The Competitive Status of the U.S. Fibers, Textiles, and Apparel Complex (1983)

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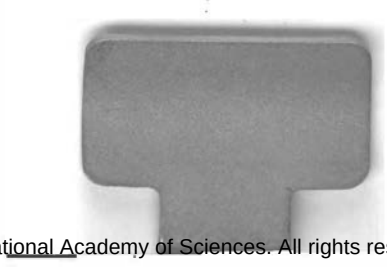

Summary

The primary objective of this study was to assess the future international competitiveness of the U.S. textile complex. To accomplish this objective, a number of steps were undertaken.

The first step was to analyze major changes in competitive conditions in the global textile complex, such as changes in production, consumption, trade, investment, technology, and levels of government intervention. A second step was to ascertain how these changes were affecting the U.S. textile complex, such as its employment, number of firms, profitability, and market share. A third step was to forecast future competitive conditions and their potential dominant, shaping forces. A fourth step was to identify major strategies undertaken or being considered by various enterprises and governments inside and outside the United States. The final step was to analyze the future strengths and weaknesses of the U.S. textile complex (in terms of its ability to increase its international competitiveness) and suggest options the U.S. government and industry should consider if it seeks to create an environment conducive to increasing the U.S. textile complex's international competitiveness.

The major findings of the study were the following:

- The level and intensity of global competition in the textile complex have increased sharply and are expected to continue to increase in the future.
- Both consumption and production have increased significantly in developing nations, often at the expense of developed countries. This phenomenon has been particularly true for the apparel segment of the textile complex, although it has been true to some degree for virtually all segments.
- The development and international spread of new technology have accelerated rapidly, especially in recent years in yarn spinning and fabric formation. A major result has been increasing capital intensity and industry concentration levels in the face of higher risks and costs of new product and process development.

- Government intervention in the global textile complex has also increased significantly over the past two decades. While general levels of tariff protection have decreased, other forms of trade barriers and government assistance to domestic textile complexes have increased, the latter particularly in developing countries. In developed countries, one major intent of these policies was to slow the reduction in domestic employment caused by increasing import competition. In developing countries, the primary purpose was to expand domestic employment and generate increased export earnings.
- Relative to its counterparts in Europe, the U.S. textile complex did not suffer as extensively from the combined impact of the trends enumerated above. On the other hand, U.S. performance, compared with textile complexes in most Asian countries, was not as good, due primarily to the comparative weakness of the apparel segment. However, in some specific segments, notably man-made fiber and yarn production, the U.S. industry continues to hold a competitive position. Various parts of the textile segment fell somewhere in between.
- In general, many firms in the U.S. textile complex are capable of improving their competitiveness, and most of the larger firms are taking many of the steps necessary to increase their competitiveness. However, increasing the international competitiveness of the U.S. textile complex will not probably result in increased domestic employment, or even in maintaining existing employment levels.
- While much of the increased international competitiveness of the U.S. textile complex can result directly from the activities of the firms themselves, changes in a number of U.S. government policies would clearly facilitate the process.

In sum, the panel projected a more internationally competitive, but smaller (in terms of number of firms and workers), U.S. textile complex in the future, almost regardless of any changes in government policy. Thus, government policies will have their greatest impact on the speed and extent of the changes visualized, rather than the direction of the changes. It was the consensus of the panel that government policy should be directed toward achieving as orderly a transition as feasible, and that it should be more consistent, proactive, and comprehensive than it has been in the past.

1
The Textile Complex

The purposes of Chapter 1 are to (a) describe the major segments, processes, and internal linkages of what is called the textile complex and (b) point out a few of the major differences between the importance, structure, and activities of textile complexes in different countries. It is intended as a primer for those who know little about these subjects. Therefore, it is a simplified description that by necessity omits many of the subleties, nuances, and complexities of the actual complex. Readers who are already familiar with the textile complex may choose to proceed directly to Chapters 2 through 4.

The textile complex, as shown in Figure 1-1, is composed of several major segments and processes: fibers (man-made and natural), fabrics (woven, knit, and non-woven), and three major end-uses of fabric--apparel, home-furnishings, and industrial.[1] Designing, dyeing, printing, and finishing are related processes that can be done at various stages and occasionally are separate segments themselves (i.e., done by independent companies). In terms of total employment and output, the three largest segments are fibers, fabrics, and apparel; therefore, these three segments receive the most attention in this report. However, the extensive linkages within the entire textile complex underscore the importance of analyzing it as a whole and not just its individual segments.

THE U.S. TEXTILE COMPLEX

As of 1981, there were approximately 27,000 companies in the American textile complex, with at least one located in every state.[2] Together, they employed more than two million workers--one out of every eight Americans employed in manufacturing--making the textile complex the largest industrial employer in the United States. It is one of the largest employers

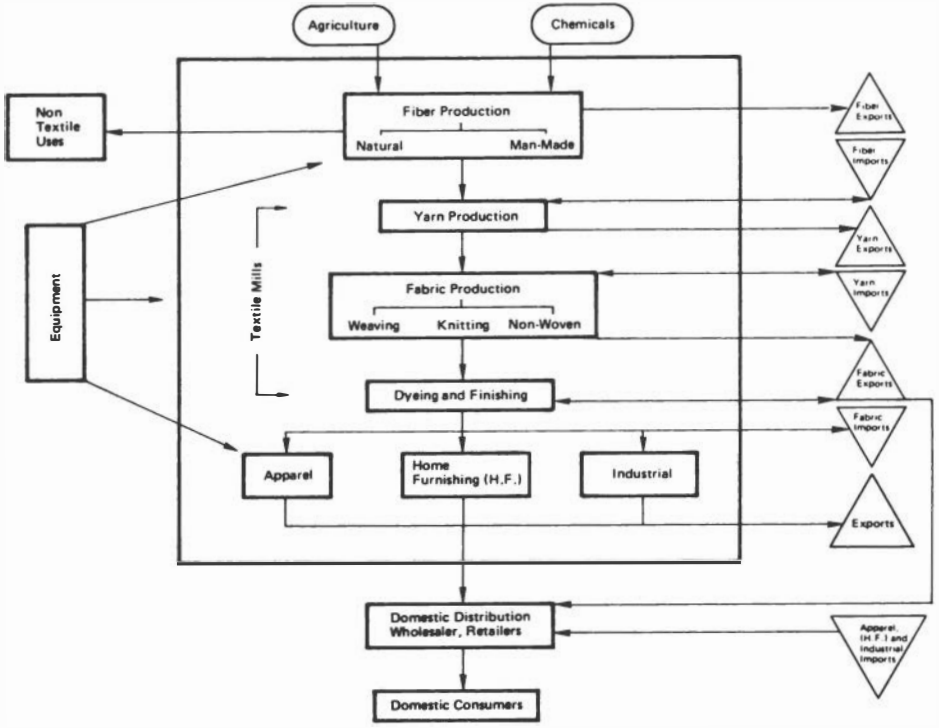

FIGURE 1-1 Textile Complex.

NOTE: This figure depicts broad interrelationships among the key sectors of the textile complex. Some operations may, in limited cases, take place in a different sequence. For example, yarn may be dyed before weaving, knitting, or exporting.

of women and minority workers in manufacturing and the largest manufacturing employer in nearly a dozen states.[3] In addition, it has been estimated that over 925,000 American workers (including machinery manufacture, chemical auxiliary production, etc.) outside the textile complex are required to produce and deliver the output of the textile complex, and that the capital expenditures by the complex and its principal suppliers require tens of thousands of additional jobs--a total additional employment generation of nearly one million workers.[4] Finally, the combined output of the complex in 1980 was $114 billion, roughly one half of which was delivered to final demand and intermediate demand outside the complex.[5] Thus, the direct and indirect impacts of the textile complex on the U.S. economy are substantial.

The total output of the U.S. textile complex has continued to expand while direct employment and average number of hours worked per week have declined. Many segments of the complex have grown in productivity faster than the average rate of productivity increase for the U.S. economy. And while production growth rates for two of its largest employment segments (apparel and fabric/yarn thread) were slightly below the national average, those for man-made fibers, floor coverings, and hosiery/knit goods were nearly double the national average.

Linkages

Figures 1-2 and 1-3 depict the major output linkages among the principal segments of the American textile complex.[6] Particularly significant are the output dependencies in Figure 1-2 of the man-made fiber segment to the apparel and fabric segments (99 percent) and of cotton farms to fabric and apparel (53.6 percent) and in Figure 1-3 of the fabric/yarn and thread mills to apparel (55.1 percent).

Table 1-1 shows the interdependencies in terms of input/output. For example, one dollar of apparel output requires 21.7 cents (21.7 percent) of input from fabric, yarn, and thread mills. Finally, Tables 1-2 and 1-3 show the employment linkages within the complex.[7] Table 1-2 shows the direct employment in a segment per billion dollars of shipments to final demand and the resulting indirect employment in other sectors of the complex, and Table 1-3 shows the same impacts measured in terms of actual shipments in 1977. Both exhibits show the significantly greater labor intensity and indirect employment impact of apparel production and the significantly lower labor intensity and indirect employment impact of man-made fiber production. In 1977, for example, apparel directly employed over one million workers and

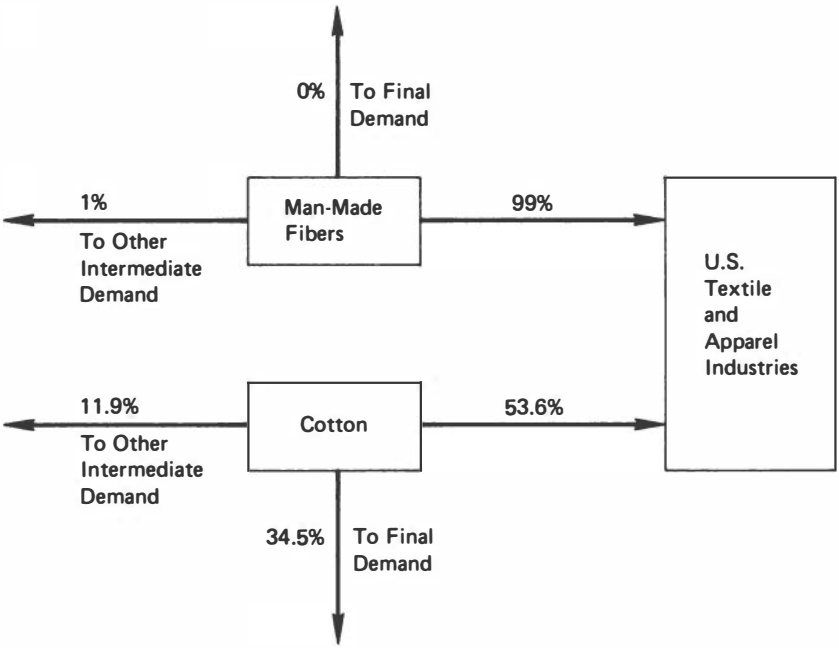

FIGURE 1-2 Uses of Products of the Man-made Fiber Industry and Cotton Farms, excluding intra-sector use. [Percent of Total Use]

NOTE: These output relationships are based on 1972 data. Exports of man-made fibers have increased rapidly in recent years, which would reduce the percent of total shipments going to the U.S. textile and apparel industries to less than the 99 percent shown here and increase the percent of product going to final demand. However, the dependence remains very high.
Data for wool alone not available. Final demand includes net foreign trade.

SOURCE: The Input-Output Structure of the U.S. Economy, 1972, Bureau of Economic Analysis, U.S. Department of Commerce, 1979, as compiled in The Dependency of the U.S. Economy on the Fiber/Textile/Apparel Industrial Complex, a report prepared for the ATMI by Economic Consulting Services, Inc., Washington, D.C., January 1981.

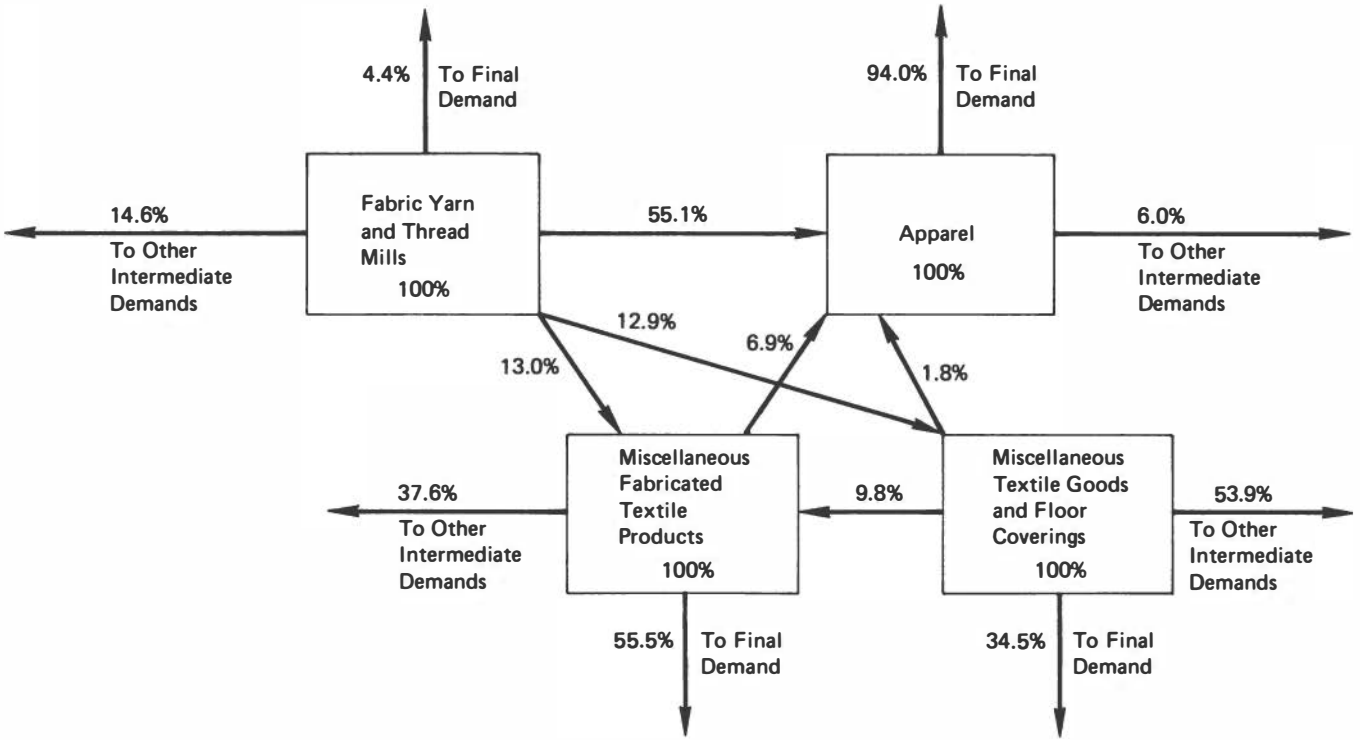

FIGURE 1-3 Uses of Products of the Four Major Sectors of the Textile/Apparel Industries, excluding intra-sector use. [Percent of Total Use]

NOTE: Final demand includes net foreign trade.

SOURCE: Same as Figure 1-2.

TABLE 1-1 Percent Direct Requirements of Specific Sectors of the Textile Complex Industry per Dollar of Industry Output in Producers Prices, 1972

INPUT \ OUTPUT	Broad and Narrow Fabrics, Yarn and Thread Mills	Miscellaneous Fabricated Textile Products	Apparel	Miscellaneous Textile Goods and Floor Coverings
Agricultural products[a]	6.0	0.3	–	–
Broad and narrow fabrics, yarn and thread mills	30.0	25.6	21.7	31.6
Miscellaneous textile goods and floor coverings	1.0	9.7	0.3	11.0
Apparel	0.1	1.1	25.4	0.8
Miscellaneous fabricated textile products	–	0.5	1.3	3.3
Chemicals and selected chemical products	2.7	2.5	0.4	0.1
Plastics and synthetic materials	13.5	11.9	1.7	0.5
Rubber and miscellaneous plastics products	0.5	2.8	0.3	2.4
VALUE ADDED:				
Employee compensation	25.2	19.3	29.9	27.6
Balance of value added	5.5	6.5	3.9	4.9
Wholesale and retail trade	4.1	4.5	3.7	4.2
Remaining industries	11.9	15.2	11.4	13.6
Total Output[b]	100.0	100.0	100.0	100.0

[a]Agricultural products other than livestock and livestock products.
[b]May not equal 100 due to rounding.

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, *The Input Structure of the U.S. Economy, 1972* (reprinted from the *Survey of Current Business*, February 1979, p. 58).

indirectly over 530,000, compared to less than 77,000 workers directly and less than 3000 workers indirectly in the man-made fiber sector. The segment with the greatest indirect employment impact is floor coverings: nearly one indirect job created for each direct job.

DESCRIPTION AND COMPARISONS OF MAJOR SEGMENTS IN A TEXTILE COMPLEX

Fibers

Fibers are generally classified into two principal groups: natural and man-made. Man-made fibers are further subdivided into cellulosic and non-cellulosic fibers.

Natural fibers, such as cotton, linen, jute, and wool are products of agriculture. Cellulosic fibers, such as rayon, acetate,

TABLE I-2 United States Textile Complex: Employment Requirement per Billion Dollars of Shipment to Final Demand

Industry Sector or Subsector	Direct Employment Requirements per Billion Dollars of Shipment to Final Demand	Resulting Indirect Employment Requirements in Other Fiber/Textile/ Apparel Sectors
Apparel (made from purchased material)	41,943	20,959
Hosiery and knit goods	38,785	13,520
Floor coverings	21,488	18,688
Miscellaneous fabricated textile goods	29,115	19,302
Miscellaneous textile goods	21,304	8,433
Fabrics, yarn, and thread mills	33,834	4,586
Synthetic fibers	16,519	626

SOURCE: *The Dependency of the U.S. Economy on the Fiber/Textile/Apparel Industrial Complex*, a report prepared for the ATMI by Economic Consulting Services, Inc., Washington, DC, January 1981.

and triacetate are products of naturally occurring cellulose (usually cotton and wood), while synthetic fibers, such as nylon, polyester, and acrylic are usually petrochemical derivatives.

While there are tens of thousands of natural fiber producers throughout the world, there are relatively few major producers of man-made fibers (less than 30). The main reason is that man-made fiber production is very capital- and knowledge-intensive and has significant manufacturing economies of scale. The major producers of man-made fibers are based in developed countries and are typically part of large diversified multinational chemical companies operating in an oligopolistic market. In the United States, DuPont, Celanese, Eastman, and Monsanto are the largest firms, while outside the United States the largest firms are Italy's ENI and Montedison; West Germany's Hoechst, Bayer, and BASF; Britain's ICI; France's Rhone-Poulenc; the Netherlands' Akzo; and Japan's Mitsubishi Rayon, Toray Industries, and Teijin.

Compared to the other major segments of the textile complex, developed countries still dominate production of man-made fibers. However, production technologies of certain man-made fibers are considered "mature," i.e., well-established, well-known, and available in many developing countries. As a result, fibers made from these mature process technologies are more price competitive and less restricted in terms of production location. On the other hand, the technologies for specialty, higher value, and more complex fibers are newer, more complicated, less price competitive, and more restricted to developed country firms.

TABLE 1-3 U.S. Textile Complex: Estimated Direct and Indirect Employment Requirements (Based on 1977 Shipment Levels)*

Industry Sector or Subsector	1977 Direct Employment Requirements	1977 Indirect Employment Requirements
Man-made fibers	76,746	2,907
Fabric, yarn, and thread mills	574,207	77,832
Floor coverings, carpets, and rugs	70,276	61,119
Miscellaneous textile goods	68,639	27,170
Hosiery and knit goods	265,817	92,661
Apparel (made from purchased materials)	1,061,632	530,500
Miscellaneous fabricated textile goods	188,298	124,826

*Numbers are based on *1977 Census of Manufactures* and have been deflated by ECS through several mechanisms explained more fully in their report.

SOURCE: *The Dependency of the U.S. Economy on the Fiber/Textile/Apparel Industrial Complex*, a report prepared for the ATMI by Economic Consulting Services, Inc., Washington, DC, January 1981.

Yarn

Yarn is typically classified as being of two types: continuous filament or spun staple. Staple fiber spun yarn is made by spinning together discontinuous fibers one to several inches in length; continuous filament yarn is produced by passing fluid chemicals through a spinneret after which the filaments are solidified and stretched. Continuous filament yarns can be modified to provide bulk, stretch, or texture. Depending on ultimate use, yarn may be further twisted, plied, dyed, or surface treated.

As an industry segment, processors of staple fiber yarn are referred to as spinners, while those of filament yarn are termed throwsters or texturizers. In a vertically integrated textile company, the yarn production element generally takes the form of a department or division. Making yarns requires a highly capital-intensive process, and the blending of several kinds of fibers into a single yarn requires additional equipment and sophistication.

Fabric

Another intermediate stage in the textile complex is fabric manufacturing in which yarn is transformed into fabric by using a weaving, knitting, tufting, or non-woven process (although some non-wovens can be produced directly from fiber).

In weaving, the most extensively utilized technology for making flat goods, sets of yarns are interlaced at right angles on a loom. In knitting, yarn is interlooped by latched or spring needles arranged in either a circular or linear array. Non-woven technology involves compressing or interlocking fibers or yarns by mechanical, thermal, chemical and/or fluid methods.

Historically, the key factors of production have been the manufacturing equipment, the skill of the technical staff, and the capital necessary to buy the machinery and to employ the skilled operators and maintenance staff. Increasingly important today are marketing skills, as global competition has increased.

The major output of the fabric segment in most countries is broadwoven fabric, although narrow and knit fabrics are also produced in sizeable quantities.

In the United States the fabric for apparel tends to be produced by larger firms that typically require large minimum orders of one color or design. There is also considerable firm specialization by type of fabric: heavy, medium, or light-weight fabric; woven fabric or knit fabric; man-made fiber fabric or natural fiber fabric; blends of natural fibers or man-made fibers; and intricately patterned fabric or simple fabric. The basic reason for the specialization is the different equipment and the number and complexity of steps required to make each type of fabric.

The traditional fabric segment (woven and knit) is in the middle of the complex in terms not only of the manufacturing flow but also in terms of capital and knowledge intensity, industry life cycle, and degree of competition. Even though there are many more producing firms and considerably more small- and medium-size firms than in made-made fiber production, they produce a relatively small percentage of total output. Thus, the fabric sector has a dualistic nature: thousands of small- and medium-size firms, each producing a limited range of products and accounting for a comparatively small percentage of total output; and a small number of huge firms, each producing a wider range of products and, as a group, accounting for a disproportionate share of total output.[8]

The largest firms in the United States are Burlington, J. P. Stevens, Millikin, West Point Pepperell, Springs Industries, and about a half dozen others. Outside the United States, the largest producers are Britain's Courtaulds, Coats Patons, Tootal, and Carrington; Japan's Kanebo, Toyobo, Mitsubishi Rayon, and Unitika; South Korea's Daewoo and Sunkyoung; and France's Dollfus-Mieg. However, both inside and outside the United States there are major differences among the largest firms in terms of their production by end-use categories (apparel, home furnishings, and industrial). In terms of product life cycle, complex and specialty fabrics are considered to be in earlier stages, while basic woven fabrics are in the mature stage.

Finally, a rapidly emerging sector within the fabric segment is the category of products called non-wovens. These products are made from wood fibers, plastics, and synthetic polymers in addition to natural and man-made fibers. Disposable diapers, coated fabrics for furniture, wall coverings, luggage, car roofs (e.g., the landau roof), disposable medical and surgical products (drapes, gowns, masks), carpet underlayments, apparel interlinings, household and industrial wipes, sanitary napkins, and many packaging materials are examples of products made from non-wovens. A significant characteristic of non-wovens is the speed at which the fabrics can be made. Many non-woven production units in place today can produce fabric at speeds of 400 feet per minute, and more advanced machines operate at speeds of over 1000 feet per minute. Non-wovens are produced at these high speeds in widths of 15 feet or more. These rates are particularly impressive when compared to knitting machine speeds of about 5 feet per minute and even slower rates of weaving machines.

SIC group 2297, Non-woven Fabrics, represents the majority of manufacturers of non-woven goods with the exception of SIC 2291, Felt Goods, and 2231, Woven Felts and Hats. It is a mixed group of companies and industries, large and small. The importance of non-wovens is not only their substitutability for wovens (disposable diapers have overtaken woven, cloth diapers), but in new applications for existing fibers. While the total production of non-wovens remains well below that of wovens and knits, non-wovens have experienced faster growth rates.[9]

Fiber, Yarn, and Fabric Finishing

The finishing process provides comfort, ease of care, durability, and aesthetic properties that can significantly affect final fabrics' receptivity in the market and their competitiveness. The dominant methods of finishing utilize knowledge- and capital-intensive wet processes.

Wet processing involves the treatment of fiber, yarn, or fabric with chemicals carried in a fluid (usually water) and is typically done in a dye house, bleachery, or finishing plant. Wet processing includes degreasing and/or scouring, bleaching, dyeing or printing, and enhancing functional properties by applying chemical finishes in fabric form.

Most wet processing organizations are classified as either commission houses or finishing divisions of vertically integrated mills. Commission houses process greige (unbleached and undyed cloth or yarn) fabric, often purchased on the greige market by convertors, under contract, who then sell the finished fabric to

outlets, converters, or fabricators. In vertically integrated organizations, this fabric is usually processed further for specific end-use applications.

Apparel

The largest of the three final production stages in the textile complex is apparel. The manufacturing process begins with the design of the garment to be made, based on forecasts of fashion, style, and needs of consumers. The design is made into patterns that are used to cut the fabric purchased from fabric manufacturers. The cut fabric is normally then sewn into garments,[10] tagged, and shipped through the distribution channels. Many apparel companies do not perform all these functions; much contracting exists. Contractors and subcontractors rely on designs and fabrics supplied to them by retailers, jobbers,[11] or larger manufacturers and only do the cutting and/or sewing of the fabric.

Apparel has typically been a creative, family, and price-advantage industry in the United States, comprising approximately 15,000 small companies averaging less than one hundred employees and producing narrow product lines. It has also been an industry where production changes have come very slowly.[12] However, the apparel industry has recently experienced some restructuring that is expected to continue in the future. The larger firms' share of output has increased, the capital and knowledge intensity of the industry have increased, and the product lines produced by many apparel firms have widened.

The apparel segment of the textile complex is by far the most labor-intensive and fragmented. Of all major segments, it has the lowest entry barriers in terms of capital and technical knowledge requirements. Only the larger firms typically produce garments in more than one category (e.g., men's outer wear, women's dresses, children's sleep wear). Most firms produce garments only in a specific price and fashion range (e.g., high-fashion women's dresses, inexpensive children's pants, etc.). The largest firms in the United States are Levi Strauss and Blue Bell (with sales of about $3 billion and $1.5 billion, respectively), followed by Interco, Cluett Peabody, Hart Schaffner and Marx, Kayser-Roth, V. F. Corp., Kellwood, Warnaco, and Jonathan Logan (each with sales over $400 million). Outside the United States, the largest firms are Kasiyama, Renown, Courtaulds, Triumph, and Bidermann.

Home Furnishing and Industrial Use Segments

The output of the home furnishing sector comprises floor coverings (carpets and rugs), sheets, pillowcases, blankets, drapes, washcloths, and towels. In general, floor coverings made from man-made fibers involve a highly capital-intensive process, and production is located primarily in the southeastern United States (especially Georgia). The most important production technology--tufting--was developed several decades ago in the United States. That leadership has continued to the present. The carpet industry relies heavily on man-made fiber producers for R&D, which has manifested itself previously in the form of new fibers or fiber blends with better wear, color, or cleaning properties. It has also relied on the dyeing and printing machinery industry, largely located outside the United States.

The product, process, and technologies for most sheets, pillowcases, blankets, towels, and drapes are considered mature and hence not widely restricted to developed production locations. However, there are some production economies of scale that result in both product and industrial concentration and a trend toward greater automation. Like their counterparts in the apparel segment, large U.S. producers of home furnishings rely on equipment manufacturers for R&D and on a marketing strategy of product differentiation.

The industrial fabric sector is mixed in terms of inputs and outputs, but not companies. The vast majority of industrial fabrics are made by divisions of the largest textile fabric companies, such as Stevens, West Point Pepperell, and Burlington, although some industrial fabrics made from non-wovens are produced by non-textile firms. Examples of industrial fabric products are dryer felts, filter bags, rubber reinforcement, auto interiors, nets, cordage, geotechnical, and medical. It is difficult to generalize about the market growth of industrial fabrics, although estimates suggest that future growth may be significant.

Designing

The designing function is a somewhat nebulous area because it can encompass many activities. While often incorrectly considered to be restricted to apparel, its application is much broader and clearly extends to home furnishings and some industrial fabric sectors. Designing textiles includes not only knowledge of fashion but also styling, fabrics, fabric construction, fibers, colors, textures, wearing and cleaning properties and, for some products, aesthetics. Most of all, it requires creativity.

The importance of the design function is largely in product differentiation: being able to offer the customer a product that is different than competitors' products. If all products are essentially the same, then price competition can be intense. But, if a product can be successfully differentiated, the degree of price competition can be reduced, and the potential for greater sales and profitability are enhanced. For manufacturers in developed countries, better-designed products can be a major factor in competing with imports.

Related Sectors and Activities

While technically not a part of the textile complex, several other economic sectors play an important role in textile complex activities. What basically distinguishes them is the fact that they do not necessarily have to exist domestically in order to have a full textile complex, as long as their output (goods or services) can be imported or utilized by domestic firms.

Agriculture

The agricultural sector basically provides the raw material for natural fibers: primarily cotton, wool, flax, and silk. In a broad context, the agricultural sector also provides leather (from animals) and wood and other cellulosics (used to make cellulosic fibers). Price, availability, and quality are all important, but consumer demand and preferences largely dictate their relative importance in fiber production.

Chemicals

Petrochemicals are the basic feedstocks for most man-made fibers. Other chemically based textile materials are dyestuffs; resins for durable press, soil release, fluid repellency, and antistatic agents; and fundamental elements and compounds like chlorine, urea, and formaldehyde (used in wet processing). The existence of a domestic chemical industry can be helpful to a country's textile complex development, and most large man-made fiber producers are divisions of large chemical companies. However, as is the case with natural fibers, the most important and basic textile chemicals are available worldwide for importation.

Machinery

The machinery and equipment industries play an important role in each of the major segments of the textile complex. Many of the manufacturing breakthroughs in the textile complex have occurred from the utilization of new equipment developed by equipment firms. Most of the new equipment has been more labor-saving and efficient than its predecessors and, as a result, has increased the international competitiveness of higher-labor-cost countries as they substituted equipment for labor. Technology also permits the manufacture of more technically sophisticated products, another competitive advantage for firms in the textile complex. Finally, it permits textiles to enter new product markets, such as non-wovens in geotechnical applications.

Due to the substantial and increasing purchase costs, new technology equipment utilization has been greater in the financially stronger fiber and fabric sectors and in the financially strongest firms in all sectors. In addition, the fact that most new equipment is developed by equipment firms rather than firms in the textile complex has resulted in new equipment being made available worldwide fairly quickly--i.e., the equipment firms have an incentive to sell their equipment to as many textile complex firms as possible, no matter in what country they are located.

Distribution

In any highly competitive industry, timely and appropriate distribution of the product is a critical determinant of success. This applies for the apparel segment, given its more competitive nature with frequent changes in style and fashion. In the distribution of apparel, a larger role is being assumed by large retailers at the expense of the family-owned specialty stores. In addition, fashion forecasting and market research for apparel and fabrics are being done increasingly at the retail level, with the largest retailers being more involved in direct contracting, domestically and internationally. The large retailers often assume the designer role, contract for production of garments, fabric, and even the fiber to be used, provide financing, and specify all related logistics.

Whether these large retailers buy domestically or abroad can clearly affect the domestic textile complex: the more they buy abroad, the greater is the competitive pressure placed on domestic producers, and the greater is the assistance given to foreign producers. The latter point is important because selling in a foreign market can be more difficult than selling in one's own domestic market. Consumer preferences are different, marketing

distribution and pricing practices are different, and there are a number of other barriers to overcome, such as tariff and non-tariff barriers, warehousing, transportation, etc. A domestic retailer can help a foreign producer overcome many of these problems. Therefore, the relationship between retailers and manufacturers (foreign and domestic) is a very important and sometimes neglected area of consideration in analyzing what changes are taking place in the global textile complex.

INTERNATIONAL DIFFERENCES IN TEXTILE COMPLEXES

The basic function and general characteristics of each segment of the textile complex are similar in most countries. For example, a typical sewing plant in Sri Lanka performs essentially the same operations as its counterpart in Germany or in the United States. The man-made fiber industry in all countries is more capital-intensive than the fabric or apparel industries in those countries. However, the fabric and apparel segments have a fairly wide range of substitutability of capital and labor. Thus, textile firms in one country may be more capital-intensive than their counterparts in other countries. In addition, there are differences in the complexity of products produced in each country--the skill, sophistication, and wages of labor employed; the degrees of vertical integration, the industry concentration levels, the number of segments in existence in each country; the importance of the textile complex to the country; and the degree of their international activities and competitiveness, just to name a few. Thus all textile complexes are not identical.

Levels of Development

In worldwide textile complex development, there is a continuum of levels ranging from embryonic to declining. Although not all levels apply in all textile development, the following is a general description of the continuum. The embryonic variety is typically found in the least developed countries and is primarily oriented toward the production for domestic consumption of simple fabrics and garments made from natural fibers. These countries typically are net importers of fiber, fabric, and apparel, and their textile complexes resemble an amalgamation of cottage industries. Another level of development involves the export of apparel, largely restricted to low-end, mature varieties, native apparel, or apparel requiring elaborate handwork or handicraft, such as embroidery. Many of the ASEAN (Association of South East Asian Nations) countries fit into this category.

Another level evolves when domestic production of fabric and garments increases significantly in terms of quantity, quality, and technical sophistication. In addition to rapidly expanding and upgrading apparel exports, these countries also begin exporting fabric and may subsequently develop their own fiber sector. Their textile complexes become larger, more diversified, more concentrated, and more internationally active. South Korea recently passed through this level, and some of the more advanced ASEAN countries and East European countries are well into this level of development. Large manufacturers and retailers in more developed countries often play an important role in this process through foreign investment, contracting, or other forms of assistance (managerial, marketing, etc.). Movement to this level is also typically spurred by local government policies of import substitution and export development.

Another level of development can be called the golden age: apparel and fabric production become even more sophisticated, and huge trade surpluses result. Man-made fiber production is also more extensive and sophisticated, even though imports of certain complex fibers may be increasing. The textile complex continues to consolidate, to diversify in product mix, and to spread internationally via foreign direct investments and contractual arrangements of its own firms. Taiwan is clearly at this level of development, followed recently by Korea. Hong Kong's geographical limitations made it difficult for it to develop is own man-made fiber sector, but its apparel and fabric sectors are at the most advanced stage of this fourth development level.

Another level of development is full maturity. Overall employment in the complex declines due to increasing productivity (particularly in the apparel sector), even though total output may be increasing. Industrial concentration continues, product and process sophistication reaches high levels, and capital intensity increases significantly (primarily due to the necessity of substituting capital for labor and for producing more complex products). Japan, the United States, and Italy are in this mature level, although significant differences remain among them. The most notable differences are Japan's more vertically integrated structure and much greater use of offshore production and contracting and the massive Italian government assistance to its domestic complex.

The sixth and final level of development is significant decline. Employment and the number of firms are reduced substantially, and significant trade deficits appear in many sectors, especially in apparel and fabric. Many segments appear to be dying or beyond revitalization, even though some specialized segments may still be healthy, and offshore production increases significantly. The United Kingdom, France, Belgium, and the Netherlands are all

basically in this stage of textile complex decline, although to varying degrees.

Throughout this entire process of development, the international flow of technology, capital, and know-how is very important. The faster and wider it spreads, the more rapid the development process becomes. As will be discussed later, the largest producers and retailers in the developed countries, along with equipment manufacturers, have been largely responsible for such flows and are expected to continue to do so. These increased flows, combined with the constantly shifting comparative advantage in production and changes in government policies, make for a dynamic and competitive global textile environment. For example, a firm can design a sophisticated garment for export to another country made from fibers it produces in several countries being spun and woven into fabric in another country, perhaps being dyed and finished in its own or still another country, then sewn in still another country for export to the ultimate consuming country.

The controlling company can profit from each process (if its own subsidiaries are involved) or from the entire process (either the final profit or the final profit plus service income from the other companies involved for having orchestrated the whole scheme). And if one of the intermediate-stage countries or the final-stage country encounters some problem (e.g., their quota is used up), the firm can shift the process to another country. Such flexibility can be critical to the success of a company competing in the global textile market.

Other Differences

Other major differences among countries' textile complexes involve vertical integration, offshore investment/production, and government involvement. Although there is no irrefutable evidence that vertical integration in the textile complex provides a significant competitive edge, firms in Asia typically are more vertically integrated than those of the United States and have more foreign production facilities. (Vertical integration meaning fiber firms owning fabric and/or apparel firms, or fabric firms owning apparel firms, etc.) For example, one of Japan's largest fiber companies, Toray Industries, wholly or partially owns numerous fabric and apparel companies in Japan. It also owns fabric companies in Korea (1), Taiwan (2), Hong Kong (3), Indonesia (7), Thailand (6), Malaysia (4), Singapore (1), and numerous apparel companies throughout Southeast Asia either directly or jointly with Textile Alliance Ltd., a Hong Kong firm now 67 percent owned by Toray. In fact, by the mid-1970s, Toray

had established vertically integrated textile operations in Taiwan, Thailand, Indonesia, and Malaysia. By establishing fiber plants in Korea and the Philippines with local firms that had already vertically integrated forward from fabric into apparel, Toray essentially established vertically integrated operations in these countries as well.[13]

But Toray was not the only company to pursue such a vertical integration strategy domestically or internationally. Its main Japanese competitor, Teijin, followed a similar strategy in Southeast Asia. In Malaysia and the Philippines, for example, these two Japanese fiber firms control most of these nations' man-made fiber textile complex via equity participation, loans, and/or other contractual arrangements.[14] Other firms that followed similar but less extensive international vertical integration strategies were Textile Alliance Ltd. and Yangzekan of Hong Kong. Both established vertical integration from spinning through apparel in Hong Kong and several Southeast Asian countries. Most of Japan's large spinning companies (such as Toyobo and Kanebo) vertically integrated backward into natural fiber yarns in Latin America during the 1950s and forward into fabric and apparel in Japan, East Asia, and the Peoples' Republic of China (PRC). In the United States, vertical integration has seldom gone beyond the spinning and finishing stages.

There has not been extensive use of offshore processing[15] by the world's textile complexes. It has been restricted largely to apparel. The differences in offshore productions useage among segments is due largely to sector differences in labor intensity and manufacturing process characteristics. There has also been more extensive use of offshore processing by some countries than others: West Germany, Japan, and the Netherlands have utilized this technique more extensively than U.S. or Italian firms.[16]

Greater amounts of government involvement and assistance are found in developing and newly developed countries. Import substitution policies, industrial development assistance, and export assistance are among the many policies and activities of developing country governments. In the developed countries, while levels of trade protection have increased substantially over the past two decades, many of their other government policies have not been as supportive of their domestic textile complex as those in developing countries have been, with the notable exception of Italy.[17]

Still another difference among national textile complexes is their relative importance in terms of employment, gross national product, and export earnings. For example, textile products are the largest export of Hong Kong (roughly 40 percent of its total exports), South Korea (about 30 percent), and Taiwan (20 percent), but a very small percentage of total U.S. and West German

exports.[18] The relative importance of textile and apparel employment in various countries and of their output (measured in terms of value added) varies significantly.

Finally, there are significant differences in productivity and wage rates. Some of these differences are shown in Table 1-4. For example, in 1980 the hourly wage rate in Korea was 12 percent of the United States, and the rate in Taiwan was 18 percent. However, many of the less developed countries are not reflected in Table 1-4. Countries such as Sri Lanka, Thailand, the Philippines, India, and Indonesia all have hourly wage rates less than 10 percent of the U.S. level.

