

ABSTRACT

JI, YAN. Strategic Shifts in Textile Production 1994-2006. (Under the direction of Dr. Trevor J. Little).

In order to better understand the changes and trends in the increasingly competitive dynamics of global textile complex, this research focuses on analyzing the rate of change in country of production origin for fiber, yarn, fabric and end-use products in the past decade. By using the model of textile product complex as framework, the data presented in this research paper were firstly collected from various data sources, such as the Fiber Economics Bureau, ITMF, ICAC, Textiles Intelligence, CIRFS, and WTO as well. The data were then validated to ensure its integrity, which represented a significant stage in the process. Finally, the data were analyzed and conclusions were drawn based on the obvious trends in the data. This research offers a practical interpretation of the direction and magnitude of changes in worldwide textile and apparel production. Meanwhile, it provides an outline of the relationships between textile trade and production, as well as the relationships between production and employment. In addition, the findings from this study will show the direction for global sourcing of textile and apparel products.

STRATEGIC SHIFTS IN TEXTILE PRODUCTION 1994-2006

by

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DEDICATION

This thesis is dedicated to my husband, Ping Li, whose love, encouragement and support made my dream come true.

BIOGRAPHY

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CHAPTER ONE

INTRODUCTION

Textile and clothing industry has played an extremely significant role in leading and sustaining the economic development and evolution in a global context. In the eighteenth century, textile and apparel manufacturing led the Industrial Revolution in Europe, and more recently contributed significantly to the success of export-led growth in the dynamic newly industrializing economies of East Asia [1, 2]. In addition, textile and apparel manufacturing operations not only were the first industrial activities to take on a global dimension but also are the most widely dispersed industries across developed and developing nations [2, 3].

With the emergence of a growing number of producing countries and the development of technology, several production migrations have taken place since the 1950s. The first was from North America and Western Europe to Japan in the 1950s and early 1960s, when the surge of imports from Japan superseded western textile and apparel production. The second shift was from Japan to the Asian Big Three (Hong Kong, Taiwan and Korea), which dominated global textile and apparel exports in the 1970s and early 1980s. In the late 1980s and early 1990s, there was a third migration, from the Asian Big Three to other developing countries due to rising wages/labor shortages, land prices, and external pressures such as currency appreciation, tariffs and quotas. In the 1980s, the industry moved primarily to China, but also to several Southeast Asian countries (Indonesia, Thailand, Malaysia and the Philippines) and Sri Lanka. In the 1990s, South Asia and Latin America became significant apparel exporters to the US market,

while Eastern Europe and the Mediterranean region became important suppliers to the EU [4; 5; 6; 7].

In recent decades, world textile and apparel industry has been undergoing a significant restructuring as the competition becomes intense in the global market. Textile and clothing manufacturing in developed countries have experienced substantial declines in many sectors, while developing countries have greatly increased their production capacity and have offered a great deal of products at lower prices to the west market. In order to reduce costs and hence compete more effectively with low-cost imports, manufacturers in developed nations have increasingly turned to offshore production and global sourcing. Consequently, the textile and apparel industries have experienced significant changes in production sites on a global scale.

Furthermore, the worldwide geographical shifts in textile and apparel production have had an enormous impact on the global trade patterns, as well as employment patterns. Dicken [3] stated that “global shifts in the textiles and clothing industries exemplified many of the intractable issues facing today’s world economy, particularly the trade tensions between developed and developing economies” (Dicken, 1998, p.283). Therefore, as the textile sector has moved through time and around the globe, a study of development and geographic shifts of this sector is extremely important and necessary because it provides “insight into the economic and social conditions of the occupants of continents and countries at a given time” (Dickerson, 1999, p. 28).

In order to help gaining a better understanding of the changes and trends in the increasingly competitive dynamics of global textile complex, this research focuses on analyzing the rate of change in country of production origin for fiber, yarn, fabric and

end-use products over the past decade. The findings from this study also will show the direction for global sourcing of textile and apparel products. The basic concepts and models applied in this research paper are introduced here to assist further comprehension of the changes and trends that are exhibited.

The Textile Complex

According to Toyne et al. [9], the textile complex is “involved in the production of natural and man-made fibers and their conversion into apparel, home furnishings and industrial goods” (Toyne et al., 1984, p. 8). The textile complex is an important component of the softgoods industry, which encompasses the upstream activities (fiber industry and textile industry) and downstream activities (end uses and distribution). The model of the softgoods industry proposed by Dickerson [8] shows the status of the textile complex within the textile and apparel production-distribution chain (see Figure 1.1).

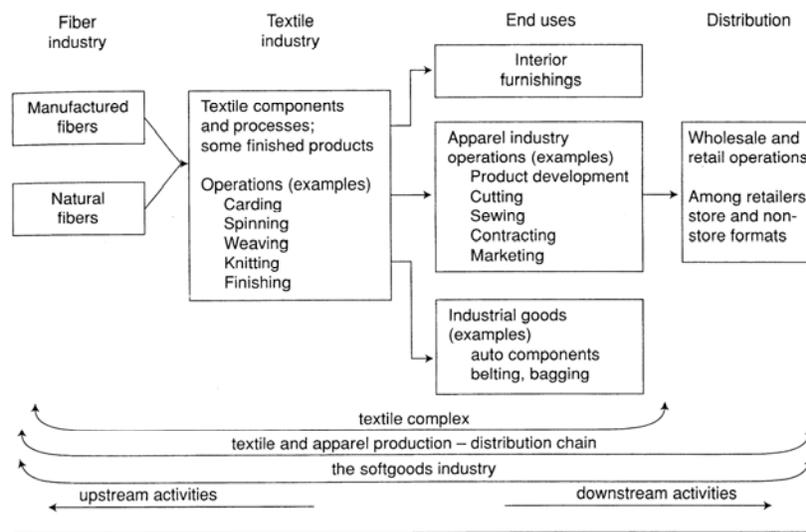


Figure 1.1 Model of the Textile and Apparel Production-Distribution Chain

Source: Dickerson, K. G. (1999). *Textiles and Apparel in the Global Economy* (3rd ed.) (p.19). New Jersey: Prentice-Hall, Inc.

The portrayal of the textile and apparel production-distribution chain illustrates the movement of textile products from fiber manufacturing through textile and end use production to the end retailers [8]. The textile and apparel industry produce the fibers, yarns, fabrics and end products, which are sold via distribution chain. As shown in the model, the textile and apparel industry directly depend upon the complex's end markets for their prosperity [9]. On the other hand, the textile complex also relies on several related industries: textile machinery, chemicals and agriculture.

Products in the Textile Complex

The term “textile and apparel products” used in this study is synonymous with textile mill products. The definition of textile mill products is the one given by the US Office of Management and Budget [10]. Quoted below is an example of part of this definition for textile mill products:

“Standard Industrial Classification Major Group 22 (SIC 22): This major group includes establishments engaged in performing any of the following operations: (1) preparation of fiber and subsequent manufacturing of yarn, thread, braids, twine, and cordage; (2) manufacturing broad woven fabrics, narrow woven fabric, knit fabric, and carpets and rugs from yarn; (3) dyeing and finishing fiber, yarn, fabric, and knit apparel; (4) coating, waterproofing, or otherwise treating fabric; (5) the integrated manufacture of knit apparel and other finished articles from yarn; (6) the manufacture of felt goods, lace goods, non-woven fabrics, and miscellaneous textiles...”. (Toyne et al., 1984, p. 191)

In the case of international textile and clothing trade, the textile and apparel products covered by the Multi-Fiber Arrangement (MFA) and subsumed into the Agreement on Textiles and Clothing (ATC) represent almost all the outputs of the textiles and apparel supply chain as shown in Figure 1.2. Those outputs in the textile and apparel industries are divided into two major groups based on the description of the Standard International Trade Classification (SITC) of textile industry output: SITC 65 is classified as textile yarn, fabrics, made-up articles, n.e.s. (not elsewhere specified), and related products; and SITC 84 is defined as articles of apparel and clothing accessories [11]. Within each of these two groups, a number of the textile and apparel products are sorted and listed under a series of three-digit SITC categories (see Table 1.1).

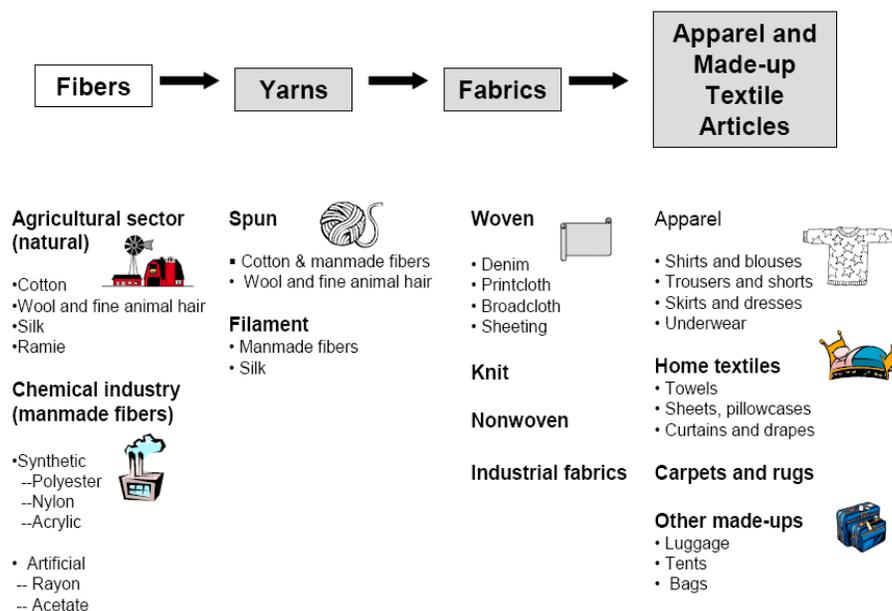


Figure 1.2 Major Products in the Textile Complex

Source: USITC (2004). Textiles and Apparel: Assessment of the Competitiveness of Certain Foreign Suppliers to the U.S. Market. Washington, DC: United States International Trade Commission (USITC). Available at: <http://hotdoes.usitc.gov/pub3671/pub3671.pdf>.

Table 1.1 Standard International Trade Classification, Sub-Sector Descriptions

Code	Description
65	Name: TEXTILE YARN,FABRIC,ETC. Description: Textile yarn, fabrics, made-up articles, n.e.s., and related products
651	Name: TEXTILE YARN Description: Textile yarn
652	Name: COTTON FABRICS, WOVEN Description: Cotton fabrics, woven (not including narrow or special fabrics)
653	Name: FABRICS,MAN-MADE FIBRES Description: Fabrics, woven, of man-made textile materials (not including narrow or special fabrics)
654	Name: OTH.TEXTILE FABRIC,WOVEN Description: Other textile fabrics, woven
655	Name: KNIT.CROCHET.FABRIC NES Description: Knitted or crocheted fabrics (including tubular knit fabrics, n.e.s., pile fabrics and openwork fabrics), n.e.s.
656	Name: TULLE,LACE,EMBROIDRY.ETC Description: Tullies, lace, embroidery, ribbons, trimmings and other smallwares
657	Name: SPECIAL YARN,TXTL.FABRIC Description: Special yarns, special textile fabrics and related products
658	Name: TEXTILE ARTICLES NES Description: Made-up articles, wholly or chiefly of textile materials, n.e.s.
659	Name: FLOOR COVERINGS, ETC. Description: Floor coverings, etc.
84	Name: CLOTHING AND ACCESSORIES Description: Articles of apparel and clothing accessories
841	Name: MENS,BOYS CLOTHNG,X-KNIT Description: Men's or boys' coats, capes, jackets, suits, blazers, trousers, shorts, shirts, underwear, nightwear and similar articles of textile fabrics, not knitted or crocheted (other than those of subgroup 845.2)
842	Name: WOMEN,GIRL CLOTHNG,XKNIT Description: Women's or girls' coats, capes, jackets, suits, trousers, shorts, shirts, dresses and skirts, underwear, nightwear and similar articles of textile fabrics, not knitted or crocheted (other than those of subgroup 842.2)
843	Name: MENS,BOYS CLOTHING,KNIT Description: Men's or boys' coats, capes, jackets, suits, blazers, trousers, shorts, shirts, underwear, nightwear and similar articles of textile fabrics, knitted or crocheted (other than those of subgroup 845.2)
844	Name: WOMEN,GIRLS CLOTHNG.KNIT Description: Women's or girls' coats, capes, jackets, suits, trousers, shorts, shirts, dresses and skirts, underwear, nightwear and similar articles of textile fabrics, knitted or crocheted (other than those of subgroup 845.2)
845	Name: OTHR.TEXTILE APPAREL,NES Description: Articles of apparel, of textile fabrics, whether or not knitted or crocheted, n.e.s.
846	Name: CLOTHING ACCESSRS,FABRIC Description: Clothing accessories, of textile fabrics, whether or not knitted or crocheted (other than those for babies)
848	Name: CLOTHNG,NONTXTL;HEADGEAR Description: Articles of apparel and clothing accessories of other than textile fabrics; headgear of all materials

Source: UN (2006). *United Nations Commodity Trade Statistics Database*. United Nations Statistics Division. Available at: <http://unstats.un.org/unsd/comtrade/help/FirstTimeUser.aspx>.

Figure 1.3 illustrates the major production steps in the textile complex, through which the materials flow from the simple textile components (e.g., fibers) to the sophisticated end-use products (e.g., finished garments). No matter how many production steps are needed/required to make a garment, clothing production is the final stage following fiber production, yarn production and fabric production.

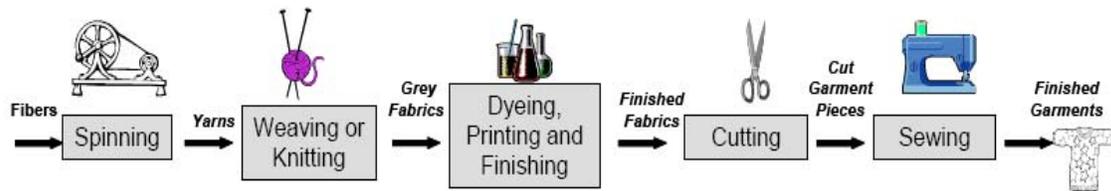
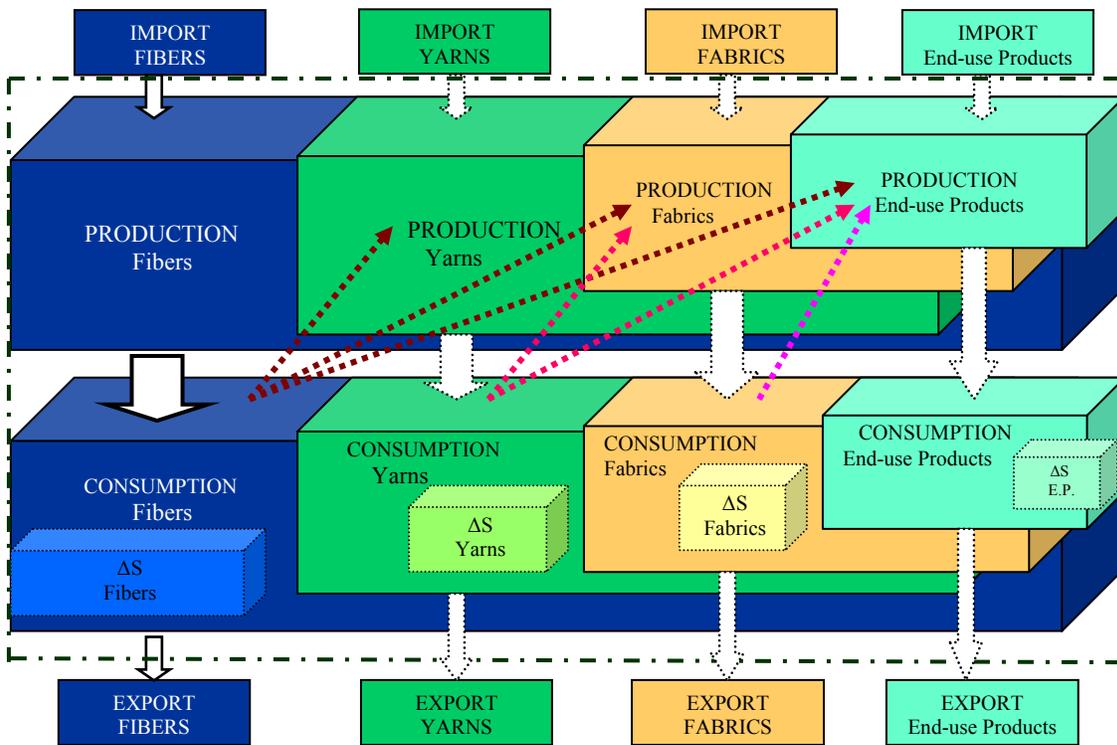


Figure 1.3 Major Production Steps in the Textile Complex

Source: USITC (2004). Textiles and Apparel: Assessment of the Competitiveness of Certain Foreign Suppliers to the U.S. Market. Washington, DC: United States International Trade Commission (USITC). Available at: <http://hotdocs.usitc.gov/pub3671/pub3671.pdf>.

Model of the Textile Product Complex

In fact, all aspects of the textile and apparel products can be segmented into four main tiers: fibers, yarns, fabrics, and end-use products. From this point of the view, model of the textile product complex (see Figure 1.4) is built up to demonstrate the linkages of the four major segments (fibers, yarns, fabrics, and end-use products) in the textile complex and the flows of three significant activities (production, consumption and trade) involved in the textile and apparel sectors.



Note: 1) ΔS indicates changing stocks (ending stocks – beginning stocks). 2) E.P. means End-use Products.

Figure 1.4 Model of the Textile Product Complex

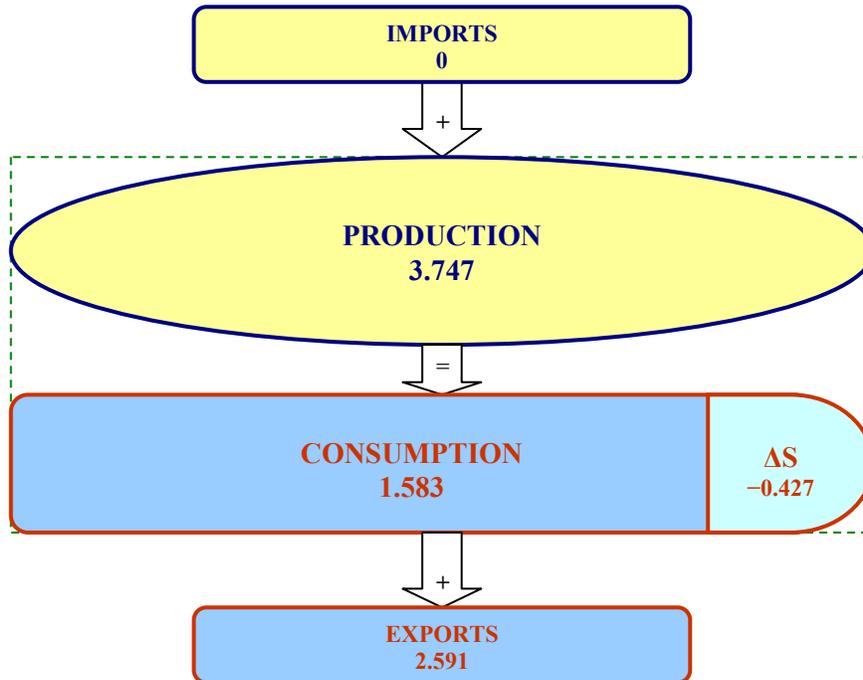
As shown in the model, the entire textile product complex is integrated with four tiers of textile and apparel products ranging from the lowest fiber stage through the highest end-use products; and the production at each level is tightly linked to the

corresponding consumption, changing stocks and trade (imports and exports) in the same tier. The colored arrows sitting between consumption and production sections indicate the possible transitions of products from the input sides to the output sides across the different tiers in the textile product complex.

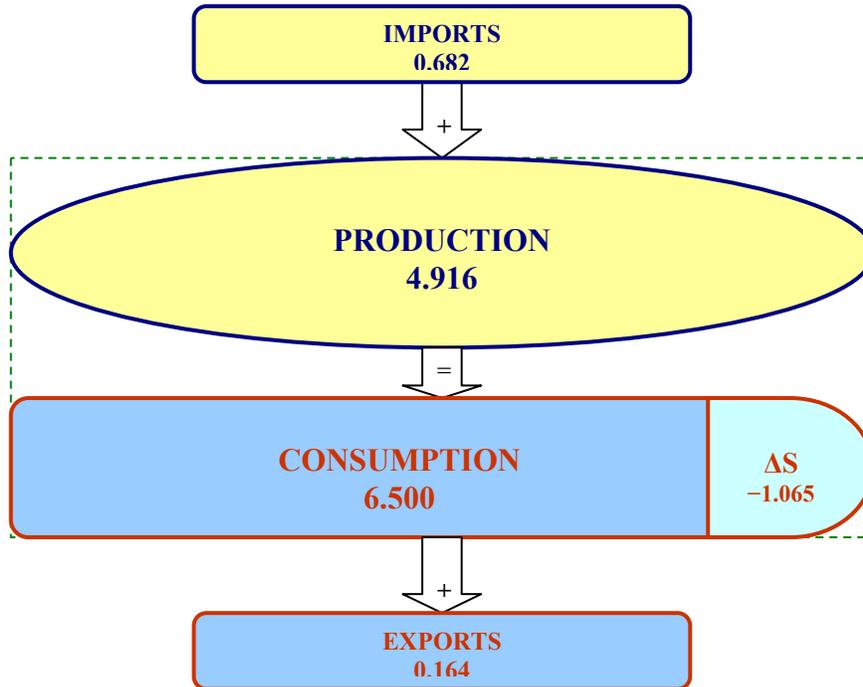
The relationship between the three distinctive events in the textile product complex can be viewed from the definition of textile consumption provided by Toyne et al. [9]: “the sum of a region’s production and its net trade (imports minus exports) is the amount of a commodity that a region consumes, ignoring stocks held in inventory” (Toyne et al., 1984, p.62). Figure 1.5 presents two examples in which the model is applied for the cotton fiber segment.

It is worthy to be noticed that from the global perspective the world total imports should equal to the total exports in each category/segment in the textile product complex. As illustrated in Figure 4, the model of the textile product complex suggests that the destinations of the flows and the conversions in the proportion rates become more complicated as the products move to the higher level. Figure 1.6 depicts the schematic flow for spun yarn production in Western Europe’s textile sector.

In the U.S.A. (Unit: Million Metric Tons)



In China (Unit: Million Metric Tons)

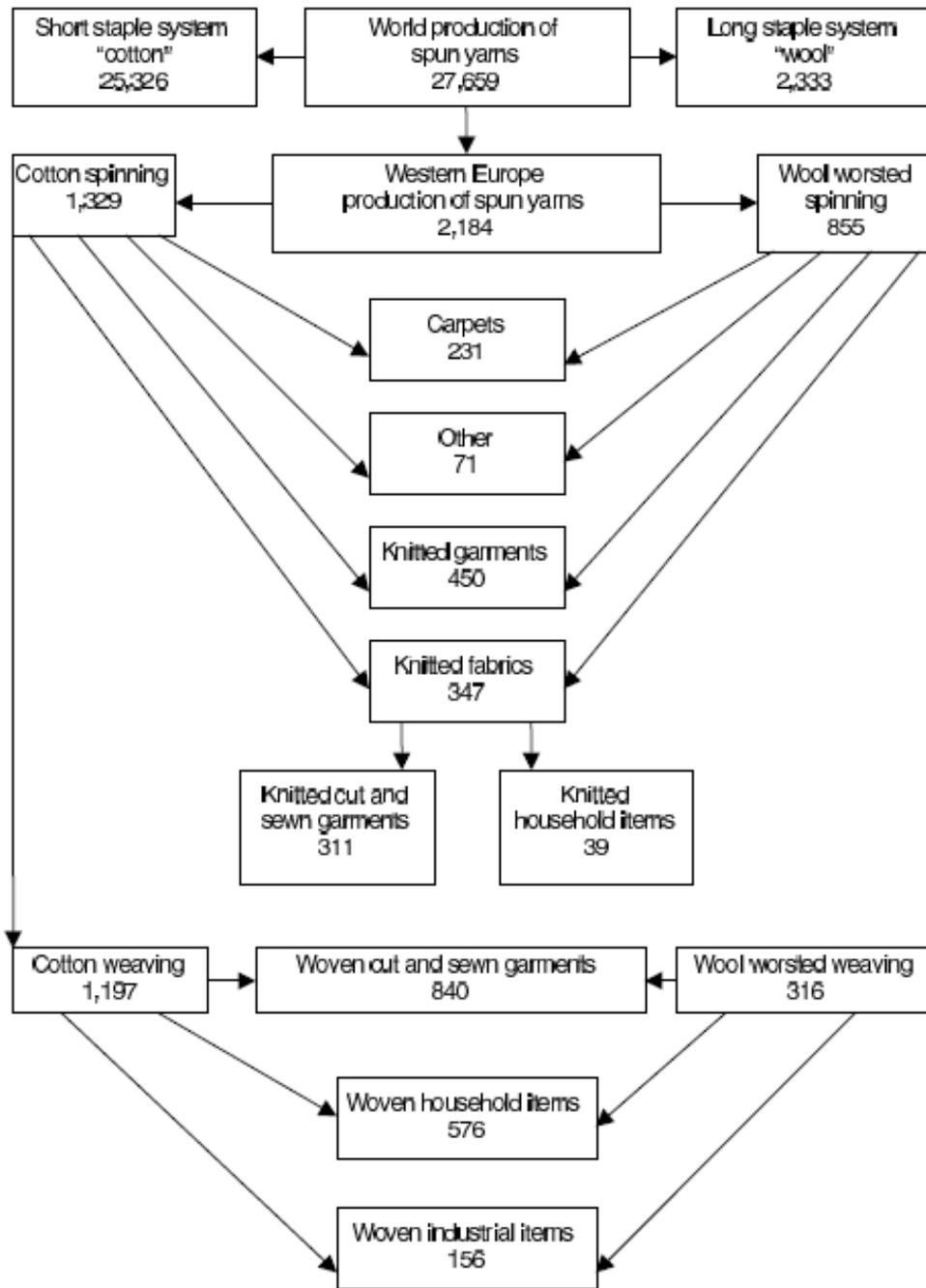


Note: ΔS indicates changing stocks (ending stocks – beginning stocks).

Formula for Fiber Model:

Fiber Imports + Fiber Production = Fiber Consumption + Fiber ΔS + Fiber Exports

Figure 1.5 The Model Applied for Cotton Fiber in 2002 [14]



Unit: Thousand Metric Tons

Note: Data indicate inputs at each process stage; also, data take into account imports and exports at each process stage and therefore do not sum to the totals indicated.

Figure 1.6 Schematic Flow Chart for Spun Yarn Production in 1999

Source: CIRFS (2001). *World Markets for Spun Yarns: Forecasts to 2010* (p. 2). Special Report No. 2649. Textiles Intelligence. UK: Textiles Intelligence Electronic Publishing.

Outline of Textile and Apparel Trade Policies

Textiles and clothing comprise a vitally important part of global trade.[16] As a growing number of producing nations entered the textile sector as a means of fostering economic development, the surge of production capacity exceeded slow growth demand on a global scale. Meanwhile, by offering many products at lower prices because of reduced labor costs, the developing countries increased substantially their share in the international textile and apparel market. As producers in developed countries attempted to protect their markets from imports from low-wage countries, trade policies emerged and then developed in order to mediate the problems associated with the worldwide overcapacity of production (i.e., surplus) [8]. Since textile and apparel trade policies have a direct impact on production around the world, a brief review of the trade agreements helps understanding the changes and trends in the textile product complex.

General Agreement on Tariffs and Trade (GATT)

In 1947, GATT was formed in order to resolve international trade problems. The primary goal of GATT was to liberalize trade, which means to free trade from the web of restraints that had evolved [8]. The General Agreement was applicable to the textile and apparel industries, as well as other industries involved in international trade. GATT was replaced by the World Trade Organization (WTO) in 1995 [17].

The Multi-Fiber Arrangement (MFA)

As a special protocol agreed upon by members of GATT, MFA governed the textile and clothing trade between 1974 and 1994 [17]. The MFA was originally designed

as a short-term quota program that allowed governments to control imports of specific products from specific countries for a temporary period of time [18]. The products in MFA included nearly all the major textile and clothing product categories except for those made from 100% silk and various other fibers consumed in small volumes [19].

The MFA was a framework for individual pairs of GATT member countries to negotiate bilateral agreements or unilateral actions with a view to establishing quantitative restraints (quotas) limiting imports into countries whose domestic industries were facing serious damage from rapidly increasing imports [20]. However, the exporting nations demanded to eliminate the MFA for many years because it was considered as a departure from normal rules and disciplines of GATT which insist that all GATT parties are to be treated equally [8]. On January 1, 1995, the MFA was superseded by the WTO Agreement on Textiles and Clothing (ATC) that sets out a ten-year transitional process for the ultimate removal of these quotas [21].

The Uruguay Round and World Trade Organization (WTO)

In order to strengthen GATT and to expand its coverage to new areas, trade ministers launched a new round of trade talks in Punta del Este, Uruguay on September 1986. This round of multilateral trade negotiations (MTN) talks was called the Uruguay Round. Whereas the previous rounds of MTNs focused especially on reduction of tariffs and nontariff barriers, the Uruguay Round aimed at rethinking trade policy areas in general [8].

As the embodiment of the Uruguay Round, the World Trade Organization (WTO) was founded in 1995. WTO is the successor to the GATT and becomes “the only global

international organization dealing with the rules of trade between nations” [22]. As of December 11, 2005, 149 countries have been the members of the WTO [23].

Agreement on Textiles and Clothing (ATC)

The ATC took over from the MFA on January 1, 1995, and provided for the complete phasing out of MFA quotas on textile and clothing among WTO members by January 1, 2005 [8; 17] As a transitional instrument, the ATC was built on the following pillars:

“(a) the product coverage, basically encompassing yarns, fabrics, made-up textile products and clothing; (b) a program for the progressive integration of these textile and clothing products into GATT 1994 rules; (c) a liberalization process to progressively enlarge existing quotas (until they are removed) by increasing annual growth rates at each stage; (d) a special safeguard mechanism to deal with new cases of serious damage or threat thereof to domestic producers during the transition period; (e) establishment of a Textiles Monitoring Body (“TMB”) to supervise the implementation of the Agreement and ensure that the rules are faithfully followed; and (f) other provisions, including rules on circumvention of the quotas, their administration, treatment of non-MFA restrictions, and commitments undertaken elsewhere under the WTO's agreements and procedures affecting this sector” [21].

At the heart of ATC was a carefully balanced transition program for the progressive integration of products over a ten-year period (1995-2004) and growth for remaining quotas until they are removed [8; 24; 25]. The integration of textile and

clothing products was carried out gradually in four stages over ten years. On the date of entry into force of the ATC (January 1, 1995), each importing country in the WTO had to integrate into GATT 1994 products accounting for not less than 16 percent of the total volume of the country's 1990 imports. The integration list had to encompass products from each of the following groups: tops and yarns, fabrics, made-up textile products and clothing. Once the products were integrated into the normal GATT rules, they were freed from any quota restrictions, and from the possibility of quotas being introduced on those products in the future [26]. At the beginning of stage II (January 1, 1998), importing countries were required to eliminate quota restrictions for another 17 percent of their 1990 imports. At stage III (January 1, 2002), not less than a further 18% of 1990 imports had to be integrated. Finally, on January 1, 2005, all remaining products would become integrated and the ATC terminated [21; 27].

Table 1.2 shows an example of the four-step quota phase-out schedule for each importing country, which is based on the commonly-used 6% annual expansion rate of the old MFA. In practice, the quota growth rates that existed under the MFA varied from product to product. The actual formula for import growth under quotas is also shown in Table 1.2.

Under the superintendence of WTO, by January 1, 2005, the textile and apparel trade was reintegrated into the mainstream of the WTO's trade rules. In particular, the MFA quotas came to an end, and importing countries are no longer be able to discriminate between exporters [20].

Table 1.2 The 10-Year Schedule for Integrating Textiles and Apparel into GATT Rules

STEP	Percentage of products to be brought under GATT (including removal of any quotas)	Percentage of products to be brought under GATT (including removal of any quotas)
Step 1: 1 Jan 1995 (to 31 Dec 1997)	16% (minimum, taking 1990 imports as base)	6.96% per year
Step 2: 1 Jan 1998 (to 31 Dec 2001)	17%	8.7% per year
Step 3: 1 Jan 2002 (to 31 Dec 2004)	18%	11.05% per year
Step 4: 1 Jan 2005 >Full integration into GATT (and final elimination of quotas). >Agreement on Textiles and Clothing terminates.	49% (maximum)	No quotas left
The actual formula for import growth under quotas was: by <i>0.1 x pre-1995 growth rate</i> in the first step; <i>0.25 x Step 1 growth rate</i> in the second step; and <i>0.27 x Step 2 growth rate</i> in the third step.		

Source: WTO (2006). Textiles: Back in the Mainstream. *Understanding the WTO: The Agreements*. Available at: www.wto.org/English/thewto_e/whatis_e/tif_e/agrm5_e.htm.

The Caribbean Basin Initiative (CBI)

CBI is officially known as the Caribbean Basin Economic Recovery Act. By offering special trade privileges for all CBI beneficiary countries, the CBI was signed into law in 1983 in order to boost CBI countries' economies and expanding their exports. The main benefit of the CBI available to all CBI countries was customs duty-free entry to the United States on a permanent basis for a wide range of products grown and manufactured in CBI beneficiary countries [28]. Although tariff-free was provided for most of Caribbean products coming into the U.S., tariffs continued to be levied on textile and apparel products [8].

North American Free Trade Agreement (NAFTA)

NAFTA became effective on January 1, 1994, establishing one of the largest and richest markets in the world [8]. In order to facilitate more trade for the United States, Canada, and Mexico, this agreement removes most barriers to trade and investment among the three countries. NAFTA encompasses the Canada-U.S. Free Trade Agreement (CFTA) that came into force on January 1, 1989 [26]. Under NAFTA, virtually all tariffs on originating textiles being traded between three members would be eliminated by January 1, 2003. The agreement signified that, “While each member country of NAFTA maintains its own external tariff, for example, the Most Favored Nation (MFN) tariff, the NAFTA preferential tariff is extended only to goods originating from a member country” [29]. NAFTA provisions for textiles and apparel have taken effect in stages, “all apparel made from North American yarn and fabric (meeting the substantial transformation rules) was immediately excluded from quota restraints, except for certain suits and shirts that are subject to quotas in varying stages for 10 years” (Dickerson, 1999, p.382). Products shipped to the United States would be monitored by U.S. Customs Service who could be lenient at first but eventually would impose harsh penalties for offenders [30].

The African Growth and Opportunity Act (AGOA)

As a form of economic aid to low-income African countries, The African Growth and Opportunity Act of 2000 (AGOA) was signed into law on May 18, 2000 as Title 1 of The Trade and Development Act of 2000. The AGOA authorized preferential access to the U.S. market for sub-Saharan exporters of apparel, which allowed more than 30

African countries, such as Kenya and Lesotho, to export cotton trousers and other products to the U.S. beyond the limits of the MFA quota system [31].

The Trade and Development Act of 2000

The Trade and Development Act of 2000 was enacted on May 18, 2000. This measure includes the U.S.-Caribbean Basin Trade Partnership Act of 2000 (CBTPA) and the AGOA as well as other important provisions. This agreement granted a new trade and investment policy for the countries of sub-Saharan Africa under the AGOA and extended trade benefits to the countries in the Caribbean Basin under the CBTPA [32].

CHAPTER TWO

LITERATURE REVIEW

Stages of Development in the Textile Complex

Almost every country in the world produces certain kinds of textile and apparel products, even though the relative importance of textile and clothing production varies both in relative terms in global markets and in relative terms within a country [8]. In other words, notwithstanding that the basic function and general characteristics of each segment in the textile complex are similar in most countries, differences are evident with regard to the degree of textile complex development in individual countries [9]. Toyne's stages of development provide a helpful conceptual approach for considering the extent to which the textile complex has developed in various nations or regions of the world [8]. The stages on "a continuum ranging from embryonic to declining" (Toyne et al., 1984, p. 20) are introduced as follows:

1. The Embryonic Stage. It is typically found in the least-developed countries where simple fabrics and garments made from natural fibers are produced primarily for domestic consumption. The industry is often little more than a collection of cottage industries. Usually, these countries import some affordable apparel components and probably export natural fibers (especially cotton). At present, the textile sectors in many countries in Africa are at this stage of development [8; 9].

2. Early Export of Apparel. It occurs due to low-wage labor used to produce garments in the nations at this stage of development. The products exported are mainly for low end-use market in developed nations. This may involve the assembly of

component parts of garments from other countries, ethnic clothing production, or the production of apparel requiring elaborate hand-work such as embroidery. Although the price is the main appeal for consumers, the quality of products is still a concern in some cases. Examples of countries at this stage are Nepal, Bangladesh, Sri Lanka, and several Latin American and Caribbean countries. Several members of Association of Southeast Asian Nations (ASEAN: comprising Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam) fit into this category [8; 9].

3. More Advanced Production of Fabric and Apparel. This stage evolves as domestic fabric output grows greatly with regard to quantity, quality and sophistication. Except for producing expanded and upgraded apparel to export, these nations in this stage develop their own fiber manufacturing and export the fabric made in their own countries. Generally speaking, the textile complexes at this level tend to be larger, more diversified, more concentrated and more internationally active. Many nations in Eastern Europe are well into this stage of the development, and some of the further advanced ASEAN countries are at this level as well. China is currently at this state and is making rapid progress towards self-sufficiency in manufactured fiber production [33]. It is to be noticed that in this process larger manufacturers and retailers in more-developed countries offer assistance to help the industries move forward. They assist by investing, by contracting or by providing information on technical aspects of production, management and marketing. In addition, movement from last stage to this stage is often inspired by local government policies that encourage import substitution and by initiatives that stimulate exporting [8; 9].

