better price. Currently the lack of reliable connections prevents this type of direct sourcing for most major retailers. Lack of control is a frequently cited problem, and promotes the use of third parties, even for retailers who do a lot of direct sourcing.

- Expected improvement

In fiscal 1990/1991 the value of Pakistan's garment exports to the U.S. increased 25% to $494 million. Comprising 29% of its total garment exports and 45% of its knitted garment exports, the U.S. is Pakistan's largest export market. Nonetheless, it is still regarded as a newcomer and there is a tendency to view the prospect of its increasing its technological levels with suspicion. Although there are some who point to the technological transfer being offered to the Pakistani industry by Japanese and Korean engineers and believe that it is well on the way to improving its technological standards, most assume that along with India and country will take a long time to achieve the necessary improvements.

- Comparison between Pakistani and CBI products

According to the majority view, quality is higher in CBI than Pakistani products. A discrepancy in quality and production control is believed to account for this. Most were also of the view that garments using poor-quality domestically made fabric were responsible for bringing down the overall reputation of Pakistani garments.

(9) Market requirements

- Changes in purchasing attitudes

Customers are buying, but the buying pattern has changed. No more conspicuous consumption "to keep up with the Joneses." Just buying for need. Also, people are buying later and at higher discounts. Markdowns sought have also grown in magnitude: Whereas the magic word used to be "30% off" or "40% off", today it's "50% off". Consumers have also grown to prefer softer materials and roomier sizes, easier-care casual garments have grown in popularity, and consumers now also demand high durability.

- The predominance of cotton

While cotton apparel accounted for 39% of the clothing market in 1984, in 1989 this had grown to 51%. Moreover, growth in the sales value of cotton garments outstripped all other garments in 1989, and from January to September 1990, a period which saw total apparel sales dropped off 1%, cotton apparel achieved a growth of 2%. Products with the label 100% cotton are the most popular, but polyester-cotton mixed also enjoy high popularity due to their durability and easy-care properties. The popularity of cotton is also evident in import trends. In the first half of 1990 imports of cotton apparel grew 13% on the same period a year earlier, expanding its share in total imports to 45% from the 40% of 1989. Cotton's popularity is still on the rise, and continued market expansion is expected in the future.

- Ethnic market expansion

The term ethnic market refers largely to the market targeting ethnic groups such as African and Hispanic Americans. This market has displayed remarkable growth over the last few years, partly as a result of population increases. In the 1980s the U.S. Asian population increased 107% to 7.27 million, the Hispanic population 53% to 22.35 million and the African population 13.2% to 29.9 million. Although the fashion tastes of these ethnic groups have become fairly Americanized, this market merits special consideration, if only on account of its sheer size.

- Women's apparel market

The market for women's fashion, which comprises 50% of the total apparel market, is the most easily influenced by fashion trends, and thus subject to erratic changes. Middle-aged and working women form the nucleus of this market.

- Value Marketing

"Product value" looks set to become a keyword in the 1990s. It refers to a combination of the quality, price and service required by consumers. Now less inclined to buy shoddy, if fashionable garments, consumers have begun to emphasize the essential value of products. A certain survey revealed that while 27% of people believed that wearing designer fashions signified success in 1988, this had dropped 17% in 1991.

- Growing environmental concern

In the 1990s responding to the "Green Consumer" movement will become an important issue with makers. Firms which have demonstrated concern for the natural environment in their selection of materials, packaging and production processes have been rewarded in their efforts with increased sales. Incorporating an environmental conservation policy into corporate philosophy will likely grow to become an important marketing strategy in the future. Demands by the ethical group of consumers concerning the social environment are also likely to intensify. These groups will likely take up issue with poor working conditions, the effects of pollution on workers' health, and underpayment of workers. Unfortunately, green consumers are usually ethical consumers as well.

- What do consumers demand?

The interviews seemed to indicate that overall consumers are most interested in the relationship between price and quality, in other words they seek the "the best price for a given quality". Although the meaning of "best price" is clear, what is meant by "given quality" is not so. According to a certain consultant, consumers in the market for low and middle grade goods look for low-priced versions of the fashions sold in upmarket department stores. Thus supplies aim to offer low-priced copies of upmarket department store products. These products are known as "knock-offs".

(10) Trends in OEM-type imports by apparel makers

The global garment industry may be broadly divided into two segments. In the first, the fashion segment,

competitiveness is defined in terms of quality, delivery time and the introduction of new products. In the mass production segment on the other hand, price competitiveness is decisive. In recent years, however, time and quality have become more and more important in this segment as well.

- Vanishing middle

  Hong Kong, Taiwan and Korea look destined to vanish from the market for middle grade products, in which they have enjoyed overwhelming competitiveness up till now. The garment industries in these places are threatened simultaneously by the superior price competitiveness of China, Southwest Asia and the Caribbean, which offer lower wages, and the introduction of increasingly sophisticated technology in Europe, the U.S. and Japan. In addition, the greater the importance of delivery times, the more advantageous production in the U.S. or the Caribbean will become.

- Developments in production bases

  The following factors can be thought most responsible for the shift to the CBI as the U.S. garment industry's major source for OEM imports.

  - Wages are substantially lower than in the NIES.
  - Delivery time is shorter.
  - Industrial infrastructure has improved.
  - The area is now more politically stable than in the past.
  - Imports of machinery and materials are exempt from tariffs.
  - The TSUSA 807 programme (tariff exemption, advantages in respect of quotas)

  Considerations of price, quality, and delivery time inform makers' decisions as to production bases. CBI countries have much to offer in each of these areas, making them attractive to makers as new production bases. In turn, retailers use accuracy of delivery, quality, price and existence of quick response functions as criteria in their choice of suppliers.

Further development in textile industries worldwide may be viewed as inevitable in light of its importance to the industrialization process. Regions such as Latin America, Vietnam, Cambodia and Africa are potential overseas sources. Overseas sources for fabric are likely to be different to those for garments. Consignment processing on a CMT (cut, make and trim) basis is likely to become a more common form of garment sourcing. Although more aggressive buyers will frequently shift their overseas sources, in general the existence of quotas as well as the need to maintain business relationships will place restrictions on how frequently procurement sources may be changed. Gradual changes in production bases can be expected nevertheless.

Industry members believe that the MFA will have been fully abolished in ten years' time. At this time shifts in production bases will be significantly greater. It is also said that if most favored nation status is withdrawn from China, procurements from there will stop.

(11) Suggestions

- Establishing mutual-trust

Several interviewees commented that in dealing with Pakistan they were disappointed with quality and that their business partners lacked reliability. In addition to conducting appropriate PR for products it is necessary to establish mutual relationships of trust with buyers.

- Eliminating middlemen/development of direct transactions

Retailers and makers alike are becoming increasingly sensitive to price. Places where middlemen are needed to avoid complications and to overcome problems of reliability are unlikely to be chosen as overseas sources. The fact that direct deals with makers in Pakistan are thought to be difficult puts it at a disadvantage.

- Offering quick response functions

Direct business relationships are not all U.S. buyers look for. They are also interested in rapid response capabilities based on new concepts, inventory control, electronic linkage, and delivery times quantified as number of days. It is also important to address the problem of how to offset the country's geographical disadvantage, ie: greater distances and longer delivery times.

- Non-price competitiveness

Elements of non-price competitiveness include quality, fashion and product diversity. As well as being appropriately priced, products need also to be fresh and conform to buyers' specifications. Before this is possible, it is necessary that the quality levels of Pakistani products be raised. In sum, it is important that the industry develop the capacity to respond to what the market demands.

- Greater value-added orientation

In the future, supremacy in the low-end market will be determined not so much by lower wage levels as the size of investment for rationalization. Looking at the development paths followed by textile industries in other Asian countries, it is clear that the way to respond to rising wages and consequent drops in price competitiveness is to enter the production of higher value-added garments.

Fig. II-6-2

US IMPORTS: CATEGORY 31

COTTON APPAREL PRODUCTS

Compiled from Major Shippers Reports, U.S. Dept. of Commerce

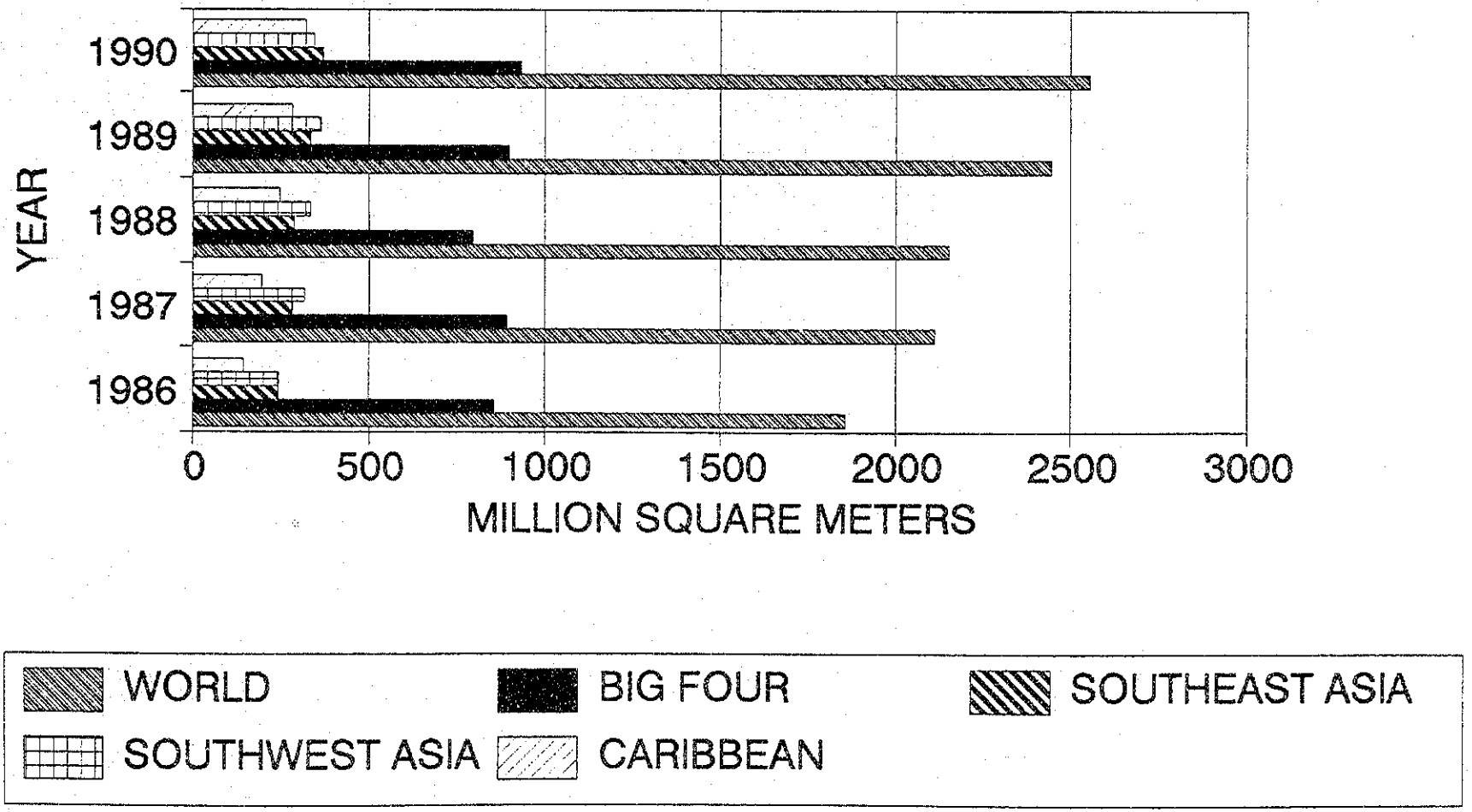
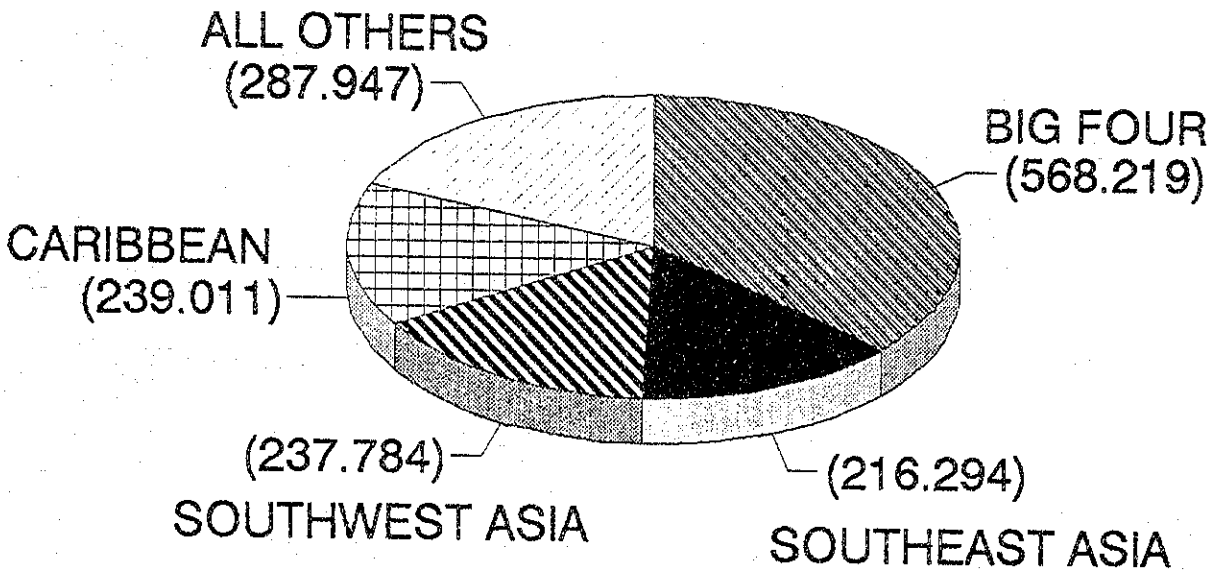


Fig. II-6-3

US APPAREL IMPORTS
CATEGORY 31: COTTON APPAREL PRODUCTS

Data in million square feet
Compiled from Major Shippers Reports, US Dept. of Commerce



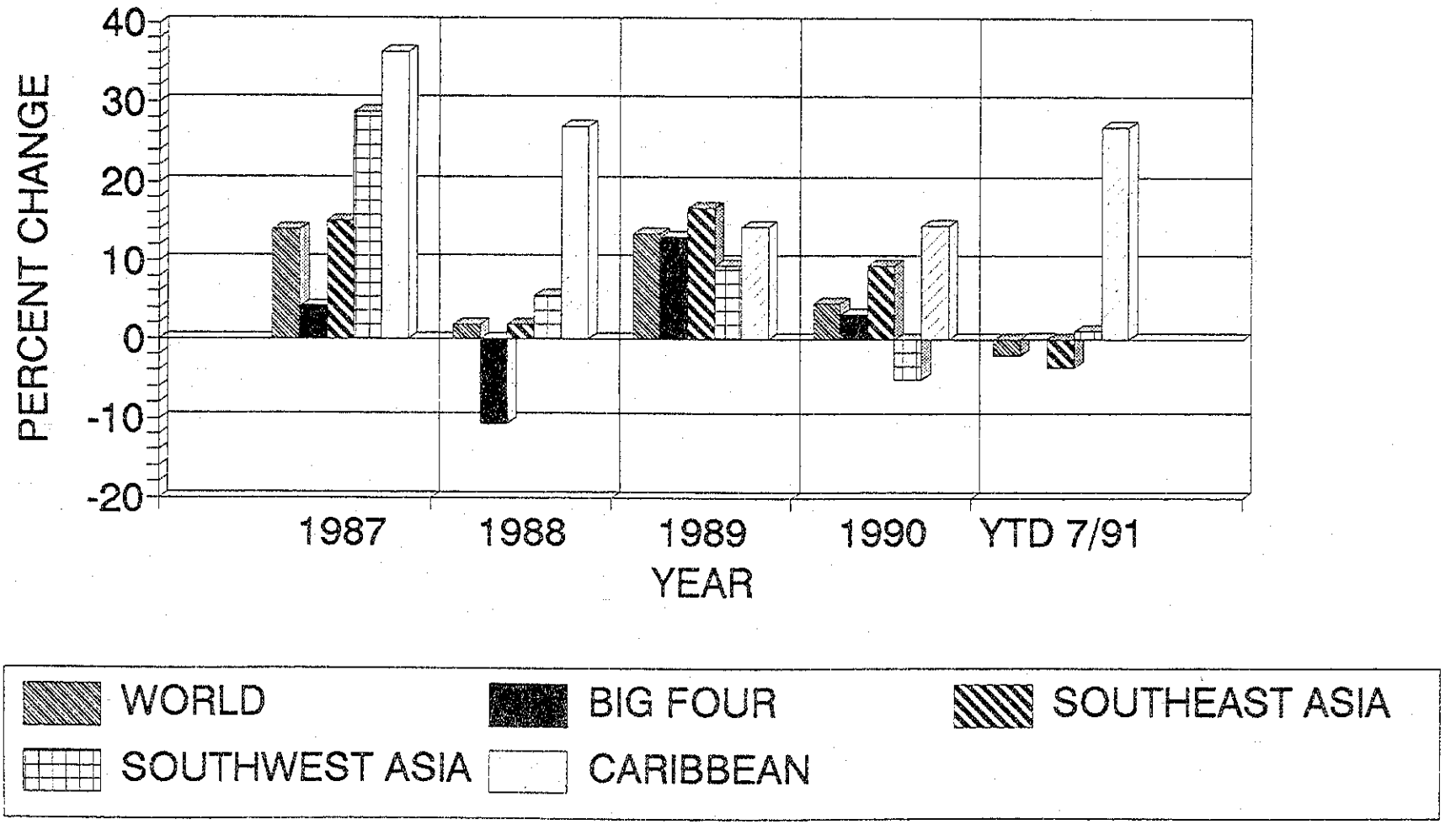
Period: Year -To - Date 7/91

Fig. II-6-4

PERCENT CHANGE IN US IMPORTS

CATEGORY 31: COTTON APPAREL

Compiled from Major Shippers Reports, U.S. Dept. of Commerce



PART III DIAGNOSTIC ANALYSIS OF TEXTILE INDUSTRY IN PAKISTAN

PART III DIAGNOSTIC ANALYSIS OF TEXTILE INDUSTRY IN PAKISTAN

Chapter 1 Present Situation and Problems of Textile Industries

1-1. Outline

For the field survey visits were made to 25 mills which carry out the various industrial processes and interviews conducted. The above-mentioned mills are located in Islamabad, Karachi, Lahore, Faisalabad and Multan areas. Mills and factories visited included those involved in spinning, weaving, dyeing-finishing, knitwear and garments so that the entire range from upstream to downstream sectors was covered with a geographical scope as indicated above. A wide variety in terms of equipment configuration and managerial policy was also involved. Power loom units were also visited in the Faisalabad area, while in connection with the cotton industry a ginning mill was visited in the Multan region and the activities of the Pakistan Cotton Standards Institute (PCSI) were investigated.