While the competitive impact of major differences in wage rates between the United States and developing nations cannot be precisely calculated, it is particularly significant for the more labor-intensive segments of the textile complex, such as apparel. The huge trade deficit of the United States in apparel reflects the competitive advantage of developing countries in apparel, made possible by combining lower wages with technology similar to that used in many U.S. firms.

One factor of U.S. competitiveness in yarn spinning is the energy cost. Some U.S. advantage can accrue from the fact that in the United States the energy costs to produce a pound of spun cotton yarn are between $0.08 and $0.10 per pound. In other countries, the energy costs can be as much as four times that figure. Therefore, competition gains in labor costs (which may be between $0.20 and $0.30) can be offset by high electrical power costs, especially in some Third World countries.

There also appear to be significant international differences in productivity. The only figures readily available are for spinning and weaving, shown in Table 1-5. According to these data, the United States has the highest level of productivity of all major producers, while Japan is the only Asian nation with a productivity level greater than one-half of the United States. However, the United States does not enjoy productivity leadership in all segments or subsegments of the textile complex, as is discussed in Chapters 2 and 3. When the United States does not have a significant productivity edge, the lower wage rates in developing countries become even more important as a competitive advantage.

In sum, the global textile complex is a composite of many highly different national textile complexes. It is these differences that make global competition so intense and complicated and equally complicated to analyze. The remainder of this report, therefore, will only highlight the major developments in the major segments of the textile complex in the major countries involved. No attempt is made to describe or analyze all of the activities and developments that are occurring or may occur in the global textile complex.

TABLE 1-4 Hourly Compensation Costs for Production Workers in Apparel and Other Textile Products Manufacturing, 21 Countries, 1980 (preliminary estimates)

Country	Exchange Rate		Average Hourly Earnings in National Currency	Ratio of Additional Compensation to Hourly Earnings	Hourly Compensation		
	National Currency Unit	National Currency Units per U.S. Dollar			National Currency	U.S. Dollars	Index U.S.=100
United States	Dollar	–	4.57	24.80	5.70	5.70	100
Canada	Dollar	1.17	5.31	16.30	6.18	5.28	93
Hong Kong[a]	Dollar	5.50[b]	6.03[c]	10-15	6.78[d]	1.23	22
Israel	Shekel	5.12	7.28[e]	40-45	10.37[d]	2.02	35
Japan	Yen	225.70	598.00	13.10[f]	676.00	3.00	53
Korea	Won	607.40	361.00[g]	15-20	425.00[d]	0.70	12
Taiwan	Dollar	36.02	31.65	15-20	37.19[d]	1.03	18
Austria	Shilling	12.93	39.57	75.60	69.48	5.37	94
Belgium	Franc	29.20	150.00	64.60	246.90	8.46	148
Denmark	Krone	5.63	40.28	17.20	47.21	8.39	147
France	Franc	4.22	17.02	63.90	27.90	6.61	116
West Germany	Mark	1.82	9.82	58.20	15.54	8.56	150
Greece[h]	Drachma	42.62	84.90	30.00[i]	110.40	2.59	45
Ireland	Pound	0.49	1.49	27.20	1.90	3.90	68

Italy	Lira	855.10	3,083.00	75.10	5,398.00	6.31	111
Netherlands	Guilder	1.99	10.58	61.40[f]	17.08	8.60	151
Norway	Krone	4.94	31.53	37.00	43.20	8.75	154
Portugal	Escudo	50.05	58.84	22.80[f]	72.26	1.44	25
Spain[j]	Peseta	71.64	204.00	40.00[i]	285.00	3.98	–
Sweden	Krona	4.23	27.17	61.90	43.99	10.40	182
United Kingdom	Pound	0.43	1.60	24.50	1.99	4.63	81

[a]Earnings and compensation exclude contractual and private social insurance.
[b]Approximate end-of-year exchange rate.
[c]Estimated from average daily earnings by assuming 8.5 hours of work per day.
[d]Mid-point of estimated average compensation range.
[e]Estimated from average daily earnings by assuming 8 hours of work per day.
[f]All employees.
[g]Earnings for production workers estimated on the basis of average hourly earnings for all employees adjusted for the relative level of production worker earnings to all employee earnings in 1979.
[h]Compensation excludes contractual and private social insurance.
[i]All manufacturing.
[j]Clothing, footwear, and leather.

SOURCE: U.S. Bureau of Labor Statistics.

TABLE 1-5 Spinning and Weaving: International Comparison of Productivity Levels

United States	100
West Germany	85 to 95
Italy	75
Japan	75
France	70
United Kingdom	55
Hong Kong	50
Taiwan	45
South Korea	45
Pakistan	10

SOURCE: Werner Associates, Inc., New York, Brussels, June 1981.

NOTES

1. The text of this report, its discussions and analyses, is based in part on available data reproduced here as figures and tables. A sometimes significant problem faced by the panel throughout its work was related to the availability, quality, replicability, and sometimes reliability of the data. Although some data in this report may be somewhat dated or in some instances be deemed soft, they are used solely to support broad discussions and conclusions of the panel and should not be evaluated independently.

2. This number includes only manufacturers and does not include agricultural suppliers. The standard industrial classifications covered by this definition are 22, 23 (exclusive of 237 and 2386), 2823, and 2824.

3. Particularly in the southern and mid-Atlantic regions.

4. See The Dependence of the U.S. Economy on the Fiber/Textile/Apparel Industrial Complex, a report prepared for the ATMI (American Textile Manufacturers' Institute) by Economic Consulting Services, Inc., Washington, D.C., January 1981.

5. Ibid. The figure shown contains some duplications that would not have occurred if reliance were on value added. For example, yarn sold to a weaving mill is counted twice, first as its value as yarn, then as its value as yarn measured as the value of the fabric. The double count occurs again as the value of fabric is included in the value of apparel calculation. Double counting in aggregating value of shipments for individual branches of the industry is common.

6. The information in this figure is based on 1972 data contained in The Census of Manufactures, U.S. Department of Commerce, Washington, D.C., 1979. Although the data are therefore somewhat dated, they are offered only as illustrations

of macro linkages. The figure was not used by the panel for the development of any options, but rather is offered to provide a clearer understanding to readers less familiar with the industry.

7. The figures shown cover indirect employment requirements in supplying sectors that fall within the fiber, textile, and apparel complex. There is of course substantial employment generated in supplying industries other than those in this complex. Some sources calculate this additional employment effect at a three- to four-time increase. The relationships reflected in this table are presented as being illustrative of the relationships between and among employment in the various sector components and the dollar volumes represented. No specific conclusions are offered from this information. Rather the data are offered to inform the less knowledgeable reader.

8. In the United States, there are approximately 5000 textile firms (SIC 22) of which the largest 50 firms account for 50 percent of the industry's total output and the largest 15 firms for roughly 35 percent of the industry's total output. (Source: ATMI)

9. Statistics in the Guide to Non-Woven Fabrics, INDA (The Association of the Non-Woven Fabrics Industry), New York, 1978, suggest a growth rate in non-wovens of 188 percent from 1971 to 1977. Other sources including the Census of Manufactures, U.S. Department of Commerce, Washington, D.C., 1972 and 1977, suggest a 101 percent increase between 1972 and 1977.

10. Apparel can also be made from leather, plastics, and non-wovens and instead of being sewn can be cemented or fused. Apparel can also be produced directly from yarn (such as hosiery and sweaters). In the case of sweaters, the parts may be assembled by the use of the looping process. However, most apparel is sewn from woven fabrics.

11. Within the industry, contractors may be used by manufacturers or jobbers to supplement the output of their shops. Jobbers perform all the functions of an entrepreneur (frequently including the cutting of the material), but leave the assembly and pressing of the garments to contractors. Generally contractors produce garments out of materials owned by their principals, either from uncut or cut materials to the specifications of their principals.

12. There are many types of apparel firms, from small contract shops to large multinational corporations. For the purposes of this study, the macro approach taken has necessitated that these various types of companies be aggregated under the category of apparel.

13. For more detail on Toray's operation, see R. Moxon, T. Roehl, and J. F. Truill (eds.), International Business Strategies in the Asia Pacific Region, JAI Press, Greenwich, CT, 1982.

14. Ibid.

15. Offshore processing by a domestic firm occurs when some production processes are carried out in the third country and are returned thereafter to the original domestic firm in a completed or a semi-completed form. Offshore processing may be done either by the affiliates of the domestic firm or by independent companies.

16. On March 16, 1982, after all major drafting work on this report was completed, the EEC issued Council Regulation No. 636/82 establishing economic outward processing arrangements applicable to certain textile and clothing products reimported into the EEC after working or processing in certain third countries. These arrangements now limit the use of offshore processing.

17. For more details on government policies affecting the apparel and fabric industries, see J. Arpan, J. de la Torre, et al., The U.S. Apparel Industry: International Challenge/Domestic Response, Business Publishing Division, College of Business Administration, Georgia State University, Atlanta, GA, 1982, chapters 4, 5, and 6; and the U.S. Department of Commerce publication on overseas restraints to textile and apparel import, Foreign Regulations Affecting U.S. Textile/Apparel Export, August 1981.

18. Source: The Economist, December 12, 1981. In Japan's case, textile exports during the 1940s and 1950s accounted for nearly 50 percent of its total exports, but now account for less than 10 percent.

2
The Changing Environment

In the past two decades there were several major changes in the environment that affected both the global textile complex and complexes in individual countries. These changes can be broadly classified under two categories: economic and governmental. In the economic category, there were changes in consumption and production patterns, changes in international trade and investment activities, changes in technology and productivity, changes in exchange rates, and changes in employment and wages. In the government category, there were changes in trade policies, changes in other policies directed specifically at textile complexes, and changes in policies that had an indirect impact on textile complexes.

Because of the vast number and complexities of changes that occurred in the past two decades in these areas, Chapter 2 only highlights the major changes and their impact on the global textile complex, with particular emphasis on the U.S. complex.

ECONOMIC CHANGES

Production and Trade Patterns

Fiber

From 1970 to 1980, all major geographical areas expanded their man-made fiber capacity, although at different rates. The world's leading producer of man-made fibers is the United States. Between the 10 years (1970 and 1980) shown in Tables 2-1 and 2-2, the U.S. percentage of world production capacity has remained relatively constant at 26 percent. By comparison, Japan's relative share fell from 17 percent to 13 percent of the total and Western Europe's from 32 percent to 21 percent. On the other hand, the relative importance of production in Eastern Europe between

TABLE 2-1 World Fiber Production by Area and by Type (thousand metric tons)

		Non-Cellulosic	Rayon and Acetate	Total	Percent
World	1970	4,700	3,436	8,136	100
	1975	7,353	2,959	10,312	100
	1980	10,492	3,242	13,733	100
Western Europe	1970	1,479	1,097	2,576	32
	1975	7,353	720	2,586	25
	1980	2,168	744	2,912	21
Eastern Europe	1970	363	852	1,215	15
	1975	812	1,083	1,819	18
	1980	1,197	1,141	2,338	17
United States	1970	1,509	623	2,132	26
	1975	2,445	340	2,785	27
	1980	3,242	366	3,608	26
Other Americas	1970	211	148	359	4
	1975	491	142	633	6
	1980	729	145	874	6
Japan	1970	970	492	1,462	17
	1975	1,021	359	1,380	13
	1980	1,357	397	1,754	13
All others	1970	168	224	392	5
	1975	718	316	1,034	10
	1980	1,799	449	2,248	16

SOURCE: *Textile Organon*, June 1977 and June 1982.

these two years rose from 15 to 17 percent, while in other countries (mainly those in East Asia and the PRC) shares rose from 5 percent to 16 percent of world output.

Within the U.S. man-made fiber sector, the production share of cellulosics fell from 54 percent in 1960 to less than 9 percent in 1979, while polyester became the dominant fiber (58 percent of all man-made fiber produced in the United States in 1979). This pattern of fiber production was also reflected in the distribution of the U.S. textile industry's output. Man-made fibers accounted for more than 75 percent of all fibers consumed by the U.S textile industry; 68 percent of all broadwovens and over 85 percent of all knit fabrics produced contained man-made fibers.

The U.S. patterns generally reflected global trends: worldwide production capacity of cellulosics dropped slightly between 1970 and 1980, while that of non-cellulosics increased nearly two and one-half times. The cellulosics share of total man-made fiber production fell from 43 percent in 1970 to 25 percent in 1980. Within the non-cellulosics group, polyesters experienced the

TABLE 2-2 Percentage Change in World Fiber Production 1970 to 1980 (output in thousand metric tons)

	Non-Cellulosic	Rayon and Acetate	Total
World	123	(6)	69
Western Europe	47	(32)	13
Eastern Europe	230	34	92
United States	115	(41)	69
Other Americas	245	(2)	143
Japan	40	(19)	20
All Others	971	101	473

NOTE: Figures in ( ) indicate a decline. Percentages calculated $\frac{1980-1970}{1970}$.

SOURCE: *Textile Organon*, June 1977 and June 1982.

fastest growth worldwide (almost 12 percent annually during the 1970s), followed by acrylics (7 percent annually), and polyamides (5 percent annually). However, there were distinct regional differences. U.S. output of polyesters advanced 11 percent annually, European closer to 5 percent, and Japanese 7 percent, while the world growth rate was nearly 25 percent.

For man-made fibers other than polyester, acrylics, and polyamides, the geographical differences were even more dramatic: U.S. production fell 21 percent, European rose 262 percent, Japanese remained essentially unchanged, while the rest of the world increased production by 155 percent.[1] Thus, there was a rising global demand for non-cellulosics (at the expense of celluosics) and an increasing shift of man-made fiber production to East Asia, the PRC and Eastern Europe .

While this report focuses on man-made fiber, a few comments about natural fiber production trends can add perspective. From 1960 to 1980, total fiber production doubled. However, during that period, man-made fiber production increased more than 300 percent, while production of natural fibers increased only 36 percent.[2] Thus, the natural fiber share of total world production declined from nearly 78 percent in 1960 to less than 54 percent in 1980.

The overall rising global demand for man-made fiber and yarn and the dramatic growth of fabric production in developing countries resulted in sizeable trade surpluses for the United States in man-made fiber and yarn. As shown in Table 2-3, the U.S. trade surplus in man-made fiber jumped from $3.8 million to $823.6 million between 1968 and 1981. This resulted primarily from a huge rise in trade surplus with Asia (from a trade deficit of $3.7 million in 1968 to a trade surplus of $450.9 million in

TABLE 2-3 The United States Net Trade Positions by Product and Country/Region: 1968 and 1981 (millions of dollars)

	Man-Made Fiber		Man-Made Fiber Yarn		Man-Made Fiber Woven Fabric		Cotton Yarn		Cotton Woven Fabric		Other Yarn		Other Fabric		Clothing		Total	
	1968	1981	1968	1981	1968	1981	1968	1981	1968	1981	1968	1981	1968	1981	1968	1981	1968	1981
Canada	11.4	65.7	13.4	83.6	14.2	154.9	3.2	20.8	24.7	83.6	1.9	26.4	20.0	182.8	(3.8)	(0.9)	85.0	616.9
Japan	(9.4)	0.8	(7.4)	(1.7)	(56.5)	(275.6)	–	0.4	(41.4)	(43.3)	(10.4)	2.3	(149.1)	(320.0)	(189.3)	(206.6)	(463.5)	(843.7)
Hong Kong	0.6	13.3	0.4	39.4	3.6	21.2	(0.4)	1.3	(26.2)	(105.1)	(0.1)	1.4	4.0	20.5	(194.9)	(2014.7)	(213.0)	(2022.7)
Republic of Korea	1.6	23.4	1.4	4.4	(1.8)	(72.3)	[b]	(0.3)	(3.6)	(37.0)	–	0.8	(6.4)	(98.2)	(60.0)	(1411.0)	(68.8)	(1590.2)
China	–	326.9	–	204.1	–	65.7	–	0.2	–	(89.4)	–	(0.2)	–	53.1	–	(457.6)	–	102.8
Rest of Asia	3.5	86.5	1.7	57.8	4.6	32.2	(2.5)	1.8	(15.0)	(154.9)	(0.3)	(3.3)	(176.7)	(139.8)	(87.2)	(2511.3)	(271.9)	(2631.0)
European Economic Community[a]	(27.3)	45.5	(28.9)	101.6	8.7	(55.7)	(2.3)	(7.9)	(8.2)	63.6	(13.2)	(20.3)	(68.7)	(165.3)	(172.2)	(134.5)	(312.1)	(173.0)
Rest of the World	23.4	261.5	42.6	174.6	46.0	321.5	(18.4)	(7.3)	24.4	(5.6)	0.7	2.5	36.9	352.0	44.7	(126.1)	200.3	973.1
TOTAL	3.8	823.6	23.2	663.8	18.8	191.9	(20.4)	9.0	(45.3)	(288.0)	(21.4)	9.6	(340.0)	(114.9)	(622.7)	(6872.7)	(1044.0)	(5567.0)

[a] Denmark, Ireland, and United Kingdom included in 1968 before they joined the European Common Market to assure comparability with 1981 data.
[b] Less than 0.05 million dollars.

NOTE: Figures in ( ) indicate a negative balance.

SOURCE: United Nations, *Commodity Trade Statistics*, 1968 and 1981.

1981). A similar reversal occurred in EEC trade from a deficit of $27.3 million in 1968 to a trade surplus of $45.5 million in 1981. There was also a nine-fold increase in the U.S. trade surplus with Canada and the rest of the world.

The growing U.S. trade surplus in man-made yarn was also significant. It rose from $23.2 million to $663.8 million between 1968 and 1981, and similarly with the EEC where a trade deficit of $28.9 million rose to become a surplus of $101.6 million. The trade surplus with Canada and the rest of the world moved up from $56.0 million to $258.2 million.

It should be noted, however, that competition to man-made fiber producers arises not only from the importation of man-made fiber yarns, but also indirectly from the importation of fabric and apparel produced with foreign fiber. Imported apparel made with foreign fabrics is a form of indirect competition.

Fabric and Apparel

From virtually the turn of the century, the estimated global production of fabric and apparel grew at rates below those of all manufacturing production. The gap narrowed somewhat during the period 1967 to 1979, as shown in Table 2-4. However, there were noticeable changes in regional shares of global production. As shown in Table 2-5, from 1963 to 1980, the share of OECD (Organization for Economic Cooperation and Development) countries in both categories declined significantly: in fabric from 57.5 percent to 48.2 percent and in apparel from 70.2 percent to 52.3 percent.[3] While the relative shares of developing countries increased, the major gains were in the centrally planned economies: in fabric from 28.6 percent to 37.5 percent and in apparel from 24.7 percent to 41.0 percent.

In general, net trade flows had a relatively minor impact on the shifts in the broad regional patterns of production. What appeared to be the major factor was differential rates of growth of domestic demand in various groups of countries--primarily driven by demographic changes, growth of income, and income elasticities. The net result of these changes was a redistribution of fabric and employment more in line with that of world population, but with OECD and centrally planned economies still maintaining a higher percentage of fabric and apparel employment than their respective shares of world population (the opposite being true for developing countries).

Looking more specifically at fabric production, growth in the United States averaged 5 percent per year during the latter half of the 1970s. In general, cotton and man-made broadwovens grew at rates higher than the overall average, while wool broadwoven

TABLE 2-4 Percent Average Annual Rate of Change, Industrial Production 1967-1979

	Textiles	Wearing Apparel, Leather, and Footwear
World[a]	2.5	0.8
Centrally planned economies[b]	4.4	4.4
Market economies[c]	2.0	(0.8)
Developed market economies[d]	4.9	1.7
Developing market economies[e]	1.4	(1.9)
North America[f]	3.7	2.6
Caribbean, Central and South America	3.5	(0.2)
Asia[g]	1.6	(2.8)
Asia excluding Israel and Japan[h]	1.3	(2.4)
Europe[i]	4.6	2.2
European Economic Community[j]	5.2	2.9
European Free Trade Association[k]	3.8	1.4
Oceania[l]	4.5	5.2

[a]Excluding Albania, China, Democratic Republic of Korea and Viet Nam.
[b]Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, Romania and the USSR.
[c]Developed and developing market economies.
[d]North America, Europe (excluding planned economies), Australia, Israel, Japan, New Zealand and South Africa.
[e]Caribbean, Central and South America, Africa (other than South Africa), Asian Middle East and East and South-East Asia (other than Israel and Japan).
[f]Canada and the United States of America.
[g]Asian Middle East and East and South-East Asia.
[h]Asian Middle East and East and South-East Asia (less Israel and Japan).
[i]Excluding centrally planned economies.
[j]Denmark, Ireland and United Kingdom included for the entire period under review (even before they joined EEC).
[k]Denmark and United Kingdom excluded in this tabulation (including the period when they were members of EFTA).
[l]Australia and New Zealand.

NOTE: Figures in ( ) indicate a decline.

SOURCE: United Nations, *Yearbook of Industrial Statistics, 1979 edition, Volume I: General Industrial Statistics,* pp. 578-590 (New York, 1981).

fabrics and knit fabrics grew at rates lower than the overall average. While these trends were significantly influenced by U.S. consumer preferences, they were also affected by international developments as reflected in international trade patterns.

As shown in Table 2-3, the United States had growing trade surpluses in man-made fiber, man-made fiber yarn, and man-made fiber woven fabrics. While the trade surplus in man-made fiber grew from $3.8 million in 1968 to $823.6 million in 1981, the U.S. trade position in cotton yarn reversed itself from a $20.4 million deficit to a $9.0 million surplus. On a geographic basis, U.S. trade patterns reflected the different degrees of international competi-

TABLE 2-5 Share in World[a] Production of the Textile and Clothing Industries (percentages)

	Textile Industry		Clothing Industry	
	1963	1980	1963	1980
Developed market economies[b]	57.5	48.2	70.2	52.3
OECD Europe	27.9	20.5	24.7	17.9
EEC[c]	23.4	15.9	22.1	14.4
North America	21.7	20.2	42.6	31.8
Japan	6.4	6.7	2.1	2.6
Centrally planned economies[d]	28.6	37.5	24.7	41.0
Developing Countries	13.9	14.3	5.1	6.7
Asia	5.4	5.4	2.1	2.8

NOTE: Percentages for each line are calculated independently. Columns are not additive or cumulative.
Production: value added in constant prices.

[a]Excluding China and other centrally planned economies.
[b]OECD countries plus South Africa and Israel.
[c]Denmark, Ireland, and the United Kingdom became members of the EEC in 1973. Their trade is reflected in 1980 numbers only.
[d]Soviet Union and six European members of CMEA.

SOURCE: United Nations: *Yearbook of Industrial Statistics*, various years.

tiveness of foreign textile complexes. In most categories, the United States has had a relatively consistent trade deficit with Japan, Hong Kong, and the Republic of Korea, but a large trade surplus in fabrics with Canada and the rest of the world. The overall strengthening of the competitive position of the U.S. fabric industry during most of the 1970s appeared to be due in part to the depreciation of the U.S. dollar, increased demand for cotton denim and corduroy, and improved efficiency of some U.S. mills.

As for the apparel industry, the U.S. share of world production declined in many product lines, losing ground primarily to parts of East Asia and Pacific producers and those in centrally planned economies. In the last half of the 1970s, the value of U.S. apparel imports increased 140 percent, while the value of apparel industry shipments increased only 50 percent. As a result, U.S. trade deficits in apparel leaped from $622.7 million in 1968 to nearly $7.0 billion in 1981.[4] One major reason for this trade deficit is that more than 90 percent of the U.S. trade deficit with the world originated in Asia (Hong Kong, 29.3 percent; Republic of Korea, 20.5 percent; the PRC, 6.7 percent; and the rest of Asia including Japan, 39.5 percent). As shown in Table 2-6 import penetration varied widely depending on product category. Once again, the major cause of the U.S. trade deficit was East Asia and the PRC (which accounted for over 90 percent of the U.S. trade deficit

TABLE 2-6 U.S. Apparel Production, Imports, Apparent Consumption and Ratios of Imports to Domestic Production and Apparent Consumption by Product Category, 1980

Number	Product Category and Description	Quantities (in thousand dozen)			Imports as Percent of	
		U.S. Production	Imports	Apparent Consumption	U.S. Production	Apparent Consumption
330	Handkerchiefs, cotton	13,323	3,357	16,680	25.2	20.1
630	Handkerchiefs, mmf	4,195	314	4,509	7.5	7.0
331	Gloves, cotton	22,507	11,694	34,201	52.0	34.2
431	Gloves, wool	31	125	156	403.2	80.1
631	Gloves, mmf	3,292	3,777	7,069	114.7	53.4
332	Hosiery, cotton	40,407	31	40,438	0.1	0.1
432	Hosiery, wool	1,261	92	1,353	7.3	6.8
632	Hosiery, mmf	238,569	3,003	241,572	1.3	1.2
333	Suit-type coats, M&B, cotton	200	185	385	92.5	48.1
433	Suit-type coats, M&B, wool	315	53	368	16.8	14.4
633	Suit-type coats, M&B, mmf	1,025	125	1,150	12.2	10.9
334	Other coats, M&B, cotton	1,071	903	1,974	84.3	45.7
434	Other coats, M&B, wool	429	41	470	9.6	8.7
634	Other coats, M&B, mmf	5,666	2,077	7,743	36.7	26.9
335	Coats, W.G.I., cotton	535	1,401	1,936	261.9	72.1
435	Coats, W.G.I., wool	1,110	190	1,300	17.1	14.6
635	Coats, W.G.I., mmf	4,074	2,414	6,488	59.3	37.2
336	Dresses, cotton	3,770	699	4,469	18.5	15.6
436	Dresses, wool	344	84	428	24.4	19.6
636	Dresses, mmf	16,726	1,165	17,891	7.0	6.5
337	Playsuits, cotton	3,138	1,383	4,521	44.1	30.6
637	Playsuits, mmf	5,934	716	6,650	12.1	10.8
340	Shirts, not knit, M&B, cotton	5,691	6,315	12,006	111.0	52.6
440p	Shirts, not knit, M&B, wool	210	221	431	105.2	51.3
640	Shirts, not knit, M&B, mmf	13,203	9,780	22,983	74.1	41.8

341	Blouses, not knit, W.G.I., cotton	3,444	6,007	9,451	174.4	63.6
440p	Blouses, not knit, W.G.I., wool	300	8	308	2.7	2.6
641	Blouses, not knit, W.G.I., mmf	15,331	4,425	19,756	28.9	22.4
338	Knit shirts, M&B, cotton	17,072	5,391	22,463	31.6	24.0
438p	Knit shirts, M&B, wool	204	75	279	36.8	26.9
638	Knit shirts, M&B, mmf	29,654	5,399	35,053	18.2	15.4
339	Knit shirts & blouses, W.G.I., cotton	7,642	7,138	14,780	93.4	48.3
438p	Knit shirts & blouses, W.G.I., wool	277	543	820	196.0	66.2
639	Knit shirts & blouses, W.G.I., mmf	25,598	14,310	39,908	55.9	35.9
342	Skirts, cotton	959	849	1,808	88.5	47.0
442	Skirts, wool	749	108	857	14.4	12.6
642	Skirts, mmf	4,866	298	5,164	6.1	5.8
443	Suits, M&B, wool	242	112	354	46.3	31.6
643	Suits, M&B, mmf	1,236	95	1,331	7.7	7.1
444	Suits, W.G.I., wool	134	29	163	21.6	17.8
644	Suits, W.G.I., mmf	1,406	115	1,521	8.2	7.6
345p	Sweaters, M&B, cotton	67	116	183	173.1	63.4
445	Sweaters, M&B, wool	845	506	1,351	59.9	37.5
645	Sweaters, M&B, mmf	2,360	1,634	3,994	69.2	40.9
345p	Sweaters, W.G.I., cotton	339	1,157	1,496	341.3	77.3
446	Sweaters, W.G.I., wool	469	2,048	2,517	436.7	81.4
646	Sweaters, W.G.I., mmf	4,603	8,661	13,264	188.2	65.3
347	Trousers, M&B, cotton	31,068	4,905	35,973	15.8	13.6
447	Trousers, M&B, wool	661	161	822	24.4	19.6
647	Trousers, M&B, mmf	19,330	2,552	21,882	13.2	11.7
348	Trousers, W.G.I., cotton	11,731	8,281	20,012	70.6	41.4
448	Trousers, W.G.I., wool	638	81	719	12.7	11.3
648	Trousers, W.G.I., mmf	18,667	5,947	24,614	31.9	24.2

TABLE 2-6 (Continued)

Number	Product Category and Description	Quantities (in thousand dozen)			Imports as Percent of	
		U.S. Production	Imports	Apparent Consumption	U.S. Production	Apparent Consumption
349	Brassieres, etc., cotton	1,870	138	2,008	7.4	6.9
649	Brassieres, etc., mmf	20,467	12,527	32,994	61.2	38.0
350	Dressing gowns, cotton	683	211	894	30.9	23.6
459p	Dressing gowns, wool	61	8	69	13.1	11.6
650	Dressing gowns, mmf	2,895	167	3,062	5.8	5.5
351	Nightwear, cotton	4,035	1,398	5,425	34.4	25.6
651	Nightwear, mmf	17,872	315	18,187	1.8	1.7
352	Underwear, cotton	62,328	2,303	64,631	3.7	3.6
652	Underwear, mmf	67,649	3,399	71,048	5.0	4.8

NOTE: Apparent consumption = U.S. Production + Imports.

mmf = man-made fiber textile products
M&B = men's and boys'.
W.G.I. = women's, girls' and infants

SOURCE: U.S. Department of Commerce, *U.S. Production, Imports & Import/Production Ratios for Cotton, Wool & Man-Made Fiber Textiles and Apparel*, June 1982.

with the world) and particularly East Asia (80 percent of the total U.S. trade deficit). The ASEAN countries' apparel trade surplus with the United States increased nearly six-fold, surpassing the trade surplus of Japan with the United States. Europe's trade surplus with the United States had also surpassed Japan's by the late 1970s.

In sum, the performance of the overall U.S. textile complex was mixed. While production and exports increased in virtually all major segments, the U.S. share of world production declined in most segments. On the bright side, the U.S. man-made fiber industry did fairly well, increasing its world share and recording trade surpluses. The fabric segment's trade performance did not do as well. Its share of world production in most fabric categories declined (measured in value added terms), as did the number of firms and total employment. The apparel segment had by far the worst overall experience. Despite increases in productivity, total output, and exports, imports captured an increasing percentage of U.S. market share (from 5 percent of domestic consumption in 1970 to 25 percent in 1981),[5] and the U.S. trade deficit in apparel ballooned to nearly $7 billion. U.S. apparel employment of roughly 1.49 million[6] in 1969 fell to 1.20 million by 1982, and the number of apparel establishments declined from 24,319 in 1970 to 23,026 by the end of 1978.[7]

Compared to the performance of the U.S. textile complex, the share of western Europe's percentage of world production of man-made fibers fell from 32 percent in 1970 to 21 percent in 1980.[8] And during the last half of the 1970s, over 4200 European apparel and fabric firms were closed, over 442,000 jobs were lost in the fabric sector and 278,000 in the apparel sector.[9] And despite having an increasing trade surplus in fibers and fabrics, Japan's textile and apparel employment suffered a decline of 15.5 percent from 1970 to 1978.[10]

But while the U.S. textile complex may take solace in the fact that its counterparts in other developed countries also have problems, the fact remains that competition from textile complexes in developing countries is on the rise and is increasing at an increasing rate.

Changes in Wages and Productivity

Comparing wages and productivity in different countries is virtually impossible to do precisely. Even when data are available from a single source (such as either the U.S. Department of Labor, Bureau of Labor Statistics; UN; OECD; or ILO), the data are not truly comparable because they are typically based on government-supplied information that is not uniformly collected,

measured, or interpreted. Therefore, considerable caution is required in making such comparisons in general and particularly when attempting to do so for a specific industry or industry subsector. However, there is something to be learned from making comparisons of those data where differences are of a truly large magnitude; i.e., where the differences are so large that the reporting discrepancies mentioned above are not material. For example, whether the average hourly wage rates in textiles in the United States and Korea are exactly $4.86 and $0.53 respectively is not as important as the magnitude of the difference. With these caveats in mind, it is possible to make some generalizations about wages and productivity on a comparative basis.

Table I-3 provides some international comparisons of wages in apparel and other textile products, while Table I-4 offers information on comparative productivity in spinning and weaving. Basically these tables show that the developing countries had significantly lower wages than the United States and that several countries in Europe had somewhat higher wages than the United States. Thus, the U.S. experience with wage increases was better than most, but the United States remained a high labor cost country compared to all but a few other countries. However, wage costs are not sufficient in themselves to explain trade patterns; productivity changes are also important.

To offset increasing wage costs, firms in all countries have sought ways to increase productivity by at least as much as the increase in wages. For example, higher labor productivity in the United States compared to Taiwan can help offset the comparatively higher U.S. wages, and any time productivity rises faster than wages, a firm can become more competitive. However, many of the major U.S. trading partners had beginning levels of productivity much lower than the U.S. base so that their percentage increases would naturally be higher. In addition, comparisons of aggregate levels and increases in productivity mask those in specific industries.[11] Finally, problems in comparing specific industrial productivity gains among countries are subject to even greater comparison validity problems than those already mentioned for wages.

So there is little that can be said definitively for the productivity of the U.S. textile complex vis à vis those in other countries. However, it was the general consensus of the panel that the U.S. textile complex overall remains the most productive in the world, but that the greatest edge is fabrics and man-made fibers. And while no readily available data exist to show that U.S. productivity is higher than other countries, the panel's perception is partially supported by the trade position of the United States in these two segments. Apart from the strong U.S. leadership in man-made fibers, the United States appears to have a strong

position in styling, production, and distribution technology in the sheet and towel sectors of home furnishings. In industrial and sophisticated specialty fabrics, West Germany leads in certain synthetic fabrics and the United States in fabrics for reinforcement for automotive, aircraft, and other sophisticated machinery. In apparel fabrics, the United States continues to lead in denim and corduroy, while the Far East leads in knit fabrics and garment and shirting fabrics. However, as mentioned earlier, these fabrics are imported in the form of finished apparel.

As to whether the U.S. lead is eroding, there is no conclusive evidence. It is evident, however, that much, if not most, of the gains in textile complex productivity worldwide are resulting from new technologies embodied in new equipment and, in the developing countries, also from increased skill resulting from more experience in manufacturing. It also appears that productivity has increased faster in the larger firms in all segments in all countries (although the output per hour [in terms of value added] may not have risen as fast). The productivity question is discussed in more detail later in this chapter in the section on Changes in Technology.

Foreign Investment Activity

On the surface, the changing economic conditions would suggest that firms in developed countries should make foreign investments in developing countries to take advantage of the latters' greater textile complex growth and lower wages; either to make less expensive products for import back to their home countries or to be more competitive in the foreign countries. However, there was not much foreign investment activity by American firms in general and not a whole lot more by European firms. In addition, the largest amount of foreign investments made by American and European firms was in man-made fiber segments in each others' countries, rather than in fabric or apparel in developing countries. On the other hand, Japanese companies made major foreign investments in all segments of the textile complex and primarily in countries with high growth potential--those in East Asia and the PRC. Firms based in Hong Kong, Korea, and Taiwan also made major foreign investments in East Asia and the PRC, although to a lesser extent than Japanese firms and sometimes in conjunction with Japanese firms.

As will be discussed in greater detail in Chapter 3, the extent of foreign investment activity in general and by nationality resulted from differences in industrial structure, the size of domestic markets, government policies, and individual corporate strategies and capabilities. As a whole, however, foreign invest-

ment activity in the global textile complex was dwarfed by trade activity, even though some of the changes in trade patterns resulted from foreign investment flows.

Offshore Processing

While the available data on foreign direct investments did not reveal much activity in general, there does appear to be increasing use of offshore processing by firms based in developed countries and particularly by apparel firms. In the typical case, cut material is shipped for sewing to lower labor cost countries and then reimported. By contrast, virtually no offshore processing occurs in spinning and weaving. The main reasons appear to be the increased domestic integration of spinning and weaving, the lower labor intensities, and, perhaps most importantly for U.S. firms, that the spinning, weaving, and finishing processes are considered manufacturing and not assembly and, therefore, do not qualify for the benefits of Item 807.00,[12] the U.S. statutory provision pertaining to offshore processing.

In apparel production the decision to move offshore can be related to the variations in duty rates and the worldwide fiber and textile raw material costs, or it can be related to the ratios between the weight of the garment and the labor content. Products of a high weight-to-labor content ratio are not economical to import. Sweatshirts, for example, contain a great deal of cotton fiber, are very heavy, and require very little labor in assembling. T-shirts and most underwear products are low labor content garments making domestic production very competitive with importation. Brassieres, however, are lightweight with a relatively high labor content. They were one of the first garments produced offshore in quantity, and there are fewer and fewer U.S. production facilities every year.

In some cases, original decisions to move offshore are reversed by a change in circumstances such as the development of a new technology. Fifteen years ago dress shirts were considered to be labor intensive, and much of the U.S production moved offshore. However, recent significant improvements in technology and productivity in dress shirt assembly in the United States may have caused a portion of that production to return. It returned because the ratio between the weight of the product and the labor content of the product shifted, and domestic production could now compete on a cost-of-production basis with imported dress shirts.

While the general use, measured in value of shipments of offshore processing, appears to have increased between 1965 and 1980 (Table 2-7), Item 807 as a percent of total U.S. imports for consumption peaked in 1974 and seems to have leveled at between 8 and 9 percent.

TABLE 2-7 U.S. Imports for Consumption of Apparel (knit and woven): Market Value in Foreign Countries* (millions of dollars)

		Item 807.000 Imports	
Period	Total Value	Value	Percent of Total
1965	578.2	1.7	0.3
1966	628.1	6.4	1.0
1967	687.5	12.2	1.8
1968	863.0	24.0	2.8
1969	1,079.1	40.5	3.8
1970	1,247.7	50.4	4.0
1971	1,502.5	69.3	4.6
1972	1,859.4	95.0	5.1
1973	2,118.5	141.0	6.7
1974	2,313.6	238.3	10.3
1975	2,630.6	253.3	9.6
1976	3,685.6	292.5	7.9
1977	4,338.4	327.9	7.6
1978	5,353.5	418.9	7.8
1979	5,469.4	476.7	8.7
1980	6,007.9	524.0	8.7

*Exclusive of customs duties, ocean freight, and marine insurance.

SOURCE: Compiled by Research Department, International Ladies Garment Workers Union.

CHANGES IN TECHNOLOGY

Numerous changes in technology have taken place in the global textile complex over the past several decades, and they influenced many of the changes in employment levels, productivity, and trade patterns just described. More specifically, new technology enhanced productivity, permitted the manufacture of new and/or more complicated products, and enhanced the competitiveness of firms that properly utilized it, regardless of where they were located. The new technology utilized in the textile complex improved product quality as well as reduced the amount of labor required. As a result, it often reduced the need for labor, particularly when productivity rose faster than product demand. Thus, these technological improvements often resulted in declining employment while simultaneously improving the competitive ability of the adopting firms. In addition, the more rapid and extensive the spread of new technology to developing countries, the faster they were able to upgrade their products in quality and style. This allowed import competition to broaden its base from low-end goods to middle-range goods. When transformed into additional exports from developing countries to developed

countries, technology transfer often resulted in additional employment losses in the developed countries.

A side effect of technological developments was increased industrial concentration of several segments of the textile complex. Man-made fiber producers increased their share of output, largely at the expense of the less concentrated natural fiber producers. New production technologies in the textile industry encouraged integration of spinning and weaving. And in Europe particularly, regional economic integration created new opportunities for scale economies, and government policies favored mergers and acquisitions (the latter also occurred in Japan).