4. The Golden Age. At this stage of development, fabric and apparel production become further enlarged and more sophisticated. Also, enormous trade surpluses result. Man-made fiber production is more sophisticated and increases in volume. The domestic textile industries in this stage have capability of supplying a good proportion of fibers and fabrics to produce garments or other end-use products, even if imports of certain complex fibers may be increasing. The textile sector at this level continues to diversify its product mix and to become more powerful in international markets. Some textile and apparel firms not only accept contractual arrangements with firms from other nations but also initiate joint arrangements for their own firms. In other words, the leading firms in the nations at this stage invest in the other countries' industries rather than receiving investments from the more advanced countries. For instance, Taiwan and Korea are clearly at this stage of development. Also, Hong Kong is at the most advanced level of this stage although its industry can not easily develop its own manufactured fiber sector due to geographical limitation. However, nations with increased sophistication in textile sectors may start to show less interest in the textile complex and favor certain other industries instead, because more technology and capital are required for the industry at this level [8; 9].

5. Full Maturity. Although total output may be increasing in the nations at this stage of development, overall employment in the textile complex goes to decline, particularly for the apparel sector. The industry continues to become more concentrated; the process and products reach more advanced level. Meanwhile, the production tends to be capital-intensive, and a great deal of the capital is used to offset the labor advantages in competing countries and to invest in more sophisticated products. Toyne et al. [9]

pointed out that 1) the United States, Japan and Italy are at this mature stage; 2) Japan has much greater use of offshore production and contracting; and 3) Italian government offers vital assistance to its domestic textile complex. Nevertheless, some arguments exist in relation to the development level at which each of the three countries is placed, for they have certain characteristics of the next stage [8; 9].

6. Significant Decline. This final stage of development is characterized by the significant decline in the textile and apparel industry. Both the number of firms and the employment in the textile complex are reduced substantially in this level, and large trade deficits appear in many segments (especially in fabric and apparel). Some sectors are dying or perhaps cannot be revitalized; others can survive and may remain healthy. It is noticeable that offshore production increases greatly at this step of development. According to Toyne and his colleague [9], the examples of the countries at this stage are the United Kingdom, Germany, France, Belgium and the Netherlands, even though the degrees of the decline vary one from the other [8; 9].

As Dickerson [8] noted, it is a reasonable way to indicate the overall economic development by examining the stages of development of the textile complex within various regions of the world, because the development stages of a nation or region are generally parallel to the stages of development for textile and apparel production.

Textile and Apparel Trade

Textile and apparel production may be the only industry through which a relatively large number of developing countries can participate in international trade [8]. Particularly in some developing countries, trade acts as an “engine of growth” that

stimulates the country’s development of economy [34]. Since the trade patterns are tied closely to the production, the geographic shifts in textile and clothing production around the world can be reflected in the resulting trade shifts fostered by this trend [8].

The Silk Road – the Earliest Global Patterns of Trade

Textiles, from early days of the “Silk Road” have been traded between nations as a desirable commodity for protection, adornment, and transacting business. Beginning in around 100 BC, a network of overland trade trails developed to be the most important ancient trade route to carry goods between Asia and Europe [35]. A 19th-century German scholar named this group of trails as the Silk Road for the precious Chinese cloth that was originally the most valuable commodity was traded abundantly on it [36]. The series of the trade routes covering 4,000 miles waxed and waned over the centuries in response to environmental obstacles and changing political circumstances (see Figure 2.1). After a sea route from Europe to Asia was discovered in the late 15th century, the Silk Road, as the land commerce routes, was gradually abandoned in favor of ocean-borne trade [35].

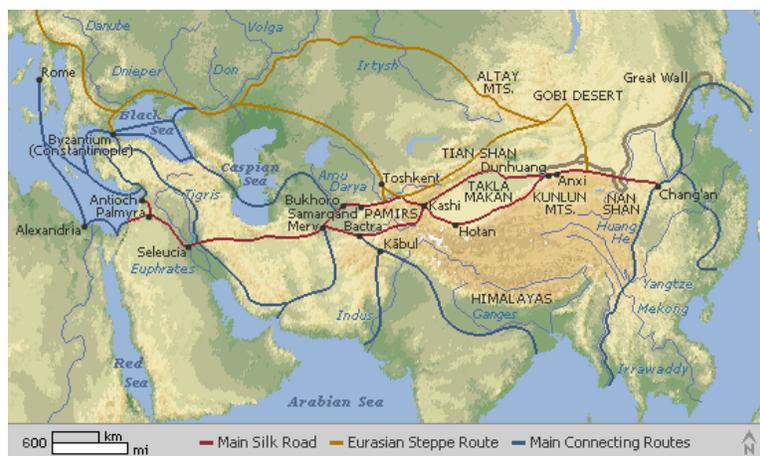


Figure 2.1 The Silk Road

Source: MSN. *Silk Road*. Available at: http://encarta.msn.com/media_461576246/Silk_Road.html.

Changes in World Trade in Textile and Apparel

As a number of emerging producing nations surged to compete for the world market share in the 1960s and 1970s, the overcapacity of production in textile and apparel occurred in the international market where demand was increasing slowly [8]. Since then, competition among nations has grown intensified in the global textile trade.

Nonetheless, the general trend of growth in world textile and apparel trade has prevailed for most of the period since 1994 according to the data from the WTO (see Table 2.1). The only exceptions to the common growth trend were two years of declines in 1998 and 1999 and a further fall in 2001. The main cause of the decline in 1998 and 1999 was the Asian financial crisis and its after effects, and the 2001 fall was principally due to the US recession that hit exports to the US market from Asia. World textile and clothing trade grew by \$17 billion from \$352 billion in 2000 to \$357 billion in 2002, showing a full recovery from the terrorist attacks on the US on September 11, 2001. In 2003, world textile trade grew in value by 12% and that of clothing by 15%. In 2004, world trade growth remained strong in both textiles and clothing after double-digit growth in the previous year. In value terms, textile trade rose to \$195 billion in 2004, up by 13% compared with the preceding year; while clothing trade grew by 11% to \$258 billion recorded for 2004 [37].

Table 2.1 World Trade in Textiles and Clothing

	Textiles	Clothing
Value (US\$ billion) (year of 2004)	195	258
Annual average % change		
1980-85	-1	4
1985-90	15	18
1990-95	8	8
1995-2000	0	5
2000-04	6	7
2002/01	5	5
2003/02	12	15
2004/03	13	11
% of world merchandise trade	2.2	2.9
% of world exports of manufactures	3.0	3.9

Source: Anson, R. & Brocklehurst, G. (2005). Trends in World Textile and Clothing Trade. *Textile Outlook International*, November-December 2005 (p. 97). Original source: World Trade Organization (WTO).

In fact, clothing trade has increased faster than textile trade since 1990. During the period of 1990-2004, world clothing trade increased by an average of 6.4% per year, while textile trade increased by only 4.6% per year. As a result, the share of clothing in total textile and clothing trade rose by 6.1 percentage points from 50.9% in 1990 to 57.0% in 2004; meantime, the share of textiles fell by the same percentage (6.1%), dropping from 49.1% to 43.0% over the fourteen years. Nonetheless, clothing trade has followed a similar pattern to that of textile trade, although it has grown at a faster pace [37].

However, WTO economists have predicted that world trade growth rate in 2005 will be slowed by lower economic output, partially due to the sharp rise in oil prices [38].

Changes in US Textile and Apparel Imports

In the past decade, changes in global textile and clothing production have tremendously impacted world textile trade. Given that the US is a large import market, changes in US imports can give some indication of global shifts in production locations.

Table 2.2 presents the US textile and apparel imports from the 35 selected suppliers between 1997 and 2002. US imports of textiles and apparel from the world grew by 67% in volume and by 34% in value over this six-year period to 38.3 billion square meters equivalent (SMEs) valued at \$72 billion. The main contributor (an 18.6% share) to the total increase in the US textile and apparel imports during 1997-2002 was substantial growth in China, whose shipments rose by 137% to 4.96 billion SMEs. Most of the growth in China occurred in 2002, when the shipments grew by 124.5% from 2.21 billion SMEs in the previous year. In 2002, China replaced Mexico as the US's leading textile and clothing supplier with a 13% share of the total import volume, while Mexico moved down to the second place with a 11.3% share of the total. Mexico's shipments increased by 43% from 3.04 billion SMEs in 1997 to 4.34 billion SMEs in 2002. Following rapid growth during the period of 1997-2000 (the early years of NAFTA), the imports from Mexico dropped by 9.6% to 4.29 billion SMEs in 2001, and then partially recovered in 2002, increasing by 1.1% to 4.34 billion SMEs [12].

Table 2.2 Textiles and Apparel: U.S. Imports from Selected Suppliers, 1997-2002
(1,000 square meters equivalent)

Country or Region Name	1997	1998	1999	2000	2001	2002
North America						
Mexico	3,041,069	3,559,315	4,142,701	4,746,533	4,289,934	4,335,089
Total Other Americas						
Bolivia	1,567	2,320	2,351	3,423	3,525	5,349
Colombia	100,347	96,070	112,570	117,338	96,518	109,611
Costa Rica	317,441	327,187	370,030	373,371	367,131	377,066
Dominican Republic	863,315	886,406	900,252	858,892	772,755	743,276
Ecuador	14,176	10,307	12,513	16,397	18,004	14,919
El Salvador	460,078	524,009	640,934	757,217	767,758	816,789
Haiti	78,228	113,415	127,350	125,011	109,099	109,285
Honduras	735,175	808,461	958,257	1,045,195	1,032,289	1,098,840
Jamaica	194,424	171,281	148,803	126,331	102,637	85,189
Nicaragua	47,765	56,597	69,381	87,513	97,724	120,441
Peru	45,198	44,597	58,315	70,461	58,281	63,474
East-Asia						
China	2,094,944	1,943,215	2,035,487	2,217,897	2,210,674	4,963,269
Hong Kong	863,355	1,020,897	1,017,557	1,123,250	1,092,272	961,680
South Korea	817,648	1,044,700	1,222,089	1,311,775	1,383,482	2,032,158
Macau	176,477	226,012	277,674	306,031	293,245	321,796
Taiwan	1,197,396	1,189,899	1,269,894	1,233,308	1,224,379	1,391,301
South Asia						
Bangladesh	764,510	865,537	910,519	1,130,770	1,169,041	1,149,765
India	985,739	1,083,648	1,149,428	1,248,337	1,250,245	1,544,666
Pakistan	1,125,845	1,483,357	1,544,766	1,996,768	2,189,346	2,536,917
Sri Lanka	479,375	527,636	559,945	655,436	631,465	559,150
South-East Asia						
Indonesia	855,047	974,751	907,305	1,052,667	1,164,629	1,215,355
Malaysia	238,490	263,499	321,503	337,407	288,980	325,592
Philippines	659,070	795,581	905,265	928,860	915,559	817,380
Thailand	768,575	997,023	1,117,474	1,318,245	1,308,481	1,315,546
Western Asia						
Jordan	1,331	2,610	1,365	20,314	62,667	91,328
Turkey	394,563	511,904	711,634	866,479	871,097	1,068,270
Africa						
Egypt	196,114	247,368	200,977	254,105	282,441	264,762
Kenya	11,305	10,223	12,573	12,670	18,573	36,514
Lesotho	21,312	23,955	25,804	34,366	50,913	84,393
Madagascar	4,633	5,280	9,247	20,511	37,486	22,165
Mauritius	34,222	37,566	38,950	40,115	41,116	47,064
South Africa	49,959	41,659	45,383	55,181	59,319	74,614
Middle-East						
Israel	266,001	298,416	359,775	476,367	517,174	533,959
World Total	22,894,521	25,944,586	28,614,986	32,864,151	32,809,615	38,284,599

Note: Rearranged by author in terms of region.

Source: USITC (2004). Textiles and Apparel: Assessment of the Competitiveness of Certain Foreign Suppliers to the U.S. Market. Washington, DC: United States International Trade Commission (USITC). Available at: <http://hotdocs.usitc.gov/pub3671/pub3671.pdf>.

After China and Mexico, other major textile and clothing suppliers to the US market in volume terms in 2002 included Pakistan, South Korea, India, Taiwan, Thailand, Indonesia, Bangladesh, Honduras, Turkey, Hong Kong, Philippines, El Salvador and Dominican Republic, in descending order of importance. Within these countries, Turkey, South Korea, Pakistan, Cambodia and Vietnam also posted significant growth in shipments to the US during 1997-2002 as shown in Table 2.2 [12].

Regional Patterns of Apparel Imports

In fact, many developing countries often have chosen textile and apparel production as the first industries to develop their economy and domestic industries. Moreover, the amount of labor involved in making garments, the availability of low-cost labor and the limited technology and capital requirements for apparel production have made apparel more attractive than textile production for these emerging countries [8]. As a result, global production shifts have taken place in both textiles and apparel sectors, but the changes for textile manufacturing are less dramatic than are those for apparel. Consequently, although similar trends occurred for the trade in both textiles and apparel, the shifts have been far more pronounced for clothing trade.

Substantial geographical shifts in clothing production have been reflected in the trade shifts for the apparel. Because the US is the world's biggest market for garment products, the breakdown of US apparel imports by region serves as a barometer of global shifts in garment assembly operation centers. Figure 2.2 shows the regional pattern of the US apparel imports in the 1990s, which helps to identify trade shifts among the main suppliers. The total value of the US clothing imports rose from \$25.0 billion in 1990 to

\$64.4 billion in 2000. Gereffi and Memedovic [6] demonstrated several key aspects of the direction and magnitude of change in the US apparel trade revealed in the map: First, there were striking regional differences in the imports pattern. The shipments from China, Mexico and to a lesser degree the Caribbean Basin were booming, while the Asian “Big Three” (Hong Kong, Taiwan and Republic of Korea) were becoming less important, and South and Southeast Asia were growing slowly or not at all. Second, a strong core-periphery pattern dominated the geography of exports activity during the 1990s in spite of considerable mobility. In the 1990s, the core suppliers were Hong Kong, the Republic of Korea, China and Mexico, but only China and Mexico held that distinction in 2000. There were 20 countries in the outer two rings that represent 1-4 percent shares of the total US apparel imports, none in the middle ring and three suppliers in the inner two rings that indicate 6% or more shares of the market. Third, Mexico improved its market share greatly, shifting from outside the circle (less than 1%) in 1990 to the core (over 10%) after ten years. By contrast, the degree of change for most countries was relatively modest between 1990-2000, moving by one ring or not at all [6].

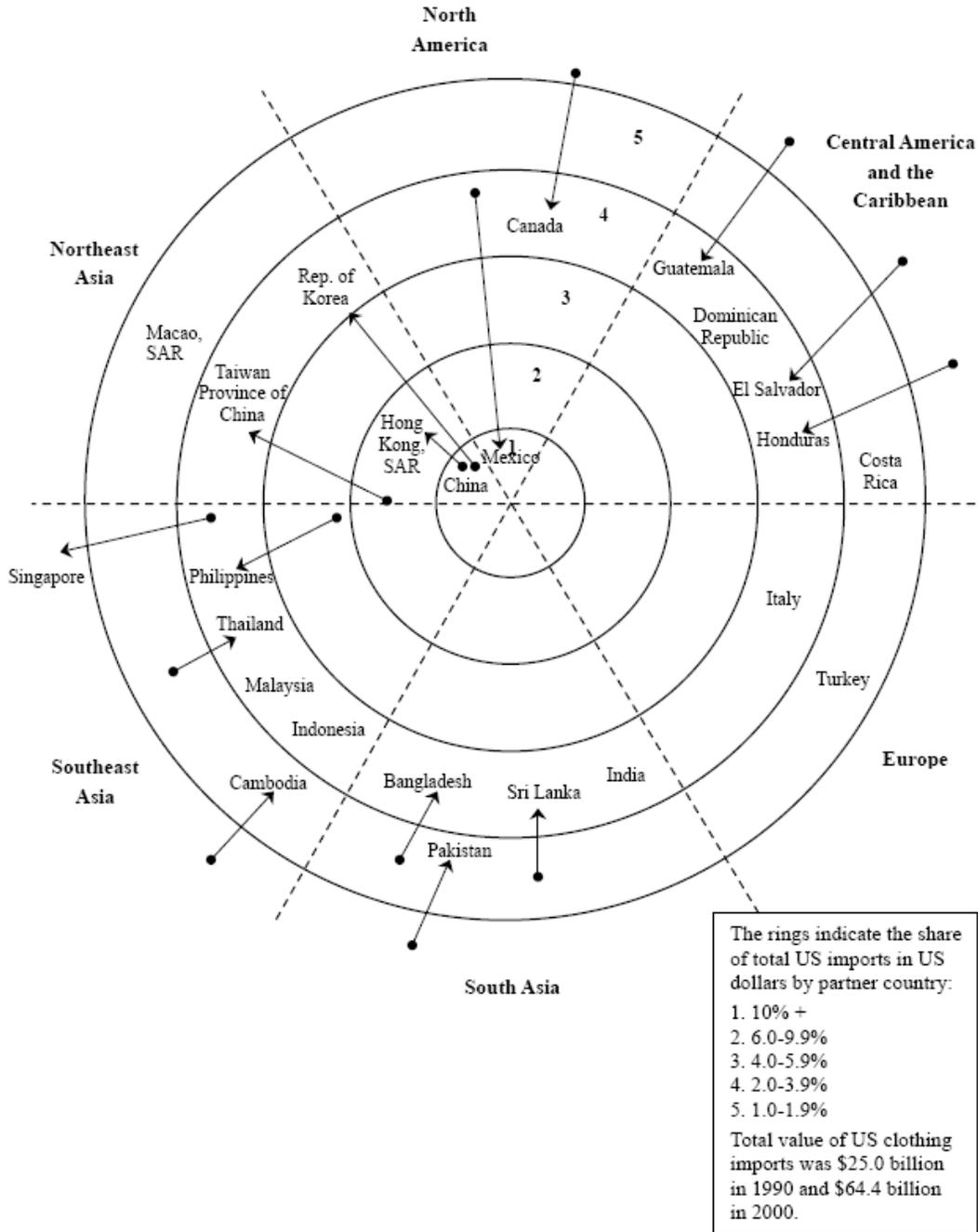


Figure 2.2 The Apparel Imports Map for the US: 1990-2000^a

Note: a. The 2000 position corresponds to the ring where the country's name is located; the 1990 position, if different, is indicated by a small circle. The arrows represent the magnitude and direction of change over time.

Source: Gereffi, G. & Memedovic, O. (2003). The Global Apparel Value Chain: What Prospects for Upgrading by Developing Countries? (p. 10). *Sectoral Studies Series*. United Nations Industrial Development Organization (UNIDO): Vienna. Available at: http://www.soc.duke.edu/~ggere/web/UNIDO-Global%20Apparel_2003.pdf.

In the case of the Europe, the world's second largest market, its apparel import map in the 1990s was similar in size and structure to that of the US. Within the Asian suppliers, only Hong Kong and China played major roles in 2000, and most of the Northeast and Southeast Asian countries lost European market share after 1990. Meantime, three new groups of countries became prominent suppliers to Europe: Turkey, Tunisia and Morocco, and several East European economies (especially Romania, Poland and Hungary) and the former Soviet Union. In the regional pattern of Japanese apparel imports in the 1990s, unlike the dense networks of 20-25 major exporters in the import maps for the US and Europe, only the Republic of Korea and China played central roles in 1990, when just 12 countries held a 1% share or more of the Japanese market in either 1990 or 2000. By 2000, China absolutely dominated the Japan's apparel market with a leading 76% share, surging from 31% in 1990. At the same time, the Republic of Korea fell from 26% in 1990 to around 4% of Japanese apparel imports in 2000 [6].

Nowadays, the developing countries have significantly increased their production capacity and have concentrated on exports as the main source of their economic progress. Meantime, these countries take advantage of domestic low-cost labor to offer more products at lower prices to compete in the global market. On the other hand, the textile and apparel industries in the developed countries have suffered substantial declines at the same time. Therefore, the textile and apparel manufacturers in the developed countries have begun to demand trade policies to effectively protect their domestic production and market. Meanwhile, the developing countries seek trade privileges to expand their market extent. Thus, the international trade becomes more and more intricate.

Effect of Quota Removal

Since the ATC entered into force on January 1, 1994, a number of literatures have predicted the likely impact of the gradual phase-out of quotas on international trade in textiles and clothing. According to Diao and Somwaru [39], the annual growth of world textile and apparel trade during the 25-year period following the ATC implementation is expected to be more than 5% faster than in the absence of the ATC. Furthermore, global clothing trade is likely to increase twice as fast as textile trade in the post-quota era [12; 39]. Furthermore, Avisse and Fouquin [40] estimated that the world trade would be about 10% higher in textiles and 14% higher in clothing as the result of the ATC [12; 40].

Although 2005 quota phase-out is predicted to result in an increase in global trade, its effect would be different among individual countries and regions [41]. Flanagan [42] noted that, in the midst of 73 countries included in the quota system, some countries were not able to fully use their quotas; on the contrary, China, India and Indonesia had consistently and widely utilized near saturation of quotas for yarn, fabric and garments. The removal of the unfilled or non-binding quota would have little impact on a country's ability to export since it could have kept on exporting to the quota limit in any case [12; 43]. Flanagan [42] divided countries into two groups based on the levels of "quota-constrained". Bangladesh, China, Hong Kong, India, Indonesia, Pakistan, Philippines, Korea, Sri Lanka, and Thailand were categorized as the group of "countries seriously held back, almost across the board, by quota today". Meanwhile, the countries such as Nepal, Oman, Qatar, and United Arab Emirates (UAE) were grouped into "countries whose quotas have been a valuable tool, now threatened" [12; 42].

Terra [44] estimated that following the elimination of the MFA quota, clothing production of the restrained suppliers as a whole would increase by 19.6% from 1995 to 2005, and their textile production could rise by 5.6% (see Table 2.3). During the same time, the market shares would shrink within non-quota-constrained exporters, such as Mexico, Africa and CBI countries; the big suppliers subject to restrictions could take the place of a fall in the exports of Latin American countries; MERCOSUR (a customs union between Brazil, Argentina, Uruguay, Paraguay and Venezuela) and Chile might decrease their exports of clothing significantly and their textiles exports moderately [44].

Table 2.3 Likely Impact of Quota Removal on Textile and Clothing Production and Trade: 1995-2005

Region	(Percent Change)			
	Production		Trade	
	Textiles	Apparel	Textiles	Apparel
Importers:				
United States and Canada.....	-2.6	-8.6	-1.3	-8.1
EU.....	-0.9	-3.7	-0.7	-6.1
Exporters:				
Restrained exporters.....	5.6	19.6	4.4	32.0
Argentina.....	0	0	0.3	-6.8
Brazil.....	0	-0.1	0.4	-13.7
Chile.....	-0.4	-0.6	-4.3	-17.9
Mexico.....	-5.5	-20.9	-1.6	-64.0
Uruguay.....	1.2	-0.9	2.3	-5.4
Other Latin America.....	-16	-35.8	-0.4	-92.1
Rest of the World.....	-0.2	-0.5	1.7	-10.4

Source: USITC (2004). Textiles and Apparel: Assessment of the Competitiveness of Certain Foreign Suppliers to the U.S. Market. Washington, DC: United States International Trade Commission (USITC). Available at: <http://hotdocs.usitc.gov/pub3671/pub3671.pdf>.

It is predicted that 2005 quota phase-out would “exact a heavy toll on many of the poorest countries given the heavy reliance of a number of small exporting nations on textile and apparel exports” (Gereffi and Memedovic, 2003, p. 11). For example, textile and apparel contributed to 86% of Bangladesh’s total exports and accounted for 37% of Nicaragua’s total exports in 2001. Figure 2.3 lists some selected countries whose textile

and apparel exports significantly contributed to their total manufacture exports in 2001 [45]. It is also seen that the reliance on textile and clothing exports was also exceptionally high for Honduras (63%), El Salvador (60%), Hong Kong (52%) and Dominican Republic (51%).

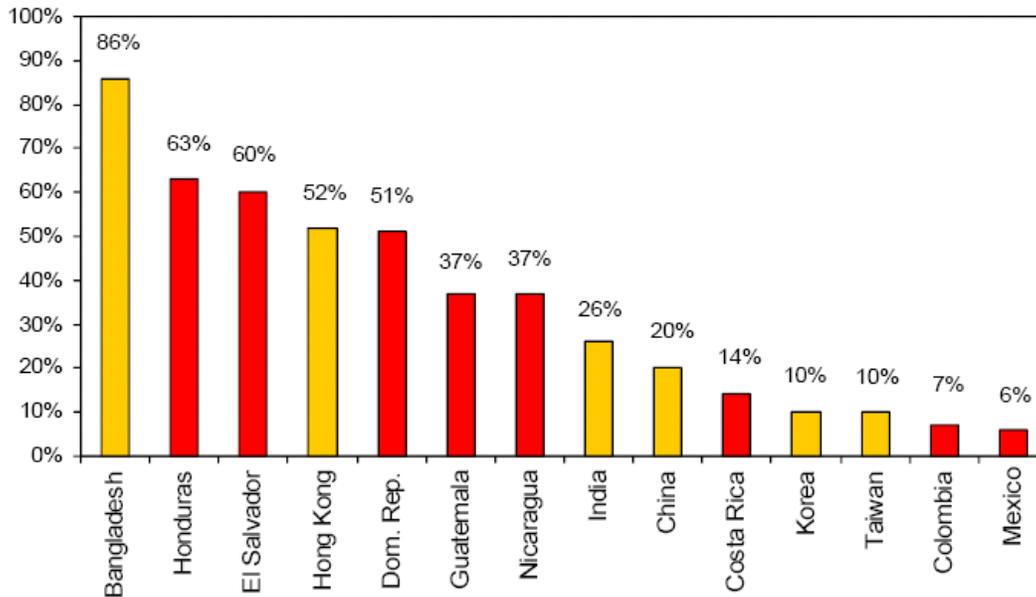


Figure 2.3 Textile and Apparel Exports as a Percentage of Manufacture Exports in Selected Countries: 2001

Source: Condo, A. (2004). China's Competitiveness and the Future of the Textile Sector in Latin America. *2004 Laeba Annual Conference: The Emergence of China: Challenges and Opportunities for Latin America and Asia*. Available at: http://www.iadb.org/laeba/downloads/Annual%20Conference%202004/PPT_ArturoCondo.pdf.

Moreover, recent simulation studies have reported that, after the quota regime is abolished in 2005, ASEAN and South Asia countries and China would experience the largest exports expansions, while Hong Kong, Taiwan and South Korea, as well as Latin American and African countries are likely to see relatively small expansions (and possibly reductions) in exports [39; 40; 44].

On January 1, 2005, the quantitative restrictions (quotas) on textile and apparel trade between World Trade Organization (WTO) members were eliminated in accordance

with the Agreement of Textiles and Clothing (ATC). The gradual removal of quotas has already had a drastic impact on the world textile and clothing sectors. The substantial gains benefiting from the removal of those longstanding quotas have been enjoyed by a small number of large, low cost clothing suppliers, including China, India, Pakistan and Bangladesh. However, meanwhile, the elimination of those quantitative restraints has had a detrimental impact on enormous small developing countries and higher cost suppliers such as South Korea and Taiwan [46].

The elimination of quotas will continue to have a major effect on the global textile complex in the years ahead. As the United States Trade Representative (USTR) pointed out, “the completion of the quota phase-out may be that significant changes will occur in the global pattern of production, trade and consumption of these products” [12].

Effect of China’s Accession to the WTO

China is the world’s largest producer of textiles and clothing [47]. Chinese textile and apparel industry is extremely competitive and characterized as “a high degree of vertical integration, low costs of production, a skilled workforce and ample access to raw materials” (Textile Outlook International, March-April 2006, p.54). Additionally, Chinese manufacturers have the ability and resources to produce “a broad assortment of quality products in virtually all price ranges” (Textile Outlook International, March-April 2006, p.54).

On the other hand, Chinese exports of textile and clothing have increased rapidly since China joined the WTO in late 2001. In 2002, US textile and clothing imports from China jumped by 33.8% in value and by 124.5% in volume. In 2003, Chinese textile and

apparel exports to the US increased by 32.8% in value and 67.0% in volume. In 2004, they went up by 25.4% in value and 40.7% in volume. Similarly, in 2005, US textile and clothing imports from China rose in value by 53.9% to US\$22.41 billion, and in volume they grew by 43.8% to 16.77 billion SMEs.

In particular, China is by far the world's largest clothing exporter, since it supplanted Hong Kong as the world's biggest clothing supplier in 1994 [37]. The surge in US clothing imports from China started in early 2002 when a large proportion of its exports were quickly freed from quota restrictions soon after China's entry into the WTO [49]. The growth was also rapid in subsequent years. In terms of value, China had a commanding 24% share of world clothing exports in 2004 whereas Hong Kong's share was just 12.2% even when re-exports were included [37]. During the first eight months of 2005, US clothing imports from China soared in volume by 119.7% to 4.07 billion sme, which accounted for 27.9% of the US clothing import market compared with 14.3% during the corresponding period in 2004 [46]. In addition, some economists have predicted that, after the quota regime is abolished in 2005, "China is expected to win most of the newly freed market to the detriment of other developing country exporters" [41].

In the light of the surge in shipments of some kinds of products in the quota-free world, the US Committee for the Implementation of Textile Agreements (CITA) responded by imposing safeguard quotas on imports of a range of key products from China in late May 2005, aiming to protect the US textile industry from mounting Chinese competition and to preserve the share of the US clothing market held by Western

Hemisphere producers, including Mexico, the Caribbean Basin and the Andean region [46].

Although the U.S., Europe and a few other WTO members have used safeguard quotas to protect their markets after 2005 quota removal, China's exports of textile and apparel remained to increase by more than 20% in the first transition year 2005 [48]. Undoubtedly, China has been the biggest beneficiary of quota phase-out as the result of China's accession to the WTO [46]. Also, China is likely to continue to make substantial gains in the post-quota world despite new US and EU quota restraints.

Changes in Global Patterns of Employment

Textile and clothing production, as a vital part of a global economy, represents "the largest source of industrial employment in the world" (Dickerson, 1999, p. 5) and the textile and apparel industries are the "employment nucleus of the complex" (Toyne et al., 1984, p. 8). Globally, the textiles and clothing industries are large employers of labor, accounting for 14.2% of all employment in 1998. World production in textiles was worth at US\$485 billion and clothing at US\$335 billion in 1998, when 13 million workers were employed in textile production and an estimated 10.7 million in the clothing manufacturing [50]. But, it is argued that the employment figures were likely to grossly underestimate the actual numbers of people involved but were not recorded in any official statistics [2; 3]. Table 2.4 shows the global patterns of the employment in textile and apparel industries in 1998 [2; 50].

Table 2.4 Percentages of World Employment by Region in 1998

Region	Textiles	Clothing
Europe	16.6	22.3
Asia	72.5	60.4
Oceania	0.4	0.0
Africa	2.9	5.3
America	7.6	12.0

Source: OETH [50] and Hines, T. [2].

Within the global textile sector, Asia was the largest employer in both textile and apparel industries in 1998, with a 72.5% share in textiles and 60.4% in apparel. In the global scope, the number of employment in textile and apparel industries, especially clothing sector, has increased rapidly in recent years. By 2003, world production in clothing was valued at US\$350 billion and the figures for employment in entire industry were estimated at 40 million [51].

Textile and apparel production is dispersed in both the developed and developing countries [8]. In recent years, when the developing countries have gained an increasing share of the world market, the developed countries have witnessed a drastic decline in production as well as employment in their domestic textile and apparel industries. Table 2.5 shows the changes of employment in U.S. textile and apparel industries over the period of 1990-1998 [52]. Although the original purpose for this chart was to measure the impact of NAFTA by comparing the rate of the job loss in U.S. before and after 1994, the trends in US employment for textile and clothing industries remain to shrink, no matter what was the real reason, NAFTA or ATC. Between 1997 and 2004, the US textile sector closed over 250 textile plants at home and lost more than 200,000 jobs [53]. Similarly,

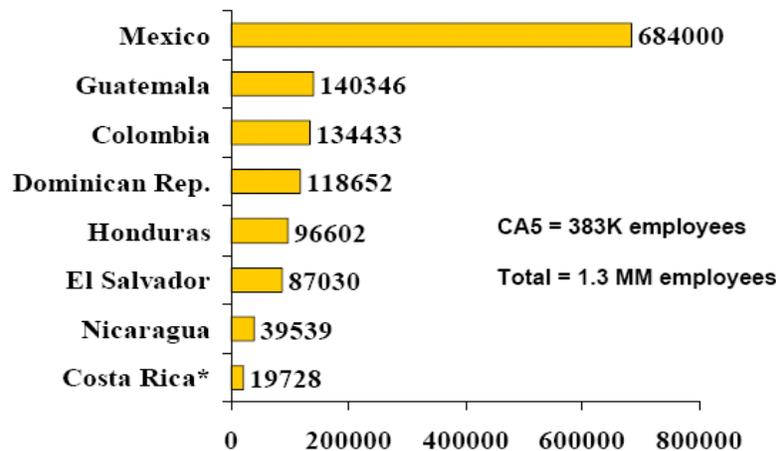
nearly a million jobs were lost in the European textile and apparel industries over 1990 and 2000 [54]. Between 1995 and 1999, the EU employment dropped by 9.1% [2].

Table 2.5 Changes of Employment in US Textile and Apparel Industries (1990-1998)

	Production Workers ('000)			Total Lost Jobs		Average Annual Change (%)		Change in Rate of Loss
	1990	1994	1998	1990-94	1994-98	1990-94	1994-98	1994-98 / 1990-94
Textile	592.9	574.5	505	-18.4	-69.5	-0.8	-3.2	4.08
Apparel	868.5	814.7	619.9	-53.8	-194.8	-1.6	-6.6	4.18

Source: Levinson, M. (1999). Testimony Before the Subcommittee on Trade of the House Committee on Ways and Means. Union of Needletrades.
Available at: <http://waysandmeans.house.gov/Legacy/trade/106cong/3-23-99/3-23levi.htm>.

Similarly, most recently, the decline in employment in textile and clothing production was observed in Latin American countries to which clothing production originally migrated. For instance, among Latin American countries, Mexico has the largest amount of employees (684,000 in 2003) in the textile and clothing industry, accounting for 52.6% of total Latin American employment (see Figure 2.4) [45]. But, more than 100,000 jobs were lost in the country in 2003 [54].



Note: * Preliminary Data.

Figure 2.4 Employment for Textile and Clothing Sector in Selected Latin American Countries in 2003

Source: Condo, A. [45].

At the same time, the number of workers in the textile and apparel industries has substantially increased in Asia, notably China, India and Pakistan. The data from CNTIC (China National Textile Industry Council) showed that Chinese textile and clothing industries hired near 15 million people in 2002, and 7.9 millions were employed in the textile-related industries [12; 55]. The same figure (approximately 15 million) was recorded for the workers in India's textile sector. In Pakistan, upwards of 1.4 million people were employed in the textile and apparel industries, accounting for roughly 40% of the employment in the manufacturing sector, and almost half of them (0.7 million) in apparel sector [55]. Generally speaking, nearly all the increases in the employment in the global textile sector are attributable to the growth in the developing countries [8].

Labor Costs

In fact, wage differences are a key factor in the global employment shifts in the textile sector, because the labor-intensive aspects of textile and apparel production, especially clothing manufacturing, make this sector quite costly in countries where wages are high.[8] Therefore, the labor costs have a major impact on the employment in the textile and apparel manufacturing in certain country or area. For example, in contrast to China, India and Pakistan, Korea experienced a decline in total employment in the textile and apparel industry, down from 151,500 workers in 1997 to 132,300 workers by 1999 [55]. The main reason was the fact that in 1998 the average hourly labor costs (see Table 2.6) in Korean textile industry was \$3.63 per hour, which was much higher than those in China (\$0.62), India (\$0.6), and Pakistan (\$0.4).

Table 2.6 Labor Costs in the Textile Industry, by Region, 1994-2004 (US\$/hour)

Country or Region Name	1994	1996	1998	2000	2002	2004
Total Europe						
Austria	19.47	20.61	18.13	15.8	19.01	24.55
Belgium	23.15	25	21.7	19.55	23.83	30.42
Bulgaria	n/a	n/a	n/a	n/a	1.01	1.5
Czech Rep.	1.51	2.21	2.05	1.97	2.36	3.94
Denmark	22.04	25.65	23.1	22.27	25.8	n/a
France	15.35	16.45	14.16	13.85	15.93	21.03
Germany	20.77	21.94	21.48	18.1	21.18	27.69
Greece	7.68	8.92	7.99	7.24	8.47	11.67
Hungary	2.19	3.18	2.98	2.63	n/a	n/a
Ireland	11.07	11.83	10.76	10.31	12.59	16.6
Italy	15.67	16.65	15.81	14.71	15.6	19.76
Netherlands	21.77	23.02	19.88	19.48	22.72	n/a
Poland	1.51	2.39	3.15	2.35	2.9	3.8
Portugal	4.02	4.77	4.51	4.31	5.36	6.87
Slovakia	1.54	1.67	1.48	1.61	1.9	3.43
Spain	8.55	9.21	8.49	8.32	10.67	14.06
Sweden	17.34	20.84	19.41	17	16.97	n/a
United Kingdom	10.74	11.71	13.58	12.72	13.93	20.17
North America						
Canada	13.6	13.92	13.93	14.29	13.59	18.61
USA	11.89	12.26	12.97	14.24	15.13	15.78
Mexico	3.22	1.52	2.23	2.2	2.3	2.19
Total Other Americas						
Argentina	2.89	4.6	4.88	5.9	1.7	2.86
Brazil	1.76	3.84	4.05	3.2	2.5	2.83
Colombia	1.88	2.14	2.51	1.92	1.82	1.97
Peru	1.7	1.98	2.09	1.74	1.63	1.93
Venezuela	1.85	2.51	3.3	2.78	1.84	2.85
Turkey	2.31	2.02	2.48	2.69	2.13	2.88
East-Asia						
Japan	25.62	24.31	20.71	26.1	22.76	18.95
China, inland	0.48	0.58	0.62	0.69	0.41	0.48
China, coastal	n/a	n/a	n/a	n/a	0.69	0.76
China, Hong Kong SAR	4.4	4.9	5.65	6.1	6.15	6.21
South Korea	4	5.65	3.63	5.32	5.73	7.1
Taiwan	5.98	6.38	5.85	7.23	7.15	7.58
South Asia						
Bangladesh	0.26	0.44	0.43	n/a	0.25	0.28
India	0.58	0.56	0.6	0.58	0.57	0.67
Pakistan	0.45	0.43	0.4	0.37	0.34	0.37
Sri Lanka	0.42	0.45	0.49	0.46	0.4	0.46

(Table 2.6 Continued)						
Country or Region Name	1994	1996	1998	2000	2002	2004
South-East Asia						
Indonesia	0.46	0.52	0.24	0.32	0.5	0.55
Malaysia	n/a	n/a	n/a	1.13	1.16	1.18
Philippines	0.95	0.91	1.12	n/a	n/a	n/a
Thailand	1.41	1.56	1.09	1.18	1.24	1.29
Vietnam	0.39	n/a	0.39	n/a	n/a	0.28
Australia	12.42	13.91	11.39	10.85	10.38	16.47
Africa						
Egypt	0.64	0.84	0.91	1.02	1.01	0.82
Kenya	n/a	n/a	n/a	n/a	0.62	0.67
Morocco	1.54	1.92	1.89	1.87	1.89	2.56
South Africa	2.19	1.86	2.05	1.82	2.17	3.8
Tunisia	n/a	1.89	1.76	1.65	1.77	2.05
Middle-East						
Israel	6.81	7.34	6.98	7.43	8.17	9.35

Note: Rearranged by author based on region.