Textile mills in Pakistan can be roughly classified into the following categories by industrial structure;

A. Integrated Mills : where spinning and weaving or spinning, weaving and dyeing-finishing processing (including sewing of bed covers in some cases) are carried out on the same premises.

B. Independent Mills : which belongs to one of the following categories
   (1) Specialist Spinning Mills
   (2) Specialist Dyeing and Finishing Factories
   (3) Specialist Weavers with power loom organized on a small or cottage weaver pattern are included under this heading

C. Knitwear Factories: Factories with integrated processes of knitting, dyeing-finishing and sewing processes to produce knitwear articles.

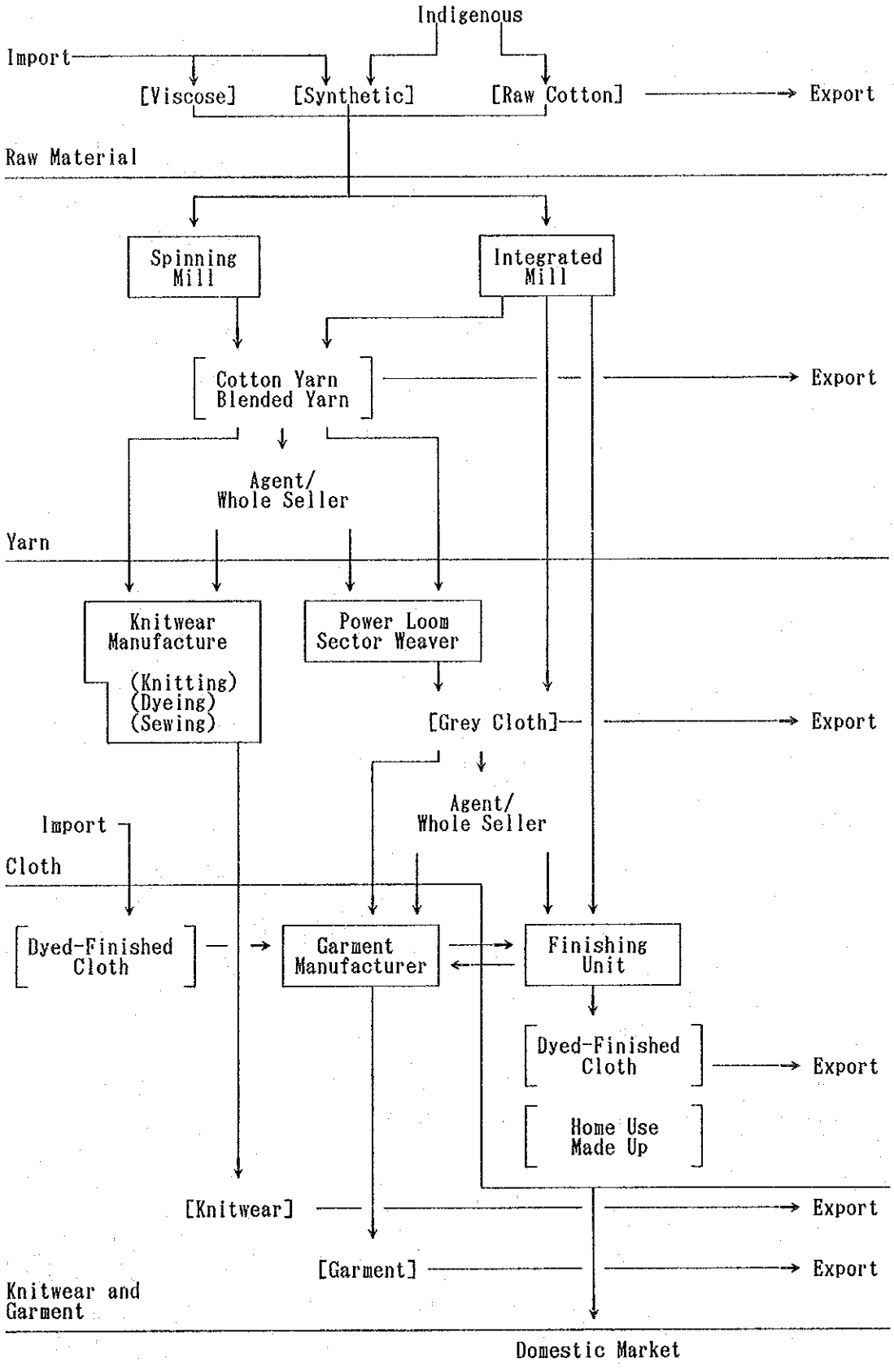
D. Garment Factories: Sewing factories for textile garments.

Even in the integrated mills their capacity of the spinning section is found to exceed that of their weaving section. Yarn is supplied by the spinning sector to the power loom and knitwear sectors as well as being exported or consumed on an in-house basis. Further, the dyeing-finishing section does not only handle in-house products but also purchases textiles for dyeing which have been produced in the power loom sector, while a part of dyeing is also done on commission so that the style of management is the same as that of the specialist dyeing-finishing factories.

Knitting factories in Pakistan are organized as integrated with knitting, dyeing-finishing and sewing, all of which are carried out. Garment factories purchase woven textiles which they have dyed on commission by specialist dyeing-finishing factories which carry out the required dyeing processing. Figure III-1-1 shows the flow of products among the various factories involved.

The following presents the status quo and problems of each sector as identified through the results of the survey carried out on the individual sectors for raw cotton, spinning, weaving, knitting, dyeing-finishing and sewing.

Fig. III-1-1 FLOW CHART OF TEXTILE PRODUCTS IN PAKISTAN

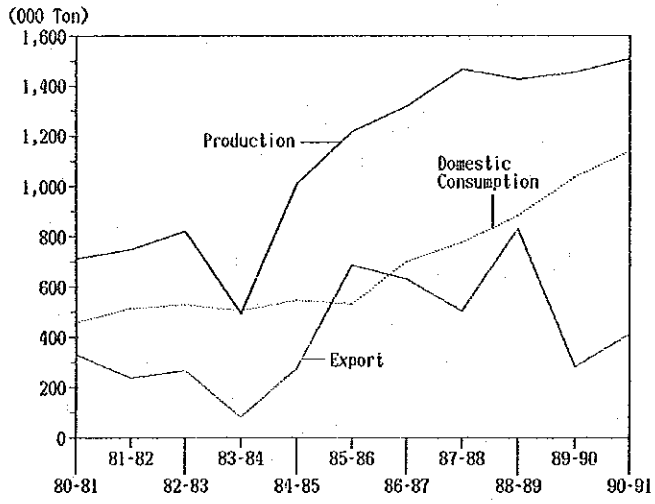


1-2. Raw Cotton

1-2-1. Development of Cotton Production

The output of raw cotton in Pakistan has increased annually to reach a level of 1.6 million tonnes (9.6 million bales) in 1990-91 (cf. Fig. III-1-2). Exports have varied in line with the rapid increase in domestic spinning capacity, but recently exports have been between 300 to 400 thousand tonnes of raw cotton. Pakistan is fifth in terms of world wide ranking for raw cotton production and third in terms of the size of raw cotton exports.

Fig. III-1-2 PRODUCTION AND DISTRIBUTION OF COTTON



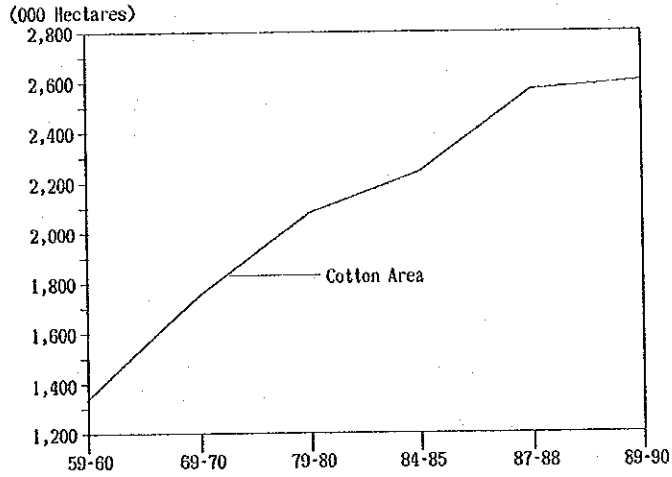
(Source) International Cotton Advisory Committee

Factors behind the increase in raw cotton output are given below :

(1) Increase in the Planted Area and in Yields

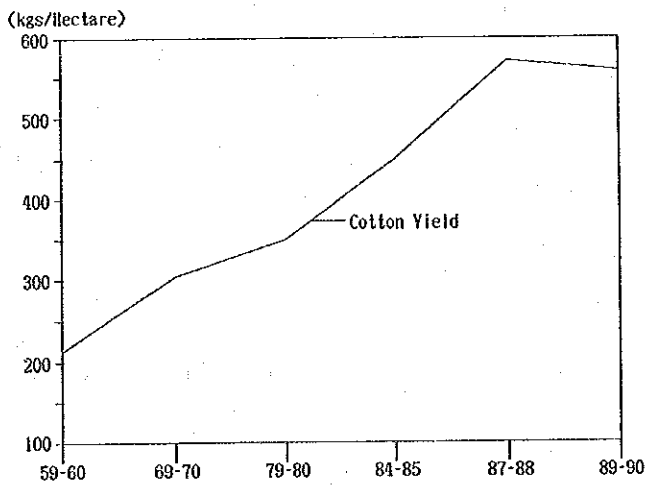
The area cultivated for cotton increased from 3.1 million acres in 1950 to its present 6.3 million acres. The yield per acre has also shown a marked increase (cf. Fig. III-1-3).

Fig. III-1-3a COTTON AREA



(Source) PCCC : Pakistan Cotton Statistics

Fig. III-1-3b COTTON YIELD



(Source) PCCC : Pakistan Cotton Statistics

(2) Improved Cultivation Technology and its Diffusion

Pakistan Central Cotton Committee (PCCC) has taken a diversified approach to the development of fertilizers, effective irrigation systems and effective pest control systems, and through the action programmes of this committee producers have been able to learn and implement the latest technology in cotton production.

(3) Improvement of Varieties

New varieties of cotton, developed in the 1980s and adaptable to high ambient temperature, have an early growth and excellent yield. Table III-1-1 shows the new varieties which were developed in the 1980s. These new breeds were rapidly obtained and planted by producers and the area planted with these increased.

(4) Improved Sowing Methods and Disease/Pest Control

The main sowing method was changed from the scatter method to the row sowing method which is more effective in terms of weeding and pest control. Further, pesticide companies not only sold agricultural chemicals but were forthcoming with advice on distribution methods and pest prevention so that damage from insects and pests showed a remarkable decrease.

(5) Governmental Policies for the Promotion of Cotton Production

The Pakistan government implemented the following measures in this connection:

- Promotion of credit provisions to producers
- Mediation for purchases of sprayers with subsidy measures
- Organized surveys of pest damage
- Implementation of programmes for intensive education and training for producers
- Establishment of a price index to ensure stability of purchase prices for raw cotton.

1-2-2. Ginning

Besides processing of long fibre cotton with roller gins, processing is generally done using a saw gin. The aging of ginning mill facilities is a problem, and there are scrap and build plans to remedy this.

1-2-3. Quality and Grading System for Cotton

(1) Quality Control of Cotton

The commodity price of cotton in Pakistan is impaired by the fact that lots are not classified according to the grade and staple standard of the cotton. In response, the Government of Pakistan has followed through its Paki-

stan Cotton Development Project with financing from the Asian Development Bank (ADB) and the Food and Agriculture Organization of the United Nations (FAO). Furthermore, the Pakistan Cotton Standards Institute (PCSI) was set up on the above basis to study and develop a standard system for quality evaluation and grading of cotton, and to promote the implementation of quality control methods and the training of classers. The details of the Institute's activities are as follows.

- Proposal of premiums and discounts in line with the grades of cotton
- The setting up of a modern cotton laboratory
  PCSI in Karachi, has a laboratory equipped with a classing room meeting international standards and High Volume Instrument for testing (HVI). The laboratory carries out research activities relating to cotton and the establishment of standards.
- Training of classers to implement the training in cotton handling, grading, quality evaluation and technology relating to grading. Each year from 20 to 40 classers are trained here.
- Diffusion of grading technology
  Seminars and study groups are held intended for cotton producers and ginning mill managers. Support is also given for the training of staff selected as classers, and though the designation of model ginning factories.

(2) Quality of Pakistani Cotton

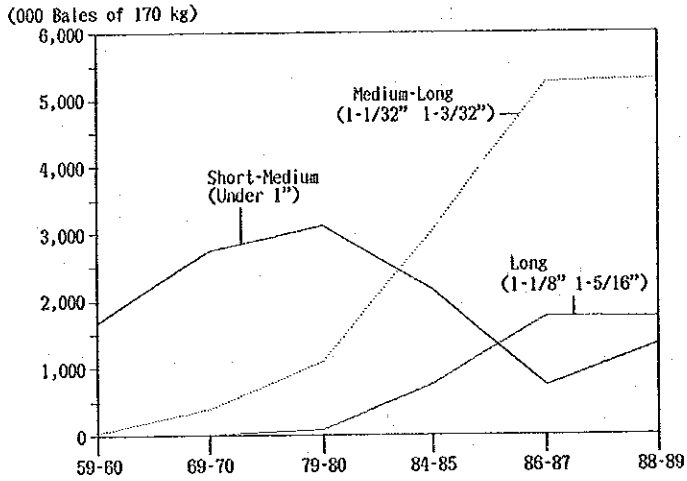
Fig. III-1-4 shows the evolution of output by the length of fibre. As a result of quality upgrading of Pakistan cotton, lengths under one inch have become rare, and cotton with lengths over 1-1/32 (corresponding to 30-40 count cotton) account more than 90% of the total.

The following are major problems relating to the quality of Pakistani cotton.

A. Impurities (mostly jute, rag, plastic film, etc.) are frequently found mixed in.
B. As the middlemen who purchase from the cotton producers deliver the cotton to ginning mills after mixing the various varieties, there are lots in which differing colours are found which results in uneven dyeing.
C. In addition to there is a large amount of excessive water content due to picking early in the moring, trash (leaves, stalks, etc.) and immature cotton due to the payment system which is based on weight, without appraisal on quality, for the cotton picking labourers.
D. Breakage of fibre and mingling of seed or trash are frequent because of the superannuation of the ginning equipment.

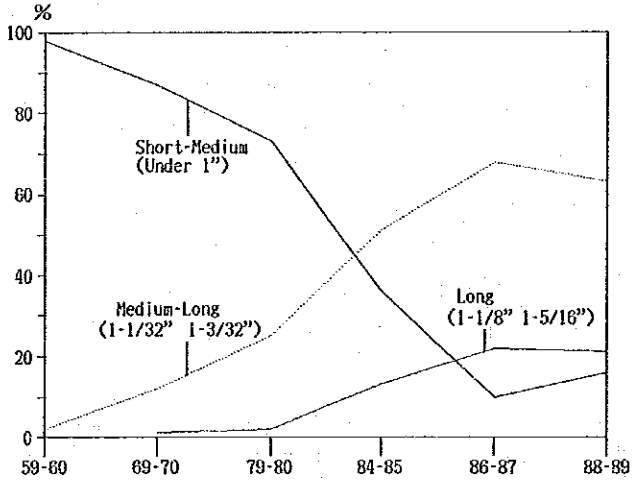
The aforementioned problems have caused inferior quality of products from downstream sectors followed by spinning and weaving sectors. Consequently, the products from those sectors, except for 20s yarns as discussed in 1-3-4 of this Chapter 1 of PART III, have not been apraised in the international markets and have not been yielded sufficient value added at these sectors.

Fig. III-1-4a STAPLE-WISE PRODUCTION OF COTTON



(Source) PCCC : Pakistan Cotton Statistics

Fig. III-1-4b STAPLE-WISE PRODUCTION OF COTTON



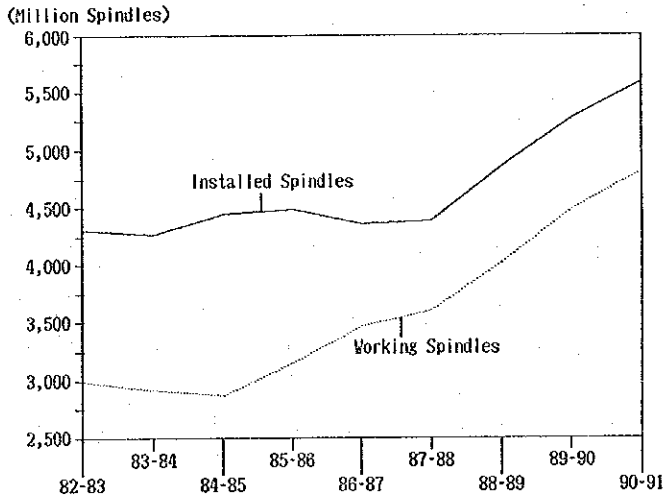
(Source) PCCC : Pakistan Cotton Statistics

1-3. Spinning Sector

1-3-1. General View

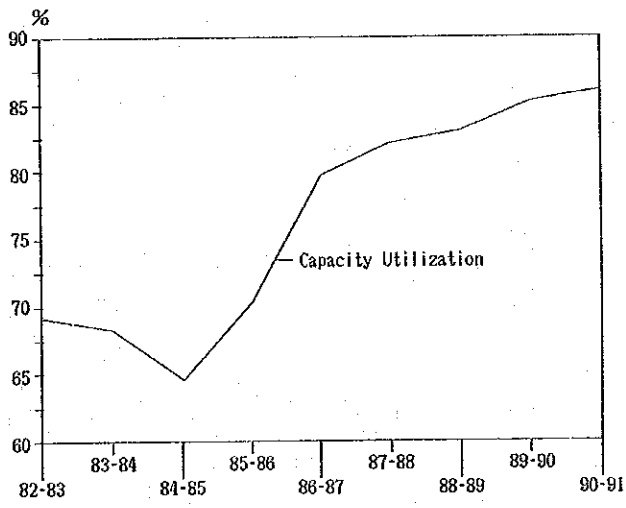
Figures III-1-5 and III-1-6 indicate the development of spinning capacity installed and working. A rapid increase in such machinery was experienced after the tax reduction on the import of textile machinery was effected in 1988-89. At the present time of 1990-91 there are 5.6 million spindles (and 74,000 rotors of open end spinning frames in addition to the above).

Fig. III-1-5a SPINNING CAPACITY (NUMBER OF SPINDLES)



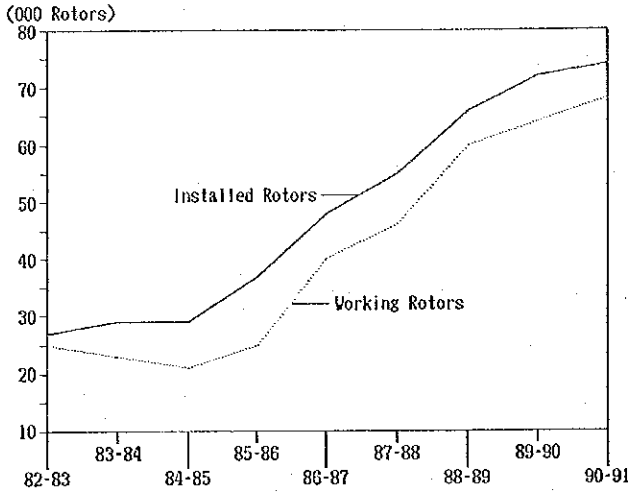
(Source) Table II-3-4

Fig. III-1-5b SPINNING CAPACITY (CAPACITY UTILIZATION)



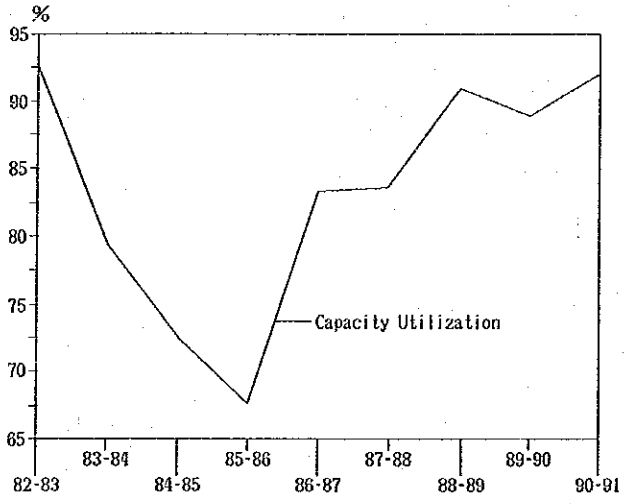
(Source) Table II-3-4

Fig. III-1-6a SPINNING CAPACITY (OPEN END SPINNING)



(Source) Table Ⅱ-3-4

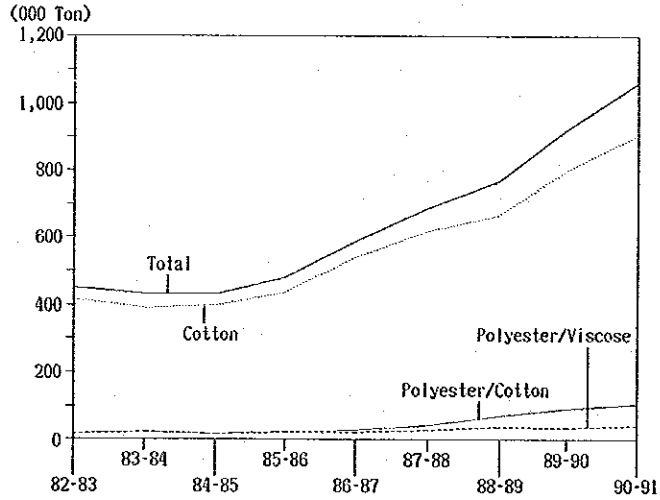
Fig. III-1-6b SPINNING CAPACITY (CAPACITY UTILIZATION OF OPEN END SPINNING)



(Source) Table Ⅱ-3-4

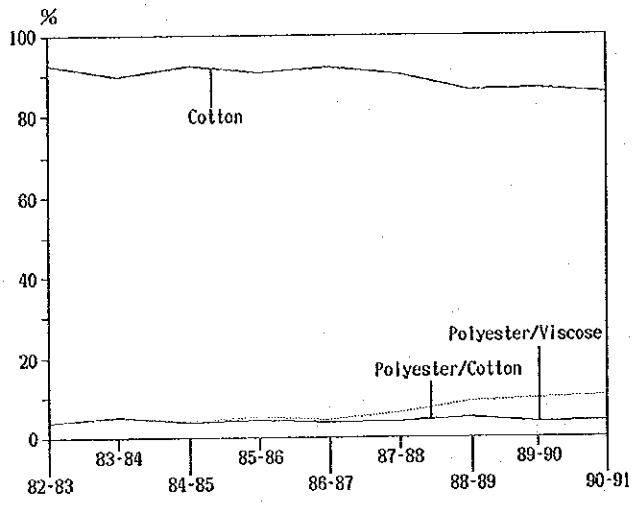
There has been a satisfactory growth in the output of spun yarn as shown in Fig. III-1-7 with 1.05 million tonnes achieved in 1990-91, while the growth in the output of blended yarn of 140,000 tonnes has also been steady. The evolution of production figures and ratios for the different varieties of cotton are shown in Fig. III-1-8. There has been a rapid growth in the production and export of coarse and medium count yarn, mainly of a 20 count type, but difficulty has been experienced in increasing the production and export of the finer counts of yarn, the 30-40 count range and above.

Fig. III-1-7a PRODUCTION OF SPUN YARN



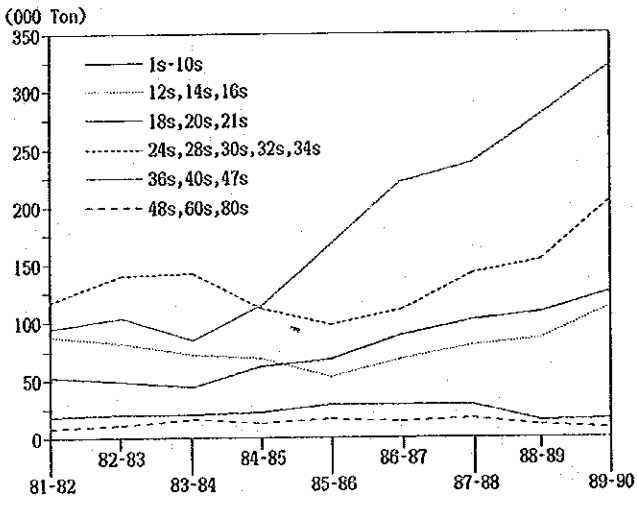
(Source) Table II-3-7

Fig. III-1-7b PRODUCTION RATIOS OF SPUN YARN



(Source) Table II-3-7

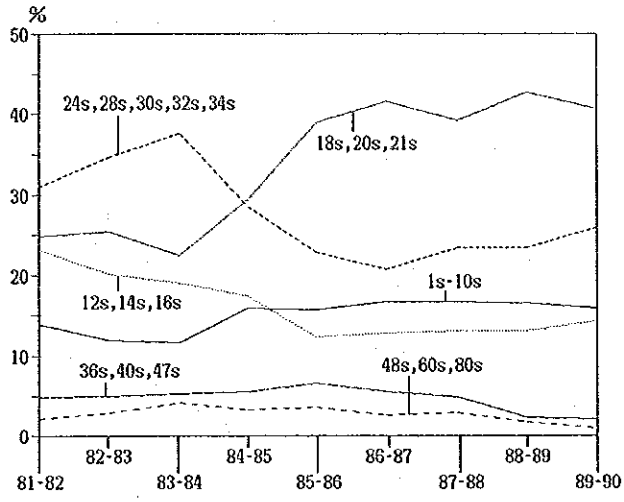
Fig. III-1-8a COUNT-WISE PRODUCTION OF COTTON YARN



* Count classifications are different from the TableII-3-7.

(Source) Table II-3-7

Fig. III-1-8b COUNT-WISE PRODUCTION RATE OF COTTON YARN

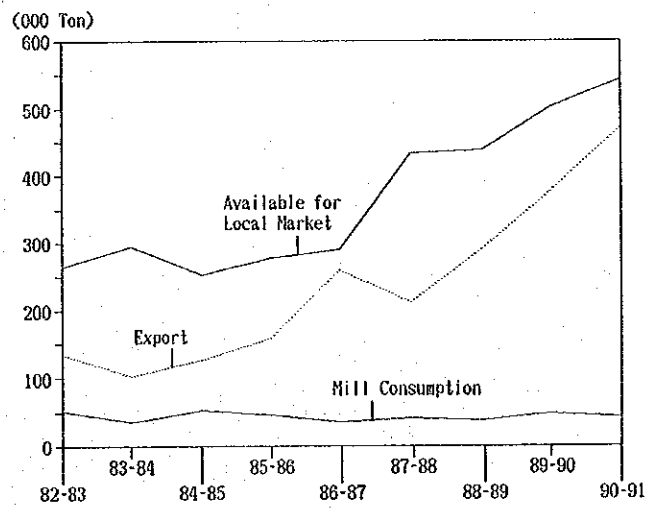


* Count classifications are different from the TableII-3-7.

(Source) Table II-3-7

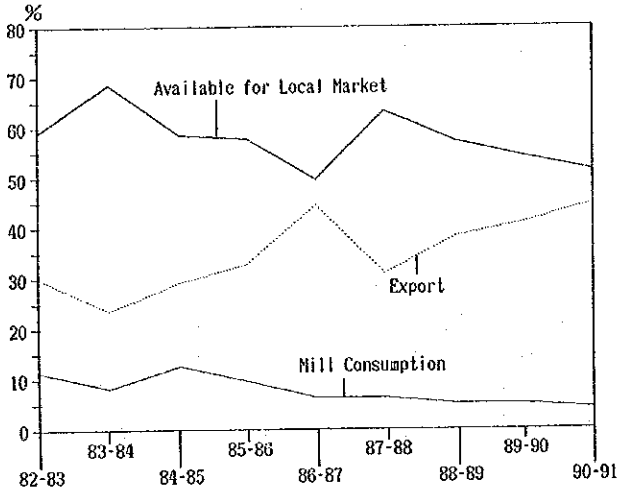
Fig. III-1-9 shows the destinations of the spun yarn. The ratio of exports has increased and there has been an increase in domestic sales in absolute terms but in-house consumption has fallen. The evolution of exports of spun yarn to the main markets is shown in Fig. III-1-10. The majority of sales goes to Japan, but sales to South Korea and Hong Kong are also on the increase.

Fig. III-1-9a REQUIREMENT FOR SPUN YARN



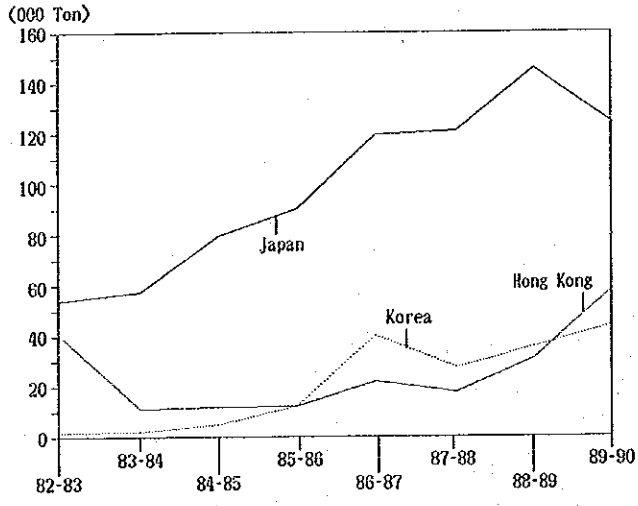
(Source) APTMA Chairman's Review 1991

Fig. III-1-9b REQUIREMENT RATE FOR SPUN YARN



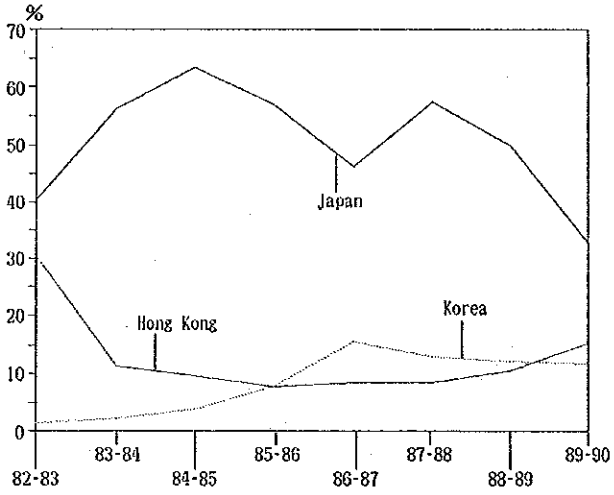
(Source) APTMA Chairman's Review 1991

Fig. III-1-10a MAJOR EXPORT MARKET OF COTTON YARN



(Source) APTMA Chairman's Review 1991

Fig. III-1-10b MAJOR EXPORT MARKET OF COTTON YARN (RATE TO TOTAL EXPORTS)



(Source) APTMA Chairman's Review 1991

Table III-1-2 summarizes the results of the diagnosis of the Spinning Sector based on the field survey.

1-3-2. Modernization of Equipment

It is possible to classify the Spinning Mills into three categories according to the state of modernization of their equipment.

A. Mills where almost no new equipment has been installed over the last 20 years.
B. Mills where part of the equipment has been modernized or which have set up new mills working in parallel with old facilities within the same premises.
C. Mills lately installed, either as specialist spinning mills or as integrated spinning and weaving mills.

(1) Group A

These include companies which are prestigious in Pakistan with a long operating history, but which have poor achievement because of their backwardness in modernizing production. Some factories are incapable of carrying out a modernization of equipment.

Buildings are old and air conditioning facilities run down. Production and auxiliary facilities are outdated, and since maintenance is inadequate these are deteriorated and productivity is low. As a result of the backward-

ness of mill production facilities the mills are unattractive to engineers and managers and these key personnel are difficult to keep on, while the operators have a poor work motivation.

Since the facilities are aged and production, maintenance and control technologies are in lower levels, the resulting product is also inferior in quality. In present circumstances, all that staff can do is to maintain production and any upgrading of product is impossible.

(2) Group B

Although this group includes mills with old equipment as in the group A, the mills in this group are proceeding with installation of new equipment as part of an active managerial policy.

The emphasis is put on modernization of production equipment, and priority is given to the renewal of pre-spinning processes such as mixing/blowing and carding or to renewal of winders. Some mills have introduced Chinese spinning frames because of their low cost. Since the modernization of maintenance and auxiliary facilities are belated in comparison with that of the production facilities, there are many mills that have installed new equipment but are not able to use it with full advantage in terms of product quality.

In some of the mills superior traditions of management have been continued in conjunction with installation of new equipment but generally speaking there are a large number of mills where outdated managerial methods have been continued on even after the modernization of equipment, and their product quality remains lower.

(3) Group C

The latest equipment not only for production equipment but also for air conditioning and testing have been installed and there is no problem with regard to facilities. However, due to a trend to underestimate the importance of auxiliary equipment, problems such as the deficient precision of maintenance equipment were found in some cases. Since superior personnel of existing mills have been selected for posts of plant manager, middle management executives and engineers, the management is thorough in Pakistan. These personnel have been shifted with a sense of pride in the operation of the new facilities and technology.

1-3-3. Technology and Mill Management

The mills visited in this study varied in level of technology and mill management. In this connection the following statements in this part of the present report are general and involving some exceptions. Further, because of limitation of time to observe individual mills, the study has been carried out focusing on the essential items of the spinning technology and was not able to be made for the details of the whole process of the mills. The following summarize status of technology and mill management of spinning mills in Pakistan upon the aforementioned premises.

(1) Spinning Technology

It was observed in general that there was an insufficient grasp of the basic technology of spinning, and there is room to improve. Especially, maintenance technology was inadequate. The following is an examination of actual examples.

(1-1) Maintenance Technology for Carding Machinery

There are defects observed in the card cylinder, doffer, variations in the wire height and wire sharpness, and as a result of the above, defective gauge settings are frequently observed. These are resulted from imperfection of precision in the card grinders and defective grinding technology.

To produce slivers free from neps, trashes and unevenness is essential in the prespinning stage. The role of carding machine is crucial to the above. The trash content of raw cotton in Pakistan is very high, so that if carding machines not well maintained used with this sort of raw cotton, the quality of the carded sliver will deteriorate due to decrease of their function in removing trashes and neps.

The maintenance of carding machine is a key task in the spinning process. The task requires a precision of 1/1000 of an inch, and necessitates special training and experience of more than 10 years. However, it was observed at this survey that generally in Pakistan there is little recognition of the importance of card maintenance so that card masters (i.e. the technicians supervising card maintenance) have not sufficiently been nurtured.

(1-2) Adjusting Technology for Combers

In response to the need for spun yarn of an excellently well-combed uniformity, combers have been introduced in many modernized mills in Pakistan. However, fleece (the bundles produced by the comber) is often uneven and contains neps. This is resulted from deficiency in control and maintenance technology such as timing adjusting of fleece element, adjustment of motion of feed roller and nipper roller, maintenance of comber.

(1-3) Maintenance and Adjusting Technology of the Draft Rollers

The draft rollers of the drawing frames, roving frames and spinning frames are the parts crucial to the quality and productivity of spun yarn. In many of the mills visited, rollers with damage or immoderate vibration were frequently observed, which were resulted from poor maintenance and adjustment including eccentricity or imperfect surface smoothness of rollers, or defective adjustment of the clearers. An example observed was a front bottom roller which damaged in service not more than four to five years. Such malfunctioning have resulted in frequent yarn breakage and yarn wrapping around rollers, so that product quality are impaired.

(1-4) The Entire Spinning Process

As has been stated before, the field survey was performed on essential portions of the mills. The overall findings including on those highlighted above are outlined, as follows:

A. Mixing and Blowing Process

- In a number of mills insufficient adjustment of piano motion device was observed.

- In spite that a considerable workers were engaging in removing foreign matters and trash in the raw cotton, it is not possible to avoid missing tiny particles. An endeavour to remove impurities in the spinning process can not be justified. Emphasis needs to be put on enhancement of raw cotton quality in this regard.

B. Carding Process

- As has been commented, there is lack of the basic maintenance technology. In particular, crucial technologies are grinding and gauge setting.

C. Combing Process

- Referring to the former statement, neps and unevenness resulted from poor adjustment and maintenance of comber were observed frequently.

D. Drawing and Roving Processes

- As has been stated, insufficient management in top roller, load to top roller and clearer has been observed

E. Spinning Process

a. As has been stated, insufficient management in top roller and clearer has been observed.

b. Fluffs were observed frequently. The causes are considered, as follows:

- Operations are practised in high revolution beyond a range where the equipment can be kept up by maintenance and management technologies

- There is inadequacy in selection of materials and type of traveller and ring, selection of weight of traveller, and replacement period for traveller and ring is not adequately controlled.

- Accurate alignment of spindle is not made

c. Occurrences of abrupt irregular twisting have been observed. The following reasons are supposed for these:

- Removal of waste yarn wrapped on spindle at doffing is deficient

- Deformed bobbins are in service

- Management of running condition, tension, etc. of spindle tapes; tape disengaged from warp, etc.

F. Winder Process

- Fluff is resulted from problems in this process also, in addition to those in the fine spinning process.

- Fluff as a result of faulty adjustment of a stop motion device of RT winder and abrasion or scratch on yarn guide and drum groove was noticed (at an automatic winder also, these faults result in occurrence of fluff)

It should be remarked that yarn cleaner of an automatic winder (Mach Coner, etc.) detects and removes slub, thick and thin yarns, but has no function to take out fluff. Further, fluff is generated first in spinning frame and more quantity of it is added in the course of processing in winding and warping processes.

(2) Mill Management

In those mills equipped with the latest equipment and lead by excellent mill managers with plentiful experience, management was relatively good. However, generally speaking, management in other mills was not seen as satisfactory in terms of operational management as noted in (1) above, product handling, check of operation and spare parts inventory control.

A. Except for cases of a few mills, the product was seen to suffer damage because of inappropriate handling, storage, transport and defective packaging of semifinished and finished goods. Not sufficient care was taken over handling and transportation of semifinished and finished goods, which affects quality of them. In weaving and knitting mills many deformed corns were observed hanging on creel. Yarns for export were packed in cartons and it was said that strength of the cartons is not sufficient so that sometimes corn was found deformed when delivered to user's factory. To investigate and improve material of paper corn, materials and methods for packing are significant to enhance reputation by users about the quality.

B. Deficiency in both a check of operation and a functional corrective action on it was observed. The supposed reason of this status is insufficiency in middle rank managers in terms of technology, knowledge, capability to guide employees, expertise and awareness on the problems. The middle rank managers are expected to elaborate comprehensive methods of upbringing the workers who are neither highly aware of needs for improvement nor educated in a sufficient grade.

C. Problems in product quality have arisen because worn parts of equipment are not properly changed to the spare. This is presumed resulted from imperfect inventory control. To prevent curtailment of equipment service life, this situation should not be left behind.

1-3-4. Quality Control and Standardization

(1) Quality

The mainstay of span yarn production in Pakistan is coarse to medium count yarn mostly between 10 to 20 count, and the principal variety for export is coarse to medium count yarn. It was stated everywhere in Pakistan that the country's yarn of these 20 count variety is one of the best international standard.

The production of yarns 30 count and over amounts to not more than 10% of the total and this has so far not increased.

The following problems in quality of Pakistani yarns of coarse count and fine count are reported.

(1-1) Quality of Coarse Yarn of 20 Count Class

Table III-1-3 indicates an example product quality of Pakistani yarn and, for reference, of Japanese yarn. As is noticed on the Table, the 20 count yarn, the major product in Pakistan, is of a quality rated not lower than Japanese product in regard with strength, u%, IPI value, etc. However, the Pakistani yarn shows lower rating in deviation of yarn length, deviation of yarn count, deviation of yarn weight, Classimat Value (large defects) and fluff index.

Further there are potential disadvantages such as foreign matters and trash contents, unevenness occurring in dying process (caused by mixing of varieties of cotton), etc., which have not been referred to as any of defects at this stage because use of the 20 count yarns of Pakistan is limited to towel, etc. and has not been extended to materials for high class garments.

The reason why the 20 count yarns from Pakistan is accepted in importing countries are that these are supplied in a condition with a quality high enough for specific uses and price relatively low. In this respect, the statement that the yarn of Pakistan is of an international grade denotes that it competes in quality and price in specific use in international market, and does not always imply that its quality is of the highest rate.

The above are the assessment to the Pakistani yarn based upon appraisal about that imported to Japan and findings in the course of the field survey. The major portion of the yarn being exported is products of mills lately introduced modern equipment from foreign countries and estimated to belong to that of the best rate quality in Pakistan. Yarns sold in the domestic market are generally of quality inferior to that for export.

Therefore, quality of yarns used by domestic weaving or knitting mills is not good with the exception of a few cases.

(1-2) Quality of Fine Count Yarns

IPI values of 30 and 40 count yarns are good. However, same as the case of 20 count yarn, deviations of yarn length, yarn counts and yarn weight and fluff index are inferior.

There are other defects not detected by means of the aforementioned tests. These involve frequent occurrence of fluff, partial irregularly twisted yarn, mixing of waste yarn, untailed yarn (a yarn ending is not possible), damage to corn, etc. These are located in 20 count class yarns also, but the inadequacy gives more distinct effects to quality of fine count yarns.

Since fine yarns of 30 to 40 count or higher are generally used as materials for garment and knitwear, mixing of foreign matter and trash and uneven dyeing, referred to as potential problems above, come to sensible. In a few spinning mills, a greatest effort to remove impurities using a number of workers has been made before mixing and blowing process. Since the result can not be perfect since some amount of impurities is possibly missed in spite of the efforts, improvement of the raw cotton quality is basically crucial.

Since raw cottons qualified for producing a 40 count yarn is used for the production of 20 count class yarn this has excellent qualities of strength, etc. However, in the case of 30-40 count yarn production, further advancement in production technology and production control is predicted to be necessary since the merit of the said surplus qualification of cotton obtained in production of 20 count yarn is lost.

On the basis of the preceding findings and discussions, it is concluded that in order to accomplish production of fine count yarns in Pakistan with international quality, endeavours in enhancing the raw cotton quality and thorough improvement of production technology and production management.

(2) Quality Control

None of the spinning mills in Pakistan investigated in the present survey undertook to display the situation with regard to quality control data (or operational records) inside the mill itself.

Of course a number of mills carried out specific quality inspections of yarn, and further some of them, equipped with updated inspection facilities, have inspection data recorded in computer systems. Although, it is said that actions are taken in managing the production process equipment upon feeding back the data, emphasis is to be put on preventing occurrence of failure by means of patrolling the production site, detecting it and counteraction in the earliest stage. It is estimated that strengthening of quality control activities is required.

(2-1) Display of Mill Operation Data

Yarn inspection data is confined to a limited number of managerial personnel and no display of information is attempted. Mills which had drawn up and displayed yarn inspection results and control charts on status of operation were very rare. Almost none displayed these where they were easily seen and accessible to operatives. Even if the control charts were drawn, no indication was made of range and limits of control, target value or result of the actions. This impressed a difference from Japanese practise where employees' quality consciousness is promoted by means of informing them of quality data and operation achievement.

(2-2) Action for Irregular Operational Conditions

It was said that feeding back information on inspection of product was practised. In the visits to mills a number of cases were observed where faults in production process were left behind. Examples of them are described in 1-3-3 Technology and Mill Management. It is estimated, therefore, that checking of irregularity in intermediate process is deficient.

Even in integrated mills it was observed that there was rare feedback of data obtained in acceptance test and tests in their own weaving or dyeing processes, or if existed, it is estimated not sufficient. There would seem to be almost no reporting back by users on product quality and no attempt made to collect such information by approaching users directly.

The feedback in this discussion means an integrated quality control system to be effected in an entire mill. It comprises the reporting of inspection results of finished product as a matter of course and a conclusive action of locating and correcting faults in production process in the light of the inspection results.

In a number of mills observed in the survey, failures in process equipment were left without remedial action, on which the following reasons are estimated:

- When a product has satisfied the client, there is no further aggressiveness action taken by the producer aiming at a higher product quality level. It is assumable that quality consciousness is still not high.

- Effective coordination of inspection results with actions to improve the production process was not made because of incompleteness in inspection standard and action procedures (including standard job procedures).

- Counteraction for defects in process is not exhaustive because a systematized practise in ordering and reporting among manager, supervisor and worker is not established.

(3) Inspection of Finished Product

Generally speaking, many mills are equipped with the latest equipment for the inspection of yarn (including raw cotton), and there is a mill among these which is equipped with a HVI (High Volume Instrument) for raw cotton. It is considered, therefore, that there are a large number of mills which give emphasis to product quality control and where there is sufficient provision of inspection devices. It is certainly true that there has been progress in these mills in the appreciation of the importance of ascertaining the quality levels since the quality is comprehended by in-house inspections. However, user's appraisal is obviously not determined by measurements with these testing equipment. Considering the relevant factors reported in 1-3-4 (1) above, it will be crucial to take steps to strengthen confidence of yarn users, i.e. weaving, knitting and dyeing sectors, by means of assessing and improving the quality (that is user's satisfaction in this context) of proprietary product yarn.

(4) Improvement of Quality Control System

Summarizing the preceding reports, it is observed that there is a need of managerial endeavours which should be based on a recognition that an effective management over the whole mill is essential. A system of integrated quality control based upon understanding of core concept of the quality control is to be established. The system involves such activities, all of which are under the control of the chief of mill, as investigation of every factor influencing the product quality, standardization of information and work flow among production, inspection and maintenance departments and implementation of production in conformity with the standardized flow.

1-3-5. Personnel

(1) Middle Rank Technicians and Engineers

There has developed a shortage of well qualified middle level managers in relation to the rapid expansion of facilities recently undertaken. Because of the shortage of technical and managerial skills in the middle managerial level, managerial functions for supervision of operatives, vocational training and inspection of production process are insufficiently realized. This has produced a situation where problems at each stage of processing in mills and factories are left untackled.

Relatively speaking there is still a large number of engineers in the spinning sector but over the last few years with the rapid increase in spinning mills engineers tend to prefer mills where facilities and technology are most up-to-date and so there is excessive mobility of technicians and engineers even among newly installed companies.

Although the level of technicians and engineers trained by the government cannot be said to be high, it is possible for all graduates to find employment because of the situation outlined above. The textile industries themselves through APTMA are also involved in furthering a programme for the estblishment of educational institutes for the training of operatives and personnel (the APTMA opened its training school in the present year of

1992).

(2) Labour Unions

The spinning sector is operated on a three shift system and all operatives are male. In modernized mills there are a large number of operatives whose productivity is low. Moreover, in mills where unions exist it is sometimes difficult to modify the operative distribution in line with the prevailing level of work at a given time. There are some newly installed mills in the Lahore area which are without unions but according to the mill officials sufficient measures were taken with regard to living conditions and accommodation so as to avoid the establishment of unions.

1-3-6. Industrial Management

Spinning industries are generally a very active sector. As already explained in the section dealing with facilities, the sector can be generally classified into three categories. It is considered that a large element of the differences in equipment investment (for equipment modernization) involved in the three categories is due to differences in the managerial situation prevailing. That is,

A: Industries in this group have a long standing history but not having adopted the latest technical developments these tend to fall behind with equipment renovation and so profitability is poor, and the capacity for development is weak.
B: While respecting traditional technology these industries proceed with a staged introduction of new technology, and nurture engineers with a firm experience and know how.
C: These are industries which have entered the field relatively recently, are provided with capital resources, and tend to employ engineers coming from existing mills to establish new installations.

Some of the companies among group A above carry out exports but the majority require all their effort just to maintain current levels so that an active managerial stance is not adopted. These companies undertake modernization and exports as far as such action is possible. The group B industries are following through a programme of staged modernization and possess confidence in their technical capabilities. The group C industries are found to be extremely assured of their facility capacity and technical levels. However, the output of these is entirely destined to export and the companies are not looking to the domestic market at present so that production is of a mass production type with a limited product range.

1-3-7. Markets

The total production output of spun yarn is 925,000 tonnes (in 1989/90) of which 377,000 tonnes are for export, which represents a 41% of the above total. The 548,000 tonnes remaining after exports is supplied to domestic markets. There is a trend for the ratio accounted for by exports to increase, and this supports the active expansion of spinning installations. At the same time there is also a considerable increase in the supply to domestic

markets.

(1) Domestic Demand

Apart from in-house demand for spun yarn coming from the weaving sectors of the same industries, demand comes from the weaving sector generally (including the towel and canvas item sectors) and from the knitting industry. A large number of products of these latter two sectors are for export. Figure II-3-1 of PART II shows the flow of spun yarn products and it appears from this that the largest consumer is the weaving sector of the mill and nonmill sectors (power loom sector), and this industrial sector supplies the main part of domestic demand for clothing items.

(2) Exports

There has been a rapid increase in the amount of cotton yarn exported in line with the rapid increase in production. In 1989 Pakistan accounted about 22% of the world exports. The main countries buying such exports over the last few years are firstly Japan, followed by Hong Kong and South Korea. These three countries account for most of the exports, accounting together for 60% of these, followed by the EC countries. Japan absorbs the largest amount of exports and these continue to grow steadily year by year. Besides the above countries other destinations are found in South East Asia (Singapore, Thailand, Indonesia and so forth), Eastern European countries (Bulgaria and so forth) and Scandinavian countries (Finland and Sweden and so forth).

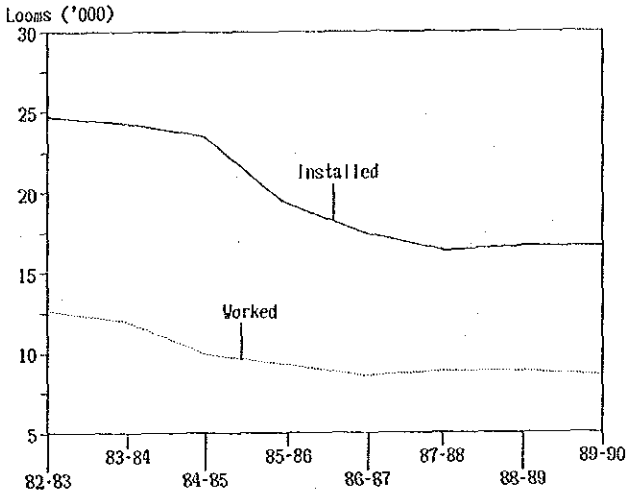
By variety the coarse and middle count items account for 99% of exports (in weight) with fine count varieties representing a very small percentage. This reflects both the exporting strength of the coarse and middle count yarns of Pakistan but also reflects the difficulties involved in the export of fine thread counts.

1-4. Weaving Sector

1-4-1. General View

Figure III-1-11 indicate the development in the number of looms in the mill sector only of the industry. In the early 1980s a level of 24,000 units had been reached but this fell to 16,000 in 1990. On the other hand although accurate statistics on the number of looms or of operators in the nonmill sector are not available, TCO gave an estimate of 145,000 units.

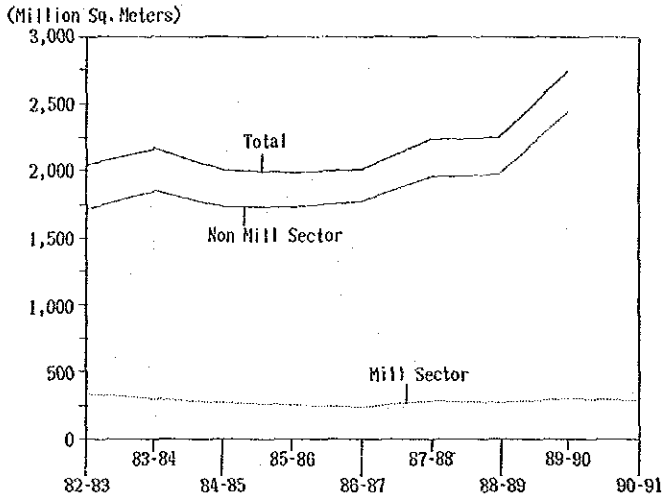
Fig. III-1-11 TREND OF MILL SECTOR WEAVING CAPACITY



(Source) Table II-3-5

As shown by Figure III-1-12, the output of this sector in 1988-89 remained about level between 2 (American) billion sq. m. and 2.25 billion sq. m which contrasts with the increased production of spun yarn realized. However, output increased to 2.7 billion sq. m. in 1989/90.

Fig. III-1-12 CLOTH PRODUCTION



(Source) Table II-3-9

It is judged that the structure of the Pakistan weaving sector is as shown in Fig. III-1-13. The following categories are employed in order to clarify the situation and productive structure of the weaving sector.

A-1:covers weaving mills where spinning and weaving are integrated together. These are not modernized. Production of mills in this group is largely carried out using shuttle looms.

A-2:covers weaving mills where spinning and weaving are integrated together and which are modernized. Production of mills in this group is largely carried out using shuttleless looms.

B: are small scale factories specialising in weaving, which largely use shuttle looms of Pakistan manufacture.

Fig. III-1-13 STRUCTURE OF WEAVING SECTOR

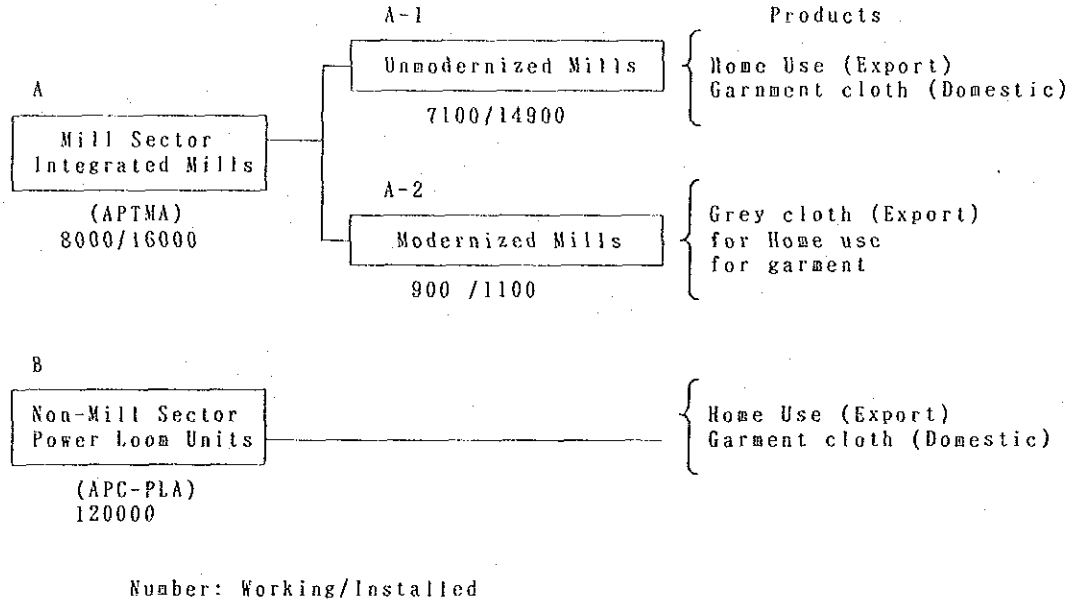


Table III-1-4 summarizes the results of the diagnosis based on the field survey (covering categories A-1 and A-2 of the three groups above). Although there is an overall difference observed between Group A-1 and Group A-2, it is evident from the above table that there is a wide range of variations among individual cases generally.

1-4-2. Group A-1

These factories belong to the mill sector of the APTMA, and many were first established in the 1950s.

(1) Modernization of Equipment

The factories are of a middle size scale with between 300 and 700 shuttle looms. Even the factories which have modernized their spinning sections like most of the factories continue to use traditional shuttle looms in their weaving sections and modernization here through equipment renovation is belated.

There are a large number of factories which have installed a certain amount of modern equipment for the preparatory processes (such as winders, warpers, sizers), but the looms are old fashioned shuttle looms made between 1950 and 1970 in Japan, Belgium or Pakistan. Since loom widths were designed for sheeting production a large ratio of wide looms (74-110 inches), and these accounted for 40% of loom equipment on average in the factories inspected during the field survey.

(2) Grey Yarn

Yarn used in the case of 100% cotton yarn were varieties ranging between 12-30 counts, with the principal variety used being of 20 count. A large number of factories also used blended yarn (mostly polyester-cotton mixtures), but otherwise only a very small number of factories employed a polyester/rayon blend. Blended yarn is mostly used for domestic clothing items. In rare cases 60 or 80 count yarn was used for domestic clothing items but this yarn was of low quality with frequent unevenness and many neps. In-house production is often divided with superior quality yarn produced on modernized equipment being exported while the next grade down of yarn is sent on to in house weaving processing.

(3) Technology, Plant Management and Utilities

Technical levels are low. In particular sizing technology is poor and results in frequent yarn breakage, and the operating efficiency of looms is low being 75-85%, partly because the good quality weaver beams (set across the looms) are not available. Temperature control is also poor, and the poor moisture absorption leads to frequent yarn breakage. The labour productivity of the looms is low with 3-9 units per operator largely because of the frequent yarn breakage.

In particular the following technical problems were reported.

(3-1) Warping Process

Defective adjustments and overhauling of details were noticed, such as defective adjustment of the drop wire in terms of applying uniform tension, defective centering of the cheese peg, defective alignment of the front comb, etc.

In many cases surveys on yarn breakages occuring during warping are not rigorously carried out. As records of yarn breakage involves the inspection of all spun yarn and so is an important target which influences the overall judgement on yarn quality. This data is of great importance to improving yarn quality and must be used to contribute to this. Frequent yarn breakage during warp beaming is an indication of some latent factor or factors impairing or reducing warp yarn quality, and to think that just tying broken yarn is sufficient action is incorrect.

(3-2) Sizing Process

Basic aspects of sizing include the even application of the starch chosen to match a particular finished product, appropriate drying, separation of yarn threads and assuring the parallel alignment of threads. Problems of a fundamental nature include the lack of thermometer devices for starch vats, indifference regarding the temperature or viscosity of liquid size, stained squeezing rollers, failure in the automatic control system of dryers, etc. Attention must be given to the reduction of thread breakage during sizing. A common problem to weaving mills

throughout Pakistan relating to the sizing materials is the quality of the oil used. The mutton tallow used widely in Pakistan is sheep fat and there is no synthetic substitute for this nor any blending or addition of surface active agent so that Pakistan is noticeably lagging behind international standards in this field. It is necessary to improve the oils used before undertaking an upgrading of the quality of fabric or increasing the number of shuttless looms.

With regard to the sizing machinery it is necessary to employ double size box type machinery so that shuttleless looms can be introduced in the future and to respond to an increased densification of fabrics.

(3-3) Weaving Process

Superannuation of the heald frame, breaking of the heald, and bending of the dropper are all potential causes of staining but many mills left such problems untreated and seemed indifferent. The main defects of fabric manufactured in Pakistan at inspection or when delivered to processing factories in terms of quality are heavy and light filling bars, double picks, and lashing-in. In the case of heavy and light filling bars particular attention needs to be given to defects of the abrasion of the various parts relating to beating, cloth winding, or let off. In the case of double picks attention needs to be given to defects affecting the weft stop motion, the shuttle or picking related parts. In the case of lashing-in attention needs to be given to defective adjustment of the end cutter or temple cutter.

Further, attention needs to be given to the control of the automatic equipment including concern for the quality of the bobbin for weft shaft (stains, bending, terminal abrasion, loose rings), control of the tension of the pirn winding, of diameters of pirn, of bunch length, etc.

(3-4) Utilities

In many of the older loom factories lighting conditions are poor or insufficient. This situation has an adverse influence on operational efficiency and also slows down the discovery of defects in the heald hook or of fabric defects.

Another hindrance to productivity is the power failures and voltage fluctuations which occur daily. Some factories have installed in-house generators in order to counter these power failures.

(4) Quality Control and Standardization

(4-1) Product Quality

The quality of woven cloth is inferior. That is there are many cases of thin and thick, lushing-in and double pick, which mean that the grade of product is unsuitable for garment uses. During the field survey no factory was observed to be carrying out inspections and collecting data. Table III-1-5 shows the results of Japanese

arrival inspection of woven cloth imported from Pakistan. The defect rate is very bad as can be seen from the results for shirting (Table III-1-5a) and sheeting (Table III-1-5b) woven on shuttle looms since defects per yard are above the 0.5 level, with defects in some cases above 1.0. The on site inspection confirms that results do in fact reflect the general level of product quality in Pakistan.

(4-2) Quality Control

Despite the fact that product quality is poor there is no action taken to remedy the problems causing this state of affairs. In mills which integrate spinning, weaving and dyeing-finishing almost no inspections are carried out for the weaving stages. Further, since the majority of final products are printed home textiles for which a high product quality is not demanded and since cloth for domestic clothing items is commonly sold in cut strips of some 25m in length, it is possible to cut off defective sections and dispatch these. As a result defective items which are unsalable do not arise and so claims for poor goods are avoided. The above situation prevents the surfacing of product quality problems.

Very few mills collect data on the frequency of yarn breakage during warping processes, and in many cases supervision of the tension control of warpers is not carried out.

In some mills grey cloth inspecting machines are not installed, in some others where these have been installed they are not employed. Inspection of grey fabric is therefore rare and many mills are content with a simple visual inspection of product at the time of dispatch. Given the above state of affairs there is naturally no feed-back of inspection results, and no steps are taken in order to ascertain feedback in the form of opinions or remarks collected from either the dyeing processors or garment manufacturers who are the product users. Actions for improvement are also neglected.

The main quality control systems relating to weaving consist of the following.

a. Quality control of yarn	: surveys on breakage during warping, results of inspection of finished grey cloth.
b. Quality control of the warper's beam	: clearing inspections of the sizing processing, mistakes or defects in yarn tying, others.
c. Quality control of weaver's beam	: check inspections during weaving
d. Grey cloth inspections	: feedback of inspection results carried out on weaving, raw yarn, preparations undertaken.

The importance of a. has already been noted, so that details of grey cloth inspecion only are outlined here.

The first aim of these inspections is to distinguish defective products from those up to standard. However this alone will not result in an improvement of quality in the finished products produced by processing. It is therefore more important to use the inspection results to grasp whether machinery is functioning well or not, identify

the quality of the operations undertaken by operators of weaving machinery, and discern the quality of prior processing (including grey yarn quality) and undertake to improve these.

However, such vital inspection is currently only undertaken in a small section of mills which handle grey fabric for export. In the majority of mills only inspections of a most rudimentary nature are carried out. This resembles the crossing of a difficult sea without radar. It is particularly startling that inspections of grey cloth should be so rudimentary while on the other hand inspections of international standard are applied using the latest measuring devices for the spinning processes.

(5) Personnel and Employment Patterns

There is a shortage of middle rank engineers and management. Since training colleges give priority to the nurture of engineers in spinning and since many students choose employment in the spinning sector, there are few personnel trained in weaving. Further, as a result of the recent increase in the number of new weaving mills there has been a drain of engineers to new installations and so the shortage problem has deepened for many mills. Against this background a desire to see an improvement in the technical competence of mid ranking managers and foremen was voiced.

Employment in a large number of mills is arranged on a work contract basis, and these adopt a system whereby the foreman arranges a lump sum contract for processing work. In many cases this means that the style of management in line with factory policy does not condition operatives. There are mills which desire to see a strengthening of external training institutes, but given the above employment situation there are many difficulties to the realisation of this.

(6) Company Management

Even in integrated mills coordinating spinning, weaving and dyeing-finishing the weaving section tends to be "spoiled" and there is little motivation to effect improvements. In general there are no specific managerial merits in comparison with the specialist weaving industries (the power loom sector) and since this sector is restricted by competition with the power loom sector, there is a trend to limit rather than increase the input of effort to the weaving section. This is reflected in the gradual decrease observable in the number of shuttle looms used in the mill sector and in the fact that operating rates relative to machine units remains at about 50% level. There is very little active effort to improve product quality or expand exports of grey fabrics for the garment sector by the replacement for improved equipment. The industry seems to have its hands full with the modernization of the spinning section and it judges that the capital necessary to modernize the weaving section as well is lacking.

(7) Markets

The major part of demand is for woven cloth for domestic clothing items and as grey fabrics for printed home textile items. In the case of companies having in house dyeing-finishing facilities, it is generally found that dye processed cloth on the premises is dispatched.

1-4-3. Group A-2

As with the above discussed group the mills of this group are mill sector factories belonging to APTMA, but unlike the above group these are equipped with the latest shuttleless looms and are modernized mills. The mills are concentrated in the Punjab province area around Multan, Faishalabad and Lahore. Besides existing integrated industries which have undergone renovation or expansion of facilities, this group includes newcomers who have entered the field as of the late 1980s.

(1) Modernization of Equipment

The size of facilities in these mills ranges from between 50 to 250 shuttleless looms. The mills are equipped with the latest equipment covering stages from preparatory processing and weaving to relevant inspection devices. They are equipped with equipment of Swiss or German fabrication, and it was noticeable that every mill tended to be equipped with the same manufacture of equipment for each particular type of machine considered. The looms are of wide type with a width of 110-153 inches and have been chosen so as to be able to produce fabric in response to the requirements of either garment items or home textile items.

(2) Grey Yarn

The major variety of grey yarn used is of 14-30 counts, while some mills employ a 40/2 count double twisted yarn and others a blended yarn of polyester/cotton. Since the mills are equipped with modernized in-house spinning sections the quality of the grey yarn supplied is relatively good. In some cases blended yarn is purchased from other mills.

(3) Technology, Industrial Management and Utilities

The technical and industrial management levels are much higher than those of the Group A-1 mills, and this group has the best levels in Pakistan. Control of sizing temperature, viscosity of size, and sizing quantity is carried out and the quality of weaver beams is excellent. Operating rates of looms is good ranging between 85-90%. Wide looms are numerous and rotation counts for looms high, with the handling capacity between four to eight looms per operative.

(4) Quality Control and Standardization

(4-1) Product Quality of Cloth

In comparison with Group A-1 product quality is good. Table III-1-5c shows the inspection results of Pakistan product (satin) imported to Japan. This shows that the defect points per yard are low with values between 0.10 and 0.26. However, Japanese users point out that oil smears, trash and neps are frequent.

(4-2) Quality Control and Standardization

Most of factories were not identified which implemented quality control in conjunction with feedback from inspection results, but there was a growing movement to implement statistical quality control under the supervision of managers.

Some mills employ inspection devices to carry out fluoroscopic inspection on a defect point system, and careful repair and washing of products is carried out. Such measures are thought to have been introduced on the demand and with the guidance of the users commanding exports.

(5) Personnel and Employment Patterns

In comparison with Group A-1 the quality of middle ranking engineers and managers is high and their morale high.

The operatives are mill employees and payment is on a fixed wage scheme and not by piece work wage rates. Some companies also gave consideration to accommodation, pension schemes, and other welfare measures.

(6) Plant Management

Managerial policies are active and there is a strong desire to increase facilities. It would seem that this is supported by the capital financing power of the mills made possible by exports.

It appears that the main managerial strategies are as follows,

A. As weaving capacity is inferior to spinning capacity, it is sought to establish exports of yarn and fabric simultaneously.

B. Product is exported as grey fabric since capital retrieval is faster.

C. The challenge of the nonmill sector (power loom sector) can be met given the high level of product quality.

(7) Markets

At present grey fabric for garment items with two to three loom lengths is produced on wide looms and the total output destined for export. The main use for the output is for garment but some fabric is used for home textiles. The destinations are Japan, South Korea, Hong Kong, Singapore and so forth. Exports to Japan are via trading companies and the final uses are in low grade garment (casual pants, overalls, etc.), and home textiles such as beddintg articles and curtains, etc.

1-4-4. Group B

The units in this group are the specialist weaving sector called the power loom sector or in contrast to the mill sector of Groups A-1 and A-2 designated as the nonmill sector. According to information from sources in the industry the total number of looms is around 150,000 and these are located in firms ranging from those on a cottage scale with nine looms up to mill size firms with 199 looms (enterprises with between 4 and 8 looms belong to the Small Power Looms Association). An outline of this sector is shown below (this does not include yarn dyeing or towel manufacturing firms).

Members of the Association	Approx. 1,500 firms
Regional distribution	
Faisalabad	125,000 looms
Other sites in the Punjab	15,000 looms
Other regions	10,000 looms
Total	150,000 looms

Under the policy to provide the clothing for the nation, these units are accorded privileges relating to tax and labour regulations, and have a strong competitive power. The All Pakistan Cotton Power Looms Association (APC-PLA) was established as the industrial association for this sector.

In contrast to the mill sector whose output is gradually decreasing, the output of the power mill sector is increasing and the ratio of this sector share for in overall total output is also growing, so that this sector produces just under 90% of the total Pakistan output of woven fabric. Statistics on the number of units by size category, output by product variety, ratio of domestic output and exports, etc. are not available, and so a detailed grasp of the actual situation is not possible. However, since this sector not only provides for the domestic cloth market but also exports a considerable quantity of output, its national importance can not be ignored.

(1) Facilities

Only very rudimentary, old type pirn winders are installed. The looms are of all types with widths between 44" and 150". Nationally manufactured machinery forms the major part and the details are as follows:

Automatic cop change shuttle loom	3% (approx. 5,000 machines)
Ordinary loom (so called power loom)	50%
power loom without automatic warp stop motion	47%

Besides the above there are about 200 shuttleless looms (second-hand Sulzer machines). In this industrial sector there are also separate warping and sizing firms (105 factories) which supply weaver's beam under a system of divided processing. Survey results of two such factories showed that these warping-sizing factories supply beam to about 700 to 1,000 looms per factory.

However the equipment and technical levels are markedly out of date and it is necessary to proceed with the modernization not only of the weaving processes but also with the modernization of the preparation factories and effect an upgrading of the technical levels of these.

(2) Grey Yarn

Since there is export of some of the yarn output of integrated spinning-weaving mills and some of the left over inhouse yarn finds its way onto the market, it is assumed that the quality of the grey yarn is middle to low. It is inevitable that quality be impaired during transportation given the carelessness with which weaver's beam is transported from the sizing operators and its negligent loading with rope.

(3) Factory Organization, Management and Technology

Factory scale ranges from units with a number of operating rooms each containing four to eight looms installed together to small scale cottage factories containing around 30 looms in one room, or to independent units with up to 50 looms under one roof. The top level factories are equipped with air conditioning facilities, are equipped with 100 automatic looms and 48 second-hand Sulzer looms which operate comparatively well, and some of these factories export grey fabric. These results show that there is a very wide range of managerial structures, equipment levels and technical expertise.

However, in the majority of factories there is absolutely no air conditioning, and smoking near to fabrics takes place, and concern about the operating environment is generally very slack. In general the working environment is poor. Technology as such cannot be said to be involved and there is a dependence on the artisan skills of operators.

The following gives examples of the main problems encountered.

(3-1) Weaving Preparation (Warping and Sizing Factories)

1) Warping Process

Since warpers not equipped with stop motion devices are normally operated in this sector, the supply of a good quality yarn is difficult and breakage frequent. As the machinery does not stop automatically when yarn breakage occurs this is disastrous and it is necessary to undertake basic technical education in the preparation firms. Prompt technical action to remedy this situation is desirable by installing stop motion devices and strengthening their maintenance activity.

Locally manufactured creel is widely used but this is structurally weak, and precision and installation very crude. In particular attention is lacking for the removal of the cheese peg shaft and tension control. For the creel model of warper used in the power loom sector is recomended H type model. (The V type model has a complicated structure.)

2) Sizing Process

The present sector of the industry presents an exaggerated version of the defects noted in connection with the A-1 Group of the Mill sector. There is a assortment of sites with relatively new equipment while others have old equipment, and on some sizing vats there is no thermometer, while surface sizing of defective permeability is carried out using highly viscous liquid size. Rice starch is used as the starch agent while mutton tallow or untreated cotton seed oil is used as oil. Basic technical training in the sizing process is required.

(3-2) Weaving Process

The first step towards progress will be to reduce weaving defects by equipping the looms which do not have stop motion devices for warp ends breakage with such stop motion devices. Otherwise the problems affecting maintenance and supervision are the same as those encountered in the A-1 Group.
The most important task for this section of the industry is the replacement and modernization of equipment. The following shows the basic policies to be adopted.

a. The changeover to automatic shuttle looms is much too belated, and an effort to equip the sector with shuttleless looms must be attempted.
b. it is not advisable to purchase the second hand shuttle looms scrapped by the mill sector simply for the reason that these are cheap.
c. It is not possible to recommend a general use in this sector of the Sulzer looms as the shuttleless looms to be introduced in view of the present technical and supervisory levels existing. Since the low speed rapier looms are designed on the basis of shuttle looms with a comparatively simple structure these are considered appropriate to a future modernization programme.

(4) Product Quality

There are great disparities in product quality. This can be seen from the fact that 47% of looms are unequipped with yarn breakage stop motion devices (yarn droppers).

It would appear that some firms carry out simple inspections on a point system for grey cloth to be exported but in most shops inspections are limited to simple checks after weaving of fabric and it is believed that on this basis comparatively good product is selected out for export destinations.

(5) Industrial Management

Managers have autonomy in deciding what is woven but in general brokers mediate business relating to allocations for grey yarn, the purchase of fabric, etc. The executives of APC-PLA meeting with the survey team gave the impression of pride and confidence that their work was contributing to the textile industry in Pakistan and were eager to see modernization. It is understandable that a variety of industries of differing scale, industrial organization, trading relations, etc. are involved in what is generally designated as the power loom sector, but it was not easy to grasp the overall picture. However, it appears that a large number of petty industries are involved and that this sector will find it difficult in terms of facilities, scale and technical aspects to develop modern industrial practises given the current situation.

(6) Products and Markets

The products produced in this sector can be roughly divided into the three categories of grey fabrics for garment items, home textile items and industrial items (packing materials for rice, fertilizer, sugar, etc.). Sheeting of 60 x 60 size using 20 count yarn is the main article woven. This can be dispatched to the domestic market and as packing material as produced. It is also dispatched to domestic dyeing-finishing processors and after processing can be exported for home textile items. Textile trading companies handle the export business for woven fabric.

1-5. Knitting Sector

1-5-1. General View

There has been a rapid increase in the production of knitted products in recent years. According to statistics of APTMA the export value in money terms for 1989/90 was 5.878 (American) billion Rupees and for 1990/91 was 7.508 billion Rupees (including synthetic blends). On the other hand domestic competition is very fierce with about 600 companies in this sector in Pakistan. The knitting sector is organized on an integrated basis with knitting, dyeing and sewing taking place to produce knitwear products from the grey yarn brought in. The official associations for the sector are the Pakistan Knitwear and Sweater Exporters Association (PKSEA) and

Pakistan Hosiery Manufacturers Association (PHMA).

1-5-2. Modernization of Equipment

(1) Knitting Process

Many factories are equipped with first class circular knitting machines of German or British made. There are a large number of single or rib knitting machines and there are few jacquard units (knitting equipment permitting complicated variable patterns and colour designs). In general the majority of equipment has a simple knitting construction. Scale is from 20 to 40 units.

Besides circular knit machinery many factories are installed with flat knitting machines for collars and cuffs, and with embroidering machinery.

(2) Dyeing-Finishing Process

Most of the dyeing equipment is of the traditional wince type, and modernization including that for drying and finishing equipment is belated. There is some factory which is relatively well equipped for production of knitted items with dyeing, drying and inspection equipment. The managerial policy in such factory is clearly defined and high levels maintained relating to personnel recruitment, implementation of training, process management and quality control. This factory actively pursues investment for modernization. Few factories are equipped with mercerising equipment, even the above. Some factories have hand printing equipment.

(3) Sewing Process

The basic equipment needed for sewing process of the final products currently being produced is installed. However maintenance of this machinery is poor.

1-5-3. Raw Materials and Chemicals

The knit manufacturers choose good quality grey yarn from the spinning mills and are satisfied with the input yarn they available. However, in international terms the quality is not always very good as knitting yarn and there are frequent yarn breakage and unevenness. The grey yarn is transported as cheese packaged in polypropylene bags and deformation and wearing often occurs. The grey yarn is mostly 100% cotton yarn with a 10-30 count, while some polyester-cotton blended yarn of 30-36 count is used. Yarns finer than 40 count are virtually unused. Many combed yarns are used but carded yarn is also employed. There is almost no supply of dyed yarn.

There are no particular problems encountered in the purchase of dyes and chemicals.

1-5-4. Technology, Factory Management and Utilities

There is frequent yarn breakage at the knitting machines because of the poor quality of the grey yarn, the low level of knitting technology and the lack of humidity-temperature control. The knitted cloth has many yarn irregularities and surface soiling is frequently observed, while uneveness also occurs.

There is insufficient provision of dyeing-finishing equipment, and the general level of dyeing technology is poor. Examples are as follows:

- equipment and technology for relaxing is lacking, and the shrinkage rate of knitted fabric is large at around 7-8% (in exceptional cases some factories have installed equipment and are equipped with this technology in consideration to the problem of residual shrinkage and to respond to relax).
- there is no mercerising equipment and so finished products lack lustre.
- there are differences in colour and uneven dyeing by lots because of the low dyeing technology

Cutting of fabric during sewing is done with unopened fabric, so that cutting is done of product in circular form and this results in a considerable cutting loss. The level of sewing technology is low, but this is not really a problem as long as production is limited to its present level of product.

Among factories in the Karachi area a water shortage problem is apparent in some cases while other factories do not experience the problem as yet. However, the volume and quality of water used is seen to pose problems. In the Punjab region underground water is used. There are many power failures but only a few factories have installed their own in house generating facilities.

1-5-5. Product Quality and Standardization

(1) Product Quality

There is no supply of fine count yarn or two-folded yarn. As the gauge of the knitting machines is from 12 to 24 and dyeing technology poor there are colour disparities between different lots, the product quality is low and final product is destined for low price markets. The loss rate of final product after sewing is 4-5%, while the shrinkage rate for final product of 7-8% is also high.

The problems facing the knitting sector of Pakistan can be summarized as largely focused on the processing and dyeing of the grey yarn and grey cloth. Problems encountered in relation to the knitting machinery are insignificant in view of the present levels of finished product concerned. Of course it is obvious that in the case of the finer yarn counts the use of fine gauge machinery becomes imperative. In Pakistan the principle that the product quality of grey yarn needs to be superior in the case of yarn for knitting compared to that for weaving has still yet to be established or widely recognized. Since the knitted cloth is weakened by the hole defects accompanying yarn breakages, when defective threads are mingled among the various thread inputs this causes

knitting streaks and course band in colour to stand out.

Therefore the following are important with regard to product quality of grey yarn:

a. A high uniformity of yarn count (few disparities, few irregularity through length)
b. Minimum number of neps, foreign matters and remaining slubs (knots). Fundamentally combed yarns are required.
c. The yarn is soft (with a low twist coefficient) while also being strong so that yarn breakage during knitting are at a minimum.
d. For top quality products raw cotton with a fine lustre is required.

In order to attain the above criteria it will first be necessary to improve the packing for the cheese. The pressure exerted on cheeses packed in polypropylene bags during transport causes deformation and yarn is rendered fragile and breaks occur when stacked bales collapse. At the very least the grey yarn intended for knitting should be packed in uniform packing cases for transport. Further tasks to be considered in the future in order to upgrade finished product include the use of single yarn of a 30-40 count range, double twisted yarns of 40/2 and 60/2 etc. and the use of dyed yarn.

(2) Quality Control and Standardization

Despite the fact that processing integrates operations from knitting to sewing none of the factories observed seemed to be taking action on the basis of feedback from process inspections or their results. Only a few factories carry out inspections of knitted pieces after knitting, and only one company of those inspected had two sided inspecting machines installed to permit a thorough inspection. The management of this factory was found to be advanced compared to other factories.

- A flow sheet for dyeing processing was available for each lot, and the conditions of processing for each processed lot were recorded, and passed on to the next process.
- Middle rank management carried out selection of raw materials, arrival inspections of these, and inspections of final product quality and between processes. Standard values for product quality were established and if not met processing was redone.

Inspection of sewn goods is only carried out before dispatch. Inspectors are to be recruited to implement inspections and repairs on the basis of inspection criteria stipulated by buyers.

1-5-6. Personnel

Despite the fact that technical levels of the knitting and dyeing-finishing processes is low, few companies have experienced problems of personnel shortage. As with factories where the above equipment (cf. 1-5-2(2)) is provided, there is a particular emphasis given to the recruitment of supervisor class personnel and in some

cases personnel are given required training.

In order to meet personnel shortages resulting from the rapid expansion of sewing, a training institute has been set up in Karachi largely on the initiative of PKS-EA. Training in this centre has begun, but at present this is confined to training in the sewing sector only.

1-5-7. Industrial Management

There are no companies undertaking the active development of in-house products or marketing activities. The companies carry out manufacturing on a commissioned basis and so take a passive, subcontractor approach. There is a strong trend for companies to be content with their present production of low price products and companies did not give the impression of taking an active stance on renovation of equipment. Companies tended to emphasise securing of orders and expansion of sales rather than product upgrading. Some companies had been able to establish a reliable increase in sales through long term contracts made with powerful American or European manufacturers and these firms showed a will to and record of the active pursuit of equipment investment and technical improvement.

1-5-8. Final Products and Markets

There is almost no domestic demand for knitwear so that almost all of the output is exported to the USA, Europe or former Soviet Union. The only product on the domestic market are items which have failed to pass the export standards. Since quality standards for export to Japan are rigorous, the companies give priority to strengthening their position in the export markets.

The bulk of output is in sportswear related items such as T-shirts, polo shirts or training suits, etc. Specifications such as product quality, design, colour, etc. are according to orders of the buyers, and finished products are designed through programmes to provide commodity samples. There are a wide variety of knitting constructions, such as pique, interlock, rib and smooth knitting. Product appearance is poor, stitches are loose and the colour brightness not very clear, so that the main part of output is low price items sold in bulk sales outlets.

The product specifications for quality, design, hue, etc. follow those stipulated by the buyer, and product manufacture is done by provision of commodity samples. The level of sales prices (manufacturer's price) are as follows.

T shirts	2.8-3.5 US$ per piece
Polo shirts	2.2-5 US$ per piece
Jacquard Sweaters	8 US$ per piece
Training Suits	10 US$ per set

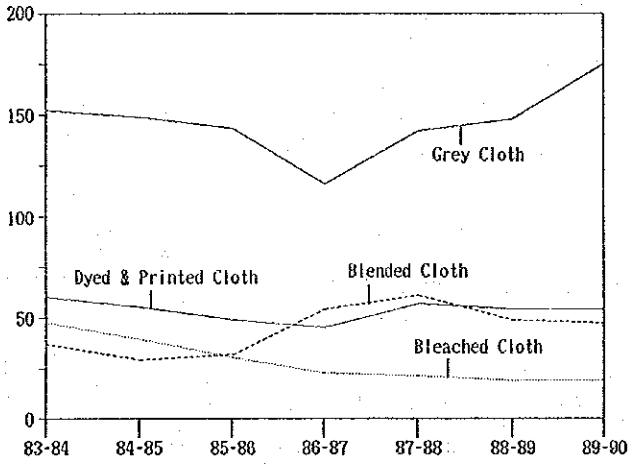
1-6. Dyeing-Finishing Sector

1-6-1. General View

Dyeing-finishing units can be divided into those which form parts of integrated factories which carry out spinning, weaving and dyeing-finishing and then those which are specialist, independent dyeing-finishing factories. In both cases the size of the units concerned range from middle to large. Even in the case of integrated factories the dyeing-finishing section is large compared to the weaving section. Therefore, grey cloth is purchased on the market in addition to in house woven fabric, and some factories take on outside orders and use excess capacity by doing subcontracted dyeing work on commission. There are also integrated factories which sell their own output of woven fabric externally while their dyeing-finishing section purchases grey cloth from external markets, so that such integrated mills are actually run on the managerial lines of independent, specialist factories.

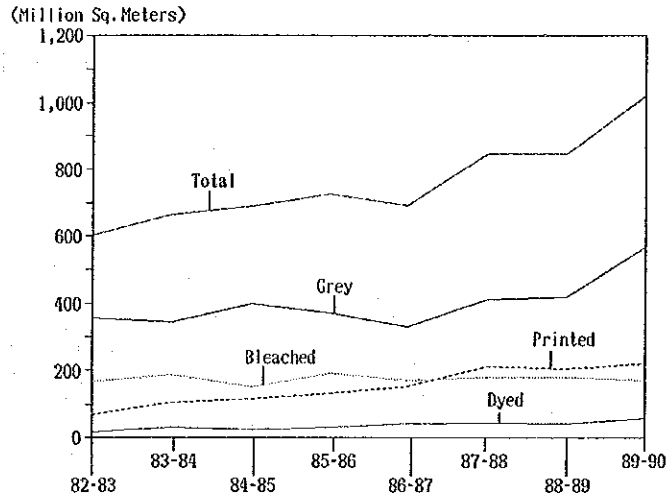
The main variety of output is printed fabrics, and in particular their is a large amount of bedding items (bed sheets, bed covers, etc.) and household items (curtains, chair covers, etc) which are produced for export. Some factories produce piece dyed or specially yarn-dyed items for domestic clothing uses but the mainstream of output is for printed goods. Some factories produce printed goods of 60 and 80 count voile and loan fabrics but this output is destined for the domestic market. The product quality is poor with frequent defects such as neps and weaving bars, but since this fabric is used for printed goods the defects are not easily detected. The figures for production and export performance by variety of fabric are shown in Fig. III-1-14 and III-1-15.
The production of bleached fabric is gradually decreasing in the mill sector, while the output of dyed fabrics,including printed fabrics, stays even. While the quantity of exports of printed cloth is increasing the amount of dyed cloth exported remains very small.

Fig. III-1-14 VARIETY-WISE PRODUCTION OF COTTON CLOTH (MILL SECTOR)



(Source) Table II-3-9

Fig. III-1-15 VARIETY-WISE EXPORT OF CLOTH



(Source) TIRDC : Pakistan Textile Statistics

Investments for the modernization of equipment are biased in favor of the printing sector and products which are processed with this equipment are largely home textile printed goods for export. The cloth demanded by the garment industry are generally piece dyed cloth while yarn-dyed cloth or printed cloth are desired for value added. The cloth required for garment use must undergo length control and be of the same hue, but at present the sector is not able to respond to such requirements regarding the cloth.

We have divided dyeing-finishing units into the following three categories in relation to their potential to provide the cloth to the garment sector and so contribute to export promotion of the latter industry.

Group A: are factories which can produce finished cloth for garment use in view of the nature of the company, technical levels and production equipment given appropriate guidance and nurture of production technology and production management.

Group B: are factories which would require investment for modernization and technological guidance and nurture, since these follow after the companies in Group A in terms of industrial organization and technical level.

Group C: These factories are not able to produce the small, diversified lot production needed for the cloth for garment use, being organized in terms of industrial scale, managerial policy and equipment to realize a large scale of production. Factories are not suited to produce the cloth for garment use in terms of technical level and equipment.

In the following consideration when discussing the dyeing-finishing sector as a whole, we shall refer to the above categories as necessary and in particular to Groups A and B in relation to the question of supply of cloth to the garment sector.

Table III-1-6 summarizes the results of the diagnosis based on the field survey (including dyeing-finishing of knitting sector).

1-6-2. Modernization of Equipment

The great majority of factories have carried out equipment investment for several years focusing on printing facilities. The main new equipment involved is for scouring, bleaching, mercerising, heat setting, printing and drying. There are few cases where new equipment for piece dyeing has been installed. Equipment has been installed for desizing, scouring, bleaching, mercerising, and printing which form the various stages in the continuous processing needed for mass production printing processing of bedding and household goods. The following disparity is evident in the piece dyeing equipment available in Group A and Group B.

Group A: Is provided with relatively recent equipment such as printing equipment, dryers, finishing equipment, etc. which are used in processing of fabric to serve in garment use. In some factories there is no provision for sanforizing equipment and so these requires installation. However, since at present there is almost no production of materials for garment use most of the sanforizing equipment available is not actually in operation.

Group B: The piece dyeing equipment is of older models and is superannuated. There are no dryer and sanforising units. Modernization of equipment will be necessary in order to be able to process cloth for garment use.

1-6-3. Raw Materials and Chemicals

The main raw material is 100% cotton fabric of coarse to middling count, but blended fabrics (blended with polyester and other synthetic/viscose fibres) account for about 10-15% used. Many of the blended yarn products are for domestic markets. In addition to in-house fabrics, factories buy grey fabrics from domestic markets and it would seem that there is considerable purchase of fabrics produced by the power loom sector.

Almost all dyes and chemicals used are imported. There are no problems to securing these but companies would like to see a reduction in customs duties and a system for their recovery at time of export.

1-6-4. Utilities

Electricity: Due to the high frequency of power failures, most factories are equipped with in-house generating facilities.

Water: For factories located in the Karachi SITE area the supply of municipal water is insufficient and the shortage problem is so serious that some factories are forced to buy water at a particularly high price. In the new industrial estates of Karachi there is a supply of industrial water from nearby rivers and there are no problems as to volume. Factories in the Punjab region employ underground water and no problems are encountered. The majority of mills do not carry out preparatory treatment of the water to be used for dyeing.

1-6-5. Technology and Factory Management

The technical levels are generally low and in particular there is insufficient knowledge of processing technology. Pigment colour is usually used for the printing and printing with dye is also carried out in some cases. Since efforts are focused on printing and piece dyeing is a difficult process, the level of piece dyeing technology is low.

Some factories carry out dyeing with continuous dyeing equipment for piece dyeing but defects such as uneven colouring, creases, defective yarn and fabric are frequently encountered with continuous dyeing products and the product quality is not up to export standard. The operating rate of continuous dyeing machinery is low since the target quantities for lots are not made up and colour disparities occur in the same lot. Generally, the traditional jigger type equipment and circular type dyeing machines are used for piece dyeing, but this results in problems such as colour differences between batches and the technology to assure a reliable product quality of processed items is lacking.

The following disparities of technology and factory management exist between the A and B groups.

(1) Group A

Judging from the state of production in factories, it would seem that production processing design and processing control such as processing conditions are to normal levels. However because of the lack of know-how, expertise, and experience with regard to dyeing technology there are problems in realising a product which can serve as the cloth for garments. As examples of problems actually observed by the Study Team the following can be noted.

- Since processing conditions are not maintained to the set conditions (for example control of the concentration of the chemicals used in the desizing, scouring and bleaching of continuous processing) the irregular conditions give rise to uneven bleaching along the length and breadth of fabric.
- the occurrence of imperfect and uneven dyeing due to insufficient desizing and scouring or inappropriate operation of dyeing equipment or irregular condition settings.
- As a result of poor operating processing, creases, odd widths, pin traces, etc. were found to occur.

(2) Group B

Factory layout is poor and in comparison with group A the shop floor is in disorder and badly arranged. This makes processing control difficult and gives rise to processing failures so that productivity is impaired. Achievements in operation of continuous dyeing equipment for piece dyeing exist, but there are colour disparities due to the inadequacy of basic technology. There is a lack of basic technology and processing technology in addition to the superannuation of equipment.

The inside of factories is cluttered and the floors are particularly soiled, semi-finished intermediate goods are left unordered and soiling defects on fabrics were observed. It is necessary to take measures to tidy and clean factories as the first step to production of product to serve as material for garment manufacture before any measures regarding equipment or technology be taken.

1-6-6. Quality Control and Standardization

(1) Product Quality

Despite the fact that product quality is not very good, the printed fabric output is accepted in markets since applications are for bedding and household goods manufacture where fabric defects do not stand out.

With the piece dyeing fabrics, there are disparities of dyeing between fabric lots and unevenness in dyeing so that the output is not appropriate for export. Since the output destined for the domestic market is cut up and sold, the quality required is not very high and yet product quality still remains too low.

(2) Quality Control

Only some of the factories carry out quality inspections of processed items (colour fastness against washing and daylight) and in most cases inspections are only carried out at the time of dispatch. Defective lengths and sections with frequent defects are simply cut away during the finished product inspection, while in some factories the daily report consists of records of the reject lengths cut away. However, there is no attempt to collect data concerning processing defects, weaving defects, yarn defects, etc. to serve as a feedback base. In fact the inspection standards are not established and checks would be limited to those points which buyers wish to have checked.

Even finished product which does not meet the set length after defective sections have been cut away is allowed if it is judged to have sufficient remaining length, so that the average product loss through defect scrapping is judged 3-10%.

Some factories carry out inspections of the dyes and chemicals received but most factories do not. Inspections of products during processes are not carried out either. Records of data from finished product inspections was

not available and no action is taken on processing on the basis of data results received back from inspections.

1-6-7. Personnel

There is a shortage of middle rank administrators, factory production managers and supervisors. The personnel shortages are serious in each factory and in particular there is a shortage of middle rank managers, operating engineers with working experience, and maintenance engineers.

1-6-8. Industrial Management

There are differences between groups A and B apparent with regard to investment in production equipment, provisions for the factory environment and the stance adopted by mid ranking managers in the factory.

Group A: Take an active policy of industrial development, carry out equipment investment with clear aims, and reinforce the factory environment and operator training.

Group B: Management of the factories appears to be with wait-and-see policy. Technical problems are coped with as they arise, but without much of long-term resourceful action programme. There is little sense of the importance of process control, job analysis, quality control, materials control, cost analysis, etc. among the managerial executives, factory managers, or factory key persons, and there is felt to be a lack of practical know-how and expertise concerning plant management.

1-6-9. Finished Products and Markets

At present, commodities are destined to be sold on export and domestic markets alike. The goods for export are almost all printed fabrics, and part of the fabric output is made up into bed covers and other sewn articles after in-house processing in sewing sections. The main targets for export are the EC countries and the USA, and designs are based on the construction, colour and pattern specifications received from clients. Some companies possess their own in-house designs and printing patterns are chosen from among these.
For the domestic market printed fabrics, piece dyed and bleached (fluorescent dyed) fabrics are dispatched.

1-7. Garment Sector

1-7-1. General View

There is not sufficient documentation covering the whole scope of the garment industry in Pakistan to allow a general overview. As the garment industry tends to have cottage industry aspects there are a large number of small and petty industries involved, and it is difficult to get an exact overall picture. The Study Team has summarized the findings of the visits and interviews with industries in this sector. The organizations for this

sector are the Pakistan Readymade Garments Manufacturers and Exporters' Association (PRG-MEA) and the Pakistan Cotton Fashion Apparel Manufacturers and Exporters Association (PCFA-MEA).

Garments and apparel are both commonly used with reference to clothing items but here the term garment is employed in the strict sense of clothing goods or clothing while apparel includes the idea of dressing up and so has a slightly different nuance of meaning. Here apparel is taken to mean not goods of clothing for everyday wear but to refer to more sophisticated clothing which expresses a fashion trend. Therefore the apparel industry refers to sectors manufacturing items to fashion designs, also referred to as fashion manufacturers. At present in Pakistan both of the abvoe Associations are conerned with the garment industry, and there are not as yet any apparel manufacturers.

The sewing industry in Pakistan can be divided into the following three groups.

A. Sewing sector for home textiles (bedding and household items) attached to dyeing-finishing factories
B. Sewing of garments made from woven fabrics
C. Sewing of knitwear made from knitted cloth

Since details of A have been given in the section concerning the dyeing-finishing sector and of C in the section on the knitting sector, the present section will be concerned with explaining the current situation of the garment sewing industries, that is B above. However, there are many problems which overlap between these three groups and in particular a large number of common technical problems with the knitwear sector of C.

1-7-2. Modernization of Equipment

Sewing equipment of Japanese make are installed. Since the sewing industry itself is of relatively recent date the equipment is not that old and factories are equipped with the machinery and equipment needed for the manufacturing processes. It will be necessary hereafter to invest in equipment and machinery which is suited to the particular items of garment which are to be sewn when modernizing the garment sector.

1-7-3. Raw Materials

As raw material domestic cotton woven fabric is employed, but some imported blended polyester/cotton fabrics etc. are also used. The woven cotton fabrics are mostly thick fabrics of medium yarn count(plain and twill). Usually grey cloth is purchased and dyed on commission. It is not easy to secure a quality of woven fabric meeting the requirements of users inside Pakistan and so the processing to the required colour and quality for the desired small lots is difficult. More than half of the efforts of companies is absorbed in securing a supply of the cloth and this is a definite problem point.

Given the present use of domestic fabrics as raw material there is a limit on the varieties in terms of thickness, thinness, softness, hardness, yarn coarseness and fineness, weaving construction, etc. This limitation of materi-

als results in problems of uneven dyeing colour, colour development, printing pattern layout, etc. and so the development of commodities is limited.

Domestic thread is used as sewing thread but imported goods such as padding, buttons, fasteners find their way on to the domestic market. In any case the quality and diversity of items available is limited.

1-7-4. Technology, Factory Management and Utilities

The technical levels are only up to the minimum required for sewing and only involve joining pieces of cloth by sewing machine, so that the technology does not meet requirements for the manufacture of garment to fit the human body. The factory layout is poor and general efficiency low. Some factories have introduced and carry out computer-aided manufacture (Computer-Aided Design: CAD) but the technology involved is observed not to have been reached a level where this can be made full use of. Processing analysis and operating time analysis based on standard operating time are not carried out and so equipment layout and operating programmes are not based on such preparatory analysis and planning.

The arrangement in storage areas for raw materials is insufficient and supervision of raw materials and maintenance of their product quality is not given attention.

As with other sectors there are frequent power failures.

1-7-5. Quality Control and Standardization

(1) Product Quality

In all aspects the product quality is poor, and the finished product lacks attractiveness as a commodity. Output which is of an even and reliable quality of design and which meets international sewing standards is not yet produced.

The output is sold as low price commodity items in bulk sales outlets. Cheapness of price is given priority and as a result the product quality aimed at is poor and there is little incentive to improve product quality. Despite the above there is a defect rate of between 3 and 5%.

(2) Quality Control and Standardization

Simple visual inspections of the cloth which are obtained are carried out on receipt, simple checks are made between process stages, and defects of the products are corrected. Inspection of total output based on established inspection standards are carried out by inspection personnel after completed manufacture of final products. Defects identified at this time are marked and correction processing carried out. Defects are totaled using a sampling technique and data entered in computers in some companies but it does not seem that this

data serves to improve the quality of final products, and it is simply filed away.

1-7-6. Personnel

Designated operators are responsible for supervision of operations in lines with several personnel, but these are not able to provide basic technical guidance. In some sites in view of improving the quality of personnel, completion of secondary education was stipulated as a prerequisite for employment and recruited labour was trained in basic sewing operations.

1-7-7. Industrial Management

Design orientated business is not carried out. The industry carries out processing work in accordance with orders received from clients. Particular companies do no possess clearly defined products or items which are their special domain. Since labour regulations are strict for factories with personnel exceeding 100 operators, some parties remarked that it is difficult for the garment sector to realize a large scale of operations.

1-7-8. Final Products and Markets

The quality and specifications (design, etc.) of final products are made to meet the details regarding these in buyers' order forms. Commodities which can be produced in Pakistan with domestic yarn, fabric and dyeing-finishing are restricted to low price items. At present, buyers place orders for low price items which can be produced in Pakistan and a large number of items have an average price around 12 US$ per piece. Production is carried out in line with orders received from buyers, and special marketing does not take place.

With the exception of specifically traditional national costumes such as the shalwar, etc. there is almost no domestic demand for garments. Therefore the garment industry depends on export markets. The main targets for export are the USA and Europe, while barter trade with the former Soviet Union also represents a special market.

Chapter 2 Potentiality for and Constraints of the Development of Textile Industry

The genuine nurture of the textile industry in Pakistan dates from independence in 1947 so that the industry has over forty years of history to date. The industry has passed through a period of nationalisation of privately owned factories and of stagnation due to various restrictions placed on the expansion of textile mills in the 1970s, to realize active expansion and increased production in the latter 1980s with the reduction of duties, relaxation of restrictions, increased production of raw cotton, and expansion of exports. By sector, while the spinning and weaving sectors have experienced forty years of decline, the knitwear and garment industries expanded as export industries from around the 1980s. **Particular characteristics of Pakistan's textile industry in relation to the upstream and midstream sectors (spinning, weaving, dyeing-finishing) are a) Pakistan is one of the world's raw cotton producing nations, b) the industry has 40 years of history dating from Independence and c) the industry is one of the major export industries of the country.** Summing up the role of the industry it serves to satisfy the domestic demand for clothing items while also supplying raw materials (cotton yarn, fabric, etc.) to the textile industries of foreign nations (export targets). On the other hand **with regard to the down-stream sectors (knitwear and garment industries) it can be noted that, a) the main raw materials used are domestic cotton yarn and fabrics and b) domestic demand is next to non existent so that these industries are only growing as export industries.**

Against the background of the above characteristics the upstream and midstream sectors have potential for industrial development on the basis of their production of yarn and fabrics. Also the downstream sectors have potentiality as export dependent processing industries, but there are a number of factors impede such potential. Furthermore, **there are a number of constraints caused by the particular operation of market mechanisms existing between the upstream/midstream sectors and the downstream sectors which hinder the linkage between the two sectors and so impede a balanced development of the textile industry overall.**

2-1. General or Common Aspects relating to the Industry

2-1-1. Raw Cotton, its Volume of Production and Quality

There was a rapid increase in the volume of raw cotton produced, which is the main raw material for Pakistan's textile industry, as of the latter 1980s. At the same time improvements in the quality of raw cotton were achieved. Production reached a level of about 10 million bales (with 170 kg. per bale) in 1990, of which 75% was supplied to the domestic spinning industry. A programme for further expansion of raw cotton production is now underway and while the volume of production varies according to climatic conditions, etc., it is possible to assure the required volume as raw material supply to the domestic spinning industries through adjustments in the amount of raw cotton exported.

As to the quality and strain of raw cotton produced, 95% of current production has a fibre length above 1-1/32

inches and it is possible to manufacture 30-40 count class cotton yarn using this raw cotton as raw material. The improvement of raw cotton varieties is proceeding and there is potential to surpass the 30-40 count class in performance, but **domestic raw cotton has a large impurity content with a high level of foreign matters, trash and water content so that it is poor by international standards. These impurities reduce the beneficial effect of improvements in strain which are undertaken and this impairs not only the quality of the raw cotton itself but reduces the rating of yarn and fabric and is a cause of imperfect dyeing.** In mills producing yarn or fabric destined for specific users who have rigorous quality standards, it is necessary to employ a large number of personnel to pick out the trash and impurities from the raw cotton in order to meet the requirements of clients, but in fact these cannot be said to be entirely satisfied. In other mills and factories however there is no action taken to remedy the problems which this trash content creates in final products. This is a major defect preventing the production of final products with a high value added. **At present a project for the establishment of a standardized raw cotton ranking system is being furthered with assistance from the FAO (the Food and Agricultural Organization of the United Nations). However, there has been no action for drawing up concrete proposals as to a plan of improvement and at present correction of the trash content problem is not progressing.**

2-1-2. Raw Materials of the Downstream Sectors

The textile industry of Pakistan using domestic raw cotton as raw material for yarn and fabric which is dyed and destined to satisfy domestic demand has also developed exports of yarn and fabric (grey cloth and processed articles) on the above industrial basis. The main part of raw materials supplied to the knitwear and garment industries also depends on nationally produced yarn and fabric which use domestic raw cotton. Coarse and medium count yarns or coarse to medium count fabrics (generally of 10-30 count) are supplied. Since commodities which can be made from this restricted range of raw materials are also limited, overseas buyers order from Pakistan with such limitations in mind, and so mid to poor rank items destined for bulk sales outlets form the main orders. The coarse or middle count fabrics and grey yarn for knitwear currently supplied are definitely not up to the standards required as raw materials for the garment and knitwear industries and requests for quality improvement have been made by buyers. **Fabrics required for garments are mostly piece dyeing and bleached cloth (fluorescent dyed) and so are required to be of a higher quality than the printed fabrics currently mass produced to supply the home textiles market.** In order to upgrade the varieties of yarn and fabric sufficiently to supply these latter sorts of fabric, it is necessary to undertake a number of improvements in the production technology and production management involved, encompassing aspects of raw cotton, spinning, weaving and dyeing-finishing. At present **in order to supply the fabrics required for manufacture of the high value added garment items, it is essential to direct efforts towards quality improvement in the upstream and midstream sectors. Such improvements will require considerable time.**

There are a number of unknown elements requiring clarification before it can be decided whether there is potentiality for Pakistan yarn and fabric as raw materials for the downstream sector. In order to take full advantage of the merits of Pakistan's position as a raw cotton producer nation and to maximize the value added of downstream finished products, there are a large number of problems to be considered and overcome. **The**

major problem among these is the lack of action among the upstream and midstream sectors in response to the strong demands of the downstream sector for an upgrading of the upstream and midstream sectors. Without action on the feedback from the downstream sector, there can be no upgrading of this since it will be blocked by the inactivity of the upper levels. As long as there is no push in this direction the potentiality of the upper and midstream sectors will not be focused or realized.

2-1-3. Equipment and Capital

(1) Modernization of Facilities of the Upstream and Midstream Sectors

Renovation and new installation of spinning equipment has been continued since the latter 1980s and the capacity of facilities has seen a rapid increase and modernization advanced. There are still many mills which use old style equipment over 15 years old, but in general there is a strong desire to realize modernization equally on the part of existing mills through modernization and expansion of facilities and through new installations on the part of new entrants to the industry. It is therefore anticipated that an active expansion and renovation of facilities accompanied by modernization will continue thus increasing the production of woven yarn. As far as coarse and medium count yarn is concerned first class equipment even by international standards is installed and there are almost no hindrances in terms of equipment provision.

Compared to the spinning sector modernization of equipment in the weaving sector is belated and weaving capacity expansion is low. There are almost no specialist mills in weaving of the mill sector, and weaving units are by and large attached to spinning as part of integrated mills carrying out spinning, weaving and dyeing. Generally speaking the modernization of the spinning sector has been given priority so as to realize an expansion of yarn exports in conjunction with the increased output of raw cotton, and as yet no action has been taken in the weaving sector. However by substituting the shuttle looms with shuttleless looms (some 3 to 4 times capacity to shuttle loom) there has been a rapid increase in production capacity and an improvement in the quality of fabrics. As a result of these improvements a trend to effect the modernization of the weaving sector is growing, in addition to that of the spinning sector which was first undertaken to respond to the increased demand for exports.

The direct impetus for modernization of the spinning and weaving sectors has been the desire on the part of the Government of Pakistan to increase exports with a view to expanding foreign currency revenue. However, this stimulus has not had any impact on the domestic downstream industries. The capital needed for modernization has been met by active investment using private capital under the BMR scheme. Therefore **emphasis has been placed on the direct export of superior quality fabrics produced using the modernized equipment thus invested in, and the fabric has not been supplied to serve as raw materials for printed fabrics or garment material to take the form of indirect exports.**

In the dyeing-finishing sectors emphasis has been placed in modernization on installation of printing equipment largely of rotary screen printing type. In contrast **there is little attention given to piece dyeing facilities which**

are required for production of garment raw materials. For technical reasons it is not possible to produce a good quality of piece dyeing and this is partly due to the bias of export demand to the printed cloth.

There is still a large amount of superannuated equipment in the upstream and midstream sectors, and there are clear disparities in the stage of modernization and upgrading achieved between sectors, but the companies with large exports and especially with large direct exports show a rapid expansion. **The main problems are a) the insufficient maintenance system for the newly installed facilities and b) the lack of investment in equipment needed for supplying raw materials required by the domestic downstream sectors.**

(2) Equipment of the Downstream Sector

The output of the knitwear and garment industries is all manufactured for export, and as the equipment investment required is relatively small equipment installed for knitting, dyeing and sewing is comparatively new. The equipment is selected to match the variety of raw material used and to be appropriate for the production of the rank of final product aimed at. The choice of equipment is extremely realistic. **In future in order to realize an upgrading of final products, it will be necessary to introduce high gauge knitting machines, yarn dyeing equipment, mercerising machinery, special sewing machinery and fusing press equipment, etc. The expansion of equipment will need to be carried out in conjunction with upgrading of technology and the upgrading of markets. If equipment is upgraded then it will be necessary to improve levels of operating technology and maintenance technology.**

The overall strength of an industry including technology, marketing, financing and human resources and its managerial stance are important factors in determining the dynamic realization of expansion or modernizing renovation of downstream sector facilities as part of a strategy of upgrading export markets. In comparison with upstream sectors, many of the downstream sectors are on a small industrial scale, so it is necessary to select the better companies which have a vigorous managerial stance and develop these through financing under appropriate conditions.

2-1-4. Technology and Management

(1) Production Technology

Despite the fact that the spinning and weaving sectors already have forty years of history, the technical levels attained are not particularly high. When the textile industry was being set up equipment was introduced from Great Britain, Japan and other foreign countries, and engineers were invited to undertake supervision. However industrial policies fluctuated with changes in government and a continuous, coherent renovation and modernization of facilities and technology was not achieved. With the recent reforms in policies relating to equipment, modernization has made progress but technical levels have not improved in line with equipment. Despite textile technology is largely related to equipment aspects there are clear disparities in technical levels attained, and technical innovation supported by historical continuity and equipment advances is required. **At present in**

Pakistan spinning and weaving manufacture is carried out but there is a lack of coherent accumulation of basic technology and mass production is not possible. Further because of the insufficiency of maintenance technology the quality of product is uneven and generally low. Within the limits of domestic national demand and for low grade coarse to medium count export items there are few complaints since the quality level demanded by markets is not very high. However, if high grade products such as middle to fine count items are to be produced, a large number of problems will be encountered. The 60 and 80 count items for domestic consumption which are produced using imported raw cotton are not up to international standards as regards product quality.

Dyeing-finishing technology incorporates basic technology of dyes and dyeing, mass production technology for dyeing processing, and technology for evaluating processed items, but in present circumstances the level of this technology is low. Many factories have only learned the handling of the latest equipment and **since engineers acquainted with dyeing technology are scarce, the level of finished product quality is low and the full equipment capacity is not realized.** Moreover hue adjustment technology and evaluation technology is poor and few factories have sufficient facilities. It is necessary to acquire systematic expertise relating to the dyeing technology which has been acquired.

An important factor to the improvement of the quality of finished products is improvement of technology. To realize this it is essential to reinforce education in basic expertise and to train up personnel by experienced engineers. **What most needed in present circumstances is a constant urge to improve the technology and the product quality. Although there is a desire to improve on an individual level, there is only little move to evolve it into vigorous action on an industrial or company scale. Except for very few factories operation depend on technical exeprtise of a particular individual, instead of possessing technology in an enterprise level.**

(2) Production Management and Quality Control

The quality of textile products in Pakistan is by no means high. The following findings in the survey are considered as examples showing that potentials of raw cotton and production facilities are not fully realized. This seems to be resulted from low leveled production control and quality control in addition to insufficient production technology.

- Modernization of equipment has been in progress, however, quality of the finished products is not very high and characteristic of equipment is not fully employed.

- There is little production of fine count yarns and fabrics, so that the full potential of the raw cotton available is not realized (problem points relating to the raw cotton are mentioned in 2-1-1).

- The yield of the export grade products is low.

A. Problems in quality consciousness of managers and factory supervisors

The low level of complaints received from buyers towards spinning, weaving and dyeing-finishing generally tends to affirm current levels of product quality, so that the urge or desire to improve the quality of finished product or realize greater value added is weak. **In the garment and knitting sectors, almost all of the output is directed for export so that managers are aware of problems in product quality, but this awareness is not sufficient to result in any general reformation of quality consciousness in the textile industry including the upstream and midstream sectors. The upstream sector has been very influential and data concerning product quality received as feedback from the downstream sectors is not sufficiently reported back to the upstream and midstream sectors, so that data transmission is incomplete.** There are efforts to push for improvements in the factors impairing the quality of raw cotton but these have not been successful.

B. Insufficient understanding of the basic nature of quality control systems

Inspection of finished goods is carried out up to a point although the actual objectives and methods differ with each sector. In particular in the spinning sector a large number of mills are equipped with inspection devices. However in the weaving and dyeing-finishing sectors few factories are equipped with cloth inspecting machines and many factories content themselves with opening out fabric for visual inspection. Even if inspecting machine is available there are virtually no factories which collect data with an eye to processing management. Even in the knitwear and garment sectors where inspections of all output are made at time of dispatch and data on defects is collected, there is insufficient attempt to connect these activities to an amelioration of processing by feedback of the data. **Despite the fact that there are a large number of problems involved in processing, the defective section of output where defects occur is treated but insufficient action is taken on improving the defective or imperfect process which is the root cause of such defects.**

In order to improve management systems it is first of all necessary for managers to be aware of the need for improvements in product quality, since their awareness will act as the driving force behind the diffusion of such product quality control systems within the factory. Since factories are forced by clients to implement inspection of output, it is necessary to make more effort to connect the inspection results to action concerning production technology and production management. This would represent the first step towards an improvement of processing and evolution of product quality control system. It is necessary in this context to promote more awareness of quality control system among mid ranking managers and engineers and provide suitable training in the aspect of quality control. The low quality of product is not the responsibility of the operators but is due to the fact that they are left without guidelines on correct procedures. This situation hinders the full realization of the benefits of improvements or modernization which have been carried out. Equipment improvements and modernization will require time and money, but **continuing and accumulative efforts in processing improvement will results in deserving effects in the production.**

2-1-5. Personnel

(1) Management Staff

The factory managers in individual factories take overall responsibility for production output, but the owner managers have the say in determining industrial strategies relating to equipment investment, sales tactics, etc. Since the Study Team concentrated on visits to factories, there are some points of industrial strategy of individual companies which could not be fully filled in during the hearings. However, through a survey of the status quo of individual companies and through meetings with the representing industrial organizations, it was possible to get an idea of the managerial stance of companies.

It is possible to divide companies in the upstream and midstream sectors of spinning, weaving and dyeing (including integrated factories) roughly into two groups of companies adopting dynamic industrial strategies and those which aim to maintain their present level of activity. The former group undertakes active equipment investment with the aim of exporting product (mostly as direct export), directs efforts to opening up new markets and are seen as successful in the above efforts at present. The efforts of this group would cause the activation of the textile industry to date. On the other hand, the industrial strategies of such companies are seen to be focused on an expansion of exports of in-house products rather than on supply of raw materials to the downstream sectors. Managers of such companies take a keen interest in news concerning foreign markets and equipment developments. It is expected that the coming generation of leaders in the Pakistan textile industry will emerge from this group.

Managers in the latter group are unenthusiastic about equipment investment or market expansion, are not active in effecting improvements and adopt a stance of maintaining the status quo, since factory achievements are not very good. They seem to be caught in a vicious circle of cause and effect. If things remain unchanged they are doomed to redundancy. It is necessary to break out of the smothering confines of traditional practise and adopt more dynamic objectives however painful such a transition may initially prove. Without planning for improvements in product quality and renovation of equipment, reinvigoration of the companies will be near impossible. The largest question remains whether the managers concerned are up to the tasks required.

Given the proceeding expansion of volume resulting from the dynamic strategies of the former group noted above, it would seem that the most appropriate approach for the time being is to upgrade industrial technology and managerial expertise. The expansion of direct exports will necessarily result in greater diversification of product and lead on to demand for supply of a better quality of raw material to domestic downstream industries. **In view of such a projected development it is necessary to proceed with present strategies and it is desirable that the government proceed with policies aligned to such an evolution. The reinvigoration of the latter group of industries is also necessary from a national viewpoint but it is best to avoid taking protectionist policies, and it is necessary to promote and support the desire to effect improvements whether for the export market or to expand domestic demand.**

As the downstream sectors such as the knitwear and garment industries are export orientated and tend to be on a smaller scale compared to the upstream and midstream industries managers are aware that the reputation of in-house products is not very high internationally. The managerial stance adopted is relatively dynamic but there are a number of problems which are beyond the power of one company to solve such as difficulties encountered with supply of grey yarn and fabrics, market development, technology and design. Therefore at present companies focus efforts on sub-contracting production for American or European industries. In order to move up from the present final product for low price markets to areas of higher value added it is not enough to perfect production technology for commissioned and sub-contractual production or deliver goods to buyers. Over and above these activities it is necessary to keep in touch with world trends in garment items, grasp the present state of manufacturing in Pakistan and plan the direction for future development. Currently a large number of industrialising nations are competing with Pakistan to serve as a base for commissioned production destined for the advanced Western nations. It will not be possible to indefinitely retain an advantage over competitors simply on the basis of plentiful, cheap labour. **It is therefore necessary to nurture comprehensive competence with regard to raw materials, management, technology and commodities.** Managers of the downstream sectors show a keen interest in foreign markets, and **it is desirable that the future generation of industrial leaders emerge from those managers who have fixed on business trends of a medium range nature rather than just a short range and who see the need for a cumulative strengthening of the industry.**

(2) Middle Ranking Managers and Engineers

Middle ranking managers and engineers responsible for factory production are in great shortage as a result of the rapid expansion and innovation experienced in all sectors of the textile industry. There is no data available to show exactly what number is needed but the demand for graduates from textile related training institutes is very high and all graduates find employment in the industry. However, it is necessary to gain experience in the factory on designing process, supervising operators and general management in production. In a number of factories managers with such experience are trained, but **the general managerial competence of mid rank managers and the technical expertise of engineers at present is low and there is a shortage in absolute terms. In order to promote Pakistan's textile industry it is necessary to break with the present ethos of status quo maintenance and activate the industry, but this will require the appropriate placing of managers and engineers with experience and innovative spirit.**

Since the training of personnel in the basics of textiles has been carried out over a long period, there are personnel resources with considerable potential. **The retraining of middle ranking managers to be the driving force for factory improvement is therefore necessary. At the same time in order to ensure sustained development hereafter it is important to develop systems for the programmed training both inside and outside the industry of engineers recruited in the textile sector.**

(3) Operating Personnel

The textile industry encompasses many areas which are labour intensive by nature. Moreover skilled compe-

tence is required for operations in the textile industry. There are a comparatively large number of simple operations for which the specified level of competence can be acquired with systematic training. Of course in sectors such as dyeing-finishing, practical training alone is insufficient and it is necessary to possess basic expertise and experience, while experience is also needed for the maintenance of machinery and equipment involved in each section. To become a work foreman knowledge and study is required in addition to experience.

The textile industry is a key industry which has already developed a modern industrial structure in Pakistan. In modern industry it is essential that operators be trained to work as members of an operating team. Literacy and ability to do simple calculations are a minimum requirement in industrial society and it is assumed that such competence has been transmitted during compulsory education. The formation of large numbers of personnel equipped to work in such an industrial society is seen as a basic task for the Government of Pakistan. The Government is focusing efforts on the diffusion of compulsory education and it is judged that there is sufficient potential to meet the personnel requirements of the textile industry. Each company needs to recruit personnel who have at least completed compulsory education and efforts must be directed to nurturing skilled operators through training as part of industrial strategy, so that companies need to be capable of carring out such training. While there are exceptional cases of factories which thoroughly train operators, generally training in factories is insufficient. The various problems arising because of insufficient expertise of operators are simply ignored and left unattended to. **The training of operators is one of the essential tasks of mid ranking managers, and when the skill levels of operators is low this is the fault of mid ranking managers and not always of the operators themselves.**

Of course the role of training institutes independent to the industry is not to be denied, but this should only form part of a company's overall programme for personnel training. Moreover, at present there is a wide disparity in the operating approaches and details with piece rate methods, fixed wage methods and lump sum contract methods being variously applied. It is not possible to select one method as the best in all cases since working conditions and personnel differ. However, whatever the approach adopted **it is important that the directives of managers be transmitted and be understood by operators, that objectives be clearly presented to operators and that managers ensure that problems in factories are clearly identified.**

2-1-6. Markets

(1) Domestic Markets

Pakistan supplies the clothing needs of the nation in general. While some blended synthetic or chemical fibres and raw cotton for fine count yarn is imported the volume involved is negligible, and the major part of raw cotton, and polyester fibre for blended yarns is of domestic production.

The domestic market for fabrics is for sale by cut length. There are large sections of the population in the large cities of Karachi, Islamabad and Lahore who wear western style clothing, but the traditional national costume of the shalwar is generally preferred. In particular women, even in the large cities, seem to wear only tradition-

al national costume. Consumers purchase fabric in markets and have these sewn into national costume at urban tailors. In the large cities there are shops which sell ready-made garments such as shirts, trousers, children's wear and national costume but this is limited to a section of the city population and it is unlikely that such a system will be rapidly diffused throughout the country. The major fabric on domestic markets is of a 20-30 count while there are also very small volumes of blended fabrics, fine count printed fabrics for women, and polyester filament fabrics on sale. In cities there is a large variety of materials, hues and designs of fabric on sale. Hereafter if the national income increases it is expected that there will be an increasing diversification of grey fabrics, colours and patterns of fabrics sold domestically, but since the shalwar is suited to the climate, terrain and customs of Pakistan it is anticipated that the garment and knitwear sectors will continue to represent only a small volume of trade in domestic demand.

The fact that there are almost no domestic markets for knitwear and garments is a disadvantage for the downstream sectors of these and acts to hinder their development. There are limits to the development possible for commodities which are 100% export orientated and for which no domestic demand exists. It is necessary to nurture a healthy internal demand in some way. It is neither possible nor desirable to force unnecessary changes in the national clothing habits. However there are clothing items for which the shalwar is not the most appropriate choice as in the case of police uniforms, army clothing or factory overalls. In particular as modernization picks up momentum hereafter it will be necessary to consider productivity, operational safety and efficiency in the factory as well as the comfort which comes with habitual use. **In this sense it is advisable to undertake the diffusion of ready made garment articles. Even if there are difficulties to the realization of assistance to the costs of such overalls and their supply, sooner or later the innovation will be necessary. Moreover since this change will contribute to the development of the textile industry itself, it should be given serious consideration.**

(2) Export Markets and Marketing

Textile products are exported at every stage. As already stated in Chapter 1, there is a tendency for the export articles of the upstream and midstream sectors to be confined to particular items as follows.

- spun yarn : coarse to medium count (inferior grade)
- fabric : grey cloth, printed cloth (for home textiles)

The reason for the concentration on such items is partly due to the limits imposed by the raw cotton (the nature of the raw cotton itself partly has the potentiality for finer count yarn), but is also due to the choice of finished products in line with the actual capability of Pakistan industry at present which favours production of low price, inferior grade products. Since yarn and grey cloth are raw materials it is necessary to match output to the required quality levels of the export destination so that problems do not arise with the buyer. Further, the printed fabrics are mainly used for articles such as bedding and household items where quality defects are not so critical. Manufacturers of printed fabrics keep in contact with buyers at the export destination or open up their own sales outlets but in the case of manufacturers selling raw materials such as yarn and grey cloth sales

are done through exporters or overseas trading companies. In either case Pakistan products are employed in uses which match with their quality and nature, and it would seem that few complaints arise as a result of this understanding. Although the output is suited to its applications it is anticipated that Pakistan will face increasing competition on such a basis in the future and that demand will be limited. It is necessary to take measures so that the export of finer count yarn and bleached cloth which have higher value added is possible in the medium range. To that end it will be necessary to investigate the market conditions of the export targets and once the market requirements and rating of Pakistan goods is grasped, quality standards should be set as targets for the improvement of product quality and efforts be directed to opening up new markets.

One characteristic of the downstream sectors is fact that nearly 100% of output is exported. With the exception of those companies whose output goes to the former Soviet Union countries on a barter negotiation basis (special long term trading relations), the major part of export is to the USA and Europe, and commodities are largely limited to the following low price items.

-Knitwear sector: low price items mostly for sports use (using coarse to medium count yarn)
-Garment sector : low price items mostly for casual and sports wear use (using coarse to medium count fabric)

Another particularity of the Pakistan knitwear and garment industries is the fact that Pakistan is one of the world's cotton producer nations. This gives the country an extremely favourable position for the export of cotton yarn and cotton fabrics. However, with regard to the downstream industries the raw materials of yarn and fabric are not necessarily obtained cheaply and the quality and range of materials available is limited. Many of the nations which have developed garment industries and export industries have not necessarily begun with the production of raw materials. It is possible to develop processing industries using imported raw materials instead of domestically produced ones, and in such cases the country concerned has been able to achieve domestic supply and increase this by bringing the production of raw materials into line with the development of the processing industries. **In Pakistan's case overseas buyers keeping in mind the limitations of Pakistan's raw materials and technology, order commodities which they know can be produced in Pakistan. In order to fulfill the buyer's orders Pakistan's garment industry purchase grey fabrics and commissions their dyeing, so that considerable difficulties are encountered in arranging for procuring and dyeing of grey fabrics suited for garment manufacture.**

Downstream industries in Pakistan are 100% export orientated but in fact many are subcontract companies receiving orders from the USA and Europe. Tables III-2-1 and III-2-2 show the rating and producer potentiality for processing items of the garment industries in the NIEs and ASEAN countries and areas. Pakistan has only just reached the level of the ASEAN countries and basic production activities of planning and management are not carried out. **Even if organized on a production to order basis, market information is a vital aspect to a garment industry and the present level of understanding of foreign markets in Pakistan is insufficient. Although difficult at present, in order to make it possible to sustain sophisticated in-house design capacity the following marketing system needs to be built up.**

- Collection of data concerning the characteristics, distribution system and sales outlets in the export target country
- Establishment of production and shipment systems for in-house products
- Establishment of product development systems based on data on overseas markets
- Systems for the collection and analysis of information concerning design and young lifestyles in the world's major fashion cities.

For the time being while continuing to carry out sub-contractual production it is advisable to keep abreast of developments in the fashion cities (Paris, Milan, New York, Tokyo) of export target countries worldwide, give close attention to grasping the distribution and sales situation abroad, and keep in touch with the latest design developments so as not to fall behind competitor nations and stay at the forefront in this field.

2-2. Particular Aspects of Specific Sectors

2-2-1. Independent Wearing (Nonmill) Sector

In the textile industries of Pakistan the production and supply of spun yarn is carried out by spinning mills which constitute a mill sector, but in the next stage for production of fabric from yarn the role of the nonmill sector (or power loom sector) is bigger than that of the mill sector.

The power loom sector accounts for 90% of fabric production, and this sector is not only important for the role it plays in national life through the supplying of fabrics for clothing items, but also because of its indirect and direct contribution to exports in the form of a considerable volume of towel, canvas and other fabric products as well as through raw materials for printed fabric production. Despite the fact that this sector consists of a conglomeration of small and petty scale companies the fact that large numbers of operators are equipment owners means that there are a large number of dedicated, diligent workers. Finally the fact that great number of people are directly or indirectly involved in this sector means that its importance in providing employment can not be ignored.

The power loom sector has maintained and developed on a small and petty scale of management under the protective policies of the government. This sector embraces a wide variety in terms of scale, facilities, products, product quality, etc. and it is not necessarily inferior to the mill sector in all cases. However, in anticipation of an upgrading of quality demands among domestic consumers, increase of export, and eventual relaxation of restrictions on imported fabrics, it is not likely that it will be possible to indefinitely pursue protectionist policies, however unavoidable these may be at present. Therefore it is necessary to focus efforts on achieving a greater international competitiveness. Recognition of the need for modernization and enthusiasm for this was remarked within the industry itself. Some entrepreneurs were engaged in installing second hand shuttleless looms and were devoting attention to renovation of equipment. However the working environments are gener-

ally poor and there are limits on modernization as things stand. In comparison with the mill sector working environments are generally poor, there is less capital funding potential for expensive equipment investments and the technical expertise does not meet with the needs of high level technology.

Left to this sector generally as it stands now, the weaving industry has only limited potential for development and a balanced development of the textile industry will be difficult. It is necessary to seek coordination of development between the mill sector and nonmill sector rather than have these fight against each other, and future development simultaneously in the following two directions is desirable.

- **gradually remove excessively protectionist policies to allow for the natural decline of ill adapted and inferior companies**

- **undertake promotion as far as possible of greater concentration and group consolidation with companies equipped with potential undertaking to assist groups in equipment investment, grouping investment and technical guidance.**

2-2-2. Dyeing-Finishing Technology

At present the main part of production is for printed items (bedding and household articles) for export. Some piece dyeing is carried out for use in domestic clothing articles (to be sold by cut fabric) but the lengths and hues are not regular, inspections are limited to visual inspection at the time of dispatch and stable production of grey fabrics for garment use is not possible. Although a clear opinion was not stated by any factory, it would seem that factories hesitate from producing grey fabrics for garment use since the lots involved are small, there is no suitable superior grey cloth of medium to fine count, and due to the unevenness of hue in piece dyeing lots and other troubles encountered.

One factor which hinders the development of the garment industry is the difficulty of obtaining raw fabrics for use in producing superior garments. There are problems caused by the unevenness of yarn and defects of fabric, but another problem is that well dyed fabrics are not obtainable, so that garment manufacturers have considerable difficulty in securing good quality cloth which has been well dyed. **Piece dyeing is the basic type of raw fabrics which is required by the garment manufacturers, and since these are used in coordination with items yarn-dyed and printed items to prevailing fashions. Length control, hue control and inspection technology are crucial elements of dyeing-finishing processes for piece dyeing items to be used for garment manufacture.**

Dyeing chemistry forms the basis of dyeing technology, and engineers concerned in this field need to have knowledge and expertise of the various types of dye and dyeing method which are suited to each raw fabrics and application. At the very least a basic knowledge and competence in dyes used for piece dyeing and printing for cotton and polyester is essential, but this technology can not be acquired through experience in the factory alone. It is necessary to have comprehensive and systematic education and practical training in these

areas, and it is also necessary to have practical training and practise in testing methods used in the actual handling of processed items.

It is necessary to acquire the operational and maintenance technology for each piece of dyeing equipment actually operated and used in processing in the factory. In particular, there sometimes arise disparities between the hue of different batches undergoing piece dyeing. Unless colour adjustment technology is mastered such troubles in production will continue. Colour adjustment technology is a vital area in dyeing units which involves management of a wide variety of colour hues, storage of shop floor data, etc. The recent introduction of computer technology has effected a speeding up of colour adjustment and the reduction of delivery periods, but the importance of this technology continues to increase. Besides the above the facilities, setting of conditions and maintenance for scouring, bleaching, mercerising, sanforizