US. Ernesto commented that: “Some sweater companies have strong sales and marketing skills, some have strong manufacturing, but we have both. Our recipe to success is that we know the US market better than anyone else, we have strong retailer relationships, and we are fully committed to manufacturing.” The more traditional model of offering the "full package” solution via a vertically integrated chain (from knitting-to-marketing to the retailers) was still preached by some Asian firms.
Crystal Kobe is investing in a new acrylic knitting facility in Mexico (near Leon, Guanajuato). They will also own all of the cut & sew capacity needed by their knitting machines. It is scheduled to start production in March of 2000, but they are already hiring and training employees. Their overall investment is in the 20-30 Million dollars, with an installed capacity of around 200 knitting machines. They chose Guanajuato as the state to locate due to a generous package of financial incentives (see Exhibit 16 for geographic location of foreign direct investment in the textile industry in Mexico).

Ernesto commented on the products that will be produced at the facility: “We are going to supply cheap acrylic sweaters via our Mexican facility. High end products requiring embroidery and beading need to be done in Asia. Mexico is still too new in the business to start dealing with such complications.” Brad was perplexed with the answer. He always thought that the high, customer-end part of the sweater business need the “JIT” full package/reorder capability. Was Mexico after all perceived as the cheap source by the Asian firms?

Ernesto commented: “Asia is extremely flexible. We can handle both small and large orders. The current Mexican infrastructure cannot. The Mexican sweater business is a bunch of little guys having older equipment. We are going to change all that. We are committed in building a viable Mexican sweater source for the needs of our US customers. We have no real customers in Mexico.”

When Brad asked him about what was the biggest problem he perceived in their current Asian supply chain in supplying the US market, Ernesto responded: “Quotas are a big problem. They are traded like other commodities in the Asian countries. You have to purchase them and the price depends on the product type. Quota prices, particularly for fashionable and hard to plan products, are extremely volatile. In Mexico, we will be able to operate quota free, duty free. We can plan and control costs, and grow at will.”

Ernesto concluded: “We moved to Mexico for cost savings reasons. Quick delivery is a side benefit. Our turnaround time is about 90-120 days. In Mexico, we expect 75-90 days. As soon as we demonstrate the success potential via our Mexican operation, other Asian firms will join the Mexican bandwagon. US sweater firms are not committed to the business, and in my opinion, their reluctance to heavily invest will cost them the business.”

Brad Lopez was trying to figure if what he heard about Crystal Kobe was good news or bad news for Solutia. Will the coming of the Asians stimulate the fiber business in Mexico, and Solutia will get its fair share? After all, Crystal Kobe was buying yarn mostly from Glen Raven, a Solutia customer? Or were the Asians a threat with them later establishing their own yarn capacity, potentially via alliance with Mexican vertically integrated fiber producers, and shifting their fiber purchases to Mexican collaborators of such expansion? Was the integrated model of Crystal Kobe a viable alternative? Of course, Brad knew that a chemical business like Solutia would never integrate into yarn and garment production. It did not make any sense to pay chemical wages for labor intensive textile operations. But could a "virtual forward integration" alternative work via alliances with National Spinning, or Glen Raven, and the Brooklyn knitters? Who would provide the retailer relationships in that case?
As the Decision Approaches:

It had been one of those 18-hour days Brad Lopez has been recently putting in. The presentation in front of the Solutia Executive Board was going to be in three days. They had reserved their whole day for the presentation and discussion of the recommendation of the strategy advising team. Brad had in front of him a thick set of transparencies. But the final recommendation section was not there. He read quickly over some highlighted bullet points:

- The US sweater producers will have a tough time surviving…
- Mexico has theoretical advantages versus both Asia and CBI…
- Short term, the decline in US fiber demand will not be offset with growth in Mexico. Long term…”

Brad felt his brain drained out. Time to go home. Sit in front of the TV and watch the news.

“… The recent earthquake in Turkey caused substantial damages in major Turkish factories, among them AKSA. Experts estimate a few months passing prior to the factories returning to their earlier production levels…” Brad was in a black humor mood. “Great” he thought, “an opportunity to increase our fiber prices.” He switched to another channel… “The recent instability in East Timor, where Indonesian militants have been on a rampage since an independence vote two weeks ago, have raised focus on the stability of the Indonesian economy and its currency…” “Oh, great” Brad thought with a sarcastic expression on his face. “It supports my cost analysis and the assumption of an appreciated Indonesian economy.” TV news was too much for him tonight. He picked up his Wall Street Journal “ US and Beijing Make Little Headway in resumed Talks on China’s WTO Bid.” At least this sounds better. “Funny”, Brad thought, “how everything I hear, watch and read seems to be interpreted unconsciously through my job perspective. I need a break and definitely a vacation after the presentation meeting.” But for the time being, a Seinfeld rerun will do. Something about nothing was all that Brad could take at this moment.
Exhibit 1: Acrilan Manufacturing Process

- Acrylonitrile (byproduct of gasoline)
- Propylene
- Vinil Acetate
- Ammonia (byproduct of natural gas)
- Other chemicals

Steps:
1. Polymer Bin
2. Dope Preparation
3. Filter
4. Polymer Reactor
5. Dryer
6. Dope Preparation
7. Wash Tanks
8. Spin Bath
9. Drying Rolls
10. Cutting
11. Baling
12. Steamer
13. Crimpler
14. Oven
15. Tow
16. Staple
17. Tow
Exhibit 2: Typical Acrylic Fiber Value Chain
Exhibit 3: Domestic Acrilic Utilization Rates
Exhibit 4: U.S. Retail Sweater Consumption
Exhibit 5: Global Competition

1997 Actual Capacity (Metric Tons)

* Next to the company capacity graph are the number of plants and their location
Exhibit 6: Global Acrylic Demand/Supply Balance
Exhibit 7: Latin America Demand/Supply Balance
Exhibit 8: Chinese Pricing

$/KG CIF (Cost, Insurance & Freight)
Exhibit 9: Acrylic Sweater Imports by Country of Origin
Li & Fung does the high-value-added front-and-back-end tasks in Hong Kong

Front end
- design
- engineering
- production planning

Back end
- quality control
- testing
- logistics

It organizes the lower-value-added middle stages through its network of 7,500 suppliers, 2500 of which are active at any one time

Raw material and component sourcing → Managing Production
## Exhibit 11: Sample Simplified Sourcing Matrix

<table>
<thead>
<tr>
<th>Region</th>
<th>Product Type (e.g. acrylic knit tops)</th>
<th>Product Type (e.g. woven cotton) etc.</th>
<th>Textile Manufacturing</th>
<th>Toy Manufacturing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia Pacific</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Korea</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Thailand</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Europe/Mediterranean</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turkey</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Egypt</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North America</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Honduras</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caribbean</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Regional Supply Sources

<table>
<thead>
<tr>
<th>Region</th>
<th>1997 ets.</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Asia</td>
<td>59%</td>
</tr>
<tr>
<td>South east Asia</td>
<td>21%</td>
</tr>
<tr>
<td>South Asia</td>
<td>10%</td>
</tr>
<tr>
<td>Mediterranean</td>
<td>8%</td>
</tr>
<tr>
<td>Central America</td>
<td>1%</td>
</tr>
<tr>
<td>Others</td>
<td>1%</td>
</tr>
</tbody>
</table>
### Exhibit 12: U.S. Apparel Imports

*Year Ending May 31, 1999 (Data in Millions)*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Change</td>
<td></td>
<td></td>
<td>Change</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Share</td>
<td></td>
<td></td>
<td>Share</td>
</tr>
<tr>
<td>CBI</td>
<td>3,154.7</td>
<td>2,963.2</td>
<td>6.46</td>
<td>23.63</td>
<td>8,487.5</td>
<td>7,924.3</td>
</tr>
<tr>
<td>Mexico</td>
<td>2,146.7</td>
<td>1,715.1</td>
<td>25.17</td>
<td>16.08</td>
<td>6,982.4</td>
<td>5,602.0</td>
</tr>
<tr>
<td>China</td>
<td>911.1</td>
<td>917.2</td>
<td>-0.66</td>
<td>6.83</td>
<td>4,400.2</td>
<td>4,315.6</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>854.8</td>
<td>800.7</td>
<td>6.77</td>
<td>6.40</td>
<td>4,371.8</td>
<td>4,232.8</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>746.8</td>
<td>708.5</td>
<td>5.40</td>
<td>5.59</td>
<td>1,616.6</td>
<td>1,534.0</td>
</tr>
</tbody>
</table>

*Source: IDS International Development Systems Inc.*
### Exhibit 13: Comparison of Wages and Benefits

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year 1995</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. Wage-$/hr.</td>
<td>0.34</td>
<td>0.81 - 1.11</td>
<td>0.69</td>
<td>0.34</td>
<td>0.71</td>
</tr>
<tr>
<td>Fringe Benefits</td>
<td>0.24</td>
<td>0.19</td>
<td>0.16</td>
<td>0.14</td>
<td>n/a</td>
</tr>
<tr>
<td>Total - $/hr.</td>
<td>0.58</td>
<td>1.00 - 1.30</td>
<td>0.85</td>
<td>0.48</td>
<td>n/a</td>
</tr>
<tr>
<td>Fringe Benefits-</td>
<td>69.6%</td>
<td>23 - 27%</td>
<td>23.2%</td>
<td>41%</td>
<td>n/a</td>
</tr>
<tr>
<td>as % of salary</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacation Days</td>
<td>10</td>
<td>10</td>
<td>15</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Year End Bonus</td>
<td>2 mo.</td>
<td>1 mo.</td>
<td>½ mo.</td>
<td>2 mo.</td>
<td>1 mo.</td>
</tr>
</tbody>
</table>

*Source: IDC Guatemala, SECO Francfort*
**Exhibit 14: Acrylic Sweater Costs: Current Duty Rates**

<table>
<thead>
<tr>
<th>Location of Cutting</th>
<th>Fabric: USA</th>
<th>Korea</th>
<th>USA</th>
<th>USA</th>
<th>USA</th>
<th>China</th>
<th>Indonesia</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
<td>Assembly: USA</td>
<td>Korea</td>
<td>Honduras</td>
<td>Mexico</td>
<td>Mexico</td>
<td>China</td>
<td>Indonesia</td>
<td>Mexico</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct Materials</td>
<td>2.10</td>
<td>1.30</td>
<td>2.10</td>
<td>2.10</td>
<td>2.10</td>
<td>1.30</td>
<td>1.20</td>
<td>1.50</td>
</tr>
<tr>
<td>Cut &amp; Sew</td>
<td>2.20</td>
<td>1.40</td>
<td>0.70</td>
<td>0.90</td>
<td>0.80</td>
<td>0.40</td>
<td>0.40</td>
<td>0.80</td>
</tr>
<tr>
<td>Freight</td>
<td>0.02</td>
<td>0.30</td>
<td>0.15</td>
<td>0.10</td>
<td>0.10</td>
<td>0.30</td>
<td>0.30</td>
<td>0.10</td>
</tr>
<tr>
<td>Duty</td>
<td>0.92</td>
<td>0.95</td>
<td></td>
<td></td>
<td>0.58</td>
<td>0.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landed Cost</td>
<td>4.32</td>
<td>3.92</td>
<td>3.90</td>
<td>3.10</td>
<td>3.00</td>
<td>2.58</td>
<td>2.44</td>
<td>2.40</td>
</tr>
<tr>
<td>$/garment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of US</td>
<td>100.00%</td>
<td>90.70%</td>
<td>90.30%</td>
<td>71.70%</td>
<td>69.40%</td>
<td>60.00%</td>
<td>56.50%</td>
<td>55.50%</td>
</tr>
</tbody>
</table>

- Duties were calculated at a rate of 34%
- This particular sweater has a suggested retail price of $30 in US department stores
- Stated costs fully accounted for productivity differences across countries:

<table>
<thead>
<tr>
<th>Country</th>
<th>Mexico</th>
<th>China</th>
<th>Korea</th>
<th>Indonesia</th>
<th>Honduras</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity as % of US</td>
<td>85%</td>
<td>65%</td>
<td>85%</td>
<td>65%</td>
<td>80%</td>
</tr>
</tbody>
</table>
### Exhibit 15: Acrylic Sweater Costs: Post WTO

<table>
<thead>
<tr>
<th>Location of Activity</th>
<th>Fabric: USA</th>
<th>Korea</th>
<th>USA</th>
<th>USA</th>
<th>USA</th>
<th>USA</th>
<th>China</th>
<th>Indonesia</th>
<th>Mexico</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cutting: USA</td>
<td>Korea</td>
<td>Honduras</td>
<td>USA</td>
<td>Mexico</td>
<td>Mexico</td>
<td>China</td>
<td>Indonesia</td>
<td>Indonesia</td>
<td>Mexico</td>
</tr>
<tr>
<td>Assembly: USA</td>
<td>USA</td>
<td>Korea</td>
<td>Honduras</td>
<td>USA</td>
<td>Mexico</td>
<td>Mexico</td>
<td>China</td>
<td>Indonesia</td>
<td>Indonesia</td>
<td>Mexico</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct Materials</td>
<td>2.10</td>
<td>1.30</td>
<td>2.10</td>
<td>2.10</td>
<td>2.10</td>
<td>1.30</td>
<td>1.20</td>
<td>1.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cut &amp; Sew</td>
<td>2.20</td>
<td>1.40</td>
<td>0.70</td>
<td>0.90</td>
<td>0.80</td>
<td>0.40</td>
<td>0.40</td>
<td>0.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freight</td>
<td>0.02</td>
<td>0.30</td>
<td>0.15</td>
<td>0.10</td>
<td>0.10</td>
<td>0.30</td>
<td>0.30</td>
<td>0.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duty(0.25%)</td>
<td></td>
<td></td>
<td>0.68*</td>
<td>0.70</td>
<td></td>
<td>0.43</td>
<td>0.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duty(0.15%)</td>
<td></td>
<td></td>
<td>(0.41)**</td>
<td>(0.42)</td>
<td></td>
<td>(0.25)</td>
<td>(0.24)</td>
<td></td>
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<tr>
<td>Landed Cost</td>
<td>4.32</td>
<td>3.68</td>
<td>3.65</td>
<td>3.10</td>
<td>3.00</td>
<td>2.43</td>
<td>2.30</td>
<td>2.40</td>
<td></td>
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</tr>
<tr>
<td>$/garment</td>
<td></td>
<td>(3.41)</td>
<td>(3.37)</td>
<td>(3.10)</td>
<td>(3.00)</td>
<td>(2.43)</td>
<td>(2.30)</td>
<td>(2.40)</td>
<td></td>
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</tr>
<tr>
<td>% of US</td>
<td></td>
<td>85.00%</td>
<td>84.50%</td>
<td>71.70%</td>
<td>69.40%</td>
<td>56.20%</td>
<td>53.20%</td>
<td>55.50%</td>
<td></td>
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</tr>
</tbody>
</table>

* Duty assessed at 25%
** Duty assessed at 15%
Exhibit 16: Geographic Location Of Direct Foreign Investment Firms In The Textile Industry Of Mexico To December 1998

Source: Secofi
GLOBAL SUPPLY CHAIN COMPETITION IN ACRYLIC FIBER IN THE NEW MILLENNIUM: Solutia, Acrilan Division & the Asian Crisis

Solutia's Acrilan (Acrylic Fiber) Division has historically sold about a third of its fiber into the sweater/single knit market. Over the years, this market has eroded steadily as Asian finished goods imports have taken share away from the U.S. based producers. The U.S. sweater producers have not been able to remain cost competitive versus the Asian companies. The U.S. yarn producers are selling less yarn to their U.S. customers as a result, and are facing high cost structures as well. The current Asian crisis is just accelerating some of these trends. Brad Lopez, director of the Acrilan Division had to make a decision. What were the actions Solutia could take in facilitating a proactive approach to solving the dwindling market share of U.S. sweater producers? Or, was it fine for Solutia to proceed with drastic downsizing alternatives in this business and shut down one third of their production capacity.

Discussion Questions:

1. What is your assessment of the future of the U.S. acrylic sweater market? What trends in the market might be important for Solutia's problem?

2. What are the international trade issues you would like to better understand in coming up with an answer to Solutia's problem? How are you going to include such considerations in your analysis and recommendation?

3. How do you like the proposed Nustart like alternative for the acrylic cut & sew business? What are the advantages and disadvantages of this alternative? If you were going to implement such an option how were you going to proceed in doing it? Be specific using options outlined in the case.

4. What do you think of Crystal Kobe's acrylic sweater supply chain approach? Can Solutia replicate such a strategy? How can they implement it? Be specific in terms of steps to take. What are the advantages and disadvantages of such an alternative for Solutia?


6. What is your opinion on the long-term viability of acrylic sweater sourcing from Mexico? How about sourcing from the Caribbean Basin? Provide arguments to support your opinion.

7. Would it make sense for Solutia to progressively downsize its production capacity? Why or why not? Explain your answer.
8. If you were Brad Lopez what alternative strategy would you propose to the Solutia executive board? Be creative and do not necessarily limit your alternatives to the ones present in the case. However, fully justify your alternative and present both its advantages and potential weaknesses. For what future state of the world your alternative will succeed? Under what future state of the world will it fail?