Source: Anson, R. & Brocklehurst, G. (2005). Trends in World Textile and Clothing Trade. Textile Outlook International, Nov.-Dec. 2005 (p. 108). Textiles Intelligence Limited.

Table 2.6 presents comparison of hourly labor costs for the textile industry in selected countries from 1994 to 2004. The dramatic shifts in production sites are mainly due to the high labor content of many textile products, notably in apparel [8]. Thus, as Hurley and Miller [54] wrote that, “it is no accident that the major centers of garment manufacture are located in those parts of the world where wage costs are lowest” (Hurley & Miller, 2005, p.32).

CHAPTER THREE

METHODOLOGY

This research focuses on the analysis of the rate of change in country of production origin for fiber, yarn, fabric and end-use products over the past decade. A series of the data chosen in this study are from various categories at different tiers in the model of the textile product complex. Analysis of the integral and comprehensive data would give a practical interpretation of the direction and magnitude of changes in worldwide textile and apparel production.

Model of the Textile Product Complex as Framework

As introduced earlier, the model of the textile product complex (see Figure 1.4) can not only show the linkages of production, consumption and trade, but also represent material flows along textile and apparel production chain. Thus, the model of the textile product complex constructed by the author is served as the framework in this study.

Use of Data

The data collected for this study concentrate on the comprehensive production data in the last decade. The data used in this research were compiled from various databases and then transferred to Excel spreadsheets for further analysis. Most of the production data were converted to the uniform unit measurement (thousand metric tons) in order to help in comparison of the data gathered from a variety of sources. It should be emphasized that the most of the production data were compiled from several yearly reports, and almost all charts with regard to production are “originals”, which were

constructed by the researcher. Also, it is important to mention that the calculations of percentage change are based on the unrounded data.

Data Sources

After compiling data, validating data is a crucial step to be taken. Since the analysis and conclusions are dependent upon the data used, the data sources selected for this study are extremely important for the integrity of the data. The majority of the production data used in this research was compiled from the journals or reports published by the following organizations/associations.

The Fiber Economics Bureau (FEB)

The Fiber Economics Bureau (FEB), founded in 1935, is the statistics division of the American Fiber Manufacturers Association, Inc. (AFMA). FEB collects and publishes trade and production data on the manufactured fiber industry, and claims itself as “the only source of direct statistics on the United States manufactured fiber industry and its products” [56]. FEB contacts and cooperates with manufactured fiber producers around the world who provide confidential producing data. Fiber Organon, a monthly statistical journal, is one of its publications. Fiber Organon focuses on the information on U.S. man-made fiber market, but global and natural fiber reports are also included.

International Textile Manufacturers Federation (ITMF)

The International Textile Manufacturers Federation (ITMF), the oldest international industrial trade association in the world, was formed in 1904, at a meeting convened at the initiative of the British cotton spinning industry. In 1963 ITMF's headquarters were moved from Manchester, England, to Zürich, Switzerland in order to facilitate international contacts and to improve administrative services and communications. ITMF says, "on the basis of its present structure and scope, the Federation is qualified to represent the broadest possible segment of the world's textile industries" [57]. Most of their publications are released once a year or once every two years. Country Statements is one of ITMF's publications specific for its annual conference. Country Statements of each year publishes a review of the past year's state of the textile industry in each member country. The data included in the report are related to the general economic situation, textile manufacturing capacities, activity levels and trade in textiles.

International Cotton Advisory Committee (ICAC)

In September 1939, an international cotton meeting was held to discuss problems of over-production, rising stocks and falling prices in the world cotton economy. The International Cotton Advisory Committee (ICAC) is the outgrowth of the meeting. At first, members were limited to cotton producing countries. Later on, they were extended to all other United and Associated Nations substantially interested in the production, export or import of cotton. As of 2005, 41 countries have joined the ICAC as members. The intrinsic parts of ICAC's work are: 1) to "provide statistics on world cotton

production, consumption, trade and stocks” and 2) to “identify emerging changes in the structure of the world cotton market” [58]. Review of the World Cotton Situation is published by ICAC, aiming to examine the world cotton market in detail. The main objectives are to provide projections of world supply and demand by country and international cotton prices. World Textile Demand is another ICAC’s publication that analyzes and projects world end-use textile fiber, mill use, production and trade of cotton and chemical fiber yarn and fabric [59].

Textiles Intelligence

Textiles Intelligence was founded in 1992 as a spin-off from the Economist Intelligence Unit. It provides business information on the global fiber, textile and apparel industries. Textile Outlook International is published by Textiles Intelligence. It presents expert comment and analysis in worldwide perspective, such as world textile and apparel trade and production trends, and profiles of companies and countries in global textile and apparel sectors [60].

CIRFS

CIRFS is “an abbreviation for ‘Comité International de la Rayonne et des Fibres Synthétiques’ or in English ‘The International Rayon and Synthetic Fibers Committee’. It is the representative body for the European man-made fiber industry” [61]. CIRFS is based in Brussels and consists of members and associate members mainly scattered around the Europe, as well as a group of major international raw material suppliers. A series of special reports published by Textiles Intelligence were written by David Morris

and produced by Deborah Tunney of CIRFS [62]. One example of these reports is World Markets for Knitted Textiles and Apparel: Forecasts to 2010.

CHAPTER FOUR

CHANGES IN WORLD FIBER PRODUCTION

Worldwide Production of Synthetic Fiber (Except Olefin)

During the period of 1994-2004, the global production of synthetic fiber (except olefin) soared by 13.75 million tons (76.6%) to 31.69 million tons in 2004. The biggest leap occurred between 1996 and 1997 by 2.24 million tons. The projected production for the year of 2006 will be 43.79 million tons, increasing by a further 38.2% from 2004 (see Table 4.1). In year 2004, East Asia was the main center of production with a 60.0% share, followed by North America accounting for 10.9%. In regional terms, there was a further shifting of production activities from North America and Europe, showing a combined 6.46% decline, to Asia with a total increased production by 79.1%. Figure 4.1 indicates the trends in synthetic fiber production worldwide over the period 1994-2006.

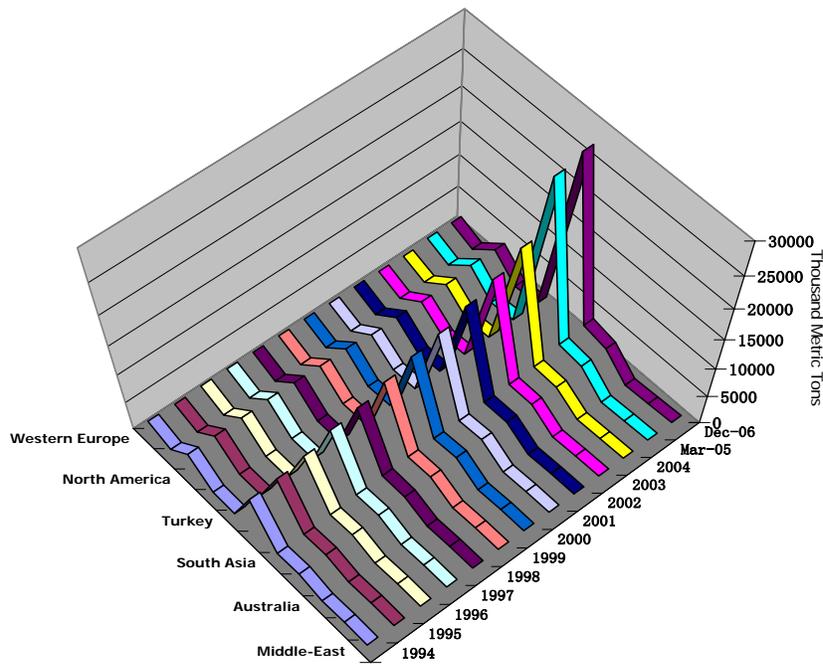


Figure 4.1 Synthetic Fiber Production & Producing Capacity by Region except Olefin: 1994-2006[63]

Table 4.1 Worldwide Synthetic Fiber Production by Region except Olefin: 1994-2006
(Unit: Thousand Metric Tons)

Country or Area Name	Actual Production						
	1994	1995	1996	1997	1998	1999	2000
Western Europe	2366.1	2279.5	2432.9	2434.6	2327.3	2267	2262
Eastern Europe	799.4	744.6	666.5	650.7	604.7	548.9	588.2
<i>Total Europe</i>	<i>3165.5</i>	<i>3024.1</i>	<i>3099.4</i>	<i>3085.3</i>	<i>2932</i>	<i>2815.9</i>	<i>2850.2</i>
USA	3250.3	3238.9	3284.1	3420	3301.1	3169.5	3149.2
Canada	175	183	149.9	147.9	146.9	143.9	139.4
Mexico	484.4	516.6	563.3	594.1	558.3	571.2	586.8
<i>North America</i>	<i>3909.7</i>	<i>3938.5</i>	<i>3997.3</i>	<i>4162</i>	<i>4006.3</i>	<i>3884.6</i>	<i>3875.4</i>
Argentina	46.4	46.9	54.2	63.4	71.6	67	87
Brazil	243.2	227.4	229.6	256.3	264.2	292.6	311.1
Colombia	63.2	71.2	65	67.1	54.7	59	59.3
Peru	44	41	42.2	42.9	40.8	44.1	48.3
Venezuela	44.5	42.1	45.1	46.2	43.7	30.2	29.2
<i>Total Other Americas^a</i>	<i>466</i>	<i>452.4</i>	<i>468.3</i>	<i>513.4</i>	<i>514.2</i>	<i>530</i>	<i>562.8</i>
<i>Turkey</i>	<i>372.4</i>	<i>452.9</i>	<i>478.5</i>	<i>519.9</i>	<i>563</i>	<i>613.5</i>	<i>744.5</i>
Japan	1394	1400	1399	1433.6	1363.6	1299.7	1307.9
China, PRC	2119	2283.7	2729.6	3332.5	3840.5	5235.1	6158.4
South Korea	1825	1858.2	2025.2	2403.3	2446	2592.8	2659
Taiwan	2301.5	2410.5	2561	2932.4	3112.4	2927.7	3122.9
<i>East-Asia</i>	<i>7639.5</i>	<i>7952.4</i>	<i>8714.8</i>	<i>10102</i>	<i>10762.5</i>	<i>12055</i>	<i>13248.2</i>
Bangladesh	4.2	11.8	14.6	14.3	13.1	13.7	13.5
India	681.1	738	916.4	1240.7	1357	1493.3	1568.4
Pakistan	227.5	255	312.8	322.7	427.8	478	503.9
Sri Lanka	2.9	5	5.4	5.3	4.6	5.1	5.4
<i>South Asia</i>	<i>915.7</i>	<i>1009.8</i>	<i>1249.2</i>	<i>1583</i>	<i>1802.5</i>	<i>1990.1</i>	<i>2091.2</i>
Indonesia	612.8	643.3	779.6	864.8	861.9	1037.8	1053.8
Malaysia	83.7	60.6	206.1	306.1	338	369	424.3
Philippines	37.9	38.5	11.1	9.2	9	8.5	10.2
Singapore	3.6	5.3	5.6	6.4	2.7	8.2	8
Thailand	420.1	479.2	533	575.4	507.3	694.2	757.8
Vietnam							
<i>South-East Asia</i>	<i>1158.1</i>	<i>1226.9</i>	<i>1535.4</i>	<i>1761.9</i>	<i>1718.9</i>	<i>2116.9</i>	<i>2354.7</i>
<i>Australia</i>	<i>11.6</i>	<i>12.5</i>	<i>16.2</i>	<i>32.9</i>	<i>38.5</i>	<i>41.7</i>	<i>27.9</i>
Egypt	40	40.3	42.2	42.9	40.4	57.8	68
Kenya	11.1	11.7	12	12.9	11	11.9	12.1
Nigeria	18.7	19.2	18.4	18	18.3	20.2	25.2
Morocco	11.3	13.2	14.4	14.9	14	15.1	15
South Africa	130.4	129.7	136.5	141.8	144.6	129.8	120.8
Tanzania	2.6	2.8	2.7				
<i>Africa</i>	<i>214.1</i>	<i>216.9</i>	<i>226.2</i>	<i>230.5</i>	<i>228.3</i>	<i>234.8</i>	<i>241.1</i>
Iran	76.2	79.2	84.9	86.9	92	106.6	128.1
Israel	10.2	11.1	10.6	11.2	12.1	19	21
Saudi Arabia			26.4	62.8	70.3	73.8	73
United Arab Emirates						2	11.1
<i>Middle-East</i>	<i>86.4</i>	<i>90.3</i>	<i>121.9</i>	<i>160.9</i>	<i>174.4</i>	<i>201.4</i>	<i>222.7</i>
World Total	17939	18376.7	19907.2	22151.6	22740.6	24485	26128.6

(Table 4.1 Continued)

Country or Area Name	Actual Production				Producing Capacity	
	2001	2002	2003	2004	Mar-05	Dec-06
Western Europe	2123.2	2147.5	2025.9	1893.6	2254.9	2187.3
Eastern Europe	563.5	575.1	581	581.7	801.4	802.4
<i>Total Europe</i>	<i>2686.7</i>	<i>2722.6</i>	<i>2606.9</i>	<i>2475.3</i>	<i>3056.3</i>	<i>2989.7</i>
USA	2687.6	2805	2693.2	2823.9	3172.3	3062.5
Canada	126.8	146.9	139.2	148.3	167	170
Mexico	536.4	509.6	457.6	468.6	567.5	567.5
<i>North America</i>	<i>3350.8</i>	<i>3461.5</i>	<i>3290</i>	<i>3440.8</i>	<i>3906.8</i>	<i>3800</i>
Argentina	70.3	50.8	63.7	68.1	87	90
Brazil	288.8	293.1	314.2	332.2	429.1	435.5
Colombia	60	56.4	49.9	76.7	86.6	90.6
Peru	46.9	51.1	50	53.9	60	60
Venezuela	20.6	8.1	6.6	7	12	12
<i>Total Other Americas^a</i>	<i>514.3</i>	<i>479.6</i>	<i>503.1</i>	<i>553.4</i>	<i>692.7</i>	<i>706.1</i>
<i>Turkey</i>	<i>669.2</i>	<i>728.1</i>	<i>766.9</i>	<i>824.4</i>	<i>1010.2</i>	<i>1017.2</i>
Japan	1239.5	1129.1	1030.3	989.2	1296.4	1276.4
China, PRC	7322.9	8849.4	10441.1	12875.3	19389	20447
South Korea	2471.9	2455.7	2418	2191.3	2565.3	2464.3
Taiwan	2977.5	3091.3	3060.9	2965	3494.2	3433.1
<i>East-Asia</i>	<i>14011.8</i>	<i>15525.5</i>	<i>16950.3</i>	<i>19020.8</i>	<i>26744.9</i>	<i>27620.8</i>
Bangladesh	13.3	15.1	16.2	17.1	20	20
India	1570.2	1695.3	1792	1913.9	2638.5	3009
Pakistan	528.4	581.5	612.5	570.3	808	838
Sri Lanka	3.8	3.8	3.7	3.6	6	6
<i>South Asia</i>	<i>2115.7</i>	<i>2295.7</i>	<i>2424.4</i>	<i>2504.9</i>	<i>3472.5</i>	<i>3873</i>
Indonesia	1190.6	1132.8	1144.2	1064.5	1420	1440
Malaysia	422.6	343.5	367.1	347.5	467	467
Philippines	8.3	8.8	6.6	4.8	11	11
Singapore	8.1	9.1	9.2	9.3	11	11
Thailand	784.5	852.6	872.5	910.6	1087.2	1084.7
Vietnam				36.1	68	120
<i>South-East Asia</i>	<i>2414.1</i>	<i>2346.8</i>	<i>2399.6</i>	<i>2372.8</i>	<i>3064.2</i>	<i>3133.7</i>
<i>Australia</i>	<i>2.2</i>	<i>2.4</i>	<i>2.5</i>	<i>2.4</i>	<i>3</i>	<i>3</i>
Egypt	66.3	71.7	68.7	69.4	84.6	84.6
Kenya	11.4	8.6	5.7	5.1	7	6
Nigeria	23.5	22.3	18.2	13.4	18	18
Morocco	17	15.6	15	16	18	18
South Africa	111.4	96.1	87.9	85.1	94	94
Tanzania						
<i>Africa</i>	<i>229.6</i>	<i>214.3</i>	<i>195.5</i>	<i>189</i>	<i>221.6</i>	<i>220.6</i>
Iran	127.4	138.8	149.1	164.4	220	263
Israel	22	26.7	28	29	30	30
Saudi Arabia	99.2	109.7	115.6	111.7	133	133
United Arab Emirates						
<i>Middle-East</i>	<i>250.8</i>	<i>277.6</i>	<i>295.2</i>	<i>307.5</i>	<i>386</i>	<i>429</i>
World Total	26243	28051.7	29431.9	31688.9	42555.2	43790.1

NB: 1) Numbers may not sum precisely due to rounding. 2) For the sake of analysis, the missing data were treated as zero. Note: a. All the other countries are included.

Source: Fiber Organon. Fiber Economics Bureau. Various issues.

Europe witnessed decreased synthetic fiber production by 21.8% during 1994-2004 due to the steady decline in both Eastern and Western Europe. Three quarters of output in Europe came from the western area, thus an approximate 20.0% decline in Western Europe was mainly responsible for the decrease in production in Europe overall.

Synthetic fiber production data in North America (U.S.A., Canada, and Mexico) showed a slight increase from 3.91 million tons in 1994 to 4.16 million tons in 1997, followed by decrease to 3.44 million tons in 2004. However, the production capacity is available for an increase in 2005 and 2006 (see Figure 4.2). Since the U.S. is the major contributor to North America, it has the same tendencies in output of synthetic fiber as that of North America, while the output in Canada and Mexico stayed relatively flat for the last decade.

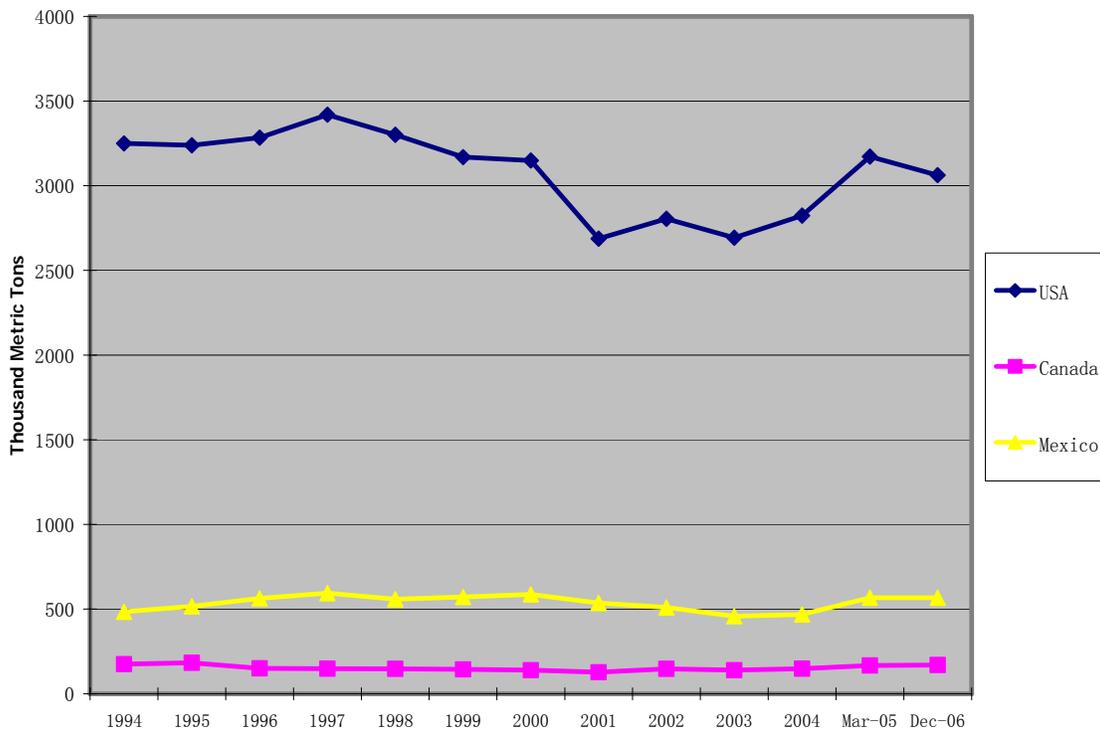


Figure 4.2 Synthetic Fiber (except Olefin) Production & Producing Capacity in North America: 1994-2006[63]

Asia is the world's most important producer of synthetic fiber, which accounted for 54.1% and 75.4% shares in 1994 and 2004, respectively (see Figure 4.3). In particular, East Asian (Japan, China, South Korea, and Taiwan) has been playing a prominent role with nearly 80% share of output in Asia. Of these four countries in East Asia, China has developed a more significant role as the major producer. In 1994, China was the second largest producer slightly lagging behind Taiwan. However, the output in China achieved 12.9 million tons in 2004, surpassing the output in Taiwan more than three times. During the same period, the synthetic fiber production in Japan dropped by 29.0% to 0.99 million tons. Even though the percentage volume share in South Korea and Taiwan decreased, actual productions increased by 20.1% and 28.8% respectively.

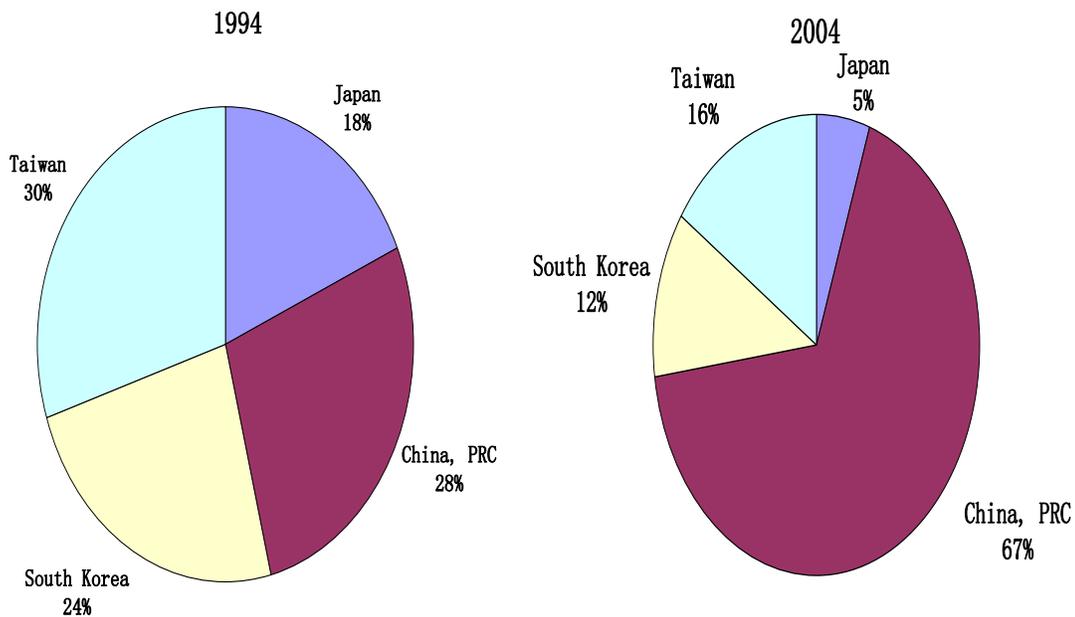


Figure 4.3 Shares of Synthetic Fiber (except Olefin) Production in East Asia in 1994 and 2004[63]

The synthetic fiber production of South Asia (Bangladesh, India, Pakistan and Sri Lanka) has risen continuously for the last ten years. With respect to individual countries,

India, a leading producer in South Asia, almost tripled its production from 1994 to 2004. During the same period, its share jumped from 3.8% to 6.0% of total world production. For the past 10 years, Pakistan has been the second important producer in South Asia, with the share ranging from 20% to 25% (see Figure 4.4).

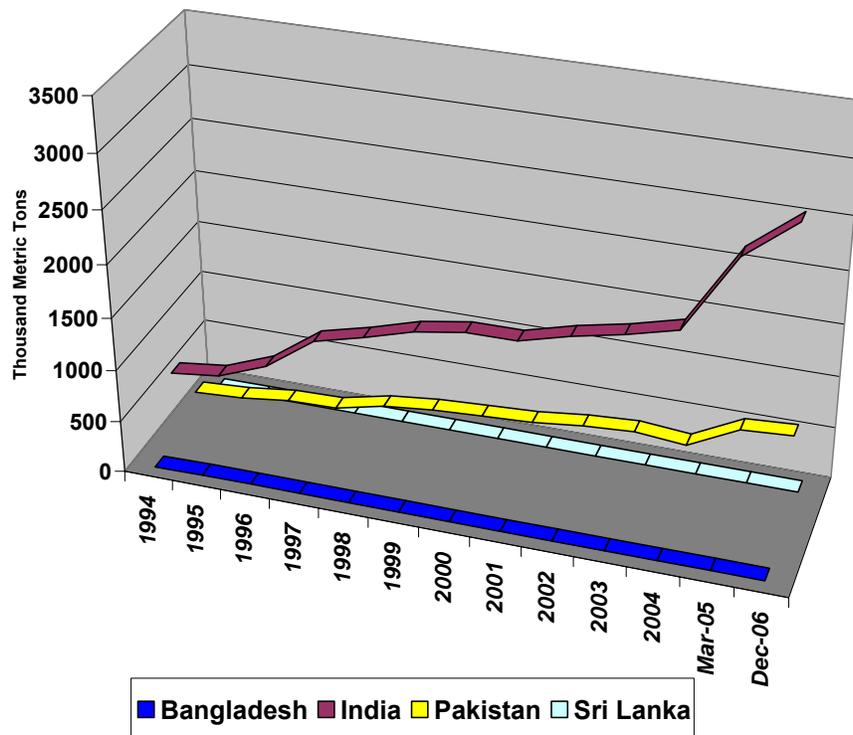


Figure 4.4 Synthetic Fiber (except Olefin) Production & Producing Capacity in South Asia: 1994-2006[63]

The share of South-East Asia (Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam) declined slightly by 2% between 1994 and 2004 among the synthetic fiber production of Total Asia, although the absolute output increased dramatically from 1.16 million tons to 2.37 million tons during the same period. Indonesia has the largest share of the synthetic fiber output in the countries of South-East Asia followed by Thailand (see Figure 4.5). In contrast to the other countries in this area, the production in Philippines dropped by 87.3% in the past ten years (1994-2004).

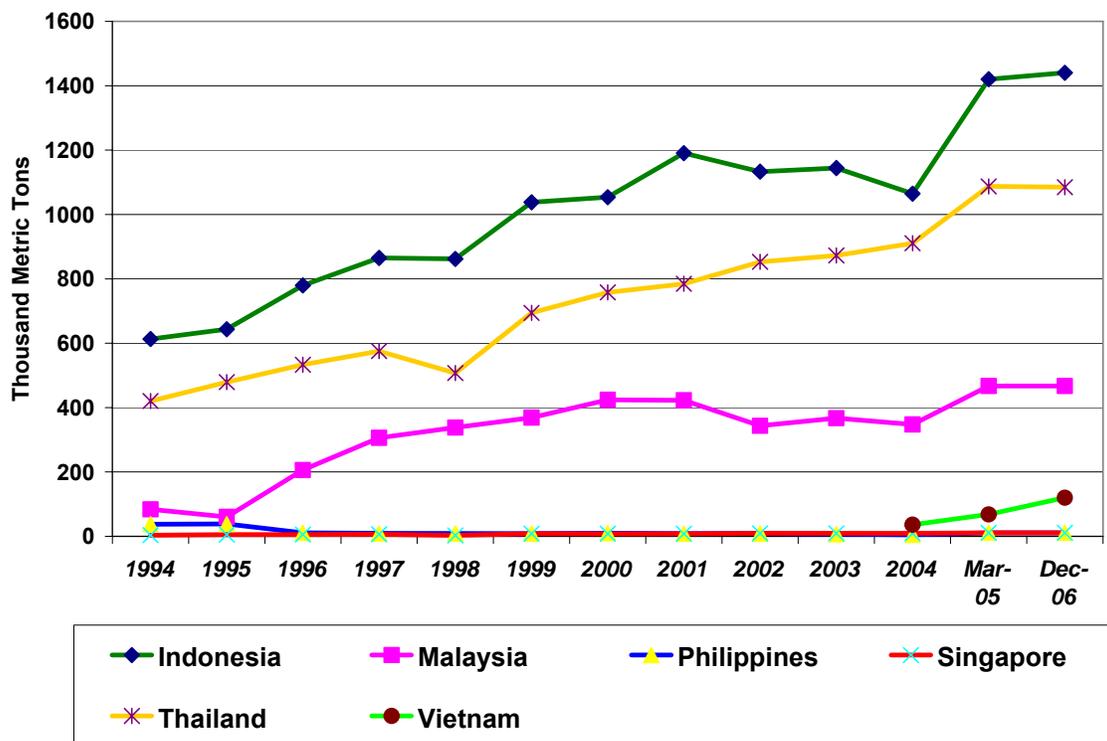


Figure 4.5 Synthetic Fiber (except Olefin) Production & Producing Capacity in South-East Asia: 1994-2006[63]

The output of synthetic fiber in Africa fell by 11.7% from 1994 to 2004, which was mainly caused by production decline in South Africa, down 0.05 million tons (34.7%) during the same period. Egypt is the second major producing country in this area. Its synthetic fiber production increased from 0.04 million tons in 1994 to 0.07 million tons in 2004; and it is projected to reach 0.08 million tons by the end of 2006, which will be a slightly over two times of the output from 1994.

The production of synthetic fibers in Middle-East has continued to rise, reaching 0.4 million tons in 2004, which mainly contributes to the output of Iran and Saudi Arabia. The synthetic fiber output in Iran is expected to rise to 0.26 million tons by 2006, up 245.1% of its output in 1994.

The synthetic fiber output in Turkey was seen a steadily increase to 0.82 million tons by 2004, up 121.4% from 0.37 million tons in 1994. The production is expected to reach 1.02 million tons by 2006, accounting for 2.3% of world synthetic output.

Australia has extremely small share in world production of Synthetic fibers. The output in Australia climbed up to 41.7 thousand tons by 1999, then suddenly dropped to 27.9 thousand tons one year later and sharply declined to 2.2 thousand tons by 2001. Since then, the synthetic fiber production in Australia remained flat at around 2.4 thousand tons till 2004, and it is likely to increase slightly to 3.0 thousand tons by 2006.

Worldwide Production of Cotton Fiber

Global output of raw cotton fiber reached an estimated record of 26.20 million tons in 2004, 7.49 million tons (40.0%) above the previous record in 1994. But, a slight decline at estimated 1.81 million tons is likely to occur in 2005, down by 6.9% from the previous year (see Table 4.2). Figure 4.6 presents geographical breakdown of world cotton fiber production.

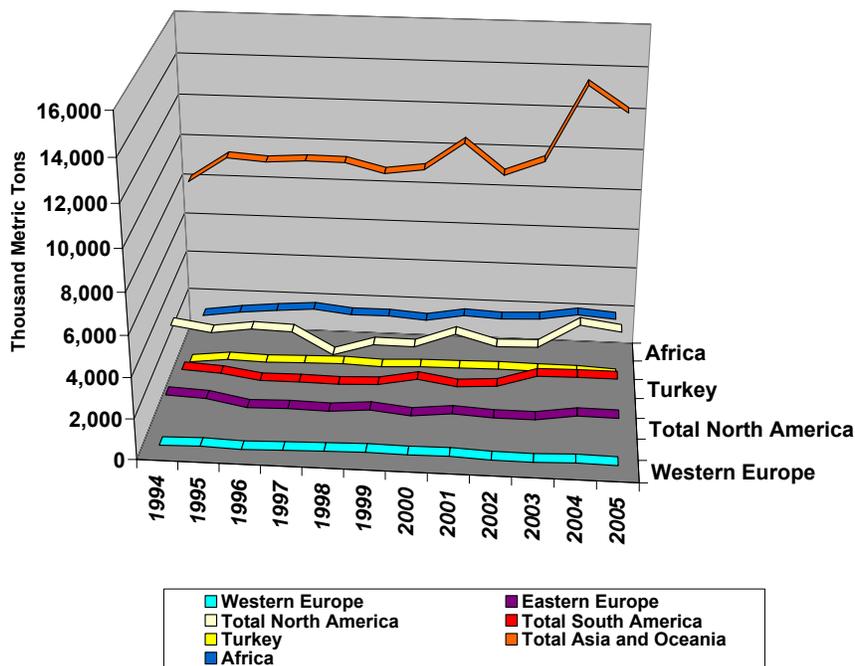


Figure 4.6 World Cotton Fiber Production: 1994-2005[14; 64]

Cotton fiber production in total Europe declined from a peak of 2.33 million tons in 1994 to 1.90 million tons in 2003, dropping by 18.8%. However, the output in 2004 rebounded to an estimate of 2.25 million tons, resulting in 0.35 million tons increase (18.5%) from the year 2003. All the output lost in the previous seasons was regained in the year 2004. The world share of total Europe in 2004 was estimated at 8.6%, slightly decreasing from a record high of 12.5% in 1994.

Table 4.2 Worldwide Cotton Fiber Production by Region: 1994-2005
(Unit: Thousand Metric Tons)

Country	PRODUCTION ^a					
	1994	1995	1996	1997	1998	1999
Western Europe ^d	430	478	408	464	509	553
Eastern Europe ^e	1,904	1,812	1,442	1,490	1,440	1,597
Total Europe	2,334	2,290	1,846	1,954	1,949	2,150
Mexico	99	191	234	209	219	137
U.S.A.	4,281	3,897	4,124	4,092	3,030	3,694
Other North America ^b	11	17	4	3	3	4
Total North America	4,391	4,105	4,362	4,304	3,252	3,835
Brazil	564	360	285	370	420	648
Other South America ^c	644	730	522	451	367	210
Total South America	1,208	1,090	807	821	787	858
Turkey	628	837	784	832	871	795
China, PRC	4,342	4,767	4,203	4,602	4,501	3,830
India	2,355	2,669	2,975	2,600	2,717	2,650
Pakistan	1,478	1,799	1,615	1,561	1,480	1,800
Other Asia and Oceania ^f	769	937	1,239	1,384	1,430	1,388
Total Asia and Oceania	8,944	10,172	10,032	10,147	10,128	9,668
Egypt	255	237	341	342	280	229
Sudan	83	106	103	85	55	62
Other Africa ^g	871	1,125	1,201	1,361	1,236	1,290
Africa	1,209	1,468	1,645	1,788	1,571	1,581
World Total	18,714	19,962	19,480	19,846	18,551	18,887

Country	PRODUCTION ^a					
	2000	2001	2002	2003	2004 ^h	2005 ^h
Western Europe ^d	519	542	453	431	500	458
Eastern Europe ^e	1,392	1,589	1,471	1,464	1,746	1,723
Total Europe	1,911	2,131	1,924	1,895	2,246	2,181
Mexico	72	92	40	68	138	152
U.S.A.	3,742	4,420	3,948	3,975	5,062	4,790
Other North America ^b	4	4	2	2	3	3
Total North America	3,818	4,516	3,990	4,045	5,203	4,945
Brazil	858	720	767	1,309	1,318	1,273
Other South America ^c	356	196	267	324	345	384
Total South America	1,214	916	1,034	1,633	1,663	1,657
Turkey	880	901	932	910	900	805
China, PRC	4,420	5,320	4,550	4,871	6,320	5,819
India	2,350	2,686	2,500	3,009	4,080	3,805
Pakistan	1,750	1,850	1,747	1,734	2,482	2,308
Other Asia and Oceania ^f	1,397	1,397	981	885	1,269	988
Total Asia and Oceania	9,917	11,253	9,778	10,499	14,151	12,920
Egypt	206	314	300	198	292	263
Sudan	74	71	68	65	114	96
Other Africa ^g	1,153	1,378	1,297	1,475	1,635	1,531
Africa	1,433	1,763	1,665	1,738	2,041	1,890
World Total	19,173	21,480	19,323	20,720	26,204	24,398

NB: Numbers may not sum precisely due to rounding.

Note: a. Based on 480 pound bales and 1 Metric Ton = 2204.62262 Pounds. b. Baleages are principally from Nicaragua. c. Baleages are primarily from Argentina, Colombia, Paraguay & Peru. d. Baleages are principally from Greece & Spain. e. Baleages are principally from C.I.S. f. Baleages are principally from Australia, Iran, Israel & Syria. g. Benin, Burkina Faso, Cameroon, Chad, Ivory Coast, Mali, Nigeria & Zimbabwe are important producing countries. h. The 2004 & 2005 data is preliminary. Data were converted from the source: Fiber Organon (2005). Fiber Economics Bureau. December, 2005. Original source: International Cotton Advisory Committee (ICAC) (2005). Cotton: Review of the World Situation, September-October 2005.

Eastern Europe is the dominant cotton producer in this region, accounting for nearly 80% of the output in total Europe during the last ten years. Cotton fiber production in Eastern Europe fell from a record high of 1.90 million tons in 1994 to a record low of 1.39 million tons in 2000. The output rebounded to 1.59 million tons in 2001 followed by a decline of 0.12 million tons (7.5%) in 2002. While the cotton production of Eastern Europe in 2003 almost stayed the same as the year 2002, it rose to an estimate of 1.75 million tons in 2004, up 0.28 million tons (19.3%) from 2003.

From 1994 to 2003, the cotton fiber production in Western Europe stayed below 0.50 million tons except the years between 1998 and 2001 (see Figure 4.7). The output of Western Europe in 2002 was 0.45 million tons, falling 0.10 million tons from a peak in 1999. The cotton fiber production in 2004 was estimated to 0.50 million tons, which was up 0.07 million tons (16.3%) from 1994. But it dropped by 8.4% from 2004 to reach an estimate of 0.46 million tons by the end of 2005.

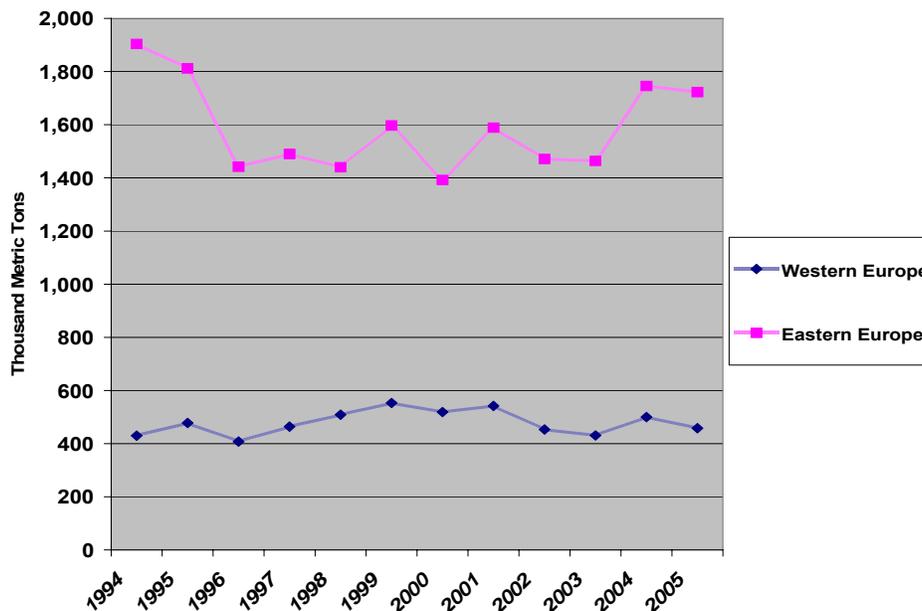


Figure 4.7 Cotton Fiber Production in Europe: 1994-2005[14; 64]

Cotton fiber production in total North America has been varying between 4.11 and 4.39 million tons before it reached a record low of 3.25 million tons in 1998. The cotton fiber production then jumped to 4.52 million tons in 2001, resulting in 0.70 million tons (18.3%) increase over the previous year. However, nearly all the output gained in 1998-2000 was lost in 2002, ending at a net loss of 0.53 million tons (11.6%) from 2001. Production of cotton fiber in total North America in 2004 jumped to an estimate of 5.20 million tons. U.S.A. is the largest producer of cotton fibers in North America, accounting for an average of 95% output in this area; therefore, its production trend in the last decade controlled that of North America. Figure 4.8 shows the changes of cotton output in U.S.A. from 1994 to 2005. The production of cotton fiber in Mexico, although very small, is the second largest producer in this region. Its output fell sharply to the bottom of 0.04 million tons in 2002, down 0.19 million tons (82.9%) from the peak in 1996. Although the output rose to an estimated record of 0.15 million tons in 2005, it only reached 65.0% of the output of the peak time during the last ten years.

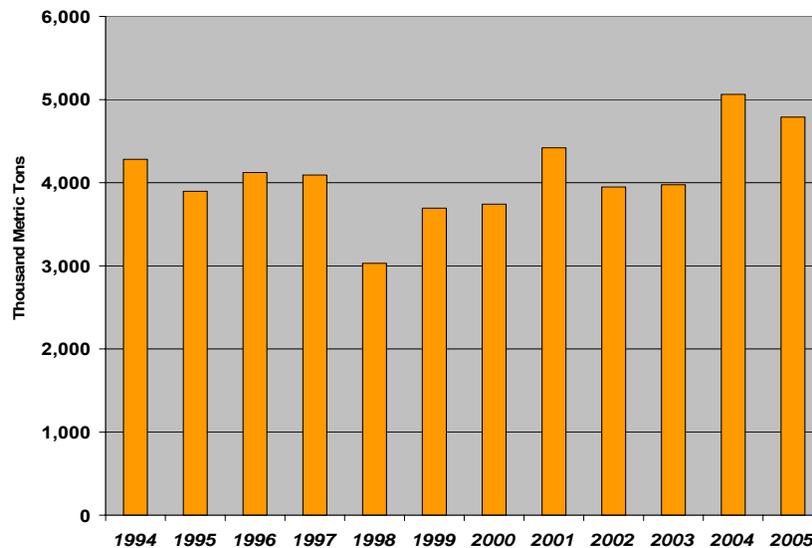


Figure 4.8 Cotton Fiber Production in U.S.A.: 1994-2005[14; 64]

The output of cotton fiber in Total South America gradually declined from 1.21 million tons in 1994 to 0.79 million tons in 1998, down 34.7% in those five years. The output climbed to 1.21 million tons in 2000, an increase of 41.5% compared with the preceding year. Cotton fiber production in total South America reached to a peak at an estimate of 1.66 million tons in 2004, up 0.46 million tons (37.7%) from 1994. Brazil is the major producer in South America, whose share in the total South America raised from 46.7% in 1994 to 80.2% in 2003. The cotton fiber output in Brazil reached an estimate of 1.32 million tons in 2004, accounting for 79.3% of the production in Total South America. Other South America that includes Argentina, Columbia, Paraguay, and Peru produced cotton in a declining trend, hitting the bottom in 2001 with only 0.20 million tons and plummeting 69.6% in output from 1994. The production in Other South America was recovered slightly to 0.27 million tons in 2002, up 36.2% from 2001. Cotton fiber output in Other South America jumped to an estimate of 0.35 million tons in 2004 and kept on rising to reach 0.38 million tons in 2005 by estimate.

From 1994 to 2004, Cotton fiber production in Total Asia and Oceania climbed about 5.21 million tons (58.2%) to an estimated record of 14.15 million tons. China, India, and Pakistan are the three largest producing countries in this region. China, the largest cotton producer, accounted for 24.1% of the world output and 44.7% of the regional production in 2004 by estimate. Although China's share in Total Asia and Oceania slowly dropped by 8.9% from 1994 to 1999, its share was up 8.1% from 1999 to 2004 to an estimated record of 6.32 million tons in 2004. Cotton fiber output in India climbed 73.2% from 2.36 million tons in 1994 to an estimate of 4.08 million tons by 2004. Cotton

fiber production in Pakistan rose to 2.48 million tons in 2004 by estimation, 1.00 million tons (67.9%) above the previous record in 1994.

The cotton fiber production of Other Asia and Oceania, including Australia, Iran, Israel, and Syria, reached to a record high of 1.43 million tons in 1998, nearly doubled the output (86% increase) from 1994. Although the production was starting to drop from 1999, it remained around 1.39 million tons for three years until 2001. The output decreased to 0.89 million tons in 2003. However, the production of cotton fiber rebounded to an estimated record of 1.27 million tons in 2004, increasing by 0.50 million tons (65.0%) from 1994 (see Figure 4.9).

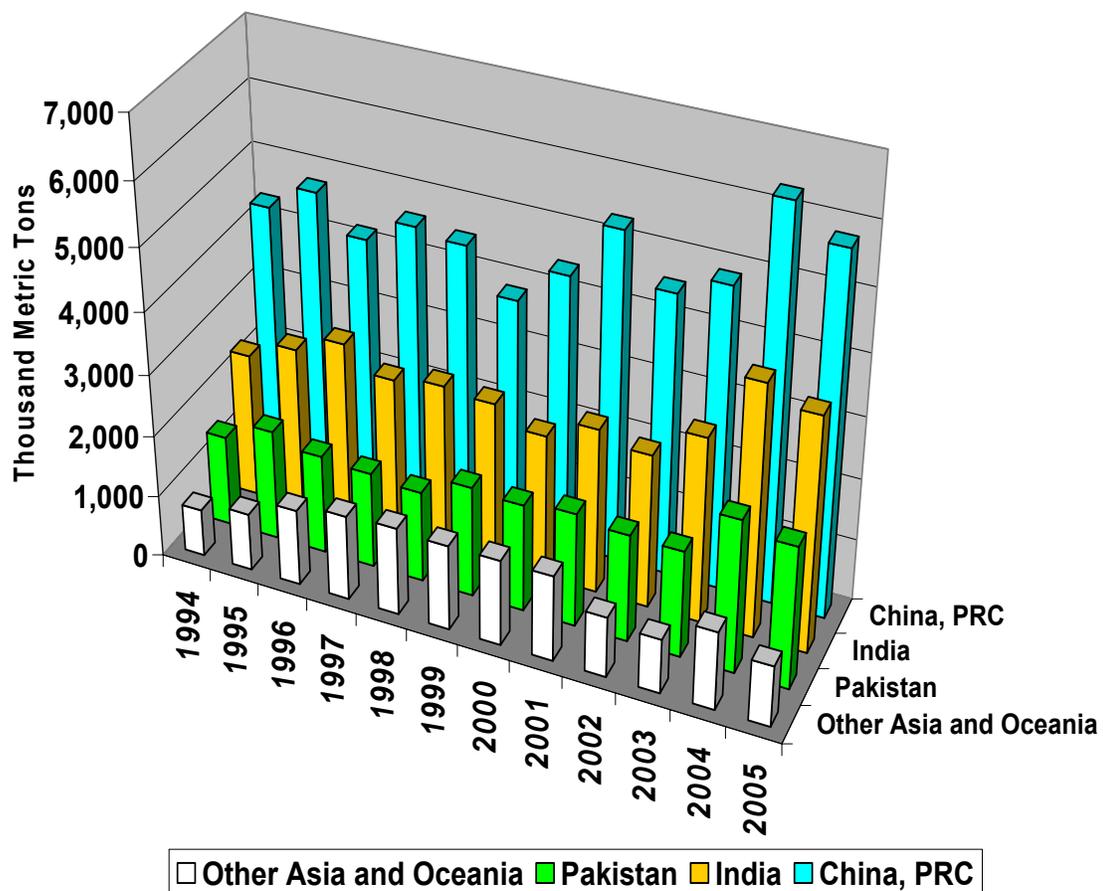


Figure 4.9 Cotton Fiber Production in Total Asia and Oceania: 1994-2005[14, 64]

The output of cotton fiber in Africa has slowly increased over the past ten years. Its share in the world total rose from the 6.7% in 1994 to 8.7% in 2002, which moved forward its world place ahead of Total South America. The cotton fiber production in Africa continuously increased to an estimated 2.04 million tons in 2004, up 0.83 million tons (68.8%) from the output in 1994 with 1.21 million tons. Egypt is the dominant cotton producing country in this region followed by Sudan. During the period of 1994-2004, the output in Egypt has been fluctuating with the peak of 0.34 million tons in 1997 and bottom of 0.20 million tons in 2003. Cotton fiber production in Egypt increased to an estimate 0.29 million tons in 2004, up 14.5% (0.04 million tons) from 1994. The production of cotton fiber in Sudan was slightly over 0.10 million tons in 1995 and 1996, which was the highest output between 1994 and 2003. It plummeted to 0.06 million tons in 1998, down 0.03 million tons (35.3%) from 1997. Although the output increased in the following years, cotton fiber production in Sudan fluctuated between 0.06 and 0.07 million tons by the end of 2003. Its estimated output in 2004 rose to 0.11 million tons, the same level as that in 1995 and 1996.

Cotton fiber production in Turkey reached a peak at an estimated record of 0.90 million tons in 2004, up 43.3% from the record low at 0.63 million tons in 1994. Its share among the world cotton fiber production has increased slightly by 0.1% from 1994 to 3.4% in 2004 by estimation.

Worldwide Production of Wool Fiber (Based on Scoured or Cleaned Basis)

The global production of raw wool (scoured or cleaned basis) has declined steadily to an estimated 1.22 million tons in 2004, down by 0.33 million tons (21.5%) from the record high in 1995 (see Table 4.3). The biggest drop in the world output of wool fiber happened consecutively in the years between 1995-1996 and 1996-1997, totaling 0.13 million tons. Since 1998, the decreasing rates of wool production were slowed down and the net loss until 2003 was topping 0.17 million tons (11.9%) in the 5-year period (see Figure 4.10).

Table 4.3 World Wool Fiber (Scoured or Cleaned Basis) Production by Region: 1995-2004
(Unit: Thousand Metric Tons)

Country	PRODUCTION ^a									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004 ^b
East Europe ^c	195	135	117	97	96	98	97	99	100	100
United Kingdom	44	43	44	46	42	42	42	33	34	33
Total Europe	239	178	161	143	138	140	138	132	133	132
USA	17	15	15	14	13	13	12	12	11	11
North America	17	15	15	14	13	13	12	12	11	11
Argentina	48	41	36	37	33	34	33	34	36	42
Uruguay	60	60	55	45	40	40	40	35	29	26
Total Other Americas	108	102	91	82	73	74	73	68	65	68
Turkey	37	36	36	36	36	31	29	28	27	27
China, PRC	128	148	128	139	142	147	149	154	169	187
East-Asia	128	148	128	139	142	147	149	154	169	187
Australia	473	472	455	447	439	433	424	393	356	340
New Zealand	213	203	187	190	189	193	178	172	171	164
Oceania	686	675	642	636	628	626	602	565	526	504
South Africa ^d	37	36	33	34	34	29	29	28	26	28
Africa	37	36	33	34	34	29	29	28	26	28
All Others	303	304	323	313	315	283	284	281	273	264
World Total	1,556	1,493	1,428	1,398	1,380	1,343	1,317	1,269	1,231	1,222

Note: a. Based on Scoured or Cleaned Basis and 1 Metric Ton = 2204.62262 Pounds. b. The 2004 data is provisional. c. East Europe includes Albania, Bulgaria, C.I.S., Czech Republic, Hungary, Mongolia, Poland, Romania & former Yugoslavia. d. South Africa excludes Lesotho and South West Africa. Data were converted from the source: Fiber Organon (2005). Fiber Economics Bureau, December, 2005. Original source: International Wool Textile Organization (2005).

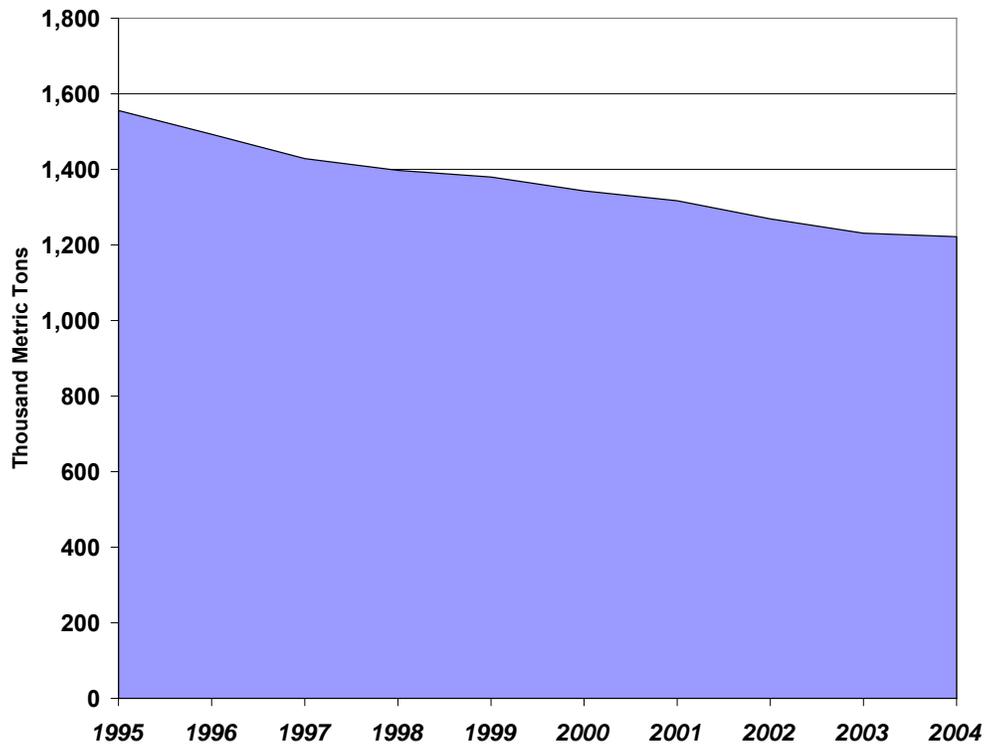


Figure 4.10 World Wool Production (Based on Scoured Basis): 1995-2004[64; 65]

In regional terms, Oceania has always been the biggest producer from 1995 to 2004, although its share in the world total production of wool fiber decreased from 44.1% in 1995 to an estimation of 41.2% in 2004. Meanwhile, Europe dropped its rank in the world share from the third place (15.4%) in 1995 to the fourth (10.8%) in 2004, showing the biggest percentage decline (44.8%) in all the regions. East Asia was the only region whose production increased by 0.06 million tons (46.1%) in the same period, forwarding its share in the world total wool production from the fourth (8.2%) in 1995 to the third (15.3%) in 2004 (see Figure 4.11).

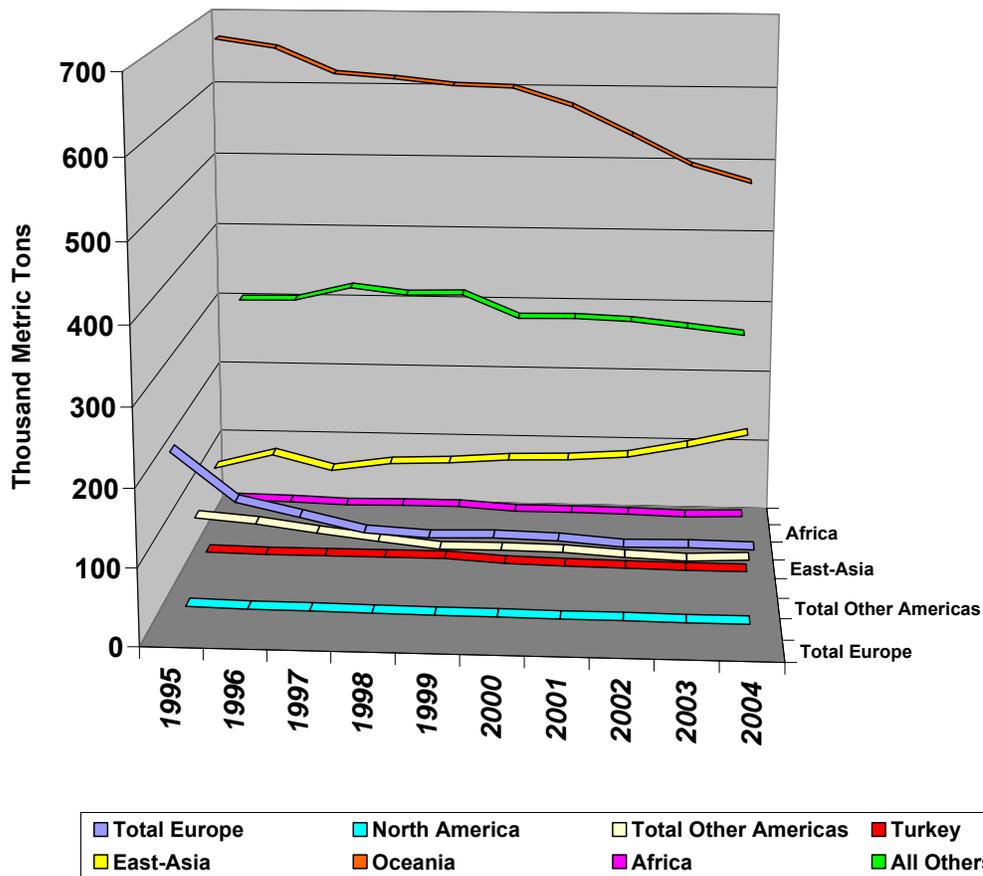


Figure 4.11 World Wool (Based on Scoured Basis) Production by Region: 1995-2004[64; 65]

Europe witnessed a decreased production of wool fiber by 44.8% from 0.24 million tons in 1995 to an estimated record of 0.13 million tons in 2004, in which almost 88.8% of the decrease was caused by Eastern Europe. Eastern Europe accounted 81.6% of the output of wool fiber in total Europe in 1995 and occupied over three quarters share of wool production in total Europe in 2004 by estimate. The output of wool fiber in Eastern Europe dropped to an estimate of 0.10 million tons in 2004, going down by 48.7% since 1995 recorded at 0.20 million tons. Wool production in the U.K. decreased to an estimated 0.03 million tons in 2004, down 0.01 million tons (25.0%) from 1995.

In North America, the U.S. was the main producing country of wool fiber during 1995 and 2004. The output of wool fiber in U.S. dropped steadily from 17 thousand tons in 1995 to 11 thousand tons by estimate in 2004, down 35.3% in total.

Other Americas (Argentina and Uruguay) witnessed a continuous wool fiber production decline from 1995 before the output reached a bottom low at 65 thousand tons in 2003. The net loss in 1995-2003 was 43 thousand tons, dropping 39.8% in output from 1995. The wool production in other Americas had a slight increase in 2004, ending at 68 thousand tons by estimation and up 3 thousand tons (4.6%) from 2003. In other Americas, Uruguay accounted for 55.6% (60 thousand tons) of the regional output of wool fiber in 1995. However, its output declined to an estimate of 26 thousand tons in 2004, accounting for 38.2% share in regional output of wool fiber. Argentina witnessed a smaller decrease to 42 thousand tons by estimation in 2004, down 6 thousand tons (12.5%) from 1995. Therefore, Argentina became the number one producer in other Americas in 2004, accounting for 61.8% of the regional output of wool fiber.

East Asia was the only region with the overall increasing trend in wool fiber production from 1995 to 2004. China has been playing the predominant role in this region. The output of wool fiber in China increased to 0.15 million tons in 1996, up 0.02 million tons (15.6%) from the previous year. However, the output dropped to 0.13 million tons in 1997, losing all the gains between 1995 and 1996. Since 1997, the output had been rising steadily to an estimated record of 0.19 million tons in 2004, up 0.06 million tons (46.1%) from 1997 (see Figure 4.12).

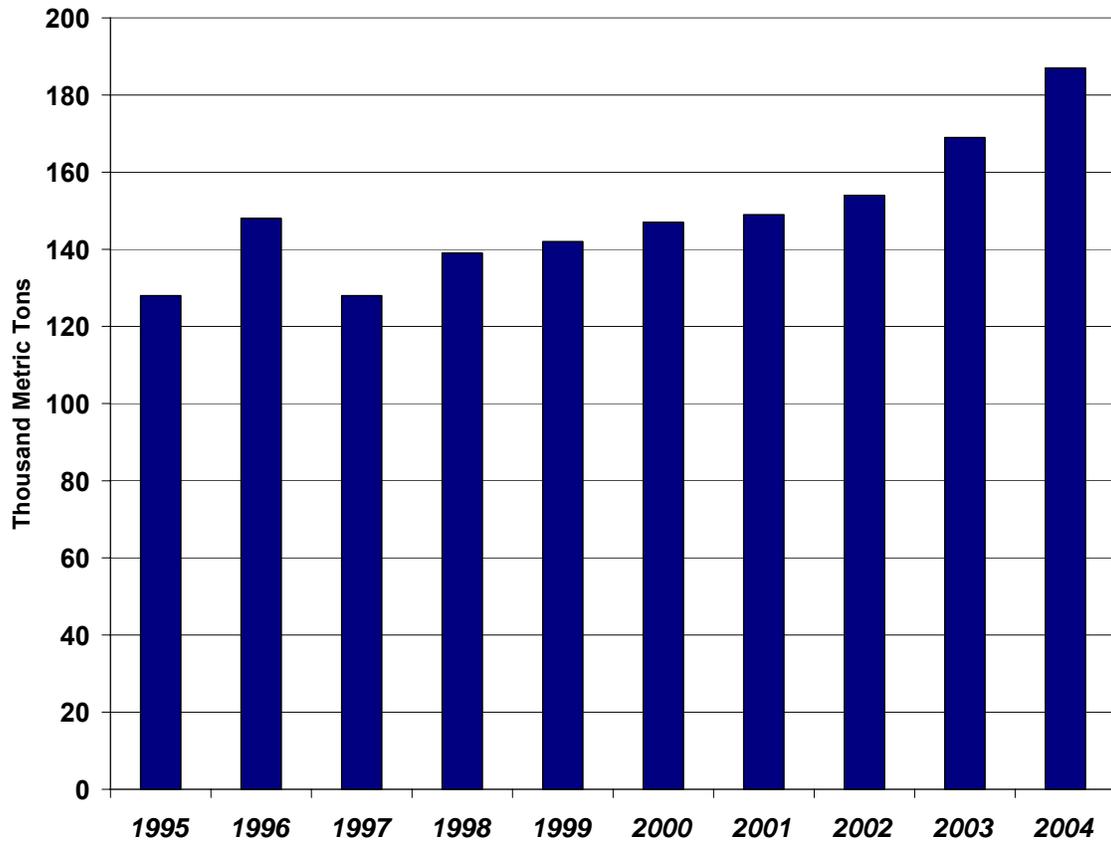


Figure 4.12 Wool Fiber (Based on Scoured Basis) Production in China: 1995-2004[64, 65]

Oceania is the number one producing region of wool fiber production in the world. Its output of wool fiber decreased substantially to an estimate of 0.50 million tons in 2004, down 0.18 million tons (26.5%) from 1995. The biggest yearly drop was 39 thousand tons (6.9%) during 2002-2003 season followed by a decrease of 37 thousand tons (6.1%) during 2001-2002 seasons. With respect to individual country, Australia, a leading producer in Oceania, accounted about two thirds of regional wool output followed by New Zealand. Over half of the regional production loss resulted from the production decline in Australia from 1995 to 2004. The wool production in Australia continuously declined from 0.47 million tons in 1995 to 0.34 million tons by estimate in 2004,

reaching a net loss of 0.13 million tons (28.1%). The output of wool fiber in New Zealand followed the same decreasing trend as that of Australia during the same period. Its wool fiber production dropped to an estimated 0.16 million tons in 2004, down 0.05 million tons (23.0%) from 1995 (see Figure 4.13).

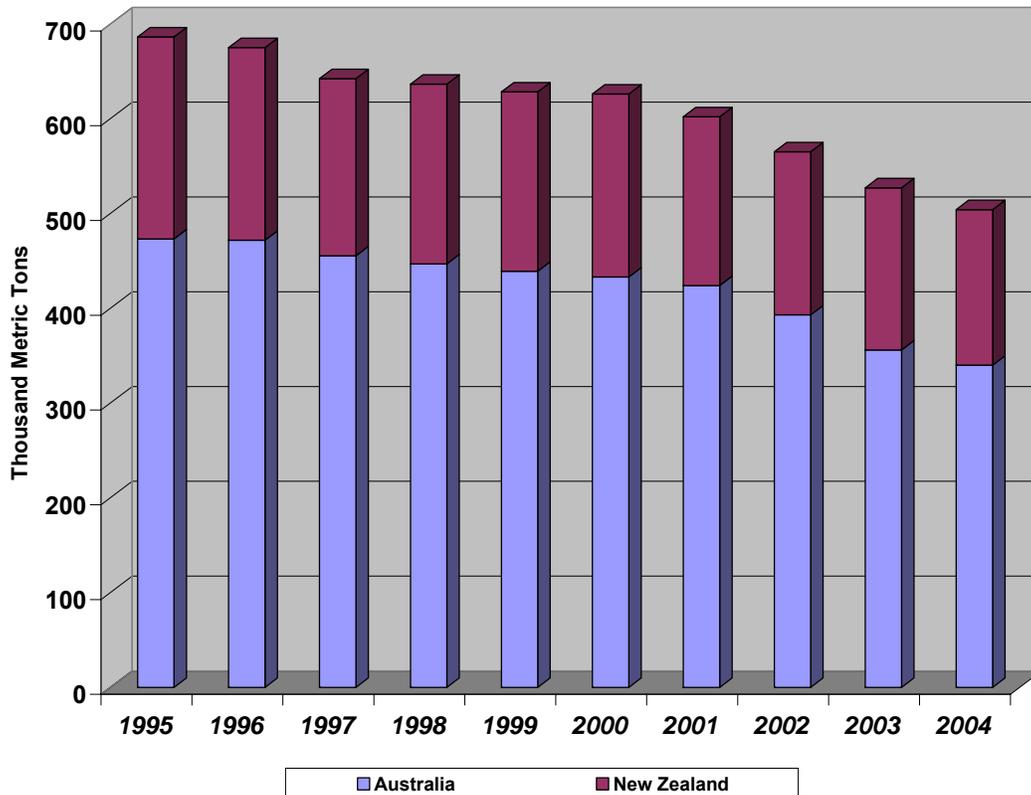


Figure 4.13 Wool Fiber Production (Based on Scoured Basis) in Oceania: 1995-2004[64, 65]

The wool fiber production in Africa dropped to 26 thousand tons in 2003, down 11 thousand tons (30.0%) from 1995. The output of wool fiber in this area stayed flat at this level during 2000-2004.

The output of wool fiber in Turkey declined from 37 thousand tons in 1995 to 27 thousand tons in 2004 by estimation, a decrease of 27.0% over the past ten years.

The wool fiber production in all the other regions has been fluctuating between 0.30 and 0.32 million tons during the period of 1995-1999. The output of wool fiber in these regions kept stagnant at 0.28 million tons in the three-year period of 2000-2002, then it decreased to an estimated 0.26 million tons in 2004, down 12.9% compared with 1995.

Worldwide Production of Cellulosic Fiber (Except Lyocell)

The global production of cellulosic fiber (except Lyocell) in 2004 grew by 8.0% to 2.49 million tons, a record high since 1994. The second highest production in the last decade was 2.42 million tons in 1995. Since then, the world production was declining to a low of 2.07 million tons in 1999, down 14.4% from 1995. Although there was a huge rebound for the world production to 2.22 million tons in 2000, all the increase was lost in the following year, resulting in a net loss of 0.13 million tons (6.0%) compared with 2000. The world cellulosic fiber production kept climbing since 2001 with the accelerated increase rates. For example, the increase rate between 2001 and 2002 was 2.0%, followed by 6.9% increase rate during 2002-2003 and 9.7% increase rate from 2003 to 2004. The increasing trend in world output of cellulosic fiber is projected to continue in 2005 (15.4%) and 2006 (0.9%), reaching 2.90 million tons in 2006 (see Table 4.4).

In regional terms, East Asia has retained the biggest producer for the last decade. Its share in the world production of cellulosic fiber increased from 30.8% in 1994 to 47.1% in 2004. At the same time, North America dropped its rank in the world share from the third place (11.0%) in 1994 to the sixth (3.2%), showing the biggest decline in all the regions. With the projected continuing increase in the world production for 2005 and 2006, the North America's share is expected to further drop because its production still keeps at the same level as the year 2004 at 0.08 million tons (see Figure 4.14).

Table 4.4 Worldwide Cellulosic Fiber Production by Region except Lyocell: 1994-2006[63]
(Unit: Thousand Metric Tons)

Country or Area Name	Actual Production						
	1994	1995	1996	1997	1998	1999	2000
Western Europe	518.4	518.4	483.4	490.1	500.2	453.2	457
Eastern Europe	251.2	254.6	186.8	198.9	174.2	141.5	122
<i>Total Europe</i>	<i>769.6</i>	<i>773</i>	<i>670.2</i>	<i>689</i>	<i>674.4</i>	<i>594.7</i>	<i>579</i>
USA	225	226	213.1	208.1	165.5	134.7	158.8
Canada	15.3	15.1	15.2	14.2	13	10.7	5.1
Mexico	13.2	13.5	13.6	14.8	14.6	13.5	14.8
<i>North America</i>	<i>253.5</i>	<i>254.6</i>	<i>241.9</i>	<i>237.1</i>	<i>193.1</i>	<i>158.9</i>	<i>178.7</i>
Argentina	4.1	4.1	4.7	4.1	3.7	2.8	1.7
Brazil	58.6	53.1	34.4	36.5	35.4	34.6	36.2
Chile	1.1	1.5	1.2				
Colombia	2	1.6					
Uruguay	2	2	2	1.8	1.8	1.8	1.9
Venezuela	1.7	1.8	2	2	1.8	2	2.2
<i>Total Other Americas</i>	<i>69.5</i>	<i>64.1</i>	<i>44.3</i>	<i>44.4</i>	<i>42.7</i>	<i>41.2</i>	<i>42</i>
<i>Turkey</i>	<i>10.9</i>	<i>10.7</i>	<i>10.6</i>	<i>10.8</i>	<i>11</i>		
Japan	218.9	212.7	198.2	184.1	164.5	135.5	126.2
China, PRC	336	435	432	450	450.2	472.1	552.3
South Korea	6.6	6.6	6.8	6.3	5.9	5.6	6.2
Taiwan	149.3	139.6	144.7	148.4	142.6	143.7	141.5
<i>East-Asia</i>	<i>710.8</i>	<i>793.9</i>	<i>781.7</i>	<i>788.8</i>	<i>763.2</i>	<i>756.9</i>	<i>826.2</i>
Bangladesh	3	4	5	4.4	5	6.2	5
India	239.7	262.1	251.9	242.4	264.4	248.5	297.5
Pakistan	3.1	3.1	3.2	3.2	2.8	2.8	
<i>South Asia</i>	<i>245.8</i>	<i>269.2</i>	<i>260.1</i>	<i>250</i>	<i>272.2</i>	<i>257.5</i>	<i>302.5</i>
Indonesia	167	177	179.6	212.9	161.9	195.6	207
Thailand	60	60	61	60.2	45.7	55.3	65
<i>South-East Asia</i>	<i>227</i>	<i>237</i>	<i>240.6</i>	<i>273.1</i>	<i>207.6</i>	<i>250.9</i>	<i>272</i>
Egypt	12.9	12.7	12.8	12.6	12	5.4	5.6
<i>Africa</i>	<i>12.9</i>	<i>12.7</i>	<i>12.8</i>	<i>12.6</i>	<i>12</i>	<i>5.4</i>	<i>5.6</i>
Iraq	7.6	8	7.7	8.6	8.6	8.6	9.2
<i>Middle-East</i>	<i>7.6</i>	<i>8</i>	<i>7.7</i>	<i>8.6</i>	<i>8.6</i>	<i>8.6</i>	<i>9.2</i>
World Total	2307.6	2423.2	2269.9	2314.4	2184.8	2074.1	2215.2

(Table 4.4 Continued)

Country or Area Name	Actual Production				Producing Capacity	
	2001	2002	2003	2004	Mar-05	Dec-06
Western Europe	438.3	431.8	426.2	427.1	459	454
Eastern Europe	98.3	97.8	101.9	100.1	135	135
<i>Total Europe</i>	<i>536.6</i>	<i>529.6</i>	<i>528.1</i>	<i>527.2</i>	<i>594</i>	<i>589</i>
USA	103	80.7	75.3	66.4	75	75
Canada						
Mexico	22.6	16.8	14.8	12.3	13	5
<i>North America</i>	<i>125.6</i>	<i>97.5</i>	<i>90.1</i>	<i>78.7</i>	<i>88</i>	<i>80</i>
Argentina	0.9	0.8	1.1	1.9	2	2
Brazil	28.7	34.2	47.2	46.8	47.9	47.9
Chile						
Colombia						
Uruguay	1.7	1	1		2	
Venezuela	0.4					
<i>Total Other Americas</i>	<i>31.7</i>	<i>36</i>	<i>49.3</i>	<i>48.7</i>	<i>51.9</i>	<i>49.9</i>
<i>Turkey</i>						
Japan	107.1	68.1	68.3	67.1	96.6	96.6
China, PRC	608.6	682.1	800.2	966.1	1150	1190
South Korea	5.9	6.3	7.4	6.6	9	9
Taiwan	127.4	114.2	121.5	134.9	145.2	145.2
<i>East-Asia</i>	<i>849</i>	<i>870.7</i>	<i>997.4</i>	<i>1174.7</i>	<i>1400.8</i>	<i>1440.8</i>
Bangladesh	5.3	6	5	5	7	7
India	251.9	285.7	283	311.3	360.9	360.9
Pakistan		9	15.2	16.7	25	25
<i>South Asia</i>	<i>257.2</i>	<i>300.7</i>	<i>303.2</i>	<i>333</i>	<i>392.9</i>	<i>392.9</i>
Indonesia	205	214	223	250	260	260
Thailand	65	71.1	73.8	79.4	80	80
<i>South-East Asia</i>	<i>270</i>	<i>285.1</i>	<i>296.8</i>	<i>329.4</i>	<i>340</i>	<i>340</i>
Egypt	3.4					
<i>Africa</i>	<i>3.4</i>					
Iraq	9	5	6.3		9	9
<i>Middle-East</i>	<i>9</i>	<i>5</i>	<i>6.3</i>		<i>9</i>	<i>9</i>
World Total	2082.5	2124.6	2271.2	2491.7	2876.6	2901.6

NB: 1) Numbers may not sum precisely due to rounding. 2) For the sake of analysis, the missing data were treated as zero.

Source: Fiber Organon. Fiber Economics Bureau. Various issues.