The trend toward increased industrial concentration was not uniform across segments or countries. The man-made fiber segment had always been highly concentrated in all countries and the apparel segment very dispersed in most countries. Thus, the major impact of technology on industry concentration was greatest in the fabric sector and to a greater extent outside the United States. For example, industry concentration levels for most segments of the textile complex increased only slightly from 1963 to 1977. In contrast, the share (percentage of total value added) of British textile establishments with more than 1000 employees increased from under 13 percent in 1948 to 32 percent in 1970, and by 1976 the five largest firms accounted for more than 50 percent of total employment and an even larger percentage of total output (compared to the 17 percent share of total industry employment by the five largest U.S. fabric firms).[13]

Most of the technological developments in the textile complex originated with equipment suppliers; however, man-made textile fiber technology was typically developed by the companies that produce these fibers. As a result, fabric and apparel producers devoted a very small percentage of their sales dollar to research and development (as this term is normally defined). On the other hand, they spent substantial funds on designing, styling, and market research--items not typically treated as R&D expenses, even though it might be argued they are a form of R&D for fabric and apparel producers.

An increasing percentage of new textile equipment was developed and manufactured by non-U.S.-based firms. The U.S. textile machinery industry has steadily contracted over the past 20 years, while those of Europe (East and West) and Japan grew. For example, U.S. imports of textile machinery grew from less than 9 percent of U.S. consumption in 1963 to nearly 50 percent by 1980, with imports from West Germany and Switzerland alone accounting for over 60 percent of U.S. imports.

In one sense, it can be argued that where and by whom the equipment is developed is not as critical as the extent of new

equipment adoption/utilization. For example, firms in developing countries do not rely heavily, if at all, on domestically produced equipment, and many of their textile complexes do quite well internationally. And while there is an argument that domestically based innovations will be more suited to domestic producers and also be adopted faster than those developed outside the country, there is no clear cut evidence to prove this. Yet, the relative decline of the European textile complex, despite the acknowledged strength of its textile machinery industry, suggests that the adoption and proper utilization of new equipment is really the key issue.

With these general observations in mind, the following is a more specific discussion of technological advances in the various segments of the textile complex.

Fibers

Man-made

The most dramatic technological developments in the fiber segment occurred in the man-made fiber sector, beginning with the development of large scale man-made production in the 1940s. Through much of the postwar period, technological developments resulted in new man-made fibers (e.g., polyester) and, until the 1960s, emanated mainly from R&D activities of the large man-made fiber producers. Through the 1960s and most of the 1970s, equipment manufacturers played a larger and larger role in new technology development. As they sold their technology internationally, and as larger fiber producers opened plants in other countries (embodying new technology), the newer technologies spread faster and further, reducing somewhat the technological lead of the major countries for producing man-made commodity fibers--high volume, more mature, and price competitive fibers.

After the successive oil shocks of the 1970s, technology development shifted its emphasis toward reducing production cost and away from new fiber development, particularly in the man-made fiber sectors. This change in orientation was necessary to help offset the spiraling costs of crude oil, which had a dual effect on man-made fiber production cost: higher energy costs and higher material costs as petrochemical prices rose accordingly.

As will be discussed in Chapter 4, the rest of this decade will probably see a change in emphasis once again in fiber technology development--this time toward new combinations and uses of existing fibers and what are termed higher-value, more specialized fibers and composites. Expected to lead the way in this

movement are new developments in yarn spinning and entanglement. It is also expected that an increased percentage of new technology development will be done in-house by the large man-made fiber producers, rather than by equipment manufacturers.

In sum, man-made fiber technological developments initially gave developed countries a position of world leadership and have continued to do so even though their international competitive lead in commodity products may have been reduced.

Natural

In the area of natural fiber production, only a few major technological developments occurred in the past 40 years. The per-acre yields of cotton were increased significantly, and the shift of consumer preferences to man-made and blended-fiber products generated some technical advances in cotton and wool fibers, notably in the processibility, easy-care, and maintenance areas. Given the global trend in consumer preferences for man-made fibers and man-made and natural fiber blends, this phenomenon of low level of technology development was not surprising. Nor is it expected to change very much.

Most of the technology affecting natural fiber production was in processes and equipment that combined natural fibers with man-made fibers (i.e., spinning and entanglement) or that reduced worker health and safety hazards incurred in producing natural fiber products. Most of the latter resulted from more stringent regulations of working conditions in plants as part of the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) regulations. While the initial impact of such regulations resulted in a diversion of corporate capital away from other projects and activities, it is expected to result in overall productivity gains as well as reducing the health and safety hazards for workers.

Yarn

In yarn production, there were several major technological developments, particularly in new opening, drawing, and spinning processes. Perhaps the biggest breakthrough was in open-end spinning, a new process that increases productivity while decreasing the number of process steps and the amount of labor required to produce a specific level of output. Other major breakthroughs, although not yet fully proven, occurred in texturing.

The new jet spinning, introduced in 1981 by Murata (the 801 MJS), eliminates roving and yarn rewinding and offers reductions in space requirements per production unit, noise levels, and maintenance costs. It also offers finer counts (NE 40-80). A major application for these yarns is expected to be in crisp-handle, high-quality shirting and blouse fabrics.

Another new piece of equipment with great potential is Fehrer AG's Dref 3--a covered yarn system that produces yarn from two separate sliver feeds or from one filament yarn and one style component. Dref 3 supposedly makes yarn faster than any short-staple spinning system now on the market: 350 mpm on man-made fibers and 300 mpm on cotton and cotton blends. In addition, Dref 3 spins from a wide range of raw materials (including cotton, polyester, acrylics, viscose, polypropylene, and polyamides), but primarily in the medium count range (NE 5-15). Yarn properties produced by Dref 3 approximate those of ring-spun yarns, not those produced on rotor spinning. Dref 3's applications have already been demonstrated by European installations in home furnishings (upholstery, wall coverings, awning fabrics, and mattress tickings), apparel (jeans, cords, and substrates), and leisure goods (deck chair canvas and camping articles).

If there has been any international competitive impact of changing technology in the use of natural fibers and spinning equipment, it is difficult to assess. In the short run, adopting the new technology required in some countries for worker safety and health reasons may have initially reduced the competitiveness of firms that were required by law to comply (compared to firms in other countries that had no similar requirements). Such required expenditures may also have caused some old processes to be scrapped, some spinning plants to be closed, or some entire firms to go out of business. If the expected benefits materialize from these required expenditures and other technological expenditures (higher productivity, better products, and lower production cost), then the long-term international competitive effects should be positive.

Fabrics

Wovens

In the past two decades, technological developments in the fabric segment were among the most extensive of any segment of the textile complex.[14] In the weaving sector, the major developments took the form of new looms: missile, rapier and water-jet looms, and more recently, air-jet looms. While these were

developed by equipment manufacturers outside the United States, their utilization by U.S. firms has accelerated rapidly in the past decade. These looms are faster, more efficient, produce higher quality fabric and require less labor than their predecessor, the fly-shuttle loom. On the negative side, the new looms are considerably more expensive; less flexible; require new, more advanced, and more expensive support equipment; and require more skilled operators.[15]

Despite the fact that the above-mentioned looms still represent a minority of all looms in operation, another generation of looms is being developed, e.g., wave shed, bi-phase. Britain's Bentley Machinery Ltd.'s Orbit is a good example of the new generation--termed by Textile World as a "space-age departure from standard loom construction."[16] The machine has an extremely high filling insertion rate--much greater than any weaving machine currently available--because its multiple rapier insertion produces fabric on both ends of the machine. The machine has had considerable interest from plants with large volume and long runs of standard construction, such as some types of industrial fabrics and backing constructions. Also included in this new generation is a machine developed by Investa of Czechoslavakia, which also simultaneously weaves two fabrics. It offers a radically new air-jet picking system utilizing a dual air-jet vent positioned in the center of a bi-phase loom.

Knits

In the knit fabric sector, the major technology development was in knitting machines, most of which were developed by textile equipment firms. Knit fabrics and apparel became quite popular in the 1960s, and U.S. firms that moved into knits enjoyed an initial period of world leadership in their production. However, slowing domestic demand for knits, increased knit fabric production abroad, and increased import competition, particularly from East Asia, kept knit fabric prices low and reduced U.S. producers' market share. Particularly impacted adversely were smaller U.S. firms whose production was limited to knit fabrics or knit apparel in very narrow product lines. Larger, more diversified firms could better adjust their product mix or find new uses for knits.

In terms of production technology, a major breakthrough occurred with the introduction of the basic double-knit machine, followed by successively finer gauge double-knit machines. However, double knits and warp knits have lost so much in popularity that these sectors have become disaster areas. In the future, technological innovations are expected to continue in needle refinements (compound needles) and in new loop-forming

systems replacing the present latch-needle systems on circular knitting machines. Increases in machine speeds are also expected, as well as the development of a practical electromechanical bar-guide indexing device to replace chain-hook systems for multibar tricot-raschel machines.

Non-wovens

Significant technological advancements in fabric production have also occurred in the non-woven sector. While many non-wovens became substitutes for woven or knit fabrics, others had uses that wovens or knits did not have. The traditional technology was largely one of compressing natural fibers to form fabric, e.g., felt. But, recent technological developments in fiber bonding and interlocking by mechanical thermal, chemical, hydraulic, and/or solvent processes have revolutionized what was a fairly insignificant sector into a high-growth, technologically intensive one with myriad end uses and equally varied inputs (e.g., wool fibers, plastics, and polymers, in addition to fibers typically used in woven and knit fabrics). And, as was described in Chapter 1, the new processes and equipment made it possible to produce flat textiles at incredible speeds compared to even the most modern technologies in weaving and knitting.

For some of the larger fabric firms, non-wovens offered a diversification potential. For traditional broad-woven firms, some new competition emerged in product lines for which non-wovens became substitutes. Finally, for most of the existing firms that were affected by the significant emergence of non-woven firms, there was a new and different kind of challenger: some firms that were not generally textile firms, such as paper companies, chemicals, plastics, and medical suppliers, often had different resources, capabilities, strategies, and outlooks, making it more difficult for textile firms to strategically assess their competition.

Other Processes

Other technological developments that affected fabric producers were those in fabric inspection and in dyeing and finishing, such as new laser greige fabric inspection equipment and color measurement instruments. In addition, new techniques and equipment for fabric sanding, napping, printing, and coloring followed earlier developments in fabric treatments, such as permanent press and antisoil. For example, traditional flat screen printing of fabrics was increasingly replaced by roller printing. And according to

their corporate reports, textured fabrics of Springs Industries and Dan River have become increasingly important lines.

Utilizing these technologies gave a temporary advantage to firms in the United States and other developed countries over imports from developing countries by means of product differentiation. The uniqueness of such fabrics allowed firms to remove themselves partially from the intense price and import competition in low-end, undifferentiated goods. However, such competitive advantages were generally short-lived because the firms in the more advanced developing countries were soon able to purchase and utilize the same equipment and techniques.

While some technological developments affected only certain subsectors of the fabric industry, there were a few that affected all segments. The most notable examples were developments in materials handling, production monitoring, job assignments, and use of microprocessors--the computerization of the firm. Some developments in materials handling were generally prompted by new federal government regulations concerning worker health and safety, especially in the United States. These regulations and their impact are discussed in the next section. In the microprocessor area, many of the larger firms had used computers for some time for inventory management and production planning. However, the development of the microprocessor and the declining cost of computers made computerization more feasible for medium and small firms. The use of the computer was also expanded to better control energy utilization, analyze market data, and make more numerous types of management decisions. In the process, firms could also streamline personnel costs or expand the use of existing personnel to other activities.

Apparel

As was the case with fabric production, most of the technological changes affecting apparel production took the form of new equipment developed by the machinery industry. While there have been numerous improvements in sewing machines, which are the real backbone of the apparel manufacturing process, the biggest technological changes have not been in the sewing process, instead they have been in the presewing processes: pattern grading, marker-making, and cutting. Much of this new equipment relies heavily on computer technology. Computer technology has also been applied to programmable sewing machines, automated pocket positioning/sewing machines, to various administrative functions (payroll, billing, production scheduling, logistical flows, tracking market trends, and so on), and even found some use in garment design. Still other technological advances in machinery

have involved finishing work of garments (including chemical treatments such as waterproofing and crease-resisting) if the fabric was not already treated before purchase from textile mills.

All in all, technology has had less impact on apparel production than on most other segments of the textile complex. While it has been becoming more capital intensive, apparel manufacturing remains more labor intensive and the least capital intensive of all segments. The constantly changing fashions, fabric weights, and the many separate sewing operations for a single garment have made it difficult to automate key processes in apparel manufacturing.

Because there appear to be no real manufacturing economies of scale as far as sewing is concerned, small sewing operations continue to enter and exit the industry, both inside and outside the United States. However, for the larger apparel firms, advanced technology can result in some company economies of scale as opposed to sewing economies of scale. Centralized computer designing facilities, cutting, grading, marking, as well as administrative operations, can lower overall manufacturing cost of multiplant firms in particular. The Japanese government recognized this potential and has recently appropriated $60 million solely for research in apparel automation. Therefore, because the new equipment is both expensive to purchase and most beneficial to larger firms, its utilization has been higher and more effective for larger apparel firms in all countries.

Summary

The numerous changes in technology that have occurred have benefited the companies that have been able to utilize them effectively: the main result being an improvement in their international competitiveness. However, the competitive advantages gained from effectively utilizing a single technological development have not proved to be long in duration, despite the increasing cost and sophistication of new technology. This has primarily resulted from the more rapid spread of new technology worldwide. Thus, technological development and adoption must be a continuous process if any competitive edge is to be maintained.

CHANGES IN GOVERNMENT POLICIES

Government policies can have a major impact on the competitiveness of any industry. They can encourage, limit, or foreclose entry into an industry; affect access to particular markets; influence the size of competitors and their ability to integrate

vertically or horizontally; and generally influence the profitability of firms in an industry. In a global context, each government's influence may vary significantly, focusing on substantially different problems or on different solutions to similar problems.

Other than perhaps industries considered vital for national defense, intensive government policies related to industries are most often directed toward industries that can or do employ a significant amount of labor. The reasons are obvious. Thus, due to its significant employment levels, the textile complex worldwide receives a lot of government attention. If a country has no textile complex or only a small one, it generally enacts policies to aid the country's growth in size and sophistication. If it already has a large one, government policies generally seek to maintain it, or at least restructure it. The specific government policies available and in use are virtually infinite, but can generally be classified into three groups: (1) those dealing with international trade and investment, (2) those dealing with the domestic complex per se, and (3) those that have an indirect impact on the textile industry but are not targeted directly at the complex. The discussion of changes in government policies focuses on these three major types.

International Policies

Probably no other manufactured products receive as much protection as fabric and apparel. Import protection (tariffs, quotas, and non-tariff barriers) is extensive throughout the world and, with the exception of tariffs, has increased rather than decreased.[17] Under the aegis of the multinational Multi-Fiber Agreement (MFA) and a host of bilateral agreements, developed countries have sought to regulate the flow of imports.

More than any other protectionism device, quota arrangements determined the basic international trade patterns. Because quotas were originally set based on prior levels of trade, those countries receiving the largest quotas did the most exporting, and changes in quota allocations caused some shifts in trade and investment patterns.

The United States and the EEC have not been alone in their desire and efforts to control the volume of imports. In attempting to develop their own domestic textile complexes, virtually all countries pursued import restrictions on many categories of apparel, fabric, or fiber. And although it is difficult to assess precisely the effective level of protection because tariffs may be low but non-tariff barriers high, it appears that the overall levels of trade protection are higher in dealing with some countries than others.

Another type of government policy affecting international trade patterns is export subsidization and assistance. Unlike the United States, most countries have enacted more substantial export subsidy policies, ranging from export tax rebates to tax credits for developing overseas markets and general export facilitating programs (such as government-collected data on differences in desired international sizes, colors, fabrics, and fibers). Virtually all governments have trade policies directly affecting their textile complexes. They also have non-trade policies affecting the textile complex, directly or indirectly, as explained below.

Textile Complex Specific Policies

The more extensive direct government policies have been those related to the very existence of the domestic complexes themselves. In developing countries, the policies have been of a nurturing variety, e.g., policies to aid the start up of a domestic textile complex and to have it grow in size and sophistication. Numerous types of government assistance have been made available, many times encouraging incoming foreign investments--all behind an increasing trade protectionist shield. Workers are trained in government-funded programs, managers and designers are sent abroad for training at government expense, tax inducements are made for new investments in the complex, for purchasing modern equipment, promoting mergers, and so on.

At the other extreme are government attitudes that foster the rationalization of the domestic textile complexes. Under these policies, few or no incentives, inducements, or other forms of assistance have been made available to firms in the complex in terms of domestic expansion. Instead, firms are encouraged and sometimes offered incentives to move production offshore, to make investments in other sectors, or to restructure their operations to put greater emphasis on certain product lines and eliminate others.

In still other countries, there have been a mixed assortment of government policies concerning the existence and future direction of their textile complexes: intermittently supporting them or discouraging them and, in some cases, doing both simultaneously.

Depending on the particular orientation of a government's policy concerning its textile complex, trade and investment patterns and corporate activities soon reflected their impact. The supportive model of Asian, Eastern European, and most Latin American countries usually led to reduced imports, increased exports and investment from other countries, and growing domes-

tic employment with increasing skills of labor and sophistication of operations.

Among the essentially non-interventionist policies are those of the Netherlands and West Germany, and particularly their policies concerning the apparel industry during most of the 1970s. Both governments concluded that, without increased protection, trimmed-down apparel industries were inevitable and judged that there would be an overall net benefit to their countries if they allowed market forces to dictate events. Virtually no government assistance was provided to help domestic firms adjust, although as signatory countries to the MFA, some trade protection remained in place. The net result was a drop in apparel employment by more than 50 percent in the Netherlands and nearly 30 percent in West Germany from 1973 to 1977 due at least in part to increased offshore production. At the time these policies were enacted, both countries had relatively strong economies and currencies and a need for labor in other industrial sectors. More recently, however, in the aftermath of the precipitous declines in employment and the general economic recession in Europe, both governments appeared to be shifting their policies toward more intervention.

Falling in the middle of these extremes have been the basic restructuring policies of the other European countries and Japan. Their governments believed that an orderly restructuring of their textile complexes was necessary. Orderly meant continued protection with a fair dose of government assistance to help companies improve their international competitiveness--after which the trade protection could (might) be reduced.

In Britain, France, and Japan, such government assistance was channeled into R&D efforts that would benefit their domestic firms, primarily those in apparel and fabric production. The Japanese and French encouraged mergers and takeovers to increase the average size of firms and, along with the Belgians, also provided federal and/or regional assistance to help retrain or relocate labor for jobs inside or outside the complex. The French, Belgians, and the British also provided employment subsidies to keep labor from being displaced too rapidly. In Japan, the government encouraged business groups with textile and apparel companies to transfer workers into their non-textile operations and lessened capital outflow restrictions to allow more Japanese firms to invest offshore.

The net results of the various government strategies were mixed. All of the countries mentioned experienced reductions in their domestic textile complexes and particularly in the apparel segments during the mid-1970s, with obvious ripple effects back to the other segments of their textile complex. While data from the OECD are incomplete, it also appeared that industrial con-

centration increased in most of the countries mentioned above. At this point, it is not clear whether the attempted restructuring/revitalization policies resulted in increased international competitiveness (with the possible exception of Japan, which may have become more internationally competitive) reversing an earlier deficit in textiles.

In the United States, a somewhat different position was taken in terms of developed country government policy. The quota protection continued, but nothing was attempted to restructure the domestic complex, and little was done to otherwise help firms improve their international competitiveness.

Indirect Policies

Other policies that influenced textile complex firms have been those concerning environmental protection, product standards, and working conditions. While these kinds of policies are not generally aimed directly at a specific industry, nor are they generally enacted with a goal of affecting international competitiveness, they often do have a competitive impact on specific industries. For example, in terms of the U.S. textile complex, flammability standards for children's sleep wear were tightened, causing textile and apparel firms to change fiber or finishing processes. Many foreign exporters were unwilling or unable to do so, and the extensive import competition in children's sleep wear abated for a while, helping U.S. producers. However, the chemical flame retardant "TRIS" was subsequently shown to be carcinogenic, and U.S. textile and apparel firms were forced to recall their "TRIS"-treated products, causing significant financial hardships on many firms.

Other examples are regulations on cotton dust and noise levels in U.S. manufacturing plants. Both require expensive changes in equipment and processes for U.S. textile firms and expenditures of scarce capital that most foreign competitors did not have to make. Yet, while such expenditures may have a negative short-term effect on the U.S. complex, the new equipment and processes may increase worker productivity and manufacturing efficiency and, therefore, may improve international competitiveness.

Another area of government policy in various countries affecting international competitiveness is regulation of wage rates and working hours. By keeping wage rates low (such as in Eastern Europe and Southeast Asia), countries could gain a competitive cost advantage over competitors in other countries with higher wage rates. For the more labor-intensive segments of the textile complex, such as apparel, this competitive edge was more

significant in terms of impact. On the other hand, increases in U.S. wage levels during the 1960s and 1970s forced U.S. companies to look harder for ways to increase productivity, which in the long run may lead to improved international competitiveness.

Other labor policies throughout the world, such as the maximum number of hours employees can work, the fringe benefits they are required to receive, and whether they are allowed to strike, also affect competitiveness. In Eastern Europe and much of East Asia and the PRC (compared to developed countries), the required work week is longer, fewer fringe benefits are required, and strikes are generally not permitted. Thus, firms based in these countries have fewer labor constraints and expenses to contend with than their competitors in most developed countries.

Still another policy area of important influence is taxation. Because taxes are a major expense for corporations, tax reduction policies provide additional income that firms can put to productive/competitive use. The generally higher corporate and personal taxes in Western Europe were not of much help to the European textile complex in its efforts to become more competitive, while the generally lower taxes in developing countries had the opposite result. In the United States, recent changes in federal tax laws generally improved the competitive situation for U.S. firms--allowing faster depreciation of assets, less taxation of expatriates' income, and so on. As the U.S. complex becomes more capital intensive and internationally oriented, these recent changes, if not reversed, can be expected to have a greater beneficial impact.

In sum, there were various degrees of government intervention and numerous changes in policies that influenced the international competitiveness of textile complexes throughout the world. The ways in which various firms have reacted to some of these governmental policies is described in Chapter 3.

NOTES

1. See W. Storck and D. Sullivan, "Fibers Thriving in Developing Countries," Chemical and Engineering News, March 1981.

2. Source: The Johnson Redbook, Section 7B, "Chemical Industry Statistics," February 27, 1981.

3. Table 2-5 defines production as value added in constant prices. However, these data may not reflect differences among areas on the relative shares played by value added in the total value of the product.

4. The 1981 figure is an estimate by ATMI. (Table 2-3).

5. On an equivalent square-yard basis. On a dollar basis, the share of imports is lower. These estimates were supplied by the staff of the American Apparel Manufacturers' Association. Estimates made by the Research Department of the International Ladies' Garment Workers' Union found that the ratio of garment imports to U.S. consumption of apparel rose from 10 percent in 1964 to 21.7 percent in 1974 and to over 40 percent in 1982.

6. SIC 23 plus SIC 225 less SIC 239.

7. Employment figures from the U.S. Bureau of Labor Statistics. Establishment estimates supplied by the staff of the American Apparel Manufacturers' Association.

8. See United Nations, Yearbook of Industrial Statistics, 1979.

9. See J. Arpan, J. de la Torre, et al., The U.S. Apparel Industry: International Challenge/Domestic Response, Business Publishing Division, College of Business Administration, Georgia State University, Atlanta, GA, 1982.

10. United Nations, Yearbook of Industrial Statistics, 1974 and 1979.

11. The major segments of the U.S. textile complex experienced productivity gains above the U.S. national average for all industries.

12. Item 807, as it is commonly referred to, is Item 807.00 of the Tariff Schedules of the United States. It specifically deals with the assembly of U.S.-made materials abroad.

13. Source: Textilwirtschaft, Frankfurt, West Germany, various issues.

14. For fabric firms that were also involved in yarn spinning, their operations and competitiveness were impacted by the technology developments in both the yarn and fabric sectors.

15. For example, the shuttle looms generally cost under $10,000 while some of the new shuttleless looms can cost over $100,000. In addition, the new looms generally require better yarn spinning and processing equipment, which can cost as much as a new loom (if the fabric firm does its own spinning). Finally, the older looms could more easily handle a greater variety of yarns than many of the new ones.

16. See Peter Lennox-Kerr, "Bi-phase: Weaving's newest technology," Textile World, February 1982.

17. While tariffs were significantly reduced during the Kennedy and Tokyo rounds of GATT, these reductions prompted many countries to increase their non-tariff barriers.

3
Corporate Responses and Strategies

The essence of successful marketing and management is the strategic acquisition and utilization of resources (materials, labor, equipment, technology, and knowledge) in anticipation of, or in response to, changes in the environment. As pointed out in the previous section, during the 1960s and 1970s firms in the textile complex in all countries faced numerous changes in the environments in which they operated. Yet, there were considerable differences in the ways that firms responded to these changes. In general, most U.S. textile and apparel firms sought to isolate or insulate themselves from the adverse changes, most notable of which were the shift of comparative advantage to developing countries and the resulting increase in import competition in the United States. On the other hand, Japanese firms made a strategic decision to invest and contract production in countries that were gaining the comparative advantage in order to develop and gain increased control of the textile complex in developing countries, particularly in East Asia and the PRC.[1] As for companies in the other countries involved, their responses were highly mixed, depending on their existing international competitiveness and the policies of their respective governments. However, virtually all firms in developed nations had to cope with the surging development and exports of East Asia and the PRC.

U.S. FIRMS

The basic problem facing U.S. textile complex firms was a significant increase in competition from both domestic and foreign (from both imports and direct foreign investments) sources. However, the nature of the increased competition varied in type and intensity for each segment.

Fiber Firms

Investments in the United States by large European-based companies and vice versa resulted in new competition on the home front and additional production capacity. Until the latter part of the 1970s, competition and the imbalance between supply and demand in the United States helped put downward pressure on domestic prices and earnings. At the same time, however, surplus domestic capacity, increased foreign demand for U.S. man-made fibers, and a weakened dollar led to significant increases in exports by U.S. firms. With investments made earlier, to a large extent in Europe, and an increased ability to service other foreign markets by exporting, U.S. firms on the whole perceived little need to invest elsewhere abroad. The more appropriate strategy was to concentrate efforts on the U.S. industry's basic comparative advantage, greater production efficiency and new products and processes through increased R&D.

Virtually all of the major U.S. fiber producers increased their spending on R&D during the 1970s, concentrating on cost reduction and developing new, higher value specialty fibers. Major capital outlays were also devoted to modernizing existing facilities in the United States and to complying with OSHA and the Environmental Protection Agency (EPA) regulations. In general, the net result of these activities was a strengthening of U.S. international competitiveness, as reflected in trade statistics and corporate earnings.

Fabric Firms

During the 1970s sluggish domestic demand and increased competition, particularly from Asia, kept prices and earnings low. Increased protectionism abroad and particularly in regions where local demand for fabrics was rising, kept U.S. exports from achieving their maximum potential, even though the dollar was weak. However, some of this unrealized export potential was attributable to the management of U.S. firms. Most U.S. fabric producers lacked the international business expertise necessary to export successfully or were either unaware or unconvinced that the export opportunities existed.

Domestically, most U.S. fabric producers were faced with a massive need to modernize their facilities and to meet the new and stricter EPA and OSHA requirements. Numerous marginally productive plants were closed, and employment was trimmed. Marketing strategies were also altered. As the domestic apparel industry weakened, many fabric companies put increased emphasis on non-apparel-use fabrics. The larger firms also put increased

emphasis on brand-name lines and stepped up their advertising efforts to create strengthened demand. In so doing, they sought to insulate themselves from the increasing import competition in low-end fabrics. Finally, some firms concentrated production on long runs of staple products and sought cost leadership.

Overall, the strong foreign demand for certain U.S.-made fabrics (particularly synthetic fabrics and cotton denim) and the weakened dollar during the 1970s resulted in increasing exports by U.S. fabric producers and lessened the perceived need for making foreign investments.[2] The basic strategies pursued by the large domestic producers were generally in line with what they should have been doing, given the U.S. comparative advantage and the changes in the environment. However, smaller producers generally lacked the management expertise and the capital required to follow the strategies of the larger firms, particularly given the mandated management attention and capital outlays to comply with increased government regulation.

Apparel Firms

Of all three major segments of the textile complex, the apparel segment in the 1970s faced the greatest increase in competition. Again, sluggish domestic demand and increased imports (and in the case of apparel, truly significant import surges) kept prices and earnings low and may have caused many firms to fail.[3] While explosive growth in foreign apparel production to some extent helped increase U.S. exports of fibers, yarns, and fabrics, it did not help expand U.S. apparel exports. On the import side, Japanese and East Asian producers utilized new equipment and enhanced marketing know-how to increase exports to the United States in middle-price range goods, while ASEAN and other developing countries filled in the lower-end portion vacated by the Japanese and East Asians.

Thus, most U.S. apparel firms faced a dilemma, neither side of which was very promising: continue trying to compete on a price basis in low- and medium-range goods or alter their existing product mix to higher fashion, less price and import-sensitive goods. Given their comparative disadvantage in labor costs, the former strategy was not always successful. Some firms could only remain marginally profitable if they utilized offshore processing. In their movement offshore, few of the smaller firms had the international business skills necessary to make offshore processing successful. In fact even larger firms were not always successful in offshore processing. For the most part, the small, family-owned firms typical of the apparel industry were not overly successful in pursuing either of these strategies.

As for the larger firms, many were able to pursue successfully one or the other of these strategies and, in some cases, both. To compete head-on with imports and to lower their costs (and sometimes avoid unionization), many firms established offshore processing facilities (particularly in the Caribbean basin) utilizing the duty provisions of Item 807.[4] Apart from offshore processing, the larger firms reduced their product concentration by adding new lines and tried to move up in price range within most lines by developing and strengthening private brands.

Exemplifying these strategies was Levi Strauss, the largest and one of the most aggressive U.S. apparel companies. From its historic concentration in denim jeans, Levi's built a strong, private brand that commanded premium prices by concentrating on superior product quality and huge image and product advertising. It then opened foreign plants (directly or via licensing) to supplement its domestic production and its exports by directly supplying foreign markets. It also began a product line diversification strategy into other menswear, womenswear, and apparel accessories, using the established Levi name and image as the springboard.

While most larger firms achieved some success, smaller firms continued to lose ground, resulting in the apparel industry's continuing to shrink in number of firms and employment. The apparel firms' problems were also negatively impacted by the activities of large American retailers, who increasingly purchased directly from foreign suppliers. This phenomenon is discussed in more detail later.

JAPANESE FIRMS

In some respects the problems facing the Japanese textile complex have been identical to those facing the U.S. complex: growing comparative disadvantage in labor cost, reduced employment and number of firms, increasing government regulations, increasing imports, and a host of new competitors in foreign markets. Unlike the U.S. firms, however, Japanese firms were faced with a currency whose value was rising sharply (affecting exports adversely) and by major reductions in Japanese tariff protection. Despite this situation, the Japanese textile complex actually gained strength and increased control over global textile complex activities. There was nothing magical or mystical about how they did it. The Japanese firms simply made a deliberate decision to streamline and upgrade their domestic complex and to pursue the shifting comparative advantage to developing countries through direct foreign investment.

In the 1950s the large Japanese spinning companies invested in Latin America to gain access to cheap cotton yarn. In the 1960s these same companies, along with some of the larger apparel companies, established operations in East Asia--the spinning and weaving companies establishing foreign apparel operations that would buy their fabric from the Japanese-based plants. During the 1970s the large fiber firms established or bought into foreign fabric companies, primarily in East Asia, supplying them with fiber made in Japan. As ASEAN countries gained comparative advantage in apparel, the same Japanese firms established or bought into apparel companies in ASEAN countries, supplying them with fabric from Japan or their subsidiaries in East Asia. The Japanese also upgraded their fabric and apparel operations in East Asia into medium-price-range products and their operations in Japan to upper ranges and specialized products such as apparel accessories.

As mentioned in Chapter 1, the two most active and largest fiber firms, Toray and Teijin, went on to establish vertically integrated textile complexes in Korea, Taiwan, and several ASEAN countries. Via a mixture of foreign investment, licensing, loans, and extensive intricate supplying and buying contractual arrangements, the large Japanese firms played an active role in the emerging textile complex in East Asia and the PRC.

In many activities and projects, the Japanese manufacturers worked closely with the Japanese trading companies. The latter's extensive marketing and distribution capabilities and expertise, comprehensive knowledge of changes in foreign government policies and supply and demand conditions, and financial strength were often critical to the success of the Japanese manufacturers' strategy.[5] With their combined global activities and viewpoint, it made little difference where a process was done. They profited from all involvements, their Japanese operations, trade with Japan, their operations in foreign countries, trade among their foreign affiliates, and from foreign affiliate trade with the United States, the EEC, and other countries outside the Pacific Basin.

In comparing the Japanese and American responses to the changing environment, the obvious question is why didn't the American companies pursue the Japanese strategy? There were several main reasons. First, the larger Japanese firms were already more vertically integrated, permitting them to export their fabric operation as they lost competitiveness while being able to supply their exported fabric operations with domestically produced fibers, thereby increasing overall profitability, growth, and competitiveness. The non-integrated firms in the U.S. complex could not do this and, hence, could not benefit similarly. Second, the Japanese had a significant cultural advantage in the region where the world's textile complex was growing the

fastest. Their better knowledge of Asian governments, firms, language, and customs gave them competitive advantage over U.S. companies.[6] Third, the rising yen, declining domestic protection, and smaller domestic market forced a more outwardly focused and aggressive strategy. Fourth, the Japanese manufacturers had the invaluable assistance of the trading companies, a group with no U.S. counterpart. Finally, many of the producers belonged to larger groups of firms whose diversified activities and growth provided employment opportunities for displaced textile employees, relieving their textile firms from worry about the negative impact foreign investments or increased automation might have on their employees.

EUROPEAN FIRMS

It is difficult to generalize about the responses of European firms because there were major differences in their degree of international competitiveness, the structures of their complexes, and the nature of their governments' involvements. However, as mentioned in Chapter 2, it is not difficult to generalize about the results of the changing environment on the European textile complex: Europe suffered the largest percentage reduction in firms and employment of any developed region, despite major efforts in Britain, France, and Italy to protect their complexes.

As might be expected, European corporate responses were significantly influenced by the policies of their respective governments. Companies in countries with strong currencies, strong economies, and relatively non-interventionist governments either moved more aggressively internationally or went out of business. The experiences of firms in the West German textile complex provided illustrative examples. Their larger chemical and fiber companies (Bayer, BASF, and Hoescht) made investments in the U.S. market and established several other types of operations in Eastern Europe, Latin America, and the Far East. As noted in Chapter 2, some West German apparel firms moved aggressively into offshore processing while concentrating domestically on product upgrading and making good use of the West German textile and equipment industries' technologically advanced machines. Yet, because of the West German government's essentially laissez-faire policy of non-intervention, many of the smaller textile and apparel companies could not successfully pursue these strategies. The result was a 27 percent drop in West German textile and apparel employment between 1973 and 1979, with an obvious ripple effect on employment in other areas of the textile complex.

The employment experience in the Netherlands was even worse. Without as strong a textile complex to begin with as in West Germany, and an even more non-interventionist government policy, the Dutch textile and apparel industry recorded a 45 percent reduction in employment between 1973 and 1979.

At the other extreme was the experience of the Italian textile complex. As mentioned in Chapter 2, throughout the 1970s and to the present, the Italian government's main objective vis à vis its textile complex has been to maintain employment at virtually any cost. Being the country within the European community with the lowest labor cost and one of the most advanced textile complexes, there was not as much competitive pressure for the Italian firms to invest in other countries. Italy's exports to other EEC countries doubled from 1977 to 1981, its $5.3 billion trade surplus in textiles (1980-1981) was the world's largest,[7] and its textile complex employment has fallen by only 2.5 percent between 1979 and 1981.

Some of these patterns resulted from Italian firms' strengthening their financial controls and improving their marketing by switching emphasis from bulk production to name brands. However, these results were also significantly influenced by large government subsidies, primarily to keep labor employed, and by partial nationalization of the Italian complex, i.e., those firms that were going bankrupt. The government subsidies and nationalization also helped keep the small Italian firms in business.

In between these two extremes were the experiences and strategies of other European firms. One of the larger problems they faced was the shifting policies of their respective governments. Unlike the rather clearly stated and consistently applied policies of the Dutch, West German, and Italian governments, the policies of the French, Belgian, and the British vacillated back and forth between those oriented toward increased protection and those oriented toward industrial restructuring and competitive enhancement.

Several of the larger French and British man-made fiber firms established operations of various kinds in the United States, Eastern Europe, and Latin America and experimented (not too successfully) with vertical integration, e.g., ICI and Courtaulds. In the United Kingdom, the stated policy of Marks and Spencer, one of the largest British retailers, to buy 90 percent domestically produced goods helped some of the British fabric and apparel companies stay afloat and at least provided some time for adjusting their competitive strategy. Even though France lost some of its established leadership as the apparel fashion center of the world to the United States, Italy, and Japan, the French textile complex was still able to capitalize on its image both domestically and abroad. In the latter case, it increased export

sales of its products or the licensing of its brand names for foreign production, examples of which in the apparel segment were Yves St. Laurent and Izod/LaCoste. In addition, more than the governments in most of the other European countries, the French government embarked on a sizeable R&D effort to improve manufacturing productivity and product upgrading. While it was too early to judge the results of this effort, the effort is expected to result in improved competitiveness of French firms.

Thus, for European firms, in general, the impact of the changing environment was more severe than for firms in the United States or Japan. If their strategic responses to these changes were more mixed in orientation and success, it was because each country's complex was at somewhat different levels of development and strength, and their respective government's policies toward the complex were different.

RETAILERS AND DESIGNERS

Before closing this section on corporate activities, some mention should be directed to the activities of large retailers and fashion designers. From the 1960s to the present, increased competition among large department stores, mass merchandisers, and discounters led to increasing foreign purchases of fabric and apparel (particularly low-end merchandise and from the developing Asian complex) and the opening of U.S. buying offices abroad.[8] As they learned that foreign production was not always as reliable as domestically supplied goods, U.S. firms began to assist foreign producers by providing them with technical and managerial know-how, such as designs, specifications, and quality control measures.

Rather than following the historical method of shopping around for existing garments and fabrics in excess supply, the retailers began to contract with foreign production under a method called specification buying, a method they had already developed domestically. The entire process means that the retailers themselves design a particular garment (or join with a leading independent designer to provide an exclusive design for the retailer), or copy an established design, and then decide which fiber to use, from whom the fibers will be obtained, who will make the fabric, where it will be dyed or printed and finished, and so on. The retailers provide the maze of contractors with exact specifications, production schedules, shipping instructions, and usually letters of credit to finance the operations and transactions. This method of operation is similar to that of Japanese trading companies, except that the retailers do not take equity participation in the producing firms.

In order to compete with the huge buying power of the mass merchandisers, such as Sears and J.C. Penney, department stores banded together to form joint, cooperative buying offices abroad. The combined sales of the U.S. department stores represented by coop buying offices and U.S. mass merchandisers and discounters exceeded $100 billion in 1980 (all products, not just apparel and fabric)--an enormous buying power, to be sure. This buying power, the access to the U.S. market that went with it, and the related flows of needed expertise and funds provided U.S. retailers with increased power over the textile complex both domestically and abroad. While the European and Japanese retailers followed similar strategies, their impact was not as large.

As the retailer's role became more important, so did that of fashion designers. Above a certain level of demand for fabrics and apparel based on need, there is a growing demand based on preferences: preferences of fashion, style, comfort, and wearing/cleaning properties. While price is virtually always important to buyers, products purchased on preference demand tend to be less subject to price competition. It is in this area of preference demand that designers played their most important role--and a role that increased in importance particularly in developed countries.

While historically considered to be the domain of French and Italian designers, fashion designing spread to more and more countries (including the United States and Japan) and to products other than apparel, such as sheets, draperies, and upholstery. Yet, like the textile and apparel equipment sectors, the expertise of leading fashion designers could be purchased on world markets by manufacturers via contract or licensing if the manufacturers themselves did not have their own design staff. Thus, Yves St. Laurent designs and labels appeared on products made by several firms, both in France and in other countries, including the PRC. The importance of all of this was that the skills and images of designers were influencing textile complex production more so than in the past--not only in terms of what was being produced, but where and by whom. While still a lesser influence than other economic or strategic factors, the role and importance of design appears to be increasing, and the increased use by manufacturers in developed countries is one major way to increase their competitiveness against developing country producers.

NOTES

1. Domestically, Japanese firms made many of the same shifts in strategy and activity that U.S. firms were making.

2. The impact of fluctuating currencies has a major impact on trade in textiles and textile products. In the late 1970s the dollar weakened, and fabric exports rose from 400 million pounds in 1978 to 600 million pounds in mid-1979, while fabric imports declined. When the dollar strengthened toward the end of 1980, U.S. fabric exports fell back to 400 million pounds in 1981, denim and corduroy fabric exports declined by 55 percent and 73 percent, respectively, and fabric imports rose 40 percent. (Source: ATMI and Johnson Redbook Service).

3. During the period from 1970 to 1976, the bankruptcy rate among U.S. apparel firms averaged over 200 per year. According to Dun and Bradstreet, the bankruptcy rate from 1977 to 1980 was roughly one firm every three days. See Focus: Economic Profile of the Apparel Industry, American Apparel Manufacturers' Association, 1982. However, because of the large number of companies (over 17,000) the actual percentage rate was about 1 percent.

4. Under Item 807 firms can ship U.S.-made components to foreign operations that can then assemble the products and ship them back to the United States, paying duty only on the value added abroad (rather than on the total value of the goods, which importers of products made entirely abroad must do). By averaging foreign and domestic production costs of garments, these firms gained a price advantage over strictly domestic producers and better supply capability than offered by strictly foreign producers. Alternatively, some U.S. firms produced low-end garments offshore and devoted domestic production to middle- and upper-range garments, allowing them to offer a more complete line than many strictly domestic or foreign producers.

5. The benefits of the trading companies' expertise was more often needed and sought by the small- and medium-size Japanese manufacturers and for countries less familiar to Japanese firms.

6. However, Japanese dominance in some East Asian countries has now placed them in an unfavorable light.

7. Source: The Economist, December 12, 1981.

8. Unfortunately, no publicly available data could be found to provide the exact percentages of purchases by U.S. retailers of foreign- versus U.S.-made textile products.

4

Future Scenarios, Policy Options, and Their Implications

The purpose of this chapter is to (1) project the structure and international competitiveness of the American textile complex (the basic scenario), (2) identify government policy options in a number of areas that could alter the basic scenario, and (3) assess what impact these options could have on the international competitiveness of the U.S. textile complex.

Drastic changes in trade or other government policies were not considered because they would be unrealistic and unfeasible in today's world. The discussion centers on incremental changes, rather than massive, sweeping varieties. Within this framework, the main policy areas examined were trade mechanisms, technology, manpower education and training, taxation, and regulation.

As important points of departure, the following points of panel consensus should be kept in mind. First, it is extremely doubtful that employment in the U.S textile complex will increase or even be maintained at its current level even if, by taking various measures, the complex becomes more competitive. However, the rate of decline in employment can be slowed. Second, the projected decline in employment and other impacts of competitive changes will not be felt equally in all segments of the complex, nor geographically equally within the United States, nor demographically equally among various groups of the work force. Third, the rate and extent of possible impacts will depend both on future government policies and on the activities of firms in the complex. Finally, it was the consensus of the panel that government policy should be directed toward achieving as orderly a transition/adjustment as feasible and that government policy should be more consistent, proactive, and comprehensive than it has been in the past.

THE BASIC SCENARIO

Assumptions: no changes in existing government policies (such as trade restrictions) or the economic, technological, and corporate activity trends described in previous chapters.

Expected Results:

- The combined U.S. trade deficits in fibers, yarns, fabrics, and products made from textile fabrics (apparel, home furnishings, and industrial products) will widen further, with an increasing trade deficit in apparel more than offsetting any future trade surpluses in fibers, yarns, and fabrics.
- Technological and other productivity-related developments will continue to reduce the need for labor in the complex but also will increase the demand for higher-skilled workers and management, permit more sophisticated products to be made, and lower production costs, particularly for apparel.
- The projected overall slow growth in domestic demand for the output of the complex in the face of increasing imports and productivity will result in employment declining slowly but steadily. The greatest reduction will take place in apparel and in those parts of the fiber and fabric segments that are heavily dependent on the apparel segment.[1] In addition, employment reductions will be largest in the unskilled categories and among women and minority groups, as has been the case in the past. Finally, employment reductions will particularly impact urban regions of the United States where relative production costs are highest.
- Increased competition from foreign and large domestic firms and the necessary increased capital outlays required to become more competitive (e.g., newer technology, more productive equipment) will result in continued industrial concentration of the U.S textile complex. Because the man-made fiber segment is already highly concentrated, and there are not major manufacturing economies of scale in the apparel segment, the greatest consolidation may take place in the yarn and fabric (textile mill products) segment. Increased concentration is expected to continue in the apparel segment due primarily to marketing economies of scale, but it is not expected to be as extensive as in the fabric segment.
- With a more concentrated and productive complex, the U.S. textile complex will become more competitive. As mentioned previously, however, the expected increase in U.S. international competitiveness will not be great enough to reverse the combined U.S. trade deficit in fibers, fabrics, and apparel, nor prevent an overall reduction in employment in the complex.

GOVERNMENT POLICY AREAS AND THEIR POTENTIAL IMPACT

The policy areas examined below pertain to international trade mechanisms, technology, manpower and education, taxation, antitrust, and other regulations. Major policy changes in these areas could significantly alter the expected results of the basic scenario described above.

Trade Mechanisms

As a preamble to this discussion of trade mechanisms, several key points are important.

First, there is an existing, official, and highly complex framework governing international trade that comprises a number of specific mechanisms: primarily, the General Agreement on Trade and Tariffs (GATT), the MFA,[2] and a host of bilateral trade agreements. The first deals primarily with trade in almost all products, while the latter two deal primarily with regulation of trade in cotton, wool, and man-made fiber textiles and apparel.[3] Historically, changes in the MFA have had more of an indirect than direct effect on fibers and their greatest direct effect first on apparel, then fabrics, then yarns. However, as pointed out in Chapter 1, unfavorable impacts on just the apparel sector will ripple backward to the fabric, yarn, and fiber sectors.

Second, one of the intended purposes of these trade policies and mechanisms was to allow developing country producers to increase their exports without unduly disrupting developed countries' markets, firms, and employment levels. Thus, there are inherent political dimensions, domestic and international, that cannot be separated from the existing and future trade framework.

Third, the existing framework seeks to regulate trade between exporting and importing countries, including the trade access of developing countries to developed countries' markets. Yet, in terms of the output of the global textile complex, the greatest future growth is projected to occur outside the developed countries[4] in the developing countries where there are considerable tariff and non-tariff barriers and restrictions on inward foreign investment, which are not likely to be reduced unilaterally. Therefore, modifications of existing trade mechanisms discussed in Chapter 2 are not likely to significantly improve the access of U.S. firms to foreign markets, be it by export or foreign investment.

With these overview considerations in mind, the options for the U.S. government are as follows:

1. To better enforce the existing trade mechanisms system and tighten controls, as well as to respond faster to changes in market conditions and import surges.
2. To seek reduction in tariff and non-tariff barriers in other countries.
3. To change to a system of granting licenses to U.S. importers instead of foreign exporters.
4. To change policies concerning offshore processing.

Better Enforcement and Control

During the Carter administration, an administrative "White Paper" addressed many of the complaints of the U.S. textile complex concerning what it perceived as slack enforcement of the MFA provisions and promised better enforcement.[5] While this White Paper was considered by the industry to be a move in the right direction, there remain several areas where improved enforcement is still needed. While the renewed (12/81) MFA is expected to help reduce these problems, faster enforcement and more strict controls would lessen import surges and market disruptions, lessen the risks and improve the planning ability of domestic firms, and make for a more orderly transition and adjustment by the complex.

The key to proper enforcement in the United States rests with the U.S. Customs Service and the amendment of customs legislation, which, for example, imposes no penalties on quota violators when tariff rates are not at issue. The Customs Service has never had sufficient personnel, and recent budget cuts have seriously lessened its effectiveness.

Testifying before the Trade Subcommittee of the House Ways and Means Committee, Customs Commissioner William Von Robb acknowledged that the 1983 budget as submitted by President Reagan may force a layoff of over 1500 employees with a further cut of some 800 jobs through attrition. Layoffs are likely to involve some 240 import specialists, who classify and monitor imports and assess and collect duties; some 1200 inspectors, who staff U.S. border crossings and ports; and 40 special agents, who investigate quota violations and fraud. There are at the present time some 1100 import specialists in all fields, 4350 inspectors, and 635 special agents, although only 400 of them are active in the field, with others assigned to supervisory and foreign liaison duties. Washington recently placed the enforcement staff under the regional directors, thus minimizing the already inadequate effectiveness of the enforcement effort.

There is a need to strengthen the enforcement capabilities by providing improved procedures and by strengthening penalty provisions, to increase the size of the Customs Service personnel (additional manpower in this field pays several fold for itself through increased duty collections), and to bolster its enforcement activities and personnel.

Increasing Responsiveness

It was the consensus of the panel that the existing trade restriction mechanisms are not sufficiently responsive to import surges or other significant changes in markets, competitive forces, or company activities. As a result, irreversible damage can be done even before an investigation begins or a response is undertaken.

There are currently provisions in both the MFA and most U.S. bilateral agreements concerning flexibility. For example, paragraphs six and nine of the Protocol extending the MFA until 1986 (concluded on December 22, 1981) justify reductions in the positive import growth rate and flexibility provisions for particular products from particular countries in specified circumstances. In addition, there are required consultations with a country whose exports to the United States increase rapidly, either because they were not covered by a bilateral agreement or because the particular agreement did not set a quota for the specific product. If no agreement can be reached, the United States can usually act unilaterally, either in accordance with the provisions of the bilateral under Article 3 of the MFA, or under the provisions of Section 204 of the Agricultural Act as amended, as the case may be.

However, delays in action by U.S. authorities often permit the build-up of exports to very high levels, and some bilaterals do not always specify that once consultation is requested, the exporting country will limit its shipments to a specified fraction of the prior year's shipments. Nor do U.S. bilaterals provide that, when undershipments occur, imports cannot increase in the subsequent year by more than a specified percentage of the applicable quota. In addition, the existing provisions (i.e, swing or shift, carry-over, and carry-forward) often increase the import growth provided for. While recognizing that multilateral trade agreements are inherently complex and that they already contain some responsive provisions, the panel believed it beneficial for the United States to examine ways to improve the speed of U.S. response.[6]

Reduction of Tariffs and Non-tariff Barriers Abroad

While the average tariff levels on fabrics and apparel are generally higher in developing countries than in the United States, the problem is even greater for non-tariff barriers. Non-tariff barriers (such as custom clearance delays, time-consuming inspection procedures, local content requirements, labeling procedures, border taxes, and equalization taxes) are often greater trade impediments than tariffs and are far more difficult to identify and assess.[7]

Obtaining reductions in foreign trade restrictions and impediments would improve U.S. export potential and, in the process, could result in improved U.S. trade balances and increased employment. The potential impact on the U.S. complex of greater exports should not be underestimated. As previously mentioned, in the future both population and per capita consumption (in pounds) of textile products are projected to increase faster outside the United States. Therefore, the more trade restrictions in other countries can be reduced, the more the U.S. complex can participate in and benefit from global growth in consumption. At the same time, it must be acknowledged that U.S. firms must be suitably prepared for and capable of participating in this growth if the benefits are to be realized. This will require greater international commitment and skills, a point addressed separately in a subsequent section of this report.

Changing the Export Authorization System

Unlike many countries, including European countries, the United States allows exporting countries to decide who shall export within the limits set forth in their bilateral agreements and does not employ a double check system. This permits foreign exporters to buy or sell their licenses to export, thus giving the economic rents (profits) to foreign holders of the licenses, rather than to U.S. citizens. This system makes it much more difficult to control the actual flow of goods to the United States. While the panel was not able to fully assess the impact of the current U.S. policy in this area, it did consider that it would be prudent for the U.S. government to investigate the issue further, that is, to analyze the U.S. system and compare it with systems in other major importing countries to determine if the U.S. system should be retained or revised.

Changing Item 807 (Offshore Processing)

The U.S. textile complex has not historically been a major user of offshore processing, but its use in the recent decade has increased, particularly by the apparel segment, as shown in Chapter 2.

The consensus of the panel, with one strongly dissenting opinion,[8] was that offshore processing (the use of Item 807) preserves jobs[9] in the fiber and fabric sectors and even some in apparel and may allow some U.S. firms to be more competitive. The panel also believed that offshore processing has a positive political impact internationally, as most of the U.S. apparel segment's use of Item 807 is in Latin American and Caribbean countries, areas with whom the United States continues to seek improvements in its political relations.

Therefore, the consensus of the panel (although with some strong dissent) was that the United States should not eliminate Item 807, but rather should consider policies that would increase its use.[10]

While the panel acknowledged that increased offshore processing might lead to some reduction in domestic employment, more service jobs might be created, the international competitiveness of firms might increase, and the longer-term prospects for the U.S textile complex might be enhanced. An interim test of any such changes might clarify this view.

Summary

While changes in almost any of the above areas would help the U.S. textile complex become more competitive, concurrent changes in several of them would have an even greater positive impact. The sooner the changes are implemented, the sooner the benefits would occur.

Technology

As described in Chapter 2, both the pace and costs of technological change have increased sharply. While these changes have had greater impact in the fiber and fabric sectors than in the apparel sector, all segments of the textile complex are expected to be increasingly affected by future technological developments. Because adoption of new technology enhances international competitiveness, careful consideration should be given to policies that affect directly and indirectly the development and utilization of new technology.

Examples of government policies that have a direct impact on technology development are (1) support for the scientific community and its R&D activities, (2) tax incentives for corporate R&D programs, and (3) support for projects that have high R&D components and spin-off applications. Examples of policies that have an indirect impact on technology development are particularly those that affect (1) future market stability and (2) the amount of capital available to conduct R&D. In the former case, an unstable or pessimistic future can increase the risks and negative perceptions of potential future technology development. In the latter case, if firms or other organizations do not have enough capital to spend on R&D, less R&D will be done.

The result can be a kind of "Catch 22" situation. If business prospects and funds availability are low, R&D declines, causing international competitiveness to decline. This causes business conditions, expectations, and future funds to decline further, causing R&D to decline further, and so on. On the bright side, the converse of this scenario is also true. If business prospects and capital availability are high, R&D increases, competitiveness increases, business prospects and capital availability improve further, and so on. The obvious trick is to get the cycle moving upward.

All of these comments essentially also apply equally to the utilization of technology. Without available funds or a sufficiently optimistic future market, firms will be less inclined and less able to purchase (utilize) the new technology. The British economy and textile complex are illustrative examples.

Finally, in this technology area, there is the issue of who does it--does it make any major difference (1) whether technology development is done by firms in the complex or by the equipment industry, and (2) whether it is done domestically or abroad? The important distinction in the first case is that firms within the complex may be more interested in selling their products than their technology, while independent equipment manufacturers' products are their technology developments. Thus, the distribution of technology, domestically and internationally, is faster if it is developed by firms outside the complex that have no incentive to restrict its distribution. The important consideration in the second case hinges on who is doing the technology development abroad. If it is firms in the foreign textile complex, R&D developments will be slower in spreading to the United States, and U.S. competitiveness could be affected adversely. On the other hand, if it is being done by foreign equipment manufacturers, then it will be made available faster to the U.S. complex, and U.S. competitiveness will be affected only by the firm's willingness and ability to purchase it.

Future Technology Scenarios

Previous chapters described the increasingly rapid rate of technology development for the textile complex and the forms it had taken. Major developments occurred primarily in new fibers and fiber combinations, yarn and fabric formation, product quality, and automated equipment (generally). Most of them were labor-saving, more energy-efficient, and oriented toward increasing productivity or enhancing product features. Most of them also emanated from equipment manufacturers and increasingly from sources outside the United States. In general terms most of these past trends are expected to continue.

Fiber

In the man-made fiber segment of the complex, the R&D emphasis of the past seven years on energy-cost reduction and EPA equipment-related technology will shift to product and process variant technology: taking existing polymers and making new combinations, higher value products, and better products in terms of quality and aesthetic and processing properties. It is not expected that any major, totally new fibers will be developed.[11] It is expected, however, that more, if not most, of the new technology will be developed by the major fiber firms, i.e., in-house rather than by equipment manufacturers.

Yarn

New developments in yarn spinning are among the most likely to occur and will have a major impact on fabric production, as new methods of spinning make yarns of better quality and more able to be processed on new high-speed equipment. New opening, drawing, and spinning processes (particularly air-jet spinning and open-end spinning) are expected to lead the way.

Fabric

Perhaps more than in any other segment, technology is expected to move farthest and fastest in fabric formation. Fly-shuttle looms may well become obsolete in the United States, replaced by newer missile, rapier, water, and air-jet looms, and later by the wave-shed and bi-phase generation of machines. Technology is also expected to advance in knitting (needle refinements, compound needles, new loop-forming systems, among others), although

not as dramatically as in wovens. As in wovens, however, much, if not most, of the new technology in knitting is expected to emanate from non-U.S. equipment manufacturers.

Finally, there remains the non-woven sector--perhaps the single area where future technological breakthroughs could be dramatic and far-reaching. While currently rather limited, the applicability of non-wovens is hindered only by technology. Non-wovens offer tremendous potential as substitutes for wovens and knits and more importantly as new markets for flat textiles. In addition, the technology is primarily located in the United States and will probably continue to be in the near future. New technology that widens the use of non-wovens in industrial and home furnishings markets represents a major future competitive advantage for U.S. firms in these markets. However, it is not likely that major technological breakthroughs will occur in the near future in the use of non-wovens as apparel fabrics.

Dyeing, Printing, and Finishing

Fabric dyeing, printing, and finishing represent still other areas where technology is expected to advance. The main reason is that these processes add flexibility to firms' strategies and products and help differentiate them from developing country firms, which compete mainly in undifferentiated low-price goods. While the United States has enjoyed technological leadership in most of these processes, the Japanese and Europeans can be expected to increase their efforts in the future.

Apparel

Unlike most of the other segments of the textile complex, there appears to be little on today's horizon that suggests that applied technology for the apparel industry is going to change very much in the next 10 years.

While the Japanese will be spending $50 to $70 million over the next 5 to 10 years on the potential application of robots to apparel manufacturing, few immediate, short-term applications to apparel manufacturing are envisioned.[12] In the immediate future, new and more extensive use of microprocessors and technology related to body fit and materials handling appear to be the key areas for major developments. In the more distant future, garment molding may eliminate some sewing operations (and sewing operators) but would probably have limited applications because it would not permit alterations or offer the flexibility provided by sewn seams.

It does not appear that most U.S. apparel firms will be increasing their own R&D efforts in the future, but instead will continue to rely on technology developed in other segments of the textile complex.

Home Furnishings and Industrial Fabrics

Except for carpet, the manufacturing technologies of the home furnishings sector are fairly similar to those of the fabric sector. Therefore, future technology scenarios for them are similar to those just mentioned for fabrics.[13] However, technologies of the industrial fabric sector are much more varied. They are more technical and R&D-oriented, utilize more specialized equipment, and, for some products such as geotextiles, are significantly different.

In addition, an increasing number of home furnishing and industrial textile products rely on non-woven processes and technologies, and this trend is expected to increase. Therefore, increasing U.S. leadership in non-woven technologies could figure prominantly in the future competitiveness of industrial and home furnishing sectors.

All in all, the expected technological impact on the industrial product and home furnishing sectors is likely to be similar to that projected for fabrics in general. New technology should make the sectors more capital intensive, more concentrated, and more internationally competitive.

Policy Implications

There can be a clear benefit to the United States from increased technology development. The most technologically advanced industries in the U.S. economy are the most competitive internationally and are growing the fastest. However, there must be increased funds to continue this development, either from the government sector or the private sector, with the greatest potential benefit probably resulting from government approved cooperative efforts.

The most defendable and pressing case for government-sponsored R&D concerns the apparel industry. Of all the segments of the U.S. textile complex, apparel is in the most precarious position. Because historically the apparel industry has not invested heavily in R&D or technological development, that industry is the one with the highest potential marginal returns from new technology. What happens to the U.S. apparel industry in the future will have major repercussions on the rest of the U.S. textile complex.

The more intense levels of international and domestic competition in apparel suggest that they will not be capable of developing major technological breakthroughs on their own. However, they would be in a position to provide input into a collaborative R&D effort, particularly with the fiber, fabric, and equipment industries. An examination of the efforts and results of such cooperative, government-sponsored R&D projects in the Far East and Europe could prove enlightening and beneficial and should be undertaken.

As for the other major segments of the U.S. textile complex, it was the consensus of the panel that increased government emphasis on technology development would be less beneficial than increased emphasis on policies that affect equipment utilization. Examples include more favorable tax incentives for the use of new, experimental equipment (not just for one piece of equipment, but for multiple units, e.g., an entire bank of looms) and more funds for education and retraining of both labor and managers in the use and servicing of more modern equipment and processes. These examples suggest that all government policies affecting capital formation within companies are important, as well as policies that mandate certain allocations of corporate capital, if the benefits of new technology are to be maximized. For, even if new technology is developed, the firms must be able to absorb it, financially and managerially.

Thus, government-sponsored R&D, as well as policies increasing capital formation in firms to develop their own R&D or to purchase and utilize other firms' R&D will all be essential. Yet, even then, they alone will not provide an automatic increase in U.S. international competitiveness. They are but one critical component in what has to be a multifaceted strategy of corporate, economic, and societal development. Another key component in this regard is manpower education and training.

Manpower Education and Training

The combined impact of the two previous scenarios suggests that the future manpower needs of the textile complex will be different than they have been in the past. In general, fewer people will be employed (particularly in apparel), but more skilled workers and managers and a different orientation of managers will be needed in all segments of the complex. Therefore, the human aspects of the textile complex will also need increased attention if its international competitiveness is to be increased.

Government policy options affecting these expected trends are

(1) To slow the projected labor displacement to allow more time for the adjustment process to work (e.g., retraining, relocation, attrition).

(2) To develop more effective and efficient federal adjustment programs for the textile complex, particularly of the job training and skill-upgrading variety.

(3) To enact policies that result in firms' having more funds to develop more productive workers and sophisticated managers, either through creation or expansion of their own programs or by sending more of their personnel to outside programs.

(4) To increase funding of research and educational programs at colleges and universities that address the future manpower needs of the textile complex.

(5) To provide specific, direct government intervention or assistance in the area of manpower education.

While policy option (5) could be considered inconsistent with the historic laissez faire doctrine of the United States, it should be recognized that the underlying assumptions of laissez faire do not exist in reality. Even though, in the long run, market forces may be sufficient in magnitude to force the adjustment process to work, there would be major short-term problems that would need to be addressed. Thus, the panel did not believe that policy option (5) was feasible nor desirable for the United States to pursue.

The anticipated impact of the other policy changes would be a more highly skilled labor force for the textile complex and less short-term unemployment for the United States as a whole. The former would clearly enhance the international competitiveness of American industries, while the latter would lower the social costs of the anticipated higher levels of unemployment.

The reasons behind the need for increased skill levels of U.S. production workers have already been discussed at length earlier in this report. Comparatively higher U.S. wage rates place U.S. firms at a competitive disadvantage against firms in developing countries unless U.S. productivity is commensurately higher. U.S. productivity, in turn, requires new equipment and a labor force that can properly utilize and service it. Thus, increased effort and funds must be allocated to upgrading the production and service skills of the textile complex's labor force.

Not fully elaborated yet in this report are the problems and needs of management--from supervisory levels up through top management levels. Therefore, the rest of this section is devoted to these areas.

At the lower levels of management, production supervisory skills are in critically short supply, as are high-grade technicians and especially production and design engineers. What appears to be necessary in order to help solve these shortages is a redirection

of educational emphasis. But, because financial support for education is being significantly reduced, it is not likely that the educational system will be able on its own to redirect its emphasis. Therefore, the panel believed policy changes at the federal and state levels could facilitate movement in the needed redirection: more specifically, additional financial support for expansion of technical and supervisory training programs and applied engineering programs. In addition, increased scholarships or other forms of financial assistance would help motivate and make it possible for more people to enroll in such programs.

The panel also believed that more middle management development programs will be needed because the nature of the textile business and its work force will be continually changing. Unfortunately, current curricula of many business schools place emphasis on large organizations, growth industries, and on preparing people for top management. They do not suitably interest nor prepare people for working in middle management, in smaller scale enterprises, or industries with slow growth--characteristic of several segments of the textile complex. As a result, business school graduates do not readily seek employment in the complex and, when they do take jobs in the complex, may find themselves ill-equipped and frustrated. Thus, what is needed are more emphases and programs in business schools oriented toward developing needed skills of middle management and small business. But while government assistance in the development and funding of such programs would be beneficial, the firms themselves must be educated and motivated and resolve to spend additional time and money of their own in these areas.

At the top management level, many problems also exist: an oversupply of people with inappropiate skills and orientation and, at the same time, a shortage of people with the needed skills and orientation. There is probably no single area where this problem is more acute than in the existing domestic and production (supply) orientation of top management in the fabric and apparel segments. What is needed now and particularly in the future are international and marketing (demand) orientations.

If the U.S. textile complex is to become internationally competitive, it must not restrict its orientation to just becoming more competitive in the U.S. market--it must grow and become more committed and more competitive outside as well. In addition to this fundamental change in perception, there is a great need for increased business knowledge and skills in the areas of international trade and investment (mechanisms, structure, dynamics, and other foreign ways of doing business) if the future global opportunities are to be achieved successfully. While most business schools are moving the curricula in this direction, the pace and extent of the movement need to be accelerated if future managers are to be suitably prepared.

Better marketing at home and abroad will be equally necessary and critical. Better anticipation of changing markets and the appropriate matching of technology changes and the firm's capabilities to these markets will be essential for future success. In a broad sense, this process and related procedures concern strategic management, the most critical aspect of which is strategic marketing: identifying what market niches will best protect the firm from competition while placing it in a position to take best advantage of opportunities. The strategic planning process and its outwardly focused orientation are particularly critical for mature, slow growth industries. More research, education, and training in the areas of strategic management and the management of mature industries would clearly benefit the textile complex. However, given the recent reduction in federal and state support for education, additional support and commitment will be necessary from industry associations and the firms themselves.

Taxation

Most of the preceding discussions point to an increased need for money--money to develop and acquire new technology and skills, to undertake new activities, and to weather any financial storms that may occur in the interim. Where will the money come from? If the government is to play a major financial role in these areas, a reallocation of existing government revenues is one option; increasing the revenue base through higher taxes is another. Neither option appears politically feasible in the near future. A third option, and one that many argue is both wiser and more feasible, is for the government to enact policies that will result in greater capital formation and after-tax income for companies--income that can then be used by the companies themselves to become more competitive.

While recent changes in the U.S. tax laws are a movement in this direction, the panel questioned whether they will be sufficient. The panel did agree that (a) tax policies that improve profitability will increase both capital formation and U.S. competitiveness at home and abroad, and (b) existing tax and depreciation rules are not a unique problem to the textile complex but are in fact a national economic problem that should be approached at that level.

Specific tax policy options suggested by the panel for government consideration were the following:

(1) To revitalize U.S. industry, the government should consider providing greater tax incentives to assure more

investment in new plant and equipment and R&D. It should specifically consider faster depreciation of fixed assets, greater tax incentives for scrapping obsolete equipment and plants, and more favorable tax treatment for R&D (development and experimentation) and expenditures related to meeting government regulations (e.g., EPA, OSHA).

(2) To stimulate capital formation, the government should consider eliminating double taxation of dividends, further increasing or removing ceilings on interest rates for personal savings, and decreasing further the capital gains tax and taxes on interest (or increasing further the tax exempt ceilings).

(3) To promote the expansion of the U.S. exports, the government should consider:

(a) simplifying or revising the rules for Domestic International Sales Corporations (DISCs),[14]

(b) increasing the amount (percentage) of deferrable DISC income,

(c) providing tax incentives for export market development and establishing foreign sales offices and possibly for developing cooperative (multifirm) export organizations.

Options (3a) and (3b) would permit more aggressive marketing, and in particular pricing, of U.S. exports as well as encourage more firms and smaller firms to begin exporting or expanding their exports.

Option (3c) is related to the need for greater U.S. expertise about, and presence in, foreign countries. Both would provide greater knowledge of foreign market conditions, better contact with foreign buyers and government officials, better after-sale service capability, and show foreign buyers a greater commitment of U.S. firms to their particular market--all of which should translate into increased U.S. exports and improved international business skills of U.S. personnel.

In sum, a larger pool of investable funds would facilitate American firms in becoming more competitive in many ways. While it would probably benefit larger firms more than smaller ones, all firms could benefit, and, the more they do, the greater their competitiveness.

One final note. As far as the panel could determine, there has been no truly comprehensive study of the comparative impact of U.S. and foreign taxation on the respective textile complexes. It has been alleged that taxation systems and procedures in foreign countries give competitive advantages to their complexes, even in countries where official corporate income tax rates are higher than their U.S. counterpart. A future study examining this issue might prove enlightening and beneficial for the United States.

Other Government Regulations

Like its foreign counterparts, the U.S. textile complex is affected by a wide variety of government regulations other than taxation. In general, such regulations are designed to safeguard various aspects or members of society, and they have proliferated rather than decreased in number. It was well beyond the charge to this panel to assess the desirability or adequacy of such regulations. However, many existing regulations do impact the competitiveness of American industries, including the textile complex--a subject within the scope of this panel's charge.

It was the consensus of the panel that government regulations have had a mixed impact on the textile complex: some favorable, some unfavorable. In addition, it was felt that too often their impact on American competitiveness was insufficiently considered before and even after some regulations were enacted.

In general, the panel believed that a more thorough study of the impact of regulations is needed. Such a study should assess how existing regulations are affecting U.S. international competitiveness, and how existing regulations could be altered to increase U.S. competitiveness.

A few specific examples where such a study would be helpful are antitrust and the impact of regulatory compliance on capital formation and allocation.

In the antitrust area, it is difficult, if not illegal, for U.S. firms to cooperate on R&D projects, even if such projects are designed to result in new processes or equipment to meet government regulations in such areas as EPA or OSHA. The same conclusion is basically true for cooperative export market development, despite the fact that expanding exports are a government priority and that cooperative export associations are legally excluded from antitrust regulation under the Webb Pomerene Act.[15] Antitrust regulations may also become increasingly important as the fabric and apparel sectors continue to consolidate, and if further integration (horizontal or vertical) takes place. The lack of comparable antitrust enforcement in major economic competitor nations does provide an international competitive advantage for their firms and industries--often at the expense of their U.S. counterparts. While the intent of U.S. antitrust is to insure fair competition in the United States, the government should consider the impact of antitrust on American competitiveness internationally.

In the area of regulatory impacts on capital formation, previous sections of this report have discussed several areas of impact. Mandated expenditures for compliance with EPA, OSHA, and many of the 37 other U.S. regulatory agencies use up scarce corporate capital. While a few of these expenditures result in increased productivity, others do not and, hence, take capital

away from potentially productive use. Of course, there is no guarantee that greater capital availability will result in increased competitiveness. However, reduced capital availability is certainly not conducive to increased international competitiveness.

GENERAL POLICY CONSIDERATIONS

Almost regardless of which future policy directions the U.S. government takes, it was the consensus of the panel that there is a great need for more consistency in U.S. policy. The uncertainty in the economic environment is already enough to make corporate planning difficult and long-term capital commitments risky. As has been pointed out already, increased planning and investment are key components of future American industrial success at home and abroad. If uncertainty about future government policy is added to the uncertainty in the market, necessary and appropriate corporate adjustment will be harder to achieve. The American textile complex is capable of adjusting to a number of different government policies, but greater government policy consistency would be both beneficial and welcomed.

In addition to greater consistency, the panel believed that future U.S. policy should also be more proactive rather than reactive. That is, the future impact on the textile complex of changing economic conditions and government policies at home and abroad should be estimated, and then policies should be enacted to facilitate the adjustment process (lessen the expected adverse impacts and increase the desirable impacts) before the proverbial horse is out of the barn. For example, many government assistance programs for firms have been so difficult to qualify for and the assistance so long in coming that some firms went bankrupt before the assistance was received (or the cost of assistance was much higher than it would have been had it been given earlier, because the necessary changes had become so massive).[16]

SUMMARY AND CONCLUSIONS

While the future for many firms and segments of the American textile complex is far from rosy, the complex as a whole is in a position to increase its international competitiveness. It can do so by becoming more capital and R&D intensive utilizing higher skilled manpower (resulting in higher productivity), by becoming more concentrated[17], by changing its historical product mix, and by becoming more internationally oriented and active. While most of the larger and financially stronger firms will be able to

meet these goals largely by their own efforts, most of the rest of the firms need some additional government assistance (directly or indirectly) to improve their competitiveness.[18]

Almost no matter what government policy may be in the future, not all firms will survive, nor will all jobs be maintained. Such is the nature of competition. The expected employment reduction in the textile complex and the rising levels of immigration into the United States have the potential for substantially increasing U.S. unemployment levels, particularly among minorities, women, and lesser skilled and educated people. Given the U.S. government's historic policy of full employment, the government will need to address this future problem in addition to what future policies, if any, it undertakes concerning the textile complex or any other American industry.

NOTES

1. The panel believed that U.S. apparel employment could decline to a level as low as 800,000 people by the end of the 1980s.

2. The MFA in Article 1 (2) states that its objectives "shall be to achieve the expansion of trade, the reduction of barriers to such trade, and the progressive liberalization of world trade in textile products...while at the same time ensuring the orderly and equitable development of this trade and avoidance of disruptive effects in individual markets and on individual lines of production in both importing and exporting countries."

3. However, the MFA does contain a provision for man-made fibers, specifically, Article 12(2), which reads: "Artificial and synthetic staple fibre, tow, waste, simple mono- and multifilaments are not covered by paragraph 1 above. However, should conditions of market disruption (as defined in Annex A) be found to exist for such products, the provisions of Article 3 of this Arrangement (and other provisions of this Arrangement directly relevant thereto)...shall apply."

4. This conclusion is based on several estimates that per capita consumption of fiber (and hence fiber products) will increase faster in developing countries because their current consumption levels are so low relative to those in developed countries. This point, combined with faster population growth in developing countries, results in the projections of greater demand growth outside developed countries in the future.

5. It referred to the need for better and improved administrative measures to enforce the textile agreements "including the use of penalties available under law where appropriate, with respect to improper transshipments, country of origin requirements, and violations of quantitative limits."

6. Several panel members recommend that the United States seek improved ways to speed up the period of consultations with exporting countries, set up specific limits in the event of import advances sufficiently in advance of the high build-up of shipments, and provide a formula for rapid resolution of disputes.

7. For a comprehensive description of the thousands of non-tariff barriers that exist in the world, see U.S. Department of Commerce report, Foreign Regulations Affecting U.S. Textile/Apparel Exports, August 1981.

8. Details of the position of the dissenting view can be found in the testimony of Sol C. Chaikin before the House Subcommittee on Trade of the Committee on Ways and Means, Special Duty Treatment or Repeal of Articles Assembled or Fabricated Abroad, March 24-25, 1976.

9. The domestic employment effect of offshore processing remains a controversial subject in virtually all countries. There is no question that some firms have closed domestic plants as a result of establishing offshore production or have reduced employment in their domestic plants (without closing plants) by moving offshore. Yet offshore processing is also said to have lessened even more drastic reductions in employment that would have occurred if the moves offshore had not been made. That is, by increasing the firms' competitiveness, domestic employment shrinkage was lessened. Studies showing both results have been conducted and, therefore, no unassailable conclusion can be reached about offshore processing's precise impact on employment within the industry directly involved.

10. Three changes suggested by some panel members but not supported by all included (1) remove Item 807 imports from the quota allocation given each country; (2) permit cutting, buttonholeing, and other jobs that presently disqualify the product from the benefits of Item 807 to be done offshore; and (3) provide more information and training for the industry on the effective use of offshore processing.

11. While not likely, some new fiber breakthroughs could emanate from the paper or plastics industries, both of which already produce laminar flexible products.

12. The main reasons are that the robotic equipment companies will continue to concentrate their efforts on industries where the use possibilities and potential gains are highest, and apparel is not one of them. Constantly changing fashions, styles, and fabric weights pose great difficulties for automation. To date, roughly $2 million has been appropriated by the Japanese government for its project on robot application for apparel manufacturing, and so far no reports have been issued on the success or failure of its robotics project.

13. As for carpet, no major technology breakthroughs are expected in the basic manufacturing process (tufting). New developments are more likely in new fiber combinations (emanating from the fiber industry) and in printing and dyeing (emanating from the equipment industry).

14. DISC came into existence in 1971 as a measure to help offset the tax advantages and subsidies that foreign governments were extending to their own exporting companies. In 1976 Congress weakened a number of DISC provisions with a tax reform act, largely in response to the feeling that these provisions might be inconsistent with GATT.

15. Less than two dozen Webb Pomerene associations have been established in the more than 60 years the Act has been in force.

16. See Jose de la Torre, et al., Corporated Responses to Import Competition in the U.S. Apparel Industry, Business Publishing Division, College of Business Administration, Georgia State University, Atlanta, GA, 1978.

17. For the apparel sector, however, concentration may not result in increased competitiveness. The main reason would be that greater flexibility, particularly in terms of market anticipation and response, may exist in small firms.

18. One can argue whether such government assistance is advisable or desirable compared to letting market forces determine which firms survive. Ultimately, this is a societal decision.

Biographical Sketches

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STIG A. KRY is Chairman of the Board of Kurt Salmon Associates (KSA), a management consulting firm founded in 1935. Before joining KSA in 1958 to work on production engineering projects, Mr.Kry held positions in a number of apparel companies both in the United States and Sweden. In addition to his corporate duties, Mr. Kry has over-all responsibility for KSA's International Division and is a member of the U.S. delegation to the International Apparel Federation.

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Mr. Malpas was the President and Chief Operating Officer of Halcon International, Inc. Earlier he had served as Executive Director of Imperial Chemical Industries. Mr. Malpas holds a B.Sc. in mechanical engineering from King's College, University of Durham, and is the recipient of a number of honors including the Order of Civil Merit awarded by the Spanish Government and the Commander of the British Empire. He is also a member of several professional associations including The Royal Institute of International Affairs, Fellow of the British Institute of Management, and Fellow of Engineering in the Council of Engineering.

RICHARD STEELE recently retired as Executive Vice-President of Celanese Fibers International Company. Dr. Steele holds a B.S. degree in chemistry from the University of North Carolina at Chapel Hill and a Ph.D. in chemistry from Princeton University. Before joining Celanese in 1965, he was the head of the textile research and product development laboratory at Rohm and Haas Company. Dr. Steele has been active in a number of professional groups and was Chairman of the Board of trustees of the Textile Research Institute. He has published over 40 papers and has received a number of honors including the Olney Medal from the American Association of Textile Chemists and Colorists and the Harold DeWitt Smith Award from the American Society for Testing and Materials.

LAZARE TEPER is the Director of Special Projects in the Office of the President, International Ladies' Garment Workers' Union (ILGWU). Dr. Teper completed his undergraduate work at the Universite de Paris and received an A.M. and Ph.D. from Johns Hopkins. Most of Dr. Teper's professional career has been spent at the ILGWU. He served for a number of years as director-at-large of the National Bureau for Economic Research, has worked on committees of the National Academy of Sciences, the U.S. Department of Labor Joint Labor Advisory Council, as a member of the committee on national planning of the National Planning Association, and as a member of the Board of Directors of the National Bureau of Economic Research. Dr. Teper is a member of a number of professional societies and is an elected Fellow of the American Statistical Association and of the American Association for the Advancement of Sciences, as well as the author of two books and several professional journal articles.

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