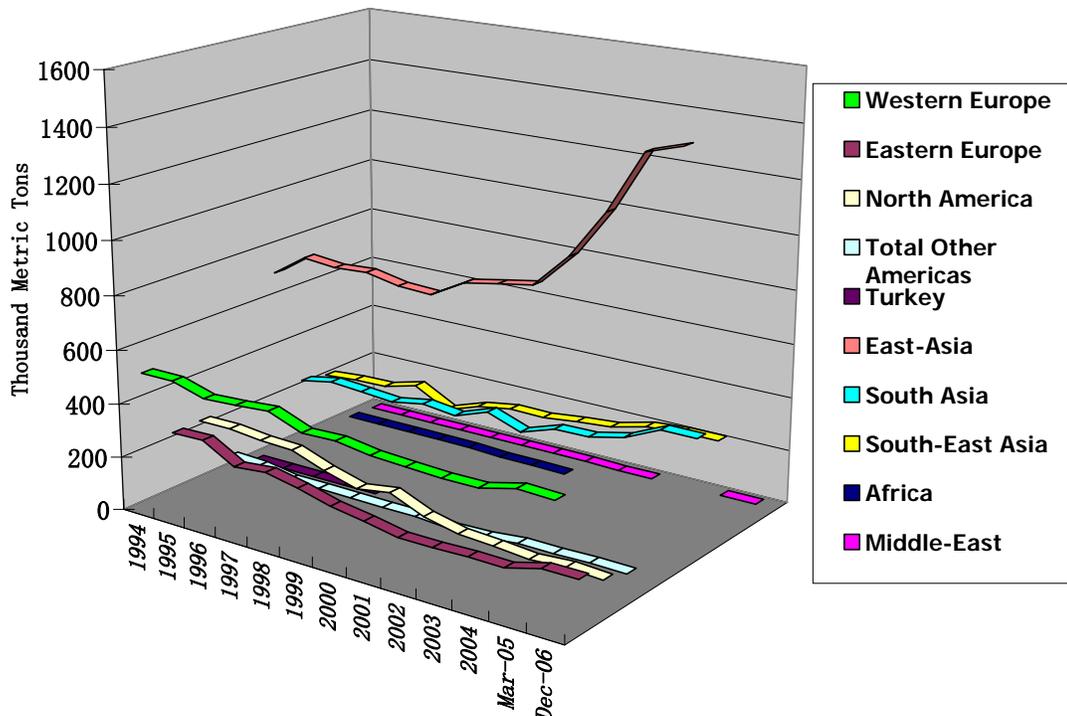


Figure 4.14 World Cellulosic Fiber Production & Producing Capacity by Region except Lyocell: 1994-2006[63]

Europe witnessed a steadily decreased production by 31.5% from 0.77 million tons in 1994 to 0.53 million tons in 2004, in which nearly two thirds of the decrease were caused by Eastern Europe. The cellulosic fiber production in Eastern Europe declined by 0.15 million tons (60.2%) from 1994 to 0.10 million tons in 2004. C.I.S is the main producer in Eastern Europe. Its shares in Eastern Europe for 1994 and 2004 were 60.9% and 79.8%, respectively. Meanwhile, its shares in total Europe for 1994 and 2004 were 19.9% and 15.2%, respectively. The production of cellulosic fiber in Western Europe went down from 0.52 million tons in 1994 to 0.43 million tons, while its share in total Europe increased from 67.4% in 1994 to 81.0% in 2004. The production in Europe is expected to increase to 0.59 million tons in 2005 and 2006, up 12.7% from 2004, in

which Eastern Europe and Western Europe will have the equal increase of about 0.03 million tons (see Figure 4.15).

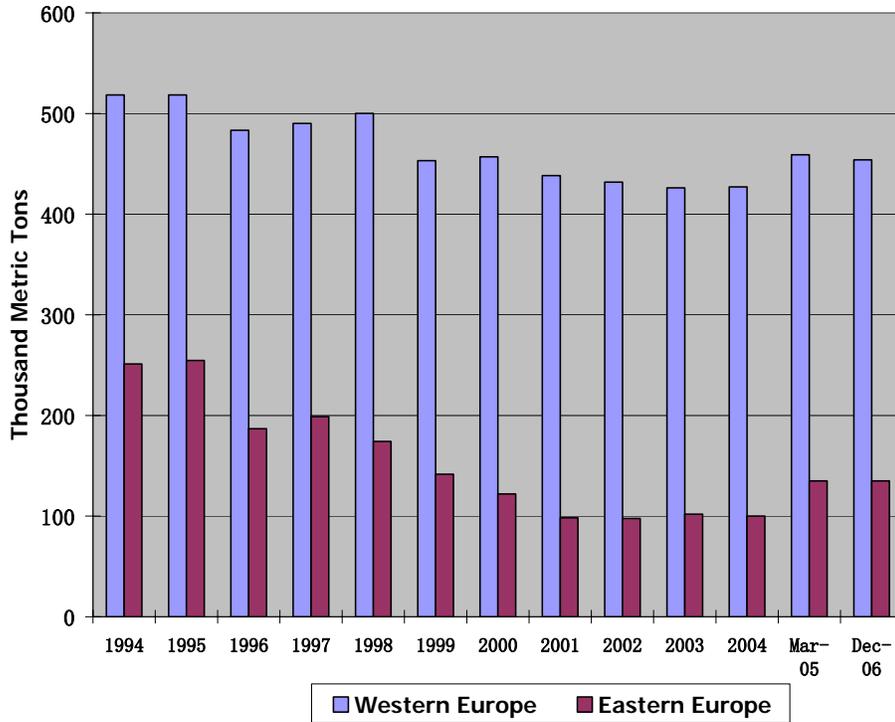


Figure 4.15 Cellulosic Fiber Production & Producing Capacity except Lyocell in Europe: 1994-2006[63]

The cellulosic fiber production in North America plummeted 69.0% from 0.25 million tons in 1994 to 0.08 million tons in 2004. Since the output of cellulosic fiber in the U.S. accounted about 80% of production in North America during the last decade, it was the main contributor for the production decline in this region. The cellulosic fiber production in America has been steadily dropping from 0.23 million tons in 1994 to 0.07 million tons in 2004, down 70.5% in total. It is expected that the output in America will rebound a little to 0.08 million tons in 2005 and 2006, up 13.0% from 2004. The output of cellulosic fiber in Mexico stayed relatively flat from 13.2 thousand tons in 1994 to

12.3 thousand tons in 2004, though it is projected to drop to 5 thousand tons in 2006, down 7.3 thousand tons (59.3%) from 2004.

Other Americas (Argentina, Brazil, Chile, Columbia, Uruguay, and Venezuela) witnessed a continuous production decline from 1994 (69.5 thousand tons) before its output of cellulosic fiber reached a bottom low at 31.7 thousand tons in 2001. The net loss between 1994 and 2001 was 37.8 thousand tons, dropping 54.4% in output from 1994. Since 2002, the cellulosic fiber production in Other Americas was increasing and rebounded to 48.7 thousand tons in 2004, up 17.0 thousand tons (53.6%) from 2001. However, the output of cellulosic fiber in Other America in 2004 was still 20.8 thousand tons (29.9%) less than that of 1994. Brazil is the main producing country of cellulosic fiber in this region, accounting for 84.3% of the regional output in 1994 and 96.0% in 2004. In 2001 the cellulosic fiber production in Brazil declined to a record low at 28.7 thousand tons for the last decade, down 29.9 thousand tons (51.0%) from 1994. It slowly rebound to 46.8 thousand tons in 2004, which was still 11.8 thousand tons (20.1%) less than that of 1994. It is projected that the Brazil's cellulosic fiber production will slightly increase and stay at 47.9 thousand tons for both 2005 and 2006.

Asia is the world's most important producer of cellulosic fiber, which accounted for 30.8% and 47.1% shares of world total cellulosic fiber production in 1994 and 2004, respectively. In particular, East Asia (Japan, China, South Korea, and Taiwan) has been playing a vital role with nearly 60% share of output in Asia for the last decade. The output of cellulosic fiber in East Asia had been rising 65.3% from 0.71 million tons in 1994 to 1.17 million tons in 2004. Of the four countries in East Asia, China has witnessed a steady increase in the last decade, whilst the output of the other three countries stayed

flat or declined. The cellulosic fiber production in China had soared by 0.63 million tons from 0.34 million tons in 1994 to 0.97 million tons in 2004, nearly tripled the output in 1994. However, during the same period, the second biggest producer in East Asia, Japan, continuously dropped in its cellulosic fiber production by 69.3% from 0.22 million tons in 1994 to 0.07 million tons in 2004. Taiwan, the third biggest producer in this region, dropped slightly by 14.4 thousand tons (9.6%) from 0.15 million tons in 1994 to 0.13 million tons in 2004. It is expected that the output in East Asia will increase to 1.44 million tons in 2006, up 0.27 million tons (22.7%) from 2004. Most of the increase in output (84.1%) is originated from China, whose production is projected to reach 1.19 million tons in 2006, up 0.22 million tons (23.2%) from 2004 (see Figure 4.16).

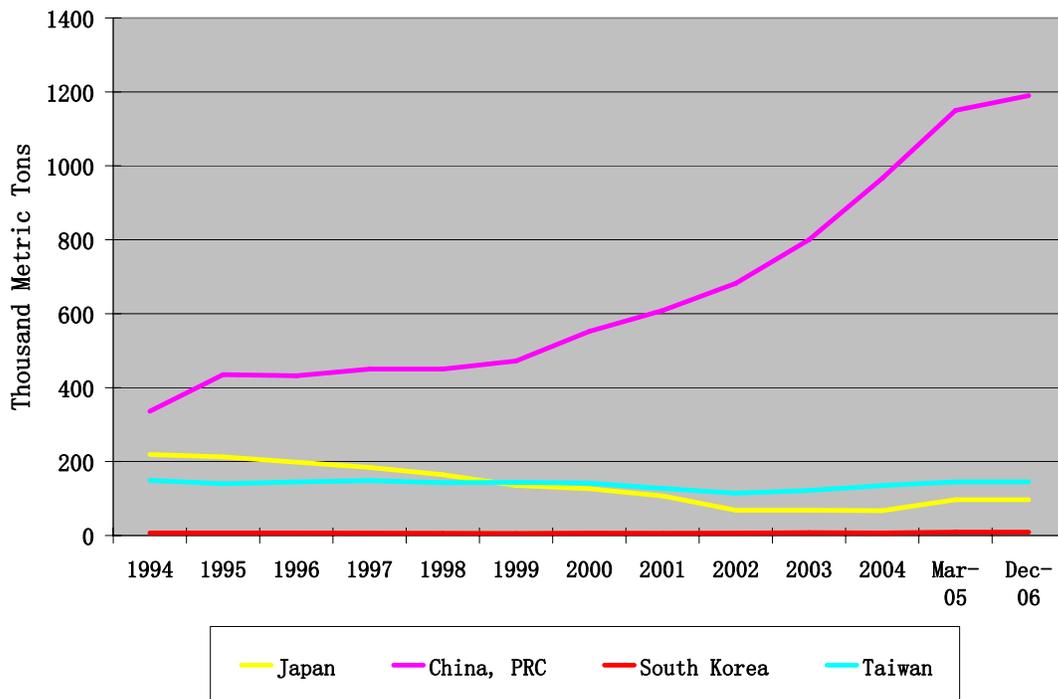


Figure 4.16 Cellulosic Fiber Production & Producing Capacity except Lyocell in East-Asia: 1994-2006[63]

Cellulosic fiber production in South Asia (Bangladesh, India and Pakistan) experienced fluctuation although the overall trend was increasing for the period of 1994-2004. Its regional production of cellulosic fiber amounted to 0.33 million tons in 2004, up 0.09 million tons (35.5%) from 1994.

India, a leading producer in South Asia, increased by 0.07 million tons (29.9%) from 1994 to 2004, while its share in this region dropped from 97.5% to 93.5% during the same period. The output of cellulosic fiber in Pakistan and Bangladesh was the same at about 3 thousand tons in 1994. However, in 2004, the cellulosic fiber production in Pakistan rose to the second rank in total output of cellulosic fiber in South Asia, reaching 16.7 thousand tons in 2004 by 438.7% increase from 1994. Bangladesh held the third place in South Asia in 2004 and nearly doubled its output of cellulosic fiber to 5 thousand tons from 1994. It is projected that the cellulosic fiber output in South Asia will increase to 0.39 million tons in 2006, up 0.06 million tons (18.0%) from 2004. Most (82.8%) of the increase in output of cellulosic fiber is originated from India, whose cellulosic fiber production is expected to rise to 0.36 million tons in 2006, up 0.05 million tons (15.9%) from 2004 (see Figure 4.17).

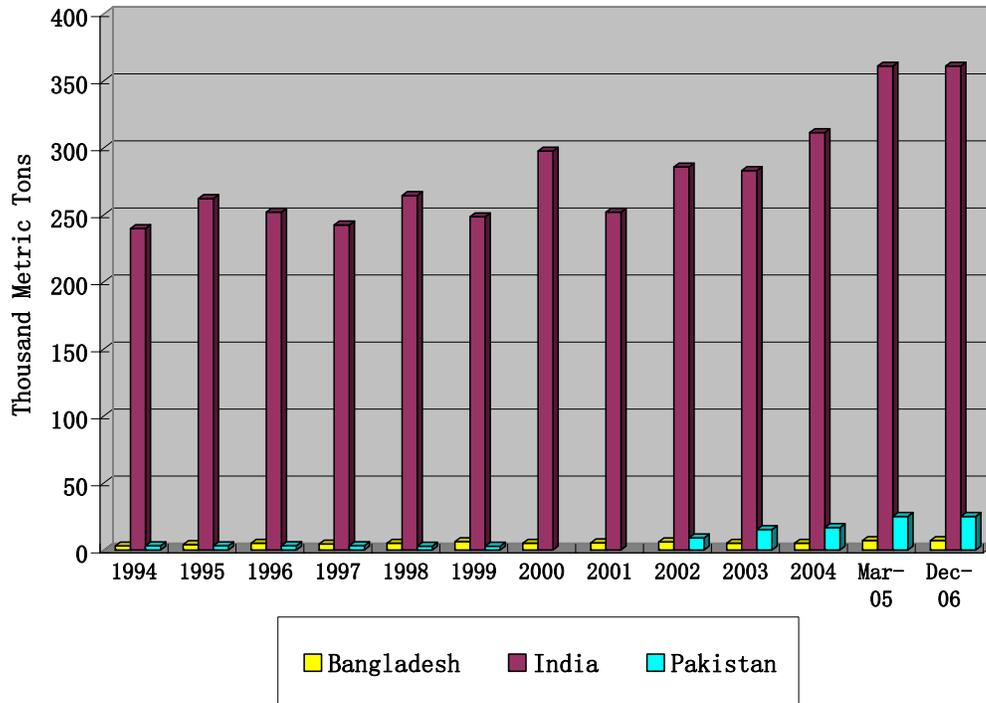


Figure 4.17 Cellulosic Fiber Production & Producing Capacity except Lyocell in South Asia: 1994-2006[63]

The output of cellulosic fiber in South-East Asia (Indonesia and Thailand) jumped to 0.33 million tons in 2004, up 0.10 million tons (45.1%) from 1994. Indonesia is the biggest producer of cellulosic fiber in South-East Asia, accounting for three quarters of the output in this region. Thailand accounted for the rest of cellulosic fiber production in South Asia. Output of cellulosic fiber in Indonesia amounted to 0.25 million tons in 2004, up 0.08 million tons (49.7%) from 1994. At the same time, cellulosic fiber production in Thailand has slightly increased to 0.08 million tons in 2004, up 0.02 million tons (32.3%) from 1994. The regional output in South-East Asia is expected to slightly increase by 0.01 million tons (3.2%) from 2004, reaching 0.34 million tons in 2006.

The production of cellulosic fiber in Egypt (Africa) dropped significantly from 12.9 thousand tons in 1994 to 3.4 thousand tons recorded in 2001, a decrease of 73.6% in ten years. In Iraq (Middle-East), the output of cellulosic fiber experienced a wave to reach 6.3 thousand tons in 2003, down by 17.1% compared with 1994. But it is expected to rise to 9 thousand tons in 2006, up 2.7 thousand tons (42.9%) from 2003.

Worldwide Production of Olefin Fiber

The global production of Olefin fiber reached 6.30 million tons in 2004, up 2.08 million tons (49.1%) from 1994. The biggest jump happened between 1998 and 1999, where the production rose by 0.53 million tons (10.8%) from 4.91 million tons in 1998 to 5.45 million tons in 1999. World production of Olefin fiber is forecast to rise by 28.4% to 8.10 million tons in 2006 compared with 2004 (see Table 4.5).

In regional terms, North America dropped from its first place in output of Olefin fiber at 1.18 million tons (28.0% share) in 1994 to the second position at 1.51 million tons (24.0% share). However, Olefin fiber production in East Asia soared to 1.53 million tons in 2004, forwarding its rank in the share of world Olefin fiber production from the third (25.5%) to the first (24.3%). It is projected that the global output of Olefin fiber will continue to rise through 2006, totaling an increase at 1.79 million tons (28.4%) from 2004. About a quarter of increase (0.41 million ton) is expected to originate from East Asia and one fifth (0.39 million tons) from North America (see Figure 4.18).

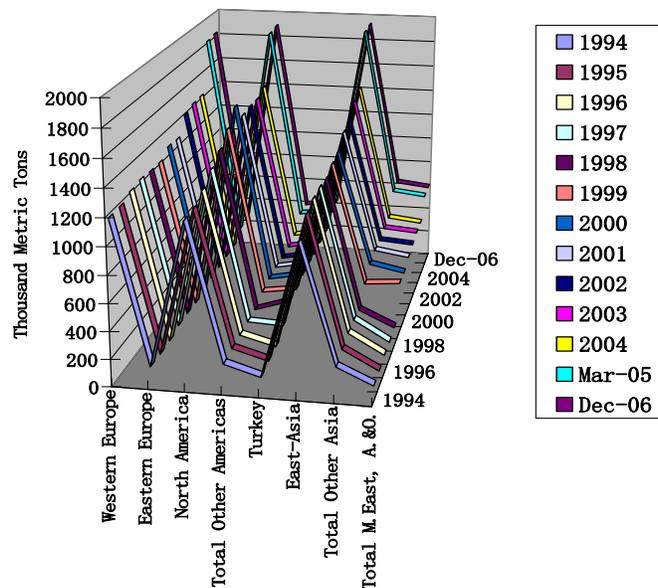


Figure 4.18 World Olefin Fiber Production & Producing Capacity by Region: 1994-2006[63]

Table 4.5 Worldwide Olefin Fiber Production by Region: 1994-2006
(Unit: Thousand Metric Tons)

Country or Area Name	Actual Production						
	1994	1995	1996	1997	1998	1999	2000
Western Europe	1174	1176	1211	1224	1213	1211	1267
Eastern Europe	136	129	131	153	154	145	159
<i>Total Europe</i>	<i>1310</i>	<i>1305</i>	<i>1342</i>	<i>1377</i>	<i>1367</i>	<i>1356</i>	<i>1426</i>
USA	1082	1088	1129	1197	1261	1343	1442
Canada	68	69	72	76	83	87	86
Mexico	32	33	44	48	48	52	60
<i>North America</i>	<i>1182</i>	<i>1190</i>	<i>1245</i>	<i>1321</i>	<i>1392</i>	<i>1482</i>	<i>1588</i>
<i>Total Other Americas</i>	<i>193</i>	<i>207</i>	<i>211</i>	<i>217</i>	<i>218</i>	<i>266</i>	<i>283</i>
<i>Turkey</i>	<i>116</i>	<i>134</i>	<i>143</i>	<i>204</i>	<i>299</i>	<i>303</i>	<i>331</i>
Japan	156	168	154	166	160	182	186
China, PRC	733	826	858	850	845	851	860
South Korea	73	79	87	89	84	94	91
Taiwan	118	118	125	127	132	134	148
<i>East-Asia</i>	<i>1080</i>	<i>1191</i>	<i>1224</i>	<i>1232</i>	<i>1221</i>	<i>1261</i>	<i>1285</i>
<i>Other Asia</i>	<i>231</i>	<i>257</i>	<i>280</i>	<i>284</i>	<i>266</i>	<i>380</i>	<i>447</i>
<i>Total M.East, A.&O.</i>	<i>115</i>	<i>120</i>	<i>136</i>	<i>136</i>	<i>150</i>	<i>400</i>	<i>395</i>
World Total	4228	4404	4580	4771	4914	5447	5755

Country or Area Name	Actual Production				Producing Capacity	
	2001	2002	2003	2004	Mar-05	Dec-06
Western Europe	1258	1393	1418	1421	1813	1828
Eastern Europe	170	174	183	185	258	259
<i>Total Europe</i>	<i>1428</i>	<i>1567</i>	<i>1601</i>	<i>1606</i>	<i>2071</i>	<i>2087</i>
USA	1325	1334	1334	1356	1700	1706
Canada	82	79	71	78	98	98
Mexico	59	62	68	79	94	101
<i>North America</i>	<i>1466</i>	<i>1475</i>	<i>1473</i>	<i>1513</i>	<i>1892</i>	<i>1905</i>
<i>Total Other Americas</i>	<i>291</i>	<i>283</i>	<i>294</i>	<i>313</i>	<i>420</i>	<i>423</i>
<i>Turkey</i>	<i>338</i>	<i>332</i>	<i>348</i>	<i>358</i>	<i>443</i>	<i>456</i>
Japan	188	164	168	170	230	230
China, PRC	924	980	1031	1069	1320	1320
South Korea	106	113	123	125	165	175
Taiwan	153	154	164	169	218	218
<i>East-Asia</i>	<i>1371</i>	<i>1411</i>	<i>1486</i>	<i>1533</i>	<i>1933</i>	<i>1943</i>
<i>Other Asia</i>	<i>475</i>	<i>474</i>	<i>492</i>	<i>504</i>	<i>651</i>	<i>656</i>
<i>Total M.East, A.&O.</i>	<i>435</i>	<i>454</i>	<i>472</i>	<i>475</i>	<i>622</i>	<i>626</i>
World Total	5803	5995	6166	6303	8032	8096

NB: 1) Numbers may not sum precisely due to rounding. 2) For the sake of analysis, the missing data were treated as zero. 3) Total M.East, A.&O.: Total Middle East, Africa & Oceania.

Source: Fiber Organon. Fiber Economics Bureau. Various issues.

Europe witnessed an increased production of Olefin fiber by 22.6% between 1994 and 2004, in which 83.4% of the increase originated from Western Europe. Output of Olefin fiber in Western Europe accounted about 90% share of the regional production in the last ten years. The Olefin fiber production increased to 1.42 million tons in 2004, up 0.25 million tons (21.0%) from 1994. It had the largest increase rate at 10.7% (0.14 million tons) from 2001 to 2002. The output of Olefin fiber in Eastern Europe was fluctuating with an overall increasing trend during 1994-2004. It rose from 0.14 million tons in 1994 to 0.19 million tons in 2004, reaching a total increase rate at 36.0% within those ten years. The production of Olefin fiber in Europe is expected to jump by 30.0% from 2004 to 2.09 million tons in 2006, in which Western Europe will have 0.41 million tons increase with a share of 84.6%.

The Olefin fiber production in North America increased by 28.0% from 1.18 million tons in 1994 to 1.51 million tons in 2004. Its production capacity is expected to rise to 1.91 million tons in 2006. The U.S. accounted about 90% of production of Olefin fiber in North America during the past decade. Also it was the substantial contributor for the increase in Olefin fiber production in this region. The output of Olefin fiber in U.S. had been steadily increasing from 1.08 million tons in 1994 to 1.44 million tons in 2000, up 33.3%. A huge production loss happened between 2000 and 2001 with a decrease at 1.17 million tons (8.1%). After that, the output of Olefin fiber in U.S. slightly increased to 1.36 million tons by 2004, up 0.03 million tons (2.34%) from 2001. It is projected that the Olefin fiber production in U.S. will keep on rising to 1.71 million tons in 2006, up 0.35 million tons (25.8%) from 2004. The output of Olefin fiber in Canada was fluctuating for the last decade and reached 78 thousand tons in 2004, up 10 thousand tons

(14.7%) from 1994. Production in Mexico has increased 2.5 times from 1994, reaching 79 thousand tons in 2004. It is expected that Olefin fiber production in Mexico will increase to 0.10 million tons in 2006, by 27.8% (0.02 million tons) from 2004.

Other Americas experienced a continuous increase in Olefin fiber production from 0.19 million tons in 1994 to 0.31 million tons in 2004, resulting in a growth rate of 62.2% in the last decade. It is projected that the Olefin fiber production in other Americas will climb to 0.42 million tons in 2006, up 0.11 million tons (35.1%) from 2004.

East Asia (Japan, China, South Korea, and Taiwan) has become the world's most important producer of Olefin fiber in the last decade, ranking at the first place in the world share in 2004. The regional production increased steadily to 1.53 million tons in 2004, by 41.9% (0.45 million tons) from 1994. For individual countries, China has been playing the leading role, accounting for more than two thirds of the total output of Olefin fiber in East Asia. The Olefin fiber production in China has witnessed a big increase since 1994, which climbed by 0.34 million tons to 1.07 million tons in 2004, up 45.8% from 1994. The Olefin fiber production in China is projected to 1.32 million tons in 2006, increasing by 23.5% (0.25 million tons) compared with 2003.

Compared to China, the output of Olefin fiber in the other three countries was relatively small (see Figure 4.19). Japan, the second largest producer in East Asia, increased its production by 9.0% from 0.16 million tons in 1994 to 0.17 million tons in 2004. Taiwan, the third biggest producer of Olefin fiber in this region, climbed by 0.05 million tons (43.2%) from 1994 to 0.17 million tons in 2004. The Olefin fiber production in South Korea nearly doubled from 0.07 million tons in 1994 to 0.13 million tons in

2004. It is expected that the output of Olefin fiber in East Asia will increase to 1.94 million tons in 2006, up 0.41 million tons (26.7%) from 2004.

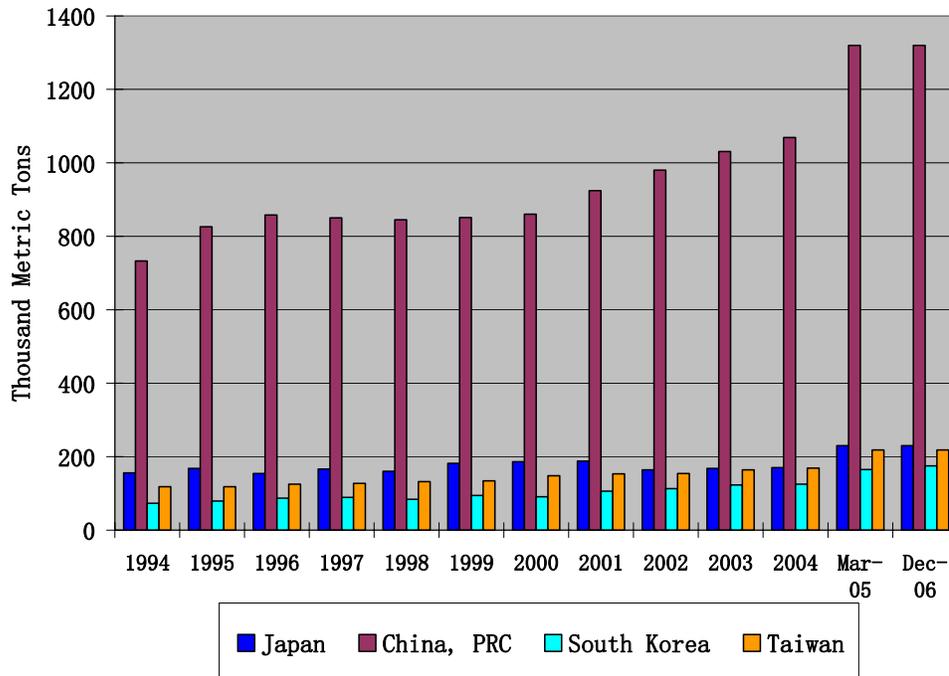


Figure 4.19 Olefin Fiber Production & Producing Capacity in East-Asia: 1994-2006[63]

The output of olefin fiber in other Asia has more than doubled since 1994, reaching a record high at 0.50 million tons in 2004. The regional production of olefin fiber is projected to 0.63 million tons in 2006, increasing 0.15 million tons (31.8%) from 2004.

The olefin fiber production in Total Middle-East, Africa and Oceania rose significantly from 0.12 million tons in 1994 to 0.48 million tons in 2004, an increase of 313% in these years. The output is expected to rise to 0.63 million tons in 2006, by 31.8% (0.15 million tons) from 2004.

The olefin fiber production in Turkey climbed to 0.36 million tons in 2004, up 0.24 million tons (209%) from 1994. The output in Turkey is expected to continue to grow to 0.46 million tons in 2006, resulting in an increase of 0.10 million tons (27.4%) from 2004.

Worldwide Production of Glass Fiber

The world production of glass fiber increased by 0.43 million tons (19.1%) since 1994 to a record high in 2002 at 2.66 million tons. The second peak production during this period took place in 2000 at 2.58 million tons, rising by 6.8% from the previous bottom production in 1998. The biggest leap occurred between 2001 and 2002 by 0.23 million tons (9.5%) (see Table 4.6).

Table 4.6 Worldwide Glass Fiber Production: 1994-2004
(Unit: Thousand Metric Tons)

Country	Actual Production					
	1994	1995	1996	1997	1998	1999
C.I.S.	24	25	25	27	30	30
Total Europe	545	567	585	610	660	674
USA	959	981	996	1,032	1,018	1,126
Total Other Americas	87	96	94	100	96	96
Japan	313	318	316	328	300	300
China, PRC	78	85	98	75	60	60
Other Asia, Africa & Oceania ^a	229	236	273	284	252	252
World Total	2235	2308	2387	2456	2416	2538

Country	Actual Production			Producing Capacity	
	2000	2001	2002	Mar-03	Dec-04
C.I.S.	28	32	34	37	40
Total Europe	728	701	718	724	740
USA	1,143	1,016	1,222	1,307	1,363
Total Other Americas	96	93	96	100	104
Japan	280	273	251	250	250
China, PRC	60	67	90	120	150
Other Asia, Africa & Oceania ^a	245	249	250	252	256
World Total	2580	2431	2661	2790	2903

Note: a. Australia, India, South Korea, South Africa and Taiwan.
Source: Fiber Organon. Fiber Economics Bureau. Various issues.

For the main producing regions and countries of glass fiber, the U.S. was the leading producer in 2002 with 45.9% world share followed by Total Europe with 27.0% (see Figure 4.20). The output of glass fiber in U.S. rose to 1.14 million tons in 2000, up

0.18 million tons (19.2%) from 1994. Then it followed a decrease in 2001 to 1.02 million tons, down 11.1% from the previous year. The output rebounded to 1.22 million tons in 2002, up by 20.3% from 2001. Total Europe witnessed a continuous increase in output of glass fiber before it reached a record high at 0.73 million tons in 2000, up 0.18 million tons (33.6%) from 1994. The glass fiber production in this region suddenly dropped by 3.7% to 0.70 million tons in 2001 followed by an increase at 2.4% to 0.72 million tons.

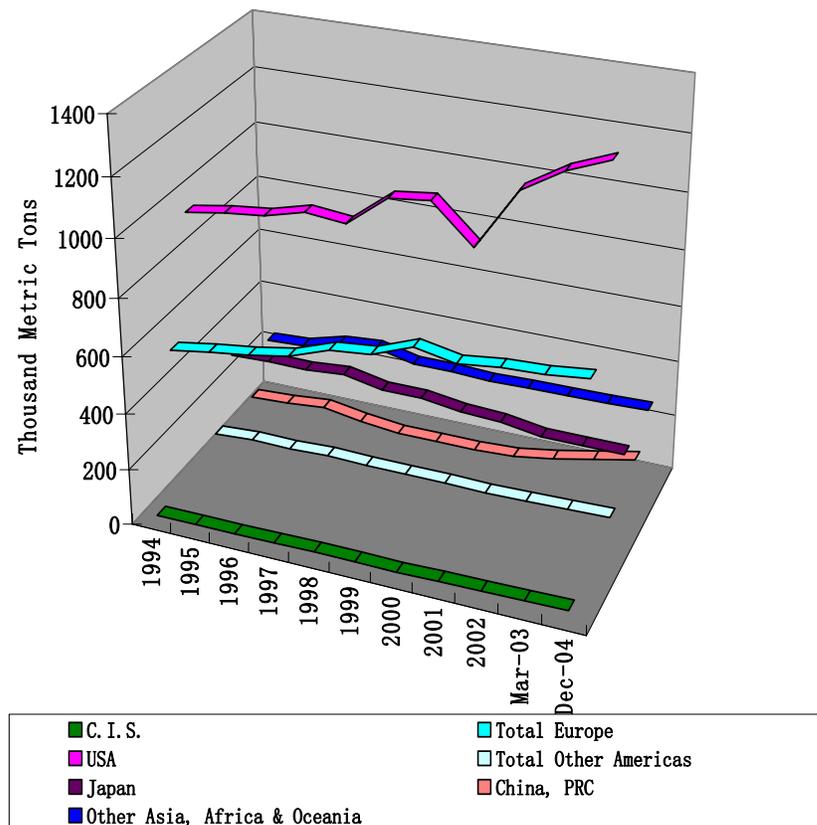


Figure 4.20 World Glass Fiber Production & Producing Capacity by Region: 1994-2004[63]

Japan had about the same world share at 9.4% as the total of the other Asia, Africa, and Oceania in 2002. Other Asia, Africa, and Oceania includes Australia, India, South Korea, Taiwan and South Africa. While the output of glass fiber in this region rose

by 9.2% to 0.25 million tons during 1994-2002, the glass fiber production in Japan declined by 19.8% to 0.25 million tons at the same time. Production of glass fiber in total other Americas held the fifth place in the world glass fiber with a 3.6% share in 2002, followed by China at 3.4%. The outputs of glass fiber in Total Other Americas reached 96 thousand tons in 2002 and 90 thousand tons in China, going up by 9 (10.3%) and by 12 (15.4%) thousand tons since 1994, respectively. The glass fiber production in C.I.S. rose to 34 thousand tons in 2002, up 10 thousand tons (41.7%) from 1994. It is projected that the world output in glass fiber would keep the rising trend to 2.90 million tons in 2004, resulting in an increase of 0.24 million tons (9.1%) from 2002. All the regions and countries are expected to have increased output through 2004 with the biggest leap in the U.S. at 0.14 million tons (11.5%) from 2002.

World Production of Other Natural Fibers (Cotton and Wool Excluded)

Although the global output of other natural fibers (cotton and wool excluded) increased by 3.4% from 5.29 million tons in 1994 to 5.47 million tons in 2004, it witnessed fluctuation during the same period (see Figure 4.21). The world production increased to a record high at 5.66 million tons in 1997, up 0.46 million tons (8.9%) from the previous bottom in 1995. It then plummeted to a record low at 4.83 million tons by the end of 1998 and decreased by 0.83 million tons (14.7%) from the previous year. Since 1998, the world output of other natural fibers steadily rose by 14.4% to 5.52 million tons in 2002. A decreasing trend was observed since 2002 and therefore the world production of other natural fibers declined by 0.05 million tons (0.9%) to 5.47 million tons in 2004 (see Table 4.7).

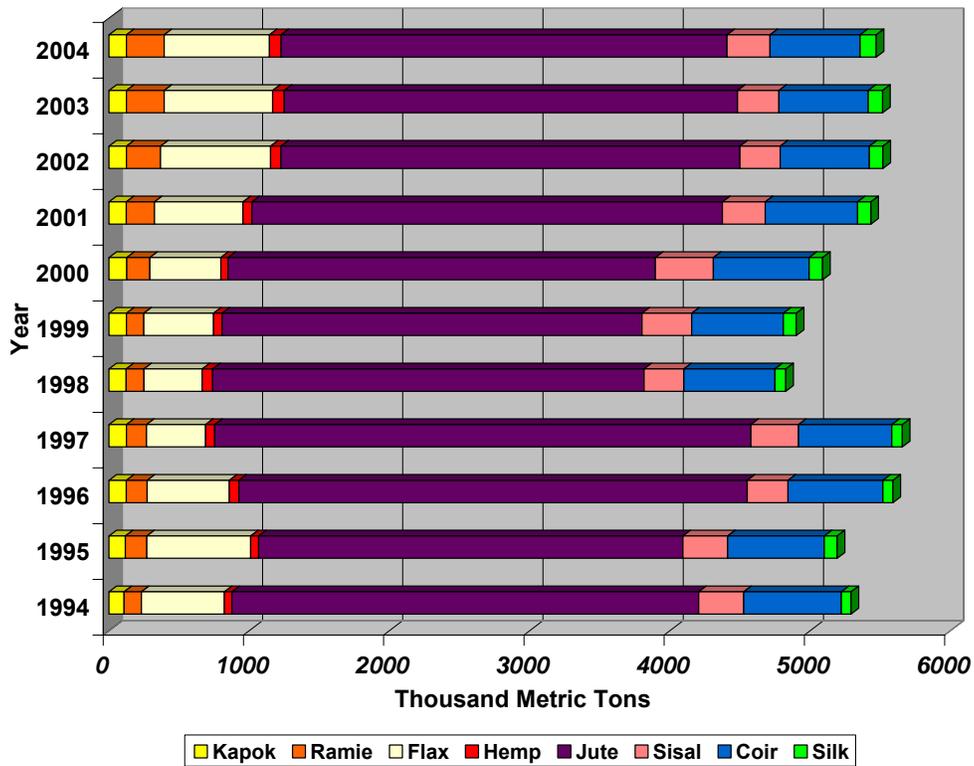


Figure 4.21 Worldwide Production of Other Natural Fibers: 1994-2004[64; 66]

Table 4.7 Worldwide Production of Other Natural Fibers: 1994-2004
(Unit: Thousand Metric Tons)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Kapok	108	117	124	125	123	125	127	124	125	125	125
Ramie	124	154	149	143	127	124	165	201	243	269	269
Flax	592	740	586	421	416	497	506	631	784	773	751
Hemp	52	56	67	65	74	61	51	63	74	83	83
Jute*	3,329	3,026	3,626	3,824	3,076	2,994	3,048	3,356	3,273	3,232	3,179
Sisal	322	319	290	339	284	354	413	305	287	295	307
Coir	696	689	677	665	649	654	683	658	636	637	642
Silk	69	92	71	75	77	92	96	95	97	102	115
Total	5,292	5,193	5,590	5,657	4,826	4,901	5,089	5,433	5,519	5,516	5,471

Note: *: Jute and jute-like fibers.

Source: 1) Silk data from Fiber Organon (2005). Fiber Economics Bureau. December 2005. 2) Other data from Saurer (2005). *The Fiber Year 2004*, Issue 5, May 2005.

Jute was the major other natural fiber, accounting for over half of the global output of other natural fibers. Worldwide Jute fiber production jumped by 14.9% from 1994 to the highest at 3.82 million tons in 1998 followed by a plummet to a record low at 2.99 million tons in 1999. The output of Jute fiber fluctuated between 3.05 and 3.36 million tons during the following five years, ending at 3.18 million tons in 2004 and up 4.3% from 2000. The output of Flax fiber increased from 0.59 million tons in 1994 to 0.75 million tons in 2004, up 26.9% over ten-year period, which forwarded its place in the global production share of other natural fibers from the third (11.2%) in 1994 to the second (13.7%) in 2004. The production of Coir fiber slightly decreased to 0.64 million tons in 2004, down 0.05 million tons (7.8%) from 1994. Thus, its world share dropped from the second place at 13.2% in 1994 to the third at 11.7% in 2004. The world production of silk rose by 66.7% from 0.07 million tons in 1994 to 0.12 million tons by the end of 2004.

Total Major Fibers Production in the World

In summary, world total major fibers output grew continuously between 1995 and 2004, up 40.7% from 54.22 million tons to 76.28 million tons by estimate. Table 4.8 lists world major fibers production by estimation from 1995 to 2004. Obviously, synthetic fiber and cotton fiber have been dominating the fiber market, accounting for 49.8% and 34.4% of the world total major fibers output in 2004 respectively.

Table 4.8 World Major Fibers Production by Estimation: 1995-2004

FIBER TYPE	PRODUCTION (Thousand Metric Tons)									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Synthetic Fiber ^a	18,377	19,907	22,152	22,741	24,485	26,129	26,243	28,052	29,432	31,689
Olefin Fiber	4,404	4,580	4,771	4,914	5,447	5,755	5,803	5,995	6,166	6,303
Cellulosic Fiber ^b	2,423	2,270	2,314	2,185	2,074	2,215	2,083	2,125	2,271	2,492
Glass Fiber	2,308	2,387	2,456	2,416	2,538	2,580	2,431	2,661	2,790	2,903
Raw Cotton	19,962	19,480	19,846	18,551	18,887	19,173	21,480	19,323	20,720	26,204
Raw Wool ^c	1,556	1,493	1,428	1,398	1,380	1,343	1,317	1,269	1,231	1,222
Other Natural Fibers ^d	5,193	5,590	5,657	4,826	4,901	5,089	5,433	5,519	5,516	5,471
Total	54,223	55,707	58,624	57,031	59,712	62,284	64,790	64,944	68,126	76,284

Note: a. Olefin is excluded. b. Lyocell is excluded. c. Scoured or Cleaned Basis. d. Cotton and wool are excluded.

Sources: 1. *Fiber Organon*, various issues. 2. Converted from International Cotton Advisory Committee, *Cotton: Review of the World Situation*, September-October 2005. 3. Converted from International Wool Textile Organization, December 2005. 4. Saurer (2005). *The Fiber Year 2004*, Issue 5, May 2005. 5. *Fiber Organon*, Vol. 76, No.12, Dec. 2005 (Original Data from United Nations Food & Agriculture Organization).

As seen from the table 4.8, total world fiber production will have reached an estimated 76.28 million tons in 2004. However, it is reported that world fiber production has achieved 67.44 million tons in 2004 [53]. The main reasons causing the above difference (8.84 million tons) in global fiber production are that: 1) the data for the output of the glass fiber is producing capacity due to the lack of the actual production data for 2004; 2) there are some inherent errors in the system (e.g., 480 lbs/bale or 495 lbs/bale for cotton fiber); 3) the data collected by different resources present the variation since

they were collected in different ways and sometimes by using different units of measurement.

When population at the global level increased by 11.1% from 5.67 billion to 6.30 billion between 1995 and 2003, the total major fibers production in the world jumped by 25.6% from 54.22 million tons to 68.13 million tons over those nine years (see Table 4.9). In other words, the overall growth rate of total global major fibers production has further outpaced that of the world's population. By applying General Linear Model (GLM) in SAS program (see Appendix I), the slopes of regression lines fitted to the data represent the average annual growth rates of world fiber production and per capita consumption of major fibers over the ten years (1995-2004) as shown in Table 4.9.

Table 4.9 World Production and Per Capita Consumption of Major Fibers 1995-2004

YEAR	FIBER PRODUCTION ('000 Metric Tons)			World Population (Thousands)	Fiber Consumption per capita (Pounds)
	Man-Made ^a	Natural ^b	Total		
1995	27,512	26,711	54,223	5,674,381	21.07
1996	29,144	26,563	55,707	5,754,690	21.34
1997	31,693	26,931	58,624	5,834,504	22.15
1998	32,256	24,775	57,031	5,913,786	21.26
1999	34,544	25,168	59,712	5,992,485	21.97
2000	36,679	25,605	62,284	6,070,586	22.62
2001	36,560	28,230	64,790	6,148,063	23.23
2002	38,833	26,111	64,944	6,224,978	23.00
2003	40,659	27,467	68,126	6,301,463	23.83
2004	43,387	32,897	76,284	6,464,750 ^c	26.01
Growth Rate^d	1,662	416	2,078	82,873	0.44

Note: a. The total of synthetic fiber (including olefin), cellulosic fiber (except lyocell) and glass fiber. b. Including cotton, wool and other natural fibers. c. Using data of 2005 instead. d. Growth rates are the slopes of lines fitted to the data by the least squares method. They are average annual rates expressed in the units in the column headings.

Indication: 1 metric ton = 2204.62262 pound.

Data Compiled from the following Sources: Production figures: same as table 4.8. Population figures: 1. FAO of United Nations. FAO Statistical Databases [67]. 2. United Nations. World Population Prospects: The 2004 Revision Population Database (Medium Variant) [68].

In terms of world fiber production, between 1995-2004 the average annual growth rate of man-made fiber output (1.66 million tons per year) is near fourfold that of natural

fiber production (0.42 million tons per year). Compared with the average annual growth rate in this period, the global fiber output has witnessed an unprecedented level of the annual growth in 2004.

CHAPTER FIVE

CHANGES IN WORLD YARNS PRODUCTION

Worldwide Production of Chemical Fiber Yarn (50% Chemical Fiber or More)

World production of chemical fiber yarn (50% chemical fiber or more) increased by 67.2% from 20.29 million tons in 1994 to estimated 33.92 million tons in 2004 (see Figure 5.1). To put this strong growth into perspective, the long-term average annual growth rate over the last ten years accounted for 5.3%. In 2004, East-Asia took the lead in production of chemical fiber yarn with a 58.5% market share, followed by Europe and Total Other Asia/Oceania each with a 9.4%. South Asia had an 8.8% share, followed by North America with a 7.6% share. Total Other Americas and the rest of the regions accounted for the remaining 6.3% share. The output of chemical fiber yarn is estimated to 36.41 million tons in 2005, which refers to a growth rate of 7.4% over 2004 (see Table 5.1).

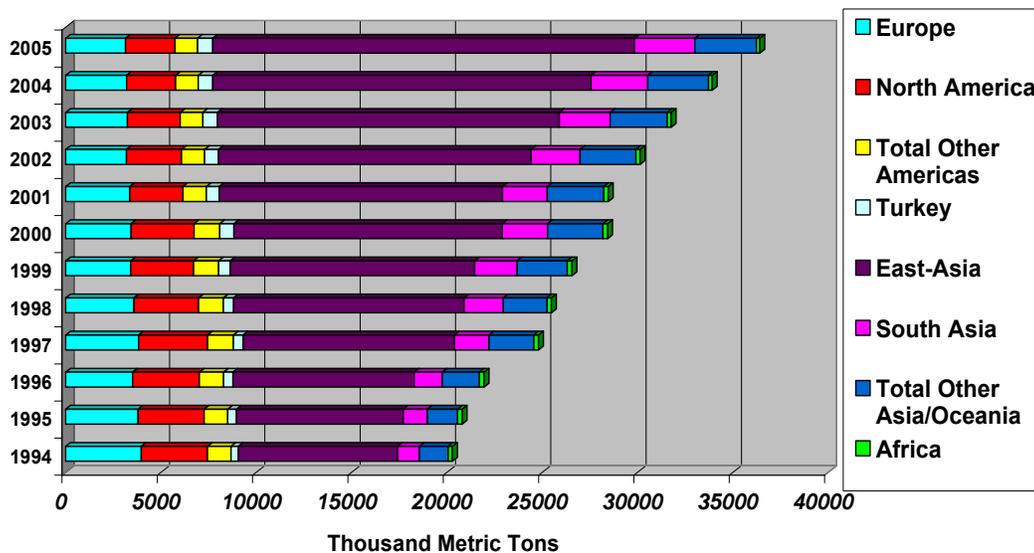


Figure 5.1 Worldwide Production of Chemical Fiber Yarn: 1994-2005[69]

Table 5.1 World Production of Chemical Fiber Yarn (50% Chemical Fiber or More): 1994-2005
(Unit: Thousand Metric Tons)

Country	PRODUCTION					
	1994	1995	1996	1997	1998	1999
Europe	3967.3	3797.1	3516.8	3819.9	3585.5	3410.6
United States	3475.3	3464.9	3497.2	3628.1	3388.2	3304.2
North America	3475.3	3464.9	3497.2	3628.1	3388.2	3304.2
Total Other Americas	1233.7	1237.4	1275.8	1351.8	1303.9	1310.6
Japan	1612.9	1612.7	1597.2	1617.7	1528.1	1435.2
China, PRC	2455	2718.7	3161.6	3977.2	4858.3	5707.2
South Korea	1831.6	1864.8	2032	2409.6	2451.9	2598.4
Taiwan	2450.8	2550.1	2705.7	3080.8	3254.1	3071.4
East-Asia	8350.3	8746.3	9496.5	11085.3	12092.4	12812.2
India	920.8	1000.1	1168.3	1483.1	1625.8	1741.8
Pakistan	230.6	258.1	316	325.9	430.6	480.8
South Asia	1151.4	1258.2	1484.3	1809	2056.4	2222.6
Turkey	383.3	463.6	489.1	511.5	529.8	613.5
Total Other Asia/Oceania	1500.8	1595.5	1946.8	2352.2	2292.5	2645.2
Africa	227	234.5	239	243.1	231.9	239.8
World Total	20289.1	20797.5	21945.5	24800.9	25480.6	26558.7

Country	PRODUCTION					
	2000	2001	2002	2003 Prel.	2004 Est.	2005 Est.
Europe	3429.2	3362.1	3193.7	3240.1	3197.7	3142.9
United States	3308	2790.6	2887.7	2772.9	2576.3	2591.2
North America	3308	2790.6	2887.7	2772.9	2576.3	2591.2
Total Other Americas	1350.9	1231.8	1209.7	1182.7	1183.5	1184.5
Japan	1434.1	1346.6	1197.2	1098.6	1034.4	1034.4
China, PRC	6710.7	7931.5	9531.5	11241.3	13528.5	15959.3
South Korea	2665.2	2477.8	2462	2425.4	2436.7	2385.5
Taiwan	3264.4	3104.9	3203.5	3167.4	2842	2741.5
East-Asia	14074.4	14860.8	16394.2	17932.7	19841.6	22120.7
India	1865.9	1822.1	1981	2075	2286.9	2448.7
Pakistan	503.9	528.4	590.7	593.6	685.7	724.9
South Asia	2369.8	2350.5	2571.7	2668.6	2972.6	3173.6
Turkey	744.5	669.2	728.1	766.9	760.9	793.1
Total Other Asia/Oceania	2910.4	2966.3	2929.5	2995.2	3190.8	3226.2
Africa	246.7	233	214.3	199	195.3	180.3
World Total	28433.9	28464.3	30128.9	31758.1	33918.7	36412.5

Source: ICAC (2004). *World Textile Demand*, November 2004. International Cotton Advisory Committee (ICAC), Washington DC, USA.

Production of chemical fiber yarn in Europe decreased by 0.77 million tons (19.4%) from 3.97 million tons in 1994 to an estimated 3.20 million tons in 2004. During the first five years in this period, the output in Europe was fluctuating significantly up to 0.30 million tons (1996-1997). The chemical fiber yarn production remained relatively flat for the next three years (1999-2001), followed by a decline of 0.17 million tons (5.0%) in 2002. It rebounded 0.05 million tons to 3.24 million tons in 2003, up 1.5% from the previous year. The output is estimated at 3.14 million tons in 2005, slightly down by 0.05 million tons (1.7%) from 2004 (see Figure 5.2).

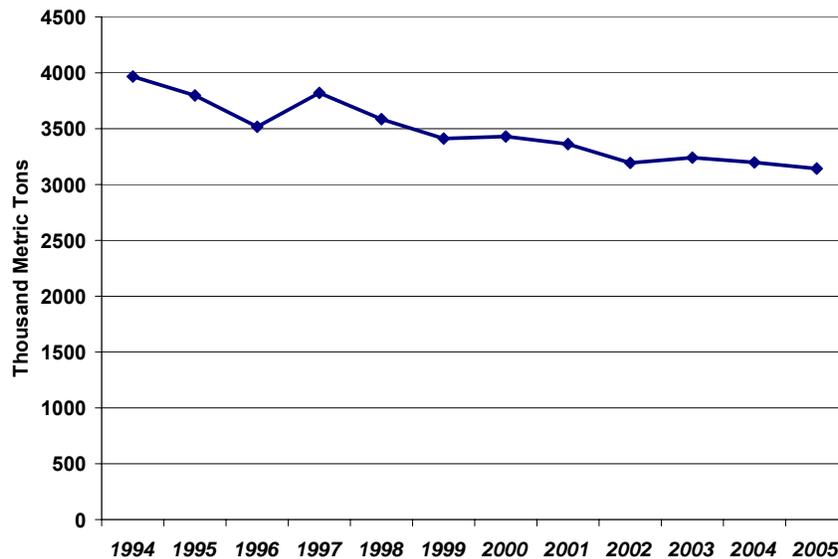


Figure 5.2 Production of Chemical Fiber Yarn in Europe: 1994-2005[69]

The output of chemical fiber yarn in North America experienced a decline by 0.90 million tons (25.9%) from 3.48 million tons in 1994 to an estimated 2.58 million tons in 2004. The United States is the major producer for the chemical fiber yarn production in this region. Its output climbed to the record high at 3.63 million tons in 1997 and then

went down to the lowest point in 2004 (see Figure 5.3). However, it is forecasted to rise to estimated 2.59 million tons in 2005, up 0.6% from the previous year.

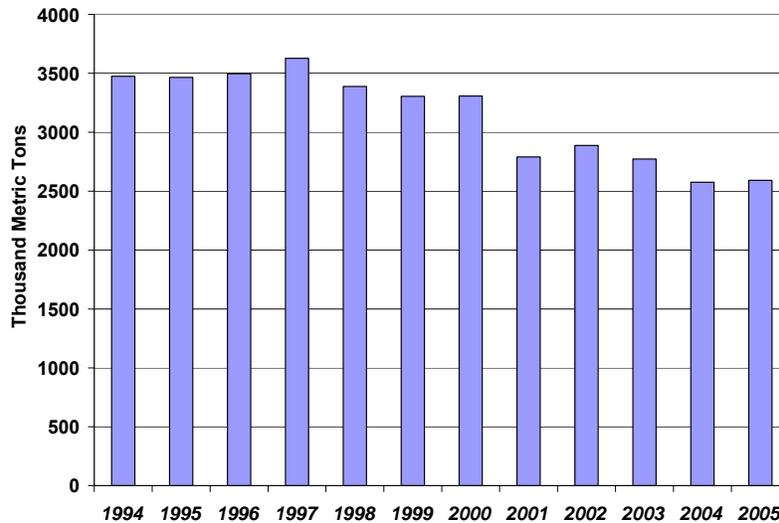


Figure 5.3 Production of Chemical Fiber Yarn in North America: 1994-2005[69]

East-Asia has witnessed a rapid development in chemical fiber yarn production, increasing by 11.49 million tons (137.6%) from 8.35 million tons in 1994 to 19.84 million tons in 2004 by estimation. During this period, the corresponding volume share jumped from 41.2% to 58.5% among the global production of chemical fiber yarn. Undoubtedly, China has primarily contributed to this regional growth in volume terms. The output of chemical fiber yarn in China surged by 11.07 million tons (451.1%) over 1994 to estimated 13.53 million tons in 2004. China has steadily emerged as the number one producer of chemical fiber yarn in the world, accounting for near 68.2% of the regional output and about 39.9% of the global production. China is expected to further enhance its commanding position in production of chemical fiber yarn by reaching 15.96 million tons in 2005 with a further 18.0% rise over 2004. Taiwan has remained the

second position in East-Asia with a volume of 2.45 million tons in 1994 up to an estimation at 2.84 million tons in 2004, increased by 16.0% (0.39 million tons). Taiwan had experienced a production increase before its output in chemical fiber yarn reached a peak high at 3.26 million tons in 2000. Since then, its production slightly fluctuated, reaching an estimation of 2.84 million tons in 2004. The output in South Korea stayed relatively flat around 2.60 million tons except that there was a huge increase to 2.41 million tons in 1997, up 0.58 million tons (31.6%) from 1994. Japan was the only country in the East-Asia region whose production was continuously declining during the period of 1994-2004. Its output dropped to a little over one million tons in 2004, down 0.58 million tons (35.9%) from 1994 (see Figure 5.4). The total production in East-Asia is projected to rise to 22.12 million tons in 2005, up 2.28 million tons (11.5%) from the preceding year. All of the regional increase in 2005 is believed to benefit from China although the output in the other countries in East-Asia is likely to remain the same (Japan) or slightly decrease (South Korea and Taiwan).

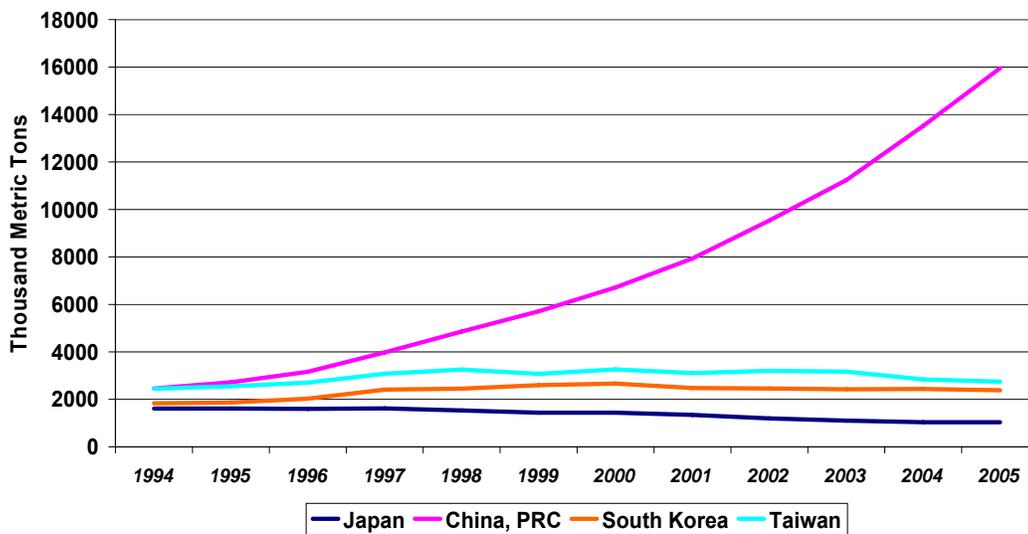


Figure 5.4 Production of Chemical Fiber Yarn in East-Asia: 1994-2005[69]

Production of chemical fiber yarn in South Asia climbed to estimated 2.97 million tons in 2004, representing a 158.2% increase (1.82 million tons) since 1994. In this region, India and Pakistan were the main producing countries, in which India accounted for over three quarters of the regional output and Pakistan for the rest (see Figure 5.5). Production of chemical fiber yarn in India kept rising at an average rate of 11.1% per year during the period of 1994-2004 except a slight decline by 0.04 million tons (2.35%) between 2000 and 2001. The biggest production leap occurred in 1997 to 1.48 million tons, up 0.31 million tons (26.95%) from 1996. The output in Pakistan grew nearly three times of that in 1994, reaching 0.69 million tons in 2004. Although the absolute production in Pakistan was much less than that in India, its percentage volume share in South Asia increased slightly from 20.03% in 1994 to 23.1% in 2004. It is estimated that production in South Asia will rise by 0.20 million tons (6.76%) between 2004 and 2005 with 80.50% of increase from India.

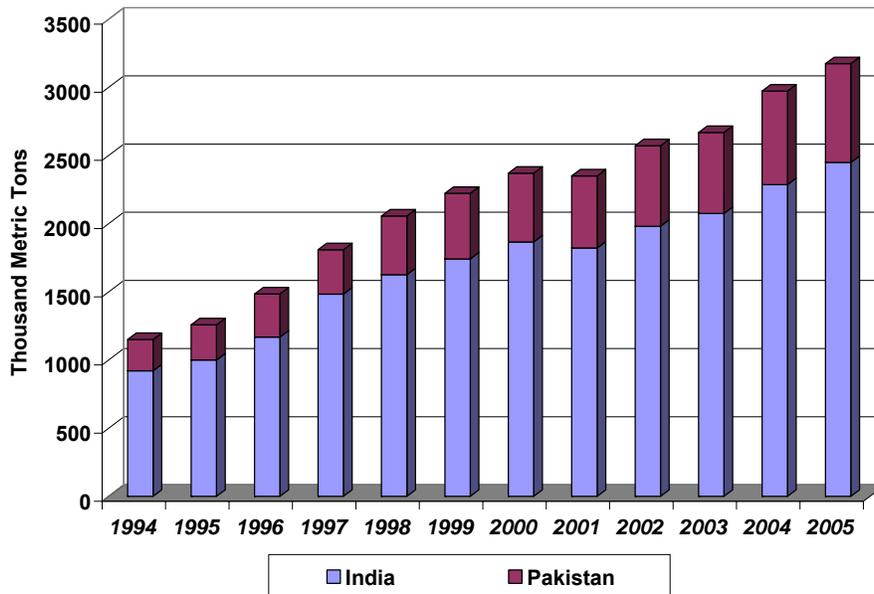


Figure 5.5 Production of Chemical Fiber Yarn in South Asia: 1994-2005[69]

The output of chemical fiber yarn in Turkey rose by 0.38 million tons (98.5%) from 1994 to estimated 0.76 million tons in 2004. It is expected to reach 0.79 million tons in 2005, representing growth of 4.2% over the previous year (see Figure 5.6).

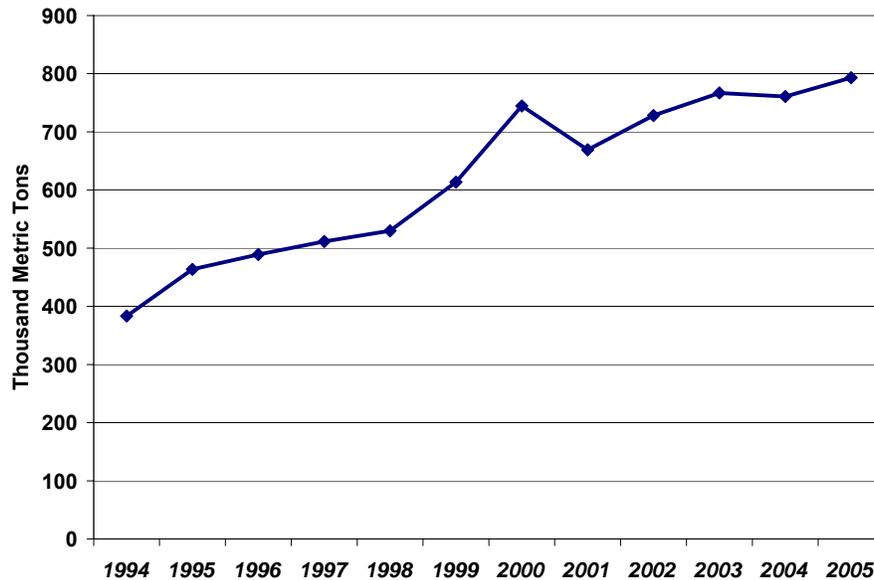


Figure 5.6 Production of Chemical Fiber Yarn in Turkey: 1994-2005[69]

Chemical fiber yarn output in total other Asia and Oceania has more than doubled since 1994, climbing to 3.19 million tons in 2004. The regional production kept rising during this ten-year period at an average rate over 10% per year, reaching its first peak at 2.35 million tons in 1997 followed by a second peak at 2.97 million tons in 2001. It is anticipated that year 2005 will follow the rising trend to 3.23 million tons and increase by 0.04 million tons (1.1%) from 2004.

Africa has the lowest share in global production of chemical fiber yarn. Its output decreased from 0.23 million tons in 1994 to 0.20 million tons in 2004, down 0.03 million tons (14.0%) in these ten years. However, production in Africa was first slightly

increasing to a record high at 0.25 million tons in 2000 followed by a steeper and steady decline thereafter (see Figure 5.7). It is forecasted for the year 2005 that the output of chemical fiber yarn will further dropped by 7.68% compared with 2004.

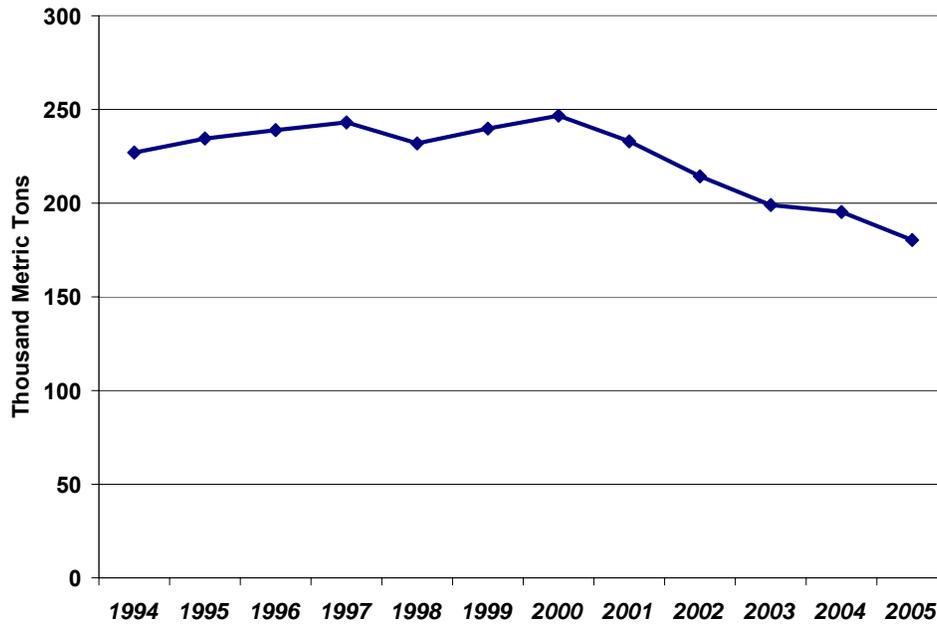


Figure 5.7 Production of Chemical Fiber Yarn in Africa: 1994-2005[69]

Worldwide Production of Cotton Yarn (50% Cotton or More)

World production of cotton yarn (50% cotton or more) jumped to an estimation of 21.77 million tons in 2004, representing an increase of 6.08 million tons (38.8%) from 1994. In fact, global output of cotton yarn has grown each year since 1994 with the exception of 1998, when it fell by 1.9% (see Figure 5.8). It is predicted that the rising trend will remain for the years 2005 and 2006, reaching 22.81 million tons in 2006 and up 1.04 million tons (4.8%) from 2004 (see Table 5.2). From the regional point of view, East-Asia has been the number one producer for the past decade. Its number one position in the world share has been strengthened from 37.0% in 1994 to 50.1% in 2004 and is projected to reach 52.3% in 2006. South Asia has been the second largest regional producer, accounting for the global share of 17.8% and 19.2% in 1994 and 2004, respectively. The global share of cotton yarn for South Asia is expected to remain at 19.1% in 2006.

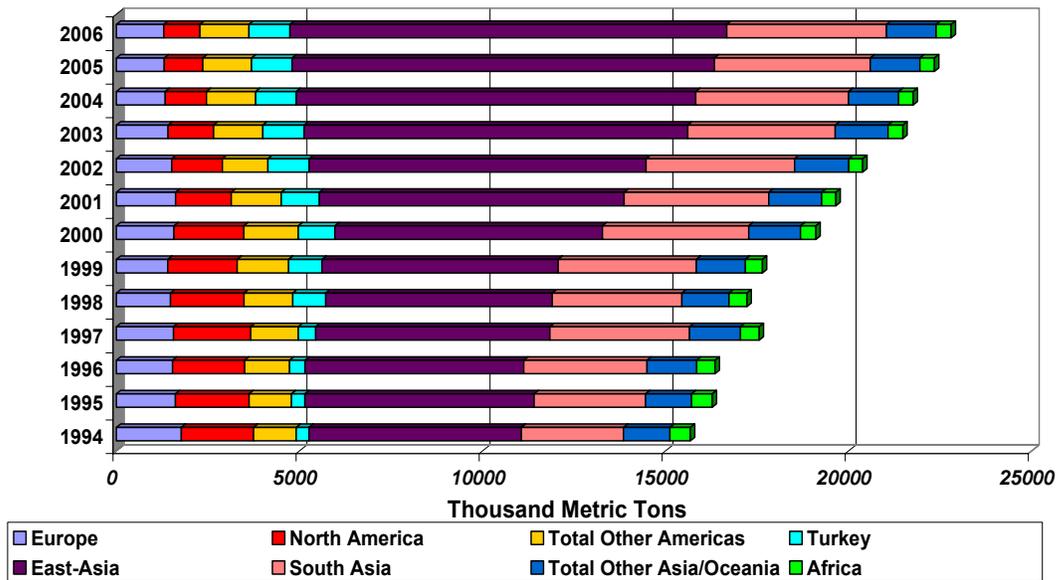


Figure 5.8 Worldwide Cotton Yarn Production: 1994-2006[69]

Table 5.2 Worldwide Cotton Yarn (50% Cotton or More) Production: 1994-2006
(Unit: Thousand Metric Tons)

Country	PRODUCTION						
	1994	1995	1996	1997	1998	1999	2000 Prel.
Europe	1775.3	1616.1	1536.3	1564.2	1477.1	1406.4	1576.2
United States	1973.1	2012.4	1970.6	2108.3	2014	1896.9	1906.2
North America	1973.1	2012.4	1970.6	2108.3	2014	1896.9	1906.2
Total Other Americas	1164.8	1155.6	1226.8	1301.2	1330.3	1401.3	1488.4
Japan	234.8	215	195.8	183.5	173.4	171	158.8
China, PRC	4895	5422.5	5122	5598	5420	5670	6575.7
South Korea	357.3	328.1	301.4	247.2	232.9	283.2	288
Taiwan	318	296.8	355.9	365.1	363.9	327	280.9
East-Asia	5805.1	6262.4	5975.1	6393.8	6190.2	6451.2	7303.4
India	1620	1834	2087	2253	2016	2157	2290
Pakistan	1166.9	1210.5	1279.3	1561.5	1525.1	1616.6	1706.7
South Asia	2786.9	3044.5	3366.3	3814.5	3541.1	3773.6	3996.7
Turkey	349.5	369.2	422	474.8	898	913	1005
Total Other Asia/Oceania	1269.5	1255	1355.9	1393.1	1288.2	1341.7	1415
Africa	558.2	563.6	501	510.5	488.8	466.1	421.8
World Total	15682.4	16278.8	16354	17560.4	17227.7	17650.2	19112.7

Country	PRODUCTION					
	2001 Prel.	2002 Est.	2003 Est.	2004 Est.	2005 Est.	2006 Est.
Europe	1618.5	1513.5	1415.9	1336.2	1309.6	1297.8
United States	1521.1	1384.4	1240.9	1128.2	1052.2	986.4
North America	1521.1	1384.4	1240.9	1128.2	1052.2	986.4
Total Other Americas	1367.5	1242.7	1347	1341.6	1334.2	1338.3
Japan	139.5	122.2	107.6	95.2	85.5	77
China, PRC	7609	8500	9836	10318.3	10972.6	11397.9
South Korea	297.6	301.2	279.6	262.1	255.3	247.7
Taiwan	279.9	279.9	255.8	237	225.6	214.1
East-Asia	8326	9203.3	10479	10912.6	11539	11936.7
India	2216	2189	2074.8	2136.1	2147.2	2191.8
Pakistan	1734	1869.6	1956	2040.4	2106.2	2166.6
South Asia	3950	4058.6	4030.8	4176.5	4253.4	4358.4
Turkey	1040	1128.5	1127.6	1109.4	1106.2	1118
Total Other Asia/Oceania	1447.2	1477.9	1441.7	1366.2	1357.4	1360.8
Africa	385.9	378	403.1	396.2	398.3	410.4
World Total	19656.2	20386.9	21486	21766.9	22350.3	22806.8

Source: ICAC (2004). *World Textile Demand*, November 2004. International Cotton Advisory Committee (ICAC), Washington DC, USA.

Europe experienced an overall declining trend from 1.78 million tons in 1994 to 1.34 million tons in 2004, resulting in a total of 24.7% decrease. The first era of decline was witnessed from 1994 to 1999 when cotton yarn production fell to 1.41 million tons, which represented a 0.37 million tons (20.8%) decline (see Figure 5.9). Thereafter the production rebounded to 1.62 million tons in 2001, followed by an era of decline from 2001 to 2004 and a continuing decrease of output is expected to continue until 2006. The projected output of cotton yarn in Europe will be 1.30 million tons in 2006, down 0.04 million tons (2.9%) from 2004.

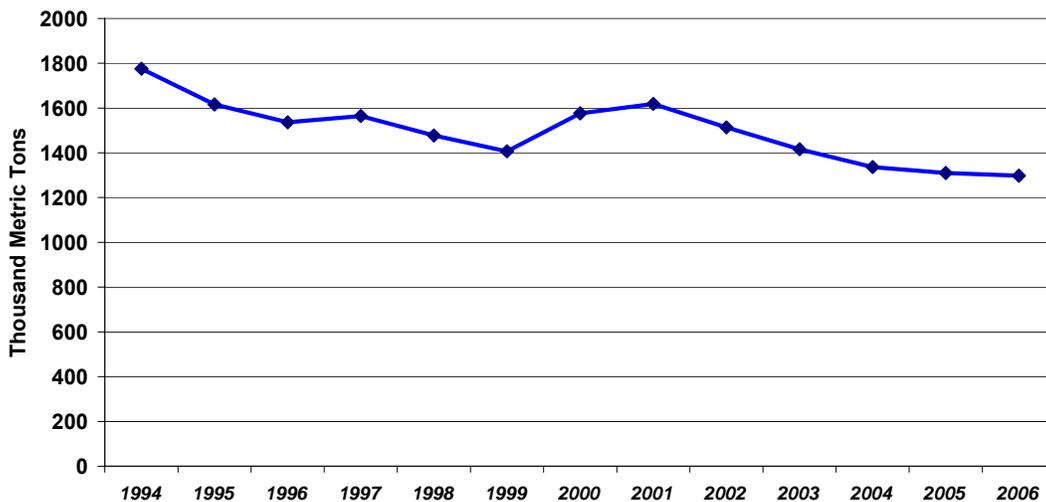


Figure 5.9 Cotton Yarn Production in Europe: 1994-2006[69]

Cotton yarn production in North America reached 1.13 million tons in 2004, declining by 0.84 million tons (42.8%) since 1994. The decreasing trend was also seen by its shrinking global share from 12.6% in 1994 to 5.2% in 2004, dropping its rank from the third to sixth place. The United States has been the predominant producing country for cotton yarn in this region. Its production was fluctuating during the first five years

(1994-1999) and reached a record high at 2.11 million tons in 1997, which was up 0.14 million tons (6.9%) from 1994. Since 2000, the output dropped continuously and is expected to further decline to below one million tons in 2006. The estimated production in 2006 will be 0.99 million tons, representing a decrease of 0.14 million tons (12.8%) from 2004 (see Figure 5.10).

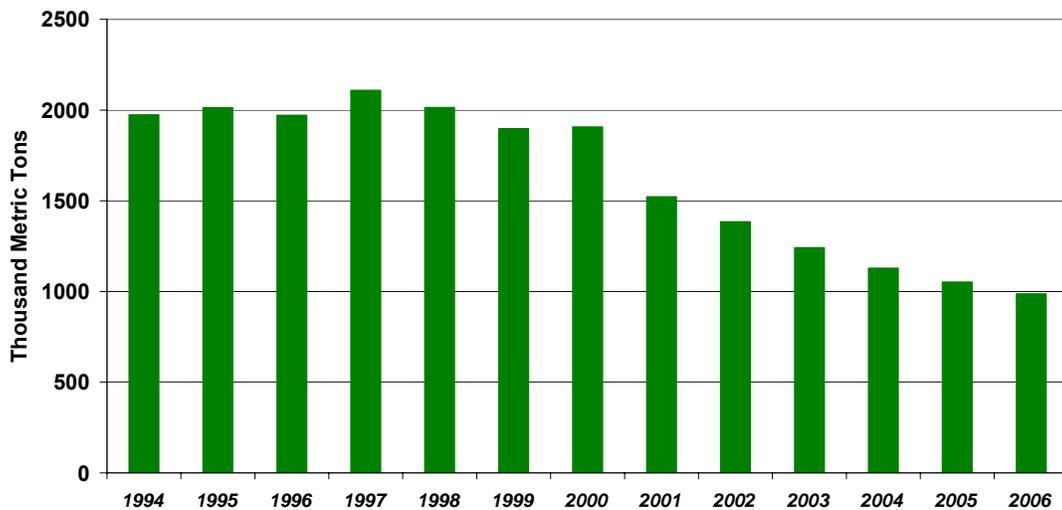


Figure 5.10 Cotton Yarn Production in North America: 1994-2006[69]

The output of cotton yarn in total other Americas rose to record high at 1.49 million tons in 2000 for the period of 1994-2004, resulting in a increase of 0.32 million tons (27.8%) from 1994. The production dropped slowly to 1.34 million tons in 2004, which was down by 0.15 million tons (9.9%) from 2000 but up 0.18 million tons (15.2%) from 1994. The estimated production in 2006 is believed to be at the same level as the 2004.

East-Asia has been recognized as the largest producing region for the production of world cotton yarn. China has been the number one producing country in this region, accounting for the regional output at 84.3% and 94.6% in 1994 and 2004, respectively. It is the only country in East-Asia with an overall rising trend at an average of 8.0% per year in production of cotton yarn between 1994 and 2004. The biggest leap in production occurred in the period of 1999 to 2003 when the output in China increased to an estimation of 9.84 million tons in 2003 and rose by 4.17 million tons (73.5%) from 1999. In 2004, the cotton yarn output in China was estimated at 10.32 million tons which represented increases of 110.8% from 1994 and 4.9% from the previous year.

South Korea has presented fluctuation in the output of cotton yarn with an overall decreasing trend by 0.10 million tons (2.7%) during 1994 to 2004. Its output in 1994 was the record high at 0.36 million tons before the record low at 0.23 million tons was hit in 1998 and down by 34.8% from 1994. The output in South Korea started to climb slowly since 1999 and reached an estimated peak at 0.30 million tons in 2002 followed thereafter by the continuous decrease.

Taiwan held the third rank in the regional production share, whose output has been continuously declining since 1997. Cotton yarn production in Taiwan was estimated at 0.24 million tons in 2004 and decreased by 0.08 million tons (25.5%) from 1994. Japan has shown a drastic decrease in the production of cotton yarn in the last decade. Its cotton yarn output was expected to be a little less than 0.10 million tons in 2004, which represented only 40% of the production in 1994.

The total output of cotton yarn in East-Asia is believed to continue to rise in 2005 and 2006. However, for the individual countries, only China will increase its output

whilst the others' are expected to drop (see Figure 5.11). The estimated production of cotton yarn in China is 11.40 million tons in 2006, up 1.08 million tons (10.5%) from 2004.

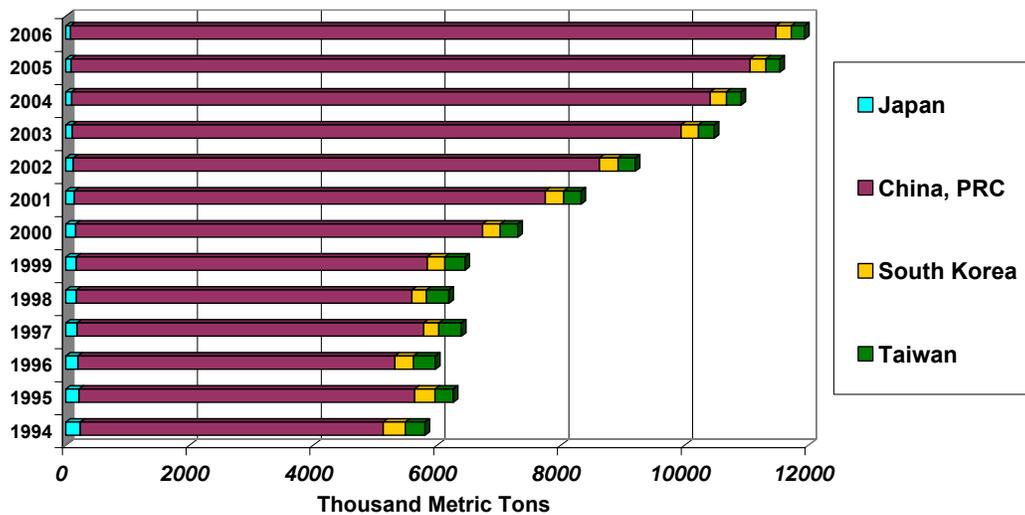


Figure 5.11 Cotton Yarn Production in East-Asia: 1994-2006[69]

South Asia took the second largest share place next to East-Asia in the global production of cotton yarn. India and Pakistan are the two predominant producing countries in this region. After the output of cotton yarn in India passed the two million ton threshold in 1996, its production has been fluctuating between 2.02 and 2.29 million tons since then. The cotton yarn output in India was estimated at 2.14 million tons in 2004, representing an increase of 0.52 million tons (31.9%) from 1994. The production of cotton yarn in Pakistan increased to an estimation of 2.04 million tons in 2004, up 0.87 million tons (74.9%) compared with 1994. Although the absolute production figures of Pakistan were still less than that of India, Pakistan has strengthened its regional share place by increasing from 41.9% in 1994 to 48.8% in 2004. The regional output of cotton

yarn in 2006 is believed to continue to rise by 0.18 million tons (4.4%) from 2004 to 4.36 million tons (see Figure 5.12).

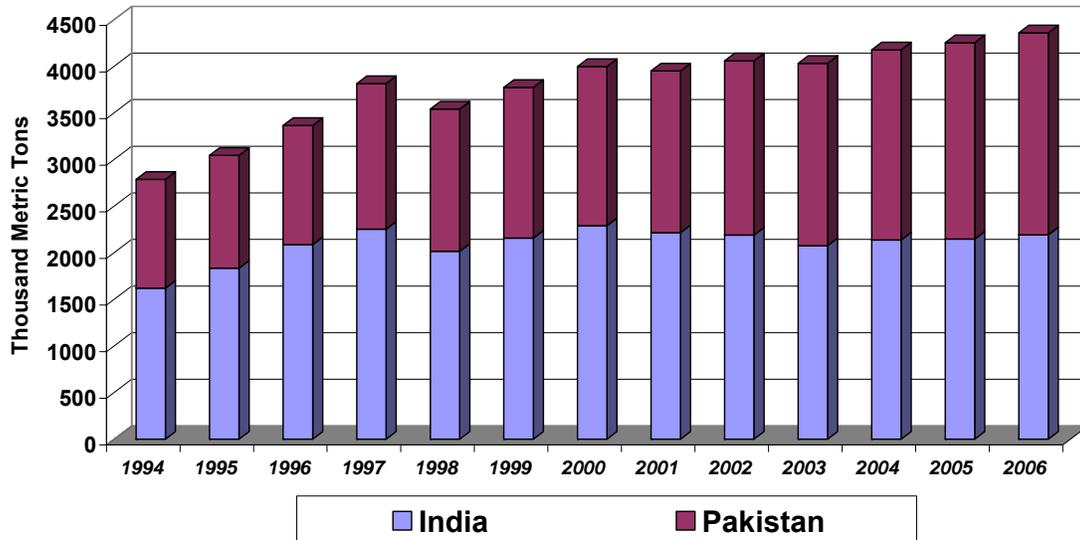


Figure 5.12 Cotton Yarn Production in South Asia: 1994-2006[69]

The output for cotton yarn in Total Other Asia and Oceania reached its record high at an estimation of 1.48 million tons in 2002, up 0.21 million tons (16.4%) from 1994. Its production was estimated to decrease to 1.37 million tons in 2004, which was down 7.6% from 2002 but up 7.6% from 1994. The regional production of cotton yarn is forecasted to drop slightly to 1.36 million tons in 2006.

The production of cotton yarn in Africa decreased from 0.56 million tons in 1994 to an estimation of 0.40 million tons in 2004, down 0.16 million tons (29.0%) over 1994. It is projected that the cotton yarn production in Africa will rebound slightly to 0.41 million tons in 2006 and represent an increase of 3.6% from 2004.

Turkey experienced a drastic increase in the ten-year period (1994-2004), reaching 1.11 million tons in 2004 and up 217.4% from 1994. However, the peak high

occurred in 2002 at 1.13 million tons, which was more than tripled the output in 1994. It is estimated that the production of cotton yarn will drop slightly in 2005 followed by a small increase in 2006 to 1.12 million tons (see Figure 5.13).

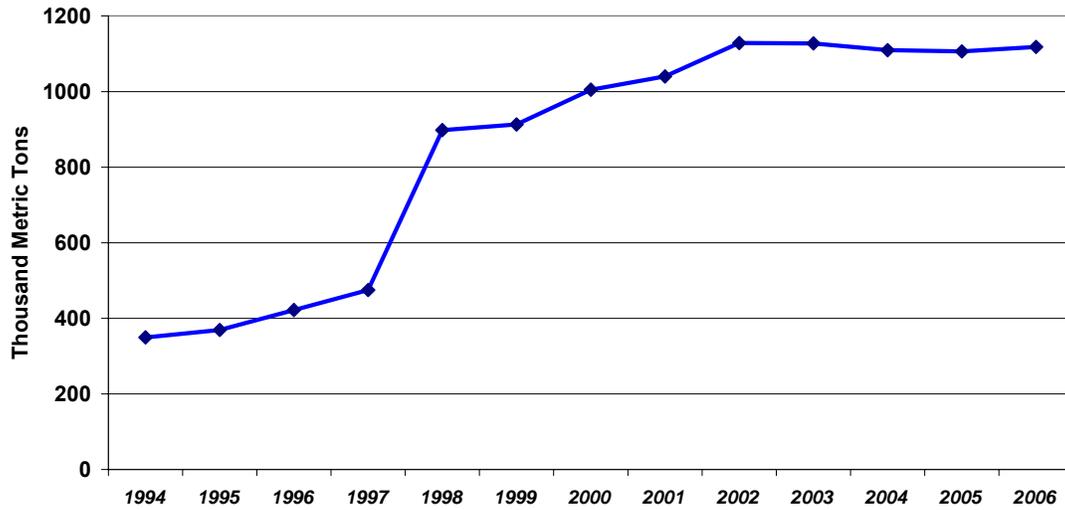


Figure 5.13 Cotton Yarn Production in Turkey: 1994-2006[69]

CHAPTER SIX

CHANGES IN WORLD FABRIC PRODUCTION

Worldwide Production of Cotton Fabric (50% Cotton or More)

World production of cotton fabric (50% cotton or more) grew by 18.1% from 9.71 million tons in 1994 to estimated 11.47 million tons in 2004 (see Figure 6.1). The global cotton fabric output was up by 0.5% in 1995 and by 0.4% in 1996. Production soared by 7.4% to 10.53 million tons in 1997 before it fell by 5.4% to 9.96 million tons in 1998. However, in 1999 and in 2000 global cotton fabric output rose by 4.3% and 4.7% respectively. Production of global cotton fabric in 2001 merely kept the same as in 2001, followed by a growth at a rate of 5.1% in 2002. After a 0.9% drop in 2003, the output was up by 1.8% to 11.47 million tons in 2004. World cotton production is predicted to rise by 3.3% to 11.85 million tons in 2006 (see Table 6.1).

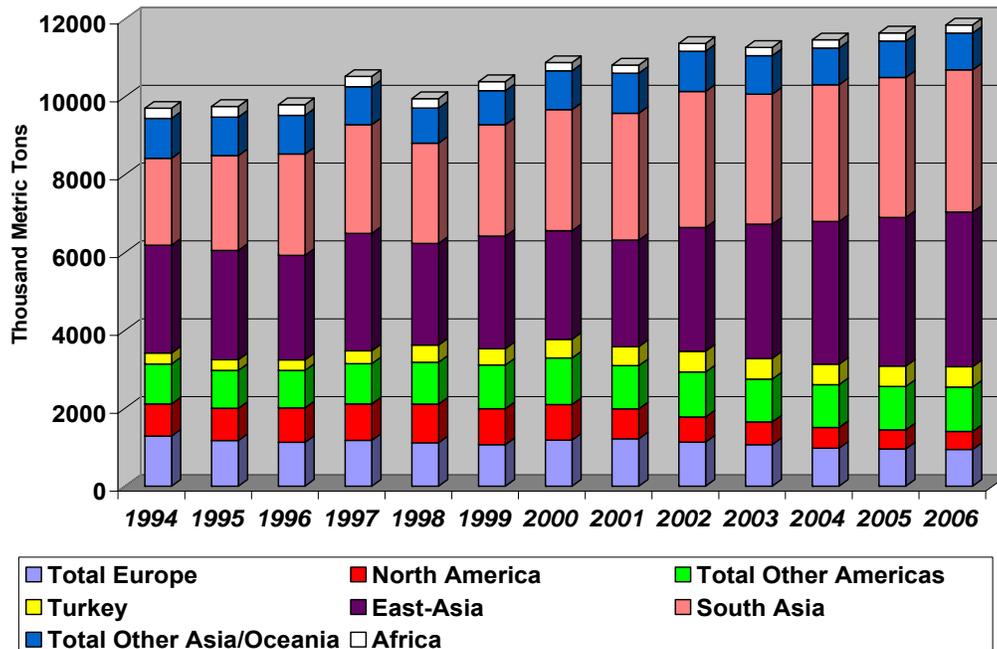


Figure 6.1 Worldwide Cotton Fabric Production: 1994-2006[69]

Table 6.1 Worldwide Production of Cotton Fabric (50% Cotton or More) by Region: 1994-2006
(Unit: Thousand Metric Tons)

Country or Area Name	Actual Production						
	1994	1995	1996	1997	1998	1999	2000 ^a
<i>Total Europe</i>	1286.4	1171.5	1124.7	1174.6	1116.7	1062.6	1181.2
USA	824.7	827.6	884.3	936.4	989.1	926.1	914.5
<i>North America</i>	824.7	827.6	884.3	936.4	989.1	926.1	914.5
<i>Total Other Americas</i>	1027.3	973.2	963.4	1037.2	1078.5	1121.7	1195.7
<i>Turkey</i>	281	275.3	272	330.1	440	420	480
Japan	212.2	186.1	172	165.9	155	147.9	126.8
China, PRC	2258.1	2384.7	2288.4	2625.5	2234.6	2534.8	2477
South Korea	57.1	44.4	34	28.6	26.9	32.7	33.3
Taiwan	244.5	195	192.1	197.2	196.5	176.6	151.7
<i>East-Asia</i>	2771.9	2810.2	2686.5	3017.2	2613	2892	2788.8
India	1498	1570	1675	1830	1627.9	1664.3	1767.4
Pakistan	734.8	864.7	924.9	960.5	946.8	1198	1344.3
<i>South Asia</i>	2232.8	2434.7	2599.9	2790.5	2574.7	2862.3	3111.7
<i>Total Other Asia/Oceania</i>	1024.9	990.5	997	976.5	903.8	878.2	1000.2
<i>Africa</i>	259.3	272.1	273	264.1	240.6	229.9	209.4
World Total	9708.3	9755.1	9800.8	10526.6	9956.4	10392.8	10881.5

Country or Area Name	Actual Production					
	2001 ^a	2002 ^b	2003 ^b	2004 ^b	2005 ^b	2006 ^b
<i>Total Europe</i>	1215.7	1130.8	1066.5	975.9	954.1	940.9
USA	771.2	645.8	581	529.3	492.4	462.1
<i>North America</i>	771.2	645.8	581	529.3	492.4	462.1
<i>Total Other Americas</i>	1107.7	1153.5	1102.4	1103.3	1114.2	1139.6
<i>Turkey</i>	487.6	534	531.1	523.8	521.7	527.5
Japan	115.2	103.3	96.8	83.1	75.7	67.6
China, PRC	2437	2892.2	3180.5	3423.7	3594.4	3757.8
South Korea	34.4	34.8	32.3	30.3	29.5	28.6
Taiwan	151.1	151.1	138.1	128	121.8	115.6
<i>East-Asia</i>	2737.7	3181.4	3447.7	3665.1	3821.4	3969.6
India	1760.9	1747.7	1652.6	1703.5	1711.3	1747.4
Pakistan	1501.6	1745.5	1686.9	1810.6	1883.9	1909.6
<i>South Asia</i>	3262.5	3493.2	3339.5	3514.1	3595.2	3657
<i>Total Other Asia/Oceania</i>	1029.6	1034.1	991.1	945.9	939	940.4
<i>Africa</i>	208.1	200.5	212	209.1	206.9	211.6
World Total	10820.1	11373.3	11271.3	11466.5	11644.9	11848.7

Note: a. The 2000-2001 data is preliminary.

b. The 2002-2006 data is estimated.

Source: ICAC (2004). *World Textile Demand*, November 2004. International Cotton Advisory Committee (ICAC), Washington DC, USA.

From the perspective of region, East Asia has been the top contributor to the global output of cotton fabrics since 1994, followed by South Asia. The share of East Asia among world total cotton fabric production rose from 28% in 1994 to 31% in 2004. During the same period, the cotton fabric output in South Asia climbed from less than quarter of share to 31% of global production (see Figure 6.2).

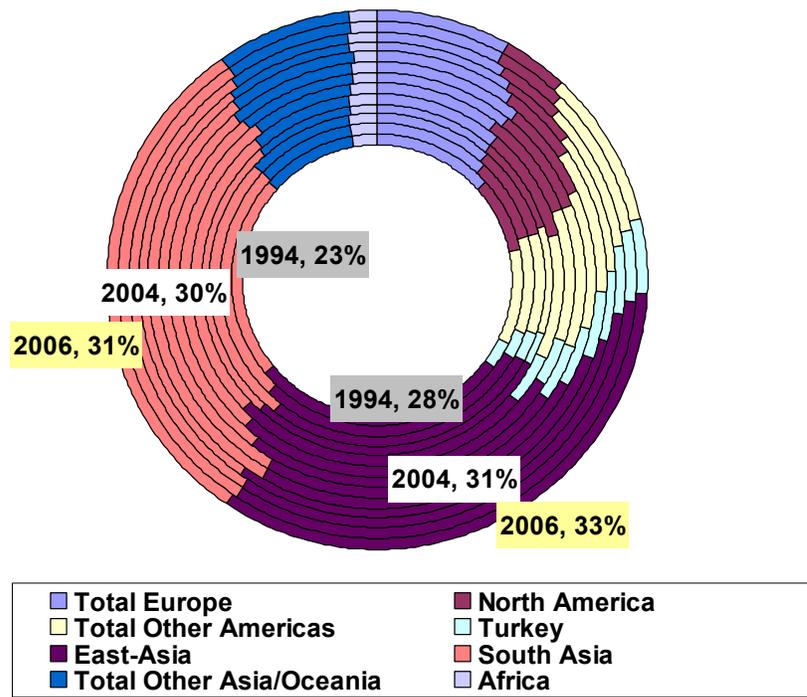


Figure 6.2 Regional Breakdown of Global Cotton Fabric Production: 1994-2006[69]

By comparison, the output in Total Europe fell from 1.29 million tons in 1994 to an estimate of 0.98 million tons by the end of 2004. After experiencing a slight fluctuation, North America suffered a larger decline, down by 35.8% during the same period. However, cotton fabric output in Turkey increased substantially by 86.4% in 2004, which was based on 0.28 million tons in 1994. Meanwhile, both cotton fabric production

in Total Other Asia/Oceania and Africa kept relatively stable in the last decade. The output in Total Other Americas was estimated at 1.10 million tons in 2004, up by 7.4% from 1994. Cotton fabric production in East Asia is expected to increase by 8.3% from 3.67 million tons on 1994 to 3.97 million tons on 2006, which is in contrast with a predicted fall of 12.7% in North America (see Figure 6.3).

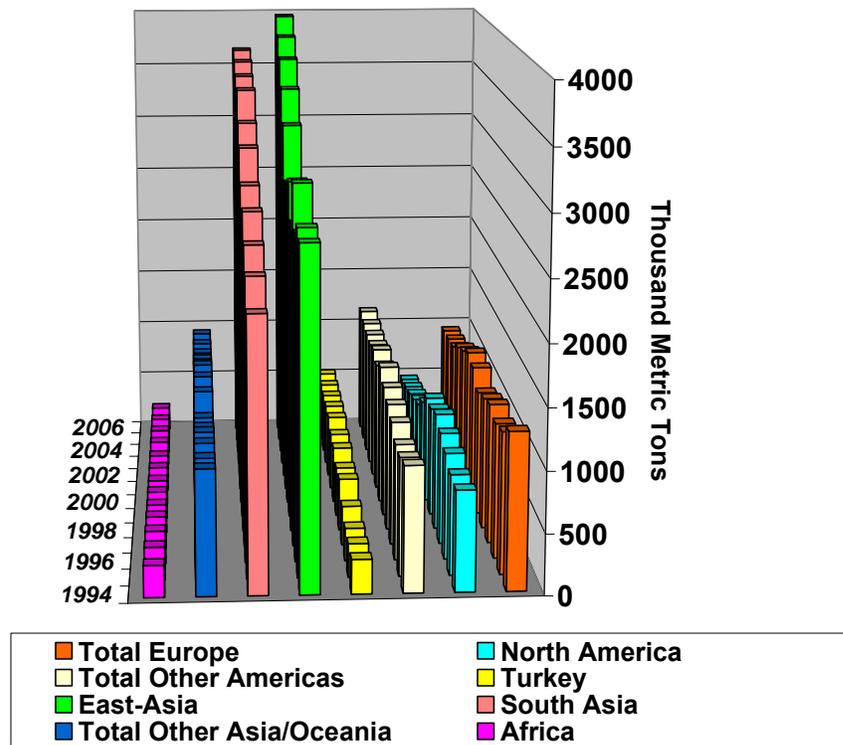


Figure 6.3 Worldwide Cotton Fabric Production: 1994-2006[69]

Of the major cotton fabric producing countries in East Asia, China's pre-eminent position is evident since the output has accounted for more than 80% of total regional production in the past decade (see Figure 6.4). Moreover, the cotton fabric production in China is expected to rise by 9.8% (0.33 million tons) from 3.42 million tons on 2004 to

3.76 million tons on 2006. The increased output is equivalent to over 100% of the total growth in East Asia during the same time.

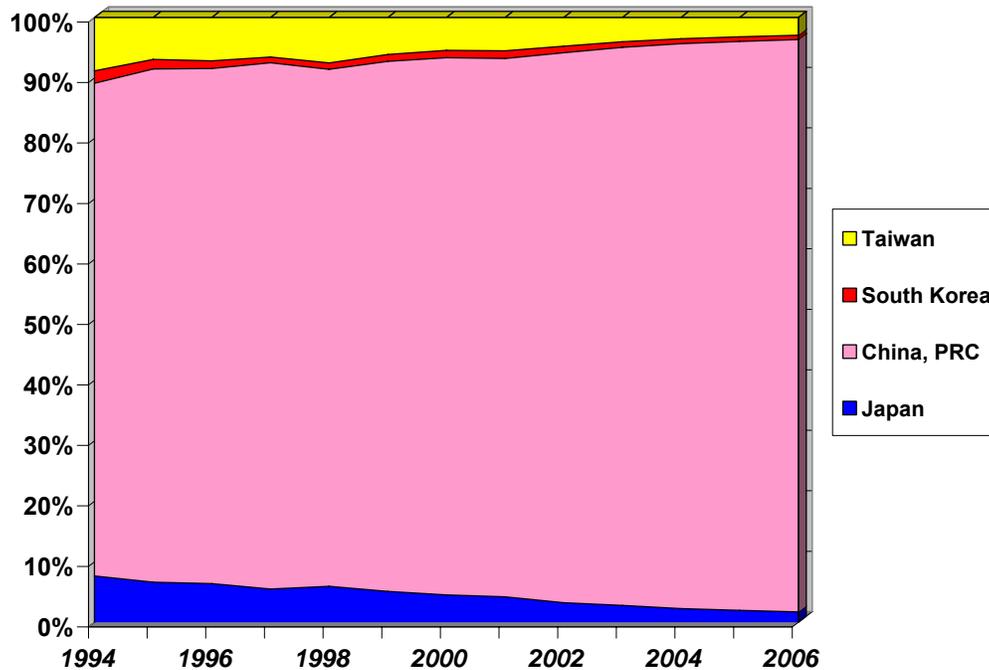


Figure 6.4 Shares of Cotton Fabric Production in East Asia: 1994-2006[69]

In East Asia, all the other three large producers (Taiwan, South Korea and Japan) have witnessed declines over the last decade. South Korea's tonnage fell by 46.9% from 0.06 million tons in 1994 to 0.03 million tons in 2004. The cotton fabric produced in Taiwan on 2004 was around 0.12 million tons less than 0.24 million tons on 1994, down by 47.6%. This is in noticeable similarity to the experience of Japan, where cotton fabric production dropped by 60.8% from 0.21 million tons in 1994 to 0.08 million tons in 2004. Between 2005 and 2006 cotton fabric production in these three countries is predicted to

continue to decline whilst the output in China is expected to increase further (see Figure 6.5).

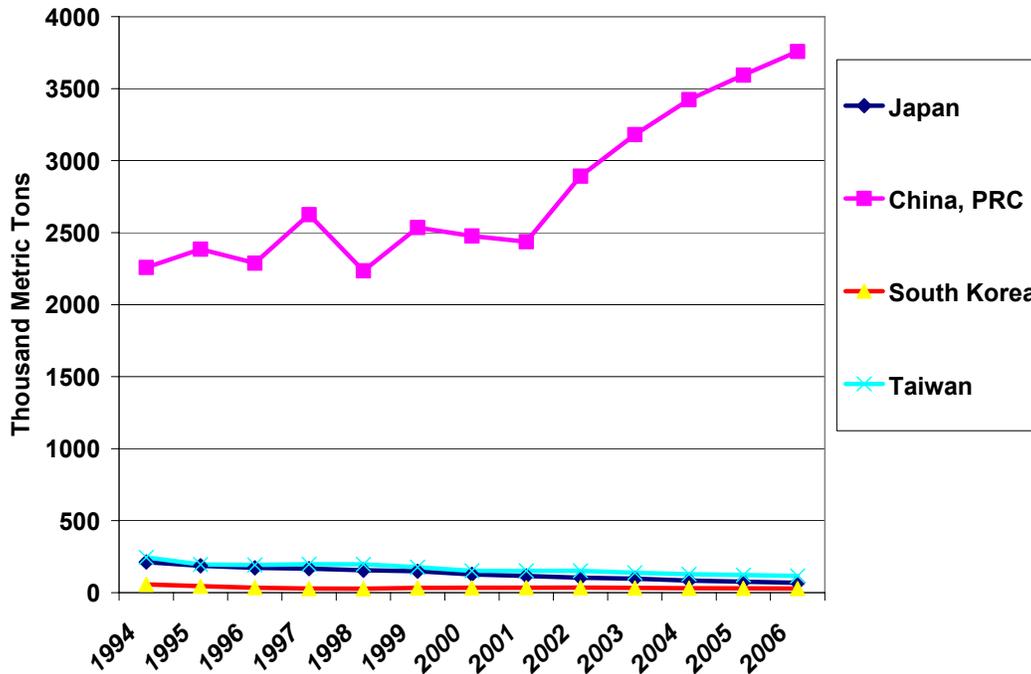


Figure 6.5 Cotton Fabric Production in East Asia: 1994-2006[69]

India and Pakistan are the leading producers of cotton fabrics in South Asia. Indian output of cotton fabric grew from 1.50 million tons to 1.70 million tons between 1994 and 2004, up by 13.7%. An even larger 146.4% increase was seen in Pakistan, where the output of cotton fabric climbed from 0.73 million tons in 1994 to 1.81 million tons in 2004 (see Figure 6.6). The increased tonnages from Pakistan accounted for more than 83.9% of total growth in South Asia over the same period. Production of cotton fabric in India is forecasted to amount to 1.75 million tons by the end of 2006, which represents growth of 2.6% compared with 2004. Also, the output in Pakistan is predicted to expand more rapidly reaching 1.91 million tons in 2006, up 5.5% on the 2004 figure.

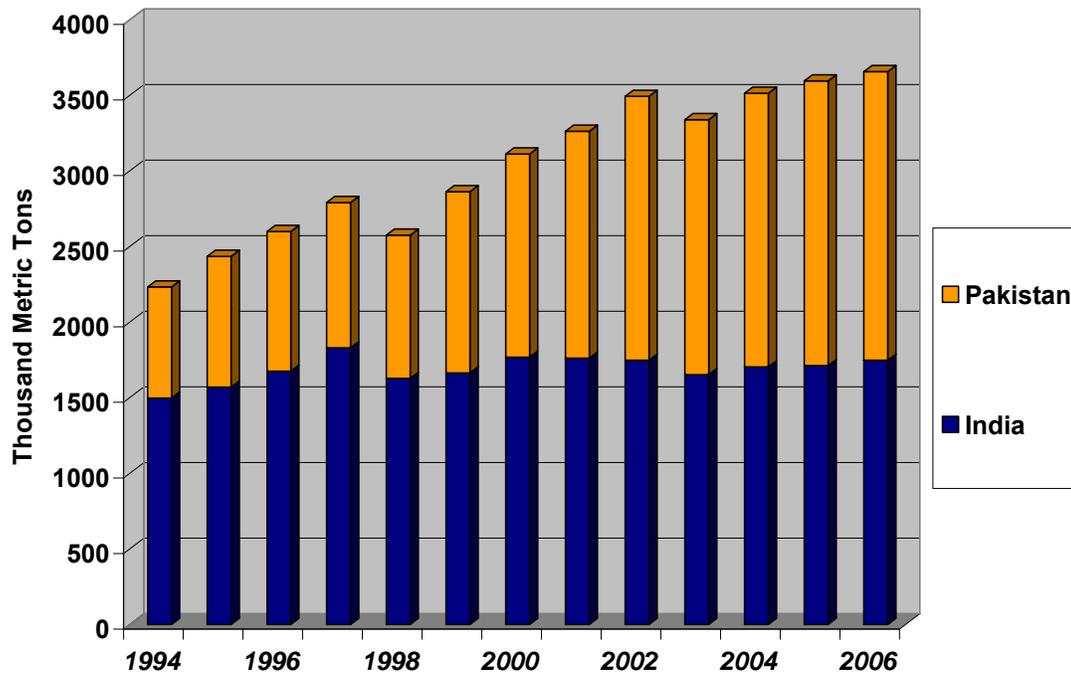


Figure 6.6 Cotton Fabric Production in South Asia: 1994-2006[69]

Fabric Production in Western Europe

The woven fabric production in Western Europe was slightly down by 3.7% between 1995 and 2001. The fall was driven by a 9.4% decline from 2.17 million tons in 1998 to 1.96 million tons by 2001, following a 6.3% rise between 1995 and 1998 (see Table 6.2). By contrast, in Western Europe, the mill consumption of yarn for knitting, as a powerful measure of production activity, represented an overall rise of 10.2% over the six-year period (1995-2000). Between 1995 and 1997 the mill consumption grew from 1.20 million tons to 1.36 million tons, up by 13.5% within the three-year period. In 1998 the consumption kept the same record as that in 1997, but it dipped slightly to 1.31 million tons by 1999 and then recovered to 1.32 million tons in 2000. After that, woven fabric production in Western Europe is expected to decline to 1.84 million tons by 2010, representing a fall of 6.4% based upon 1.96 million tons recorded in 2001. Similarly, the mill consumption of yarn for knitting in Western Europe is predicted to drop by 9.0% over the eleven years (2000-2010).

Table 6.2 Fabric Output in Western Europe from 1995 to 2010

(Thousand Metric Tons)

Western Europe	1995	1997	1998	1999	2000	2001	2010^a
Woven Fabric	2037	2153	2165	2120	2053	1961	1835
Knitted Fabric ^b	1197	1359	1353	1308	1319	n/a	1200
Total Fabrics	3234	3512	3518	3428	3372	n/a	3035

Note: a. Forecasts; plus Switzerland Norway. b. Mill Consumption of Yarn for Knitting.

Source: 1. Woven fabric data from CIRFS (2003). *World Markets for Woven Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2653. 2. Knitted fabric data from CIRFS (2003). *World Markets for Knitted Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2652.

Fabric Production in Central and Eastern Europe

In Central and Eastern Europe, mill consumption of yarns for weaving fell to 0.19 million tons by 2001, down by 21.6% (0.05 million tons) over 1995. However, the yarn consumption for weaving is forecast to be around the 0.19 million tons by 2010. The mill consumption of yarn for knitting in Central and Eastern Europe remained at relatively stable levels between 0.15 and 0.16 million tons between 1995 and 2000. Nonetheless, the consumption is likely to reach 0.20 million tons in 2010, growing by 24.2% compared with 2000 (see Table 6.3).

Table 6.3 Fabric Output in Central and Eastern Europe from 1995 to 2010

(Thousand Metric Tons)

Central and Eastern Europe	1995	1997	1998	1999	2000	2001	2010^a
Woven Fabric ^b	236	204	187	180	185	185	190
Knitted Fabric ^c	157	153	160	155	157	n/a	195
Total Fabrics	393	357	347	335	342	n/a	385

Note: a. Forecasts. b. Mill Consumption of Yarns for Weaving. c. Mill Consumption of Yarn for Knitting.

Source: 1. Woven fabric data from CIRFS (2003). *World Markets for Woven Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2653. 2. Knitted fabric data from CIRFS (2003). *World Markets for Knitted Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2652.

Fabric Production in Turkey

Turkish mill consumption of yarns for weaving jumped from 0.42 million tons in 1995 to 0.65 million tons in 2001, representing an increase of 53.6% or 0.23 million tons. Moreover, Turkey will witness a further 55.0% increase in this segment from 2001 to 1.00 million tons by 2010 (see Table 6.4). The mill consumption of yarns for knitting in Turkey kept on rising from 0.47 million tons in 1995 to 0.63 million tons in 2000, going up by 34.9% over the six years in succession. The growth is expected to continue till

2010 when Turkish mill consumption of yarn for knitting is predicted to reach 0.80 million tons, representing a rise of 27.0% based upon the record in 2000.

Table 6.4 Fabric Output in Turkey from 1995 to 2010

(Thousand Metric Tons)

Turkey	1995	1997	1998	1999	2000	2001	2010^a
Woven Fabric ^b	420	514	500	569	685	645	1000
Knitted Fabric ^c	467	543	560	578	630	n/a	800
Total Fabrics	887	1057	1060	1147	1315	n/a	1800

Note: a. Forecasts. b. Mill Consumption of Yarns for Weaving. c. Mill Consumption of Yarn for Knitting.

Source: 1. Woven fabric data from CIRFS (2003). *World Markets for Woven Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2653. 2. Knitted fabric data from CIRFS (2003). *World Markets for Knitted Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2652.

Fabric Production in the US

The weaving industry in the United States continues to decline, so does the knitting industry. The synthetic woven fabric production accounted for almost 60% of total woven fabric output in the US. The production of US synthetic woven fabric rose from 0.82 million tons in 1995 to a peak of 0.90 million tons in 1997, but has since fallen to 0.63 million tons in 2002, dropped by 23.6% based upon the record in 1995. Similarly, the output of US cotton woven fabric followed the same trends as in the case of synthetic woven fabric. The cotton woven fabric production reached a peak of 0.64 million tons by 1997, going up by 13.5% in 1994 recorded at 0.56 million tons. Thereafter, US cotton woven fabric output was continuously down to 0.36 million tons in 2003. As a result, an overall decline of 35.2% occurred in the US cotton woven fabric production between 1994 and 2003.

Over the same period, the output of knitted fabric fell by 54.8% in the United States. It fluctuated slightly between 1994 and 2000, starting from 1.01 million tons and

ending with 0.89 million tons. In 2001 the production dropped sharply to 0.58 million tons and then kept on declining in the following two consecutive years. Since 1994 the US knitted fabric output decreased by 54.8% to 0.46 million tons in 2003 (see Table 6.5). As a whole, US fabric output represented a 31.0% decline during the eight-year period (1995-2002).

Table 6.5 Fabric Output in the US from 1994 to 2003

(Thousand Metric Tons)

U.S.	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
<i>Cotton Woven Fabric</i> ¹	561	562.95	601.5	636.9	596.1	558.2	557.7	465.2	442.1	363.5
<i>Synthetic Woven Fabric</i> ²	n/a	822.4	818.7	898.5	875.3	841.9	798.6	670.9	628.2	n/a
Woven Fabric	n/a	1385.4	1420.2	1535.4	1471.4	1400.1	1356.3	1136.1	1070.3	n/a
Knitted Fabric ³	1011.5	950	860.5	895.4	826.4	905.2	892.4	580.2	540	456.77
Total	n/a	2335.4	2280.7	2430.8	2297.8	2305.3	2248.7	1716.3	1610.3	n/a

Source: 1. UNCD (converted by author) [13]. 2. CIRFS (2003). *World Markets for Woven Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2653. 3. *Country Statements*, ITMF, various issues.

Fabric Production in Mexico

The output of cotton woven fabrics in Mexico rose by 66.5% from 0.12 million tons in 1995 to 0.20 million tons by 1999, followed by a slight fall to 0.17 million tons in 2002. Hence, it resulted in an overall 38.4% increase for cotton woven fabric production in Mexico over the eight-year period (see Table 6.6).

Table 6.6 Fabric Production in Mexico from 1995 to 2002: Thousand Metric Tons

Mexico	1995	1996	1997	1998	1999	2000	2001	2002
Cotton Woven Fabrics	122.8	126.5	161.5	187.9	204.5	190.5	167.5	169.9
Knitted Fabrics	225	n/a	364.8	409.7	419.8	425	425	n/a
Total Fabrics	347.8	126.5	526.3	597.6	624.3	615.5	592.5	n/a

Source: 1. Woven fabric data from CIRFS (2003). *World Markets for Woven Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2653. 2. Knitted fabric data from CIRFS (2003). *World Markets for Knitted Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2652. Original source: CIRFS; USA Statistical Office.

The production of knitted fabrics in Mexico grew rapidly during the second half of the 1990s, rising by 88.9% or 0.20 million tons between 1995 and 2000. But the production volume in 2001 remained unchanged as recorded in the previous year.

Fabric Production in Central America

The production of total knitted fabric in Central America amounted to 0.14 million tons in 2000. In the same year, Honduras and El Salvador, the leading producers of knitted fabric within Caribbean Basin Initiative (CBI) countries, held shares of 28.2% and 25.7% respectively. Other significant producers were the Dominican Republic and Guatemala with respective shares of 21.6% and 15.8% (see Table 6.7). CBI countries import large quantities of fabrics to manufacture apparels for exports. In 2000, about 0.40 million tons of apparel destined for the US market were manufactured in CBI countries, where three predominate producers (Honduras, the Dominican Republic and El Salvador) together accounted for 70.3% of total production.

Table 6.7 Production of Knitted Fabric and Apparel in Central America, 2000

(Thousand Metric Tons)

Country	Knitted Fabric	Knitted Man-made Apparel for USA	Total Apparel for USA
Costa Rica	6.4	11.1	40.2
Dominican Republic	29.7	30.6	99.7
El Salvador	35.4	17.8	70
Guatemala	21.8	12.9	35.5
Honduras	38.9	31.2	109.5
Jamaica	0.5	5.1	17.2
Others	5	7.2	25.1
Total	137.7	115.9	397.2

Source: CIRFS (2003). *World Markets for Knitted Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2652. Original source: derived from private sources.

Fabric Production in Brazil

Brazil is a major producer for woven fabrics in South America. Its production of woven flat fabrics reached 1.09 million tons in 2001 (see Table 6.8) [70]. In 2000 the output of knitted apparel in Brazil stood at 0.51 million tons, and a rise to 0.55 million tons is expected to take place by 2010. Within the knitting sector, nearly 80% of the total knitwear is produced on circular knitting machines, while the rest of the knitwear is manufactured on other knitting machines including warp knitting, flat knitting and raschel knitting machines [62].

Table 6.8 Production of Woven Flat Fabrics in Brazil, 2001

(Thousand Metric Tons)

Fabrics Type	2001
Cotton Woven Fabrics	726.1
Other Natural Fiber Woven Fabrics ^a	50.5
Cellulosic and Synthetic Woven Fabrics	314.1
Total	1090.7

Note: a. Includes wool, ramie and coconut palm.

Source: CIRFS (2003). *World Markets for Woven Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2653. Original source: Instituto de Estudos e Marketing Industrial (IEMI).

Fabric Production in Japan

The output of woven fabrics in Japan dropped by 43.9% between 1995 and 2002, going down from 0.54 million tons to 0.30 million tons (see Table 6.9). Among Japanese total woven fabrics production in 2002, synthetic woven fabrics represented a 57% share, the woven fabrics made of natural fibers accounted for 33%, and the remaining 10% share was held by cellulosic woven fabrics [70]. The output of knitted fabrics in Japan amounted to 0.10 million tons in 2001, falling by 31.2% since 1995. Moreover, a further decline of 27.5% is likely to occur between 2001 and 2010.

Table 6.9 Fabric Production in Japan from 1995 to 2010**(Thousand Metric Tons)**

Japan	1995	1996	1997	1998	1999	2000	2001	2002	2010^a
Woven Fabrics ^b	541.4	521.6	529	458.2	415.8	369.9	342.4	303.5	n/a
Knitted Fabrics	150.2	n/a	151.2	136.4	118.4	110.4	103.4	n/a	75
Total Fabrics	691.6	n/a	680.2	594.6	534.2	480.3	445.8	n/a	n/a

Note: a. Forecasts.

b. Convert from mn m² to thousand metric tons based on 1 mn m²=0.15 thousand metric tons.

Source: 1. Woven fabrics data from CIRFS (2003). *World Markets for Woven Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2653. 2. Knitted fabrics data from CIRFS (2003). *World Markets for Knitted Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2652. Original data source: JTN Monthly, various issues. Osaka Senken, Osaka, Japan.

Fabric Production in Taiwan

The woven fabric production in Taiwan amounted to 1.14 million tons in 2000, increasing slightly by 2.0% from the previous year. Between 1995 and 2001 the output of knitted fabric in Taiwan grew by overall 8.2% (see Table 6.10). However, the knitted fabric production has fallen since 1998. Following a 38.6% growth from 0.19 million tons in 1995 to a peak at 0.26 million tons in 1998, the output dropped to 0.21 million tons by 2001, down 21.4% based upon the record four years before. Furthermore, the production of knitted fabric in Taiwan will fall by a further 17.1% since 2001 to 0.17 million tons by 2010.

Table 6.10 Fabric Output in Taiwan from 1995 to 2010**(Thousand Metric Tons)**

Taiwan	1995	1996	1997	1998	1999	2000	2001	2002	2010^a
Woven Fabrics ^b	n/a	n/a	n/a	n/a	1119.5	1141.7	n/a	n/a	n/a
Knitted Fabrics	188.2	n/a	241.5	260.9	242.2	211.6	205	n/a	170
Total Fabrics	n/a	n/a	n/a	n/a	1361.7	1353.3	n/a	n/a	n/a

Note: a. Forecasts.

b. Convert from mn m² to thousand metric tons based on 1 mn m²=0.15 thousand metric tons.

Source: 1. Woven fabrics data from CIRFS (2003). *World Markets for Woven Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2653. Original data source: Handbook of Statistics, 2000-01, Association of Synthetic Fiber Industry, Mumbai. 2. Knitted fabrics data from CIRFS (2003). *World Markets for Knitted Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2652. Original data source: CIRFS; USA Statistical Office.

Fabric Production in China

Chinese production of all types of fabrics rose by 67.3% from 4.83 million tons in 1994 to 8.08 million tons in 2003. The total fabric production jumped to 5.95 million tons in 1995, 23.1% higher than in 1994. 1996 saw a fall to 4.78 million tons, but this was followed by growth to 5.69 million tons in 1997. From 1998 the output of all fabrics went up by 46.7% from 5.51 million tons to 8.08 million tons in 2003.

In terms of fiber type, pure cotton fabric output accounted for a bit more than half of all fabrics production in China. It increased by 73.5% from 2.65 million tons in 1994 to 4.59 million tons in 2003, showing the similar trends in all fabrics output over the same period. Silk fabric manufacturing was the second largest sector for the fabric industry in China between 1995 and 1999, followed by the industry of man-made fiber fabrics. The Silk fabric output held around a 25% share of all fabrics production, while the output of man-made fiber fabrics represented a 20% share (see Table 6.11).

Table 6.11 Fabric Production in China from 1994 to 2003

(Thousand Metric Tons)

CHINA	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
All Fabrics^a	4830	5947.7	4780	5687.3	5509	5715	6332	6629.4	7370	8081
Pure Cotton Fabric ^a	2646	3013.9	2414.7	2716.9	2612	2708	3182.6	3520	3944	4592
Man-made Fiber Fabric ^a	n/a	1258.2	793.9	1331.6	1032.1	1171.3	n/a	n/a	n/a	n/a
Silk Fabric ^a	n/a	1506.7	1149.9	1491.2	1459.8	1590.1	n/a	n/a	n/a	n/a
Other Fabrics	n/a	168.9	421.5	147.6	405.1	245.6	n/a	n/a	n/a	n/a
Woven Clothes^b	n/a	9685	7617	7999	8665	9545	n/a	n/a	n/a	n/a
Cotton Knitwear	780.8	894	753.4	803.2	516.1	569.1	625.2	1171.6	1165	914.5

Note: a. Data were converted by author. (1 million linear meters equals to 0.2286 thousand metric tons by estimation)

b. The measurement unit is Million Pieces.

Source: 1.UNCD[13](converted by author); 2.A series of China Statistical Yearbooks. 3.Chinese Textile Industry Development Report 2000/2001. China Textiles Press, April 2001.

The output of cotton knitwear in China experienced a wave to reach 0.91 million tons in 2003, representing an overall increase of 17.1% over 1994. Beginning with 0.78

million tons, the cotton knitwear production in China fell to the lowest record at 0.52 million tons in 1998 and remained at this level in 1999. After a slight recovery to 0.63 million tons in 2000, 2001 saw a jump to 1.17 million tons, up 87.4% over the previous year. Between 2001 and 2002 the output of cotton knitwear remained almost unchanged, having dropped by only 0.6%. The production of cotton knitwear fell in 2003, by 21.5% (0.25 million tons) compared with the previous year.

However, China has even further increases in almost every sector of textile industries after the elimination of quota by the end of 2004. According to Statistical Center at China National Textile & Apparel Council (CNTAC), it is reported that between January and October in 2005, all fabrics production in China reached 29.67 billion linear meters [73], which was estimated at an equivalent 6.78 million tons. If 6.78million tons is divided by 10 (months) and then followed by multiplying 12 (months), the projection of all fabrics output in China would be around 8.14 million tons by estimation for year 2005, showing a raise by 0.74% compared with 8.08 million tons recorded in 2003.

Fabric Production in India

Indian production of woven fabrics grew by 11.3% from 1.63 million tons in 1995 to 1.82 million tons in 2002 (see Table 6.12). After that, the production is forecast to rise by a further 7.4% to 2.1 million tons by 2010. The output of knitted fabric in India increased year by year from 4.29 million tons in 1995 to 6.60 million tons in 2000, up by 53.8% or 2.31 million tons over the six-year period. A further rise to 7.50 million tons is expected by 2010.

Table 6.12 Fabric Output in India from 1995 to 2010

(Thousand Metric Tons)

India	1995	1997	1998	1999	2000	2001	2002	2010 ^a
Total Fabrics	5924.7	n/a	n/a	n/a	8410.1	n/a	n/a	9550
Woven Fabric ^b	1633.8	n/a	n/a	n/a	1810.1	1801.4	1819.2	2050
Knitted Fabric ^c	4290.9	5221.95	5615.4	6000	6600	n/a	n/a	7500
Knitted Apparel^d	n/a	12372	13126	13950	14846	n/a	n/a	20000

Note: a. Forecasts. b. Cotton and Wool Fabrics. c. Convert from mn m² to thousand metric tons based on 1 mn m²=0.15 thousand metric tons. d. Million Pieces.

Source: 1. Woven fabric data from CIRFS (2003). *World Markets for Woven Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2653. 2. Data of knitted fabric and knitted apparel from CIRFS (2003). *World Markets for Knitted Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2652.

Fabric Production in Thailand

Overall, the output of woven fabric in Thailand fell by 7.2%, from 0.45 million tons in 1995 to 0.42 million tons by 2001 (see Table 6.13). After the sharp decline of 15.4% from 1995 to 1998, a relatively steady recovery occurred between 1998 and 2001, showing an overall growth of 9.8%.

Table 6.13 Fabric Production in Thailand from 1995 to 2010

(Thousand Metric Tons)

Thailand	1995	1996	1997	1998	1999	2000	2001	2010 ^a
Total Fabrics	687.5	n/a	617.7	578.8	592.4	612.4	626.4	740.0
Woven Fabric	454	418.6	411.3	383.9	392.6	412.4	421.4	490.0
Knitted Fabric	233.5	n/a	206.4	194.9	199.8	200.0	205.0	250.0
Woven Apparel	285.5	268.3	250.0	223.3	230.1	240.0	240.0	280.0

Note: a. Forecasts.

Source: 1. Data of woven fabrics and woven apparel from CIRFS (2003). *World Markets for Woven Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2653. Original data source: *JTN Monthly*, derived from Textile Industry Division of the Thai ministry of Industry. 2. Knitted fabrics data from CIRFS (2003). *World Markets for Knitted Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2652. Original data source: CIRFS; textile journals.

As in the case of woven fabric output in Thailand, the similar trends took place in the knitted fabric production over the same years (1995-2001). The output of knitted fabric in Thailand stood at 0.21 million tons in 2001, decreasing by 12.2% compared with

0.23 million tons in 1995. But both the output of woven fabric and the knitted fabric production are likely to increase during the period of 2001-2010, up by 16.3% and by 22.0% respectively.

Shares of Different Sectors in Textile Industry

A study conducted by CIRFS indicated that in 2001 the global weaving sector consumed an estimated 28 million tons of natural and man-made fibers and the knitting sector used 17 million tons, representing about 51% and 31% of the world total 55 million tons fibers respectively. It also reported that non-spun end uses including nonwovens accounted for 11% (6 million tons) and carpets owned 7% (4 million tons) of the fibers produced globally in the same year (see Figure 6.7) [62].

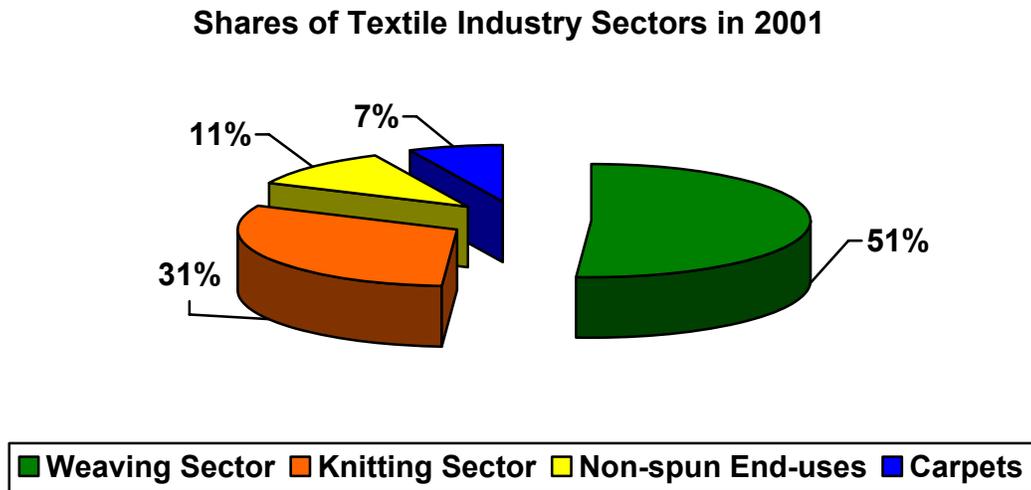


Figure 6.7 Shares of Textile Industry Sectors in 2001

Data from *source*: CIRFS (2003). *World Markets for Knitted Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2652.

From the above data, the ratio between woven fabric and knit is around 1.65 (28/17) in the global textile product complex. In other words, the output of woven fabric represents about 62.2% of total woven and knitted fabrics production worldwide, although individual nations concentrate on specialization in different textile sectors.

CHAPTER SEVEN

CHANGES IN WORLD END-USE PRODUCTS PRODUCTION

World Textile Fiber Consumption at the End-Use Level

The principal end-use applications for textile products are apparel, home furnishings and industrial goods [9]. The apparel products include “knitted and not knitted (mainly woven) garments and clothing accessories, gloves, headwear and neckwear” [12]. The home furnishings textiles products consist of domestic items, such as floor coverings (carpets and rugs), upholstery, sheets, pillowcases, blankets, drapes, washcloths and towels. The industrial fabric goods comprise dryer felts, filter bags, tents, awnings, automotive interior components, sand-paper backings and mail bags [9].

World textile fiber consumption at the end-use level has increased continuously in the past ten years (1995-2004). Table 7.1 represents the growing tendencies in world textile fiber consumption for end-use products between 1994 and 2004.

**Table 7.1 World Textile Fiber Consumption (End-Use): 1995-2004
(Thousand Metric Tons)**

Year	World Total
1995	40,792
1996	42,295
1997	45,084
1998	45,470
1999	47,083
2000	49,559
2001	49,933
2002	52,258
2003	54,290
2004	56,641

Source: ICAC (2004). World Textile Demand (p.12). December 2004. Washington DC, USA.

World textile fiber consumption at the end-use level is estimated to reach 56.64 million tons in 2004, increasing by 38.9% or 15.85 million tons based upon the record in 1995. Also, it is projected to amount to 58.41 million tons by 2005 and keep on growing in the following six years at an average annual rate of 3% to reach 67.5 million tons in 2010 [69].

Production of End-Use Products

The output of end-use products is tightly related to the amount of fibers/yarns consumed in the process of finished products' manufacturing. In 2004, the US fiber consumption for floor coverings accounted for 32.1% of the country's total fiber consumption, followed by industrial and other consumer uses with a share of 30.4% (see Table 7.2). For apparel and home textiles, the fiber usages represented the shares of 24.7% and 12.7% respectively. On the other hand, the fall in all sectors reflected a reduction in end-use production activity levels in the US textile industry on these five consecutive years (2000-2004). The biggest contributor to the decline was a 1.18 million tons decrease in fiber usage in apparel production, followed by a 0.49 million tons fall in home textiles.

Table 7.2 Changes in Fiber Consumption by End Use Application in USA: 2000-2004

	2000		2004		2004/00
	Volume ('000 tons)	Share (%)	Volume ('000 tons)	Share (%)	Change (%)
Apparel	2,742	33.8	1,564	24.7	-43.0
Home Textiles	1,300	16	806	12.7	-38.0
Floor Coverings	2,042	25.2	2,033	32.1	-0.4
Industrial and Other Consumer Uses	2,034	25.1	1,924	30.4	-5.4
Total	8,118	100	6,327	100	-22.1

NB: 1) Numbers may not sum precisely due to rounding.

2) Conversion based on 1 metric ton = 2204.62262 pound.

Source: Textiles Intelligence (2005). Statistics: Fiber Consumption for Technical Textiles in the USA. Technical Textile Markets, 4th quarter 2005. Original source: Fiber Organon.

In the US, during the six successive years (1995-2000), total mill consumption of yarns for knitting suffered an overall 17.9% fall, resulting from the declines in almost all categories of end-use products, with the exception of socks and other apparel (see Table 7.3). Within total knitted products, apparel products as a whole held a share of 92.0% (0.64 million tons) in 2000.

Table 7.3 Mill Consumption of Yarns for Knitting by End Use in the USA: 1995-2000

(Thousand Metric Tons)

	1995	1996	1997	1998	1999	2000
Hosiery	37.1	36.5	36.9	28.4	29.2	24.5
Socks	96.3	95	122.2	128.6	125.7	110.8
Linings and Pocketings	1.6	1.6	1.5	1.8	0.8	0
Underwear and Nightwear	216.9	198.1	218.3	174.9	162.9	147.7
Robes and Loungewear	1.8	0.8	0.4	1.5	0.2	0
Jerseys	52.9	53.7	60.9	48	39.7	32.2
Top Weight Fabrics	180.8	188.1	215.4	161.3	164.6	153.3
Bottom Weight Fabrics	56.5	27.4	36.3	35.3	42.7	27.9
Other Apparel	121.6	132.8	138.9	134.3	117.5	141.6
Household Textiles	26.1	23.1	12.5	9.1	6.6	5.6
Industrial Applications	53	46.7	49.4	44.1	51.5	50
Total	844.6	803.8	892.7	767.3	741.4	693.6

Note: Where information is not available in the table the fiber may have been included in another fiber category, because the data are limited by disclosure constraints.

Source: CIRFS (2003). *World Markets for Knitted Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2652. Original source: Fiber Economics Bureau Inc, Washington DC.

In Western Europe, the total output of cut and sewn knitted clothing and knitted household products climbed to a peak of 0.79 million tons in 1998, but dropped by 5.6% in 1999 and by a further 1.6% fall in 2000 (see Table 7.4). Moreover, the decline is forecast to continue, down 9.1% for cut and sewn knitted apparel and 11.5% for knitted household products over ten-year period (2000-2010).

Table 7.4 Production of Cut and Sewn Knitted Clothing and Knitted Household Products in Western Europe: 1995-2010

(Thousand Metric Tons)

	1995	1996	1997	1998	1999	2000	2010 ^a
Cut and Sewn Knitted Clothing	513	513	646	672	635	623	585
Cotton System	198	194	251	248	239	220	200
Wool System	64	65	69	74	72	72	60
Man-made Continuous Filament	251	254	326	350	324	331	325
Knitted Household Products	90	90	114	120	113	113	100
Total	603	603	760	792	748	736	685

Note: a. Forecasts.

Source: CIRFS (2003). *World Markets for Knitted Textiles and Apparel: Forecasts to 2010*. Textile Intelligence. Special Report No. 2652. Original source: CIRFS.

World Apparel Production

Clothing manufacturing is the largest segment at the final production stage in the global textile product complex [8]. It has low entry barriers in terms of capital and technical knowledge requirements [9]. In fact, apparel industry is more attractive for developing countries than textile production because of the labor-intensive nature of apparel manufacturing and the ready adaptability of unskilled, low-wage labor to garment assembly [8]. On the other hand, compared with textile production, apparel manufacturing has higher labor content and less scope of automation [48], so developed countries cannot afford high labor costs and therefore move garment assembly operations to low cost nations. As a result, clothing production has tremendously transferred from the developed countries to the developing nations [8]. Also, changes in apparel manufacturing are more dramatic than those for textile production. This trend has already been reflected in international trade in textile and apparel as mentioned earlier.

In comparison with other textile segments, apparel manufacturing is a more complex activity because components production and garment assembling may be

operated and interlinked in different countries/regions on a worldwide scale. The resulting global clothing production systems have made it extremely hard to identify products as foreign or domestic [8]. Therefore, a lot of information on world apparel manufacturing is hard to obtain because of disclosure constraints. In nature, trading is more conducive to data collection than production because several international organizations like United Nations gather and publish the trade data in consistent and comparable form [9].

World's 15 Leading Apparel Exporters

In geographical terms, the landscape of international apparel trade has changed in tandem with the changes which have taken place in global clothing industry as a whole. Thus, rapid changes in worldwide apparel manufacturing locations can be reflected in the substantial changes of the rankings for major apparel suppliers in world market. Table 7.5 shows the world's major clothing exporters between 1997 and 2004. Together, the leading fifteen suppliers by value accounted in 2004 for 58.3% of world exports of clothing. World clothing exports rose by 38.7% from \$186.03 billion in 1997 to \$258.09 billion in 2004. Most (a 41.9% share) of the growth over this period was generated by enormous increase in shipments from China. Since China replaced Hong Kong as the world's largest apparel supplier in 1994, the country has strengthened its first position in global apparel market by its boosted exports. During the eight-year period of 1997-2004, Chinese apparel exports increased by 95.2% to \$61.86 billion. After a 15% rise between 1997 and 2001, Chinese apparel exports grew further by 69.5% over the next three years.

In 2004, world apparel exports from China occupied 24.0% of the world total exports of clothing.

**Table 7.5 World Exports of Clothing (SITC 84) by Major Suppliers: 1997-2004
(US\$ billions)**

Country or Region	1997	1999	2000	2001	2004	2004/1997 Change (%)
China	31.69	29.95	35.94	36.5	61.86	95.20%
Europe ¹	15.86	14.71	14.76	15.8	19.13	20.62%
Turkey	6.87	6.72	6.72	6.84	11.19	62.88%
Hong Kong ²	9.32	9.57	9.93	9.26	8.14	-12.66%
Mexico	5.73	8.13	8.77	8.03	7.20	25.65%
India	4.76	5.58	6.69	6.68	6.62	39.08%
United States ³	8.67	8.27	8.63	7.01	5.06	-41.64%
Romania ³	1.75	2.04	2.33	2.78	4.72	169.71%
Indonesia ³	2.90	3.86	4.73	4.53	4.45	53.45%
Bangladesh	3.50	4.03	5.03	5.15	4.44	26.86%
Thailand ³	3.69	3.45	3.76	3.58	4.05	9.76%
Vietnam ³	1.38	1.62	1.82	1.87	3.98	188.41%
South Korea ³	4.19	4.87	5.03	4.31	3.39	-19.03%
Tunisia ³	2.30	2.38	2.23	2.60	3.27	42.17%
Pakistan ³	1.81	1.85	2.14	2.13	3.03	67.40%
Subtotal	104.42	107.03	118.51	117.07	150.53	44.16%
Total	186.03	188.8	200.41	198.53	258.09	38.74%

Note: 1. Extra-EU (25) exports: data represent EU exports to non-EU countries. 2. Domestic exports (re-exports excluded). 3. Data compiled by author from UN (2006). United Nations Commodity Trade Statistics Database.

Source: 1. Data 1997-2001 from USITC (2004). Textiles and Apparel: Assessment of the Competitiveness of Certain Foreign Suppliers to the U.S. Market. Washington, DC: United States International Trade Commission. Original data compiled from United Nations data. 2. Data 2004 from Textile Asia (2005). World Trade in Textiles & Clothing 2004: WTO Statistics. Textile Asia, November 2005. Original data from WTO Trade Statistics. 3. UN (2006). United Nations Commodity Trade Statistics Database [13].

Although the 25 EU countries (see Appendix II) as a whole ranked second among the world's 15 leading clothing exporters in 2004 in terms of extra-EU trade, clothing exports from the EU only held a 7.4% share of the world total apparel exports, which is far behind China. Extra-EU exports rose by 20.6% to \$19.13 billion in 2004 compared with 1997. However, some of the growth may due to the continuing appreciation of the

euro against the US dollar since the first quarter of 2002 [37]. Turkey moved up two places to third position from 1997 to 2004. Turkish apparel exports to the world grew to \$11.19 billion in 2004, up by 62.9% based upon \$6.87 billion recorded in 1997. In the same period, the domestic apparel exports from Hong Kong suffered a 12.7% fall. As a result, Hong Kong fell one place to number four between 1997 and 2004.

The apparel exports from Mexico rose by 25.7% from \$5.73 billion in 1997 to \$7.20 billion in 2004. This overall increase was greatly attributable to substantial growth between 1997 and 2000, which outpaced the slight fall in the following four years. Indian clothing exports increased by 39.1% from 1997 to \$6.62 billion in 2004, climbing one place from seventh to sixth during the same period. Apparel exports from the US decreased by 41.6% from \$8.67 billion in 1997 to \$5.06 billion in 2004. Consequently, the US fell three slots to number seven within those eight years. By contrast, the clothing exports in Romania progressed at a surprising rate over the same period (1997-2004), surging by 169.7% based upon \$1.75 billion recorded in 1997. Hence, Romania moved up six places to eighth during the eight-year period.

Other notable world apparel suppliers such as Indonesia, Bangladesh, Thailand and Vietnam each held a 1.5%-1.7% share of the world apparel exports in 2004. Between 1997 and 2004, Indonesia climbed two places to ninth resulting from its growth rate of 53.5%. Meantime, Bangladesh remained the tenth place by an overall rise of 26.9% despite a slight decline during 2001-2004. However, Thailand fell two spots from ninth to number eleven, although its clothing exports increased by 9.76% in the eight years. Apparel exports from Vietnam had a huge rise (188.4%), soaring from \$1.38 billion in 1997 to \$3.98 billion in 2004. As a result, Vietnam moved up three places to number

twelve over this period. Conversely, the apparel exports from South Korea dropped by 19.0% over the period of 1997-2004. South Korea moved down five spots from eighth in 1997 to number thirteen eight years later. Meanwhile, the clothing exports from Tunisia and Pakistan rose by 42.2% and 67.4% respectively. But, Tunisia and Pakistan fell two places each to occupy number fourteen and number fifteen respectively.

Above all, the significant shifts in rankings among those main apparel suppliers in the world have reflected the fact that the apparel assembly operations have been continuously moving to low-cost developing countries. Of the world's 15 leading apparel exporters in 2004, the nine countries in Asia as a whole held a 60.0% share, Turkey, Romania (Eastern Europe), total 25 EU countries and Tunisia (Africa) each accounted for 6.7%, and the rest was equally shared by the US and Mexico.

CHAPTER EIGHT

CONCLUSIONS

The textile and clothing industry has led and sustained the development of world economy for many decades. Being a vital part of a global economy, textile and apparel production not only is dispersed in both developed and developing nations, but also represents the largest source of industrial employment around the globe. In addition, textile and apparel production may be the only industry through which a relatively large number of developing countries can participate in international trade, in which many developing countries rely heavily on exports as a main source of their economic progress. As an increasing number of emerging producers from developing countries entered the textile sector, production overcapacity was observed on a global basis. Consequently, the competition in world textile and apparel market becomes intense. Manufacturers in developing countries take advantages of their sufficient low-cost labor and hence offer more products at reduced prices to compete in global market. Meanwhile, in order to lower costs and therefore compete more effectively with low-cost imports, many producers in the developed nations have been forced to turn to global sourcing or move production facilities off-shore. This trend has led decreases in textile and apparel production in developed countries, and in turn, declines in employment.

In light of the rapid changes in global textile and apparel industries, this research paper provides a glimpse into the changes and trends in worldwide textile and apparel production in the recent decade. By using the model of textile product complex as framework, the data presented in this research paper were firstly collected from various

data sources, such as the Fiber Economics Bureau, ITMF, ICAC, Textiles Intelligence, CIRFS, and WTO as well. The data were then validated to ensure its integrity, which represented a significant stage in the process. Finally, the data were analyzed and conclusions were drawn based on the obvious trends in the data. However, since production data at higher level, notably for apparel manufacturing, were difficult to obtain due to various restrictions (e.g. disclosure constraints for production data, funding shortage, accessibility of data sources, etc.), some conclusions were drawn according to the analysis on production-related data, involving trade and consumption data.

In global scope, the output of synthetic fiber (except Olefin) soared by 76.6% to 31.69 million tons during the period of 1994-2004, and the projected production for the year of 2006 will be 43.79 million tons, increasing by a further 38.2% from 2004. Raw cotton fiber production reached an estimated record of 26.20 million tons in 2004, 40.0% above the previous record in 1994. But, a slight decline is likely to occur in 2005, down by 6.9% from the previous year. Between 1995 and 2004, the production of raw wool (scoured or cleaned basis) has decreased steadily to an estimated 1.22 million tons in 2004, down by 21.5% from 1995. The output of cellulosic fiber (except Lyocell) in 2004 jumped by 8.0% to 2.49 million tons compared with 1994. The increasing trend is expected to continue in 2005 (15.4%) and 2006 (0.9%), reaching 2.90 million tons in 2006. The production of Olefin fiber reached 6.30 million tons in 2004, up 2.08 million tons (49.1%) from 1994. Also, it is forecast to rise by 28.4% to 8.10 million tons in the following two years. Between 1994 and 2002, the production of glass fiber increased by 19.1% to 2.66 million tons. The output of other natural fibers (cotton and wool excluded) increased by 3.4% from 5.29 million tons in 1994 to 5.47 million tons in 2004. Within the

output of all other natural fibers (excluding cotton and wool), Jute has ranked first, accounting for over half of the world total.

In all, world total major fibers output have been kept on growing, up 40.7% by estimate between 1995 and 2004. During the same period, the growth rate of total global major fibers production has further outpaced that of the world's population. Synthetic fiber (Olefin included) and cotton fiber have dominated all textile fibers output, accounting for 49.8% and 34.4% of the world total in 2004 respectively. In addition, the statistical analysis based on the General Linear Model shows that the average annual growth rate of man-made fiber output is near fourfold that of natural fiber production during the ten years (1995-2004). Compared with the average annual growth rate in this period, the global fiber output has witnessed an unprecedented level of the annual growth in 2004.

From the yarn perspective, world production of chemical fiber yarn (50% chemical fiber or more) rose by 67.2% from 20.29 million tons in 1994 to estimated 33.92 million tons in 2004. It is estimated to 36.41 million tons in 2005, which refers to a growth rate of 7.4% over 2004. Global production of cotton yarn (50% cotton or more) jumped to an estimation of 21.77 million tons in 2004, representing an increase of 6.08 million tons (38.8%) from 1994. It is predicted that the rising trend will remain for the years 2005 and 2006, reaching 22.81 million tons in 2006 and up 4.8% from 2004.

On the fabric side, global output of cotton fabric (50% cotton or more) climbed to estimated 11.47 million tons in 2004, up by 18.1% from 1994. It is forecast to rise by 3.3% to 11.85 million tons in 2006. In addition, the global weaving sector consumed an estimated 28 million tons of natural and man-made fibers and the knitting sector used 17

million tons in 2001, representing about 51% and 31% of the world total 55 million tons fibers respectively. In the same year, non-spun end uses including nonwovens accounted for 11% (6 million tons) and carpets owned 7% (4 million tons) of the fibers produced globally.

Turning to end-use products, world textile fiber consumption at the end-use level has increased continuously between 1994 and 2004. Also, it is projected to grow in the following six years at an average annual rate of 3% to reach 67.5 million tons in 2010. Clothing manufacturing, the largest segment at finished products production stage, has low entry barriers in terms of capital and technical knowledge requirements. In the last decade, apparel production has tremendously transferred from the developed countries to the developing nations. Moreover, in comparison with textile production, apparel manufacturing has higher labor content and less scope of automation, so developed countries cannot afford high labor costs and therefore move garment assembly operations to low cost nations. As a result, clothing production has tremendously transferred from the developed countries to the developing nations. Also, changes in apparel manufacturing are more dramatic than those for textile. This trend has already been reflected in international trade in textile sector. International clothing trade has increased at a faster pace, although it has followed a similar pattern to that of textile trade. During the period of 1990-2004, world clothing trade in value increased by an average of 6.4% per year, while textile trade rose by only 4.6% per year. As a result, the share of clothing in total textile and clothing trade grew by 6.1 percentage points from 50.9% in 1990 to 57.0% in 2004. But world trade growth rate in 2005 is predicted to be slowed by lower economic output, partially due to the sharp rise in oil prices.

In geographical terms, textile and clothing production, especially apparel manufacturing, has shifted significantly from the developed countries and relatively high-cost countries (e.g. Hong Kong, Taiwan and South Korea) to low-cost developing countries over the past decade. The main stream of these changes is the sequential shifting of production activities from the US and Europe to Asia. Given that the world total textile and apparel production has increased annually at a moderate pace, a sharp declining output in the textile industry as a whole has been observed in the US and the Europe as well, resulting from declines or slower growth in different product categories. Nevertheless, both the US and EU still have ranked among the world's major producers in each sector, even though the overall market share occupied by each country has decreased in the world total. Obviously, in both countries, the declines in clothing production have been far more drastic than those in textile production.

By contrast, Asia has been the main center of textile and clothing production, acting as a driver of growth in global market. Most of the increases in this region have been attributed to China, India and Pakistan. In particular, China has enjoyed the tremendous growth in virtually every sector in textile and apparel industries, resulting in its supremacy over other countries in the world. Other major textile producing countries in Asia include South Korea, Taiwan, Indonesia, Thailand, Malaysia and Philippines. Other than these countries, Bangladesh, Vietnam and Sri Lanka have joined the world's leading apparel suppliers on the global basis. In Asia, Japan is one of the major contributors to chemical textiles production, although its output has been declining.

Other than the giant Asian countries, Turkey has seen fast growth in both textile and apparel sectors, resulting in an increased share in the west market, notably in Europe.

Also, Tunisia and Romania have become the prominent apparel suppliers to Europe as well.

In fact, international trade agreements have had an obvious effect and will make a direct impact on global shifts in production centers. Relocating of sourcing volumes to Asia has been in lines with such trade agreements. Admittedly, the preferential trade agreements, such as NAFTA and CBI, have contributed greatly to Mexico and Caribbean Basin countries, which have emerged as prominent apparel suppliers for the US market. Apparently, China has been the biggest beneficiary of quota phase-out under the ATC as the result of China's entry into the WTO in late 2001. After China, the substantial gains benefiting from the removal of those longstanding quotas have been enjoyed by India, Pakistan and Bangladesh. However, quota elimination has had a detrimental impact on enormous small developing countries and higher cost suppliers such as South Korea and Taiwan. But, the U.S., Europe and a few other WTO members have been using safeguard quotas imposed on a broad spectrum of Chinese imports to protect their markets in the post-quota era. Meanwhile, preferential trade agreements continues to give non-Asian partners duty-free access to the US and EU market. Thus, the intensified competition associated with the rising oil prices and falling prices for textile and clothing products has existed in international trading environment and will last for many years to come.

On the other hand, the political, environmental, and business strategies have a profound impact on shifts of production locations in the world. Hence, with the expanded globalization of the economy and the emergence of new technology, world textile industry is subject to change in the dynamic global complex.

CHAPTER NINE

RECOMMENDATIONS FOR FUTURE WORK

Based on the model of the textile product complex (see figure 1.4) developed by the researcher and introduced earlier in this thesis, some recommendations for future work are provided as follows:

1. Since the production activities become more complicated while the textile and apparel products move to the higher phase, a more in-depth study of this research can be conducted, especially at fabrics level and at the stage of end-use products.

2. Because an individual nation or region concentrates on specialization in different textile sectors, more comprehensive production data for each country or region would provide a more detailed world map of textile and apparel production.

3. Additional research is recommended related to North-South regional trade, especially for regions showing a significant difference in labor rates.

4. A more in-depth statistical analysis might reveal other trends in the world's textile and clothing industry, which were not possible to see in this research paper.

5. A similar type of study can be applied to other significant activities in the textile complex, such as trade and consumption.

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APPENDIX

APPENDIX I

STATISTICAL TEST

The SAS System 02:16 Thursday, June 1, 2006 1

Obs	Yearnumber	Year	Manmade	Natural	Total	Population	Consumption
1	1	1995	27512	26711	54223	5674381	21.07
2	2	1996	29144	26563	55707	5754690	21.34
3	3	1997	31693	26931	58624	5834504	22.15
4	4	1998	32256	24775	57031	5913786	21.26
5	5	1999	34544	25168	59712	5992485	21.97
6	6	2000	36679	25605	62284	6070586	22.62
7	7	2001	36560	28230	64790	6148063	23.23
8	8	2002	38833	26111	64944	6224978	23.00
9	9	2003	40659	27467	68126	6301463	23.83
10	10	2004	43387	32897	76284	6464750	26.01

The SAS System 02:16 Thursday, June 1, 2006 2

The GLM Procedure

Number of Observations Read 10
 Number of Observations Used 10

The SAS System 02:16 Thursday, June 1, 2006 3

The GLM Procedure

Dependent Variable: Manmade

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	227880144.0	227880144.0	551.35	<.0001
Error	8	3306508.1	413313.5		
Corrected Total	9	231186652.1			

R-Square Coeff Var Root MSE Manmade Mean
 0.985698 1.830216 642.8946 35126.70

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Yearnumber	1	227880144.0	227880144.0	551.35	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Yearnumber	1	227880144.0	227880144.0	551.35	<.0001

Parameter	Estimate	Standard Error	t Value	Pr > t
Intercept	25985.80000	439.1806434	59.17	<.0001
Yearnumber	1661.98182	70.7803696	23.48	<.0001

The SAS System 02:16 Thursday, June 1, 2006 4

The GLM Procedure

Number of Observations Read 10
Number of Observations Used 10

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The GLM Procedure

Dependent Variable: Natural

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	14303756.41	14303756.41	3.42	0.1018
Error	8	33503311.19	4187913.90		
Corrected Total	9	47807067.60			

R-Square 0.299198
Coeff Var 7.566570
Root MSE 2046.439
Natural Mean 27045.80

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Yearnumber	1	14303756.41	14303756.41	3.42	0.1018

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Yearnumber	1	14303756.41	14303756.41	3.42	0.1018

Parameter	Estimate	Standard Error	t Value	Pr > t
Intercept	24755.66667	1397.984199	17.71	<.0001
Yearnumber	416.38788	225.305554	1.85	0.1018

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The GLM Procedure

Number of Observations Read 10
Number of Observations Used 10

The GLM Procedure

Dependent Variable: Total

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	356368699.3	356368699.3	66.56	<.0001
Error	8	42833021.2	5354127.7		
Corrected Total	9	399201720.5			

R-Square	Coeff Var	Root MSE	Total Mean
0.892703	3.721740	2313.899	62172.50

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Yearnumber	1	356368699.3	356368699.3	66.56	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Yearnumber	1	356368699.3	356368699.3	66.56	<.0001

Parameter	Estimate	Standard Error	t Value	Pr > t
Intercept	50741.46667	1580.693805	32.10	<.0001
Yearnumber	2078.36970	254.751873	8.16	<.0001

The GLM Procedure

Number of Observations Read	10
Number of Observations Used	10

The GLM Procedure

Dependent Variable: Population

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	566603654040	566603654040	1017.28	<.0001
Error	8	4455823116.5	556977889.57		
Corrected Total	9	571059477156			

R-Square	Coeff Var	Root MSE	Population Mean
0.992197	0.390866	23600.38	6037969

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Yearnumber	1	566603654040	566603654040	1017.28	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Yearnumber	1	566603654040	566603654040	1017.28	<.0001

Parameter	Estimate	Standard Error	t Value	Pr > t
Intercept	5582167.467	16122.12812	346.24	<.0001
Yearnumber	82872.933	2598.31621	31.89	<.0001

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The GLM Procedure

Number of Observations Read 10
Number of Observations Used 10

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The GLM Procedure

Dependent Variable: Consumption

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	16.01603030	16.01603030	32.17	0.0005
Error	8	3.98272970	0.49784121		
Corrected Total	9	19.99876000			

R-Square 0.800851
Coeff Var 3.115413
Root MSE 0.705579
Consumption Mean 22.64800

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Yearnumber	1	16.01603030	16.01603030	32.17	0.0005

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Yearnumber	1	16.01603030	16.01603030	32.17	0.0005

Parameter	Estimate	Standard Error	t Value	Pr > t
Intercept	20.22466667	0.48200197	41.96	<.0001
Yearnumber	0.44060606	0.07768165	5.67	0.0005

APPENDIX II
THE 25 EU COUNTRIES

The 25 EU Countries	Austria	Belgium	Cyprus	Czech Republic	Denmark
	Estonia	Finland	France	Germany	Greece
	Hungary	Ireland	Italy	Latvia	Lithuania
	Luxembourg	Malta	Netherlands	Poland	Portugal
	Slovakia	Slovenia	Spain	Sweden	U.K.

Source: Europa (2006). European Union Member States. Available at:
http://europa.eu/abc/governments/index_en.htm (last visited Aug. 26, 2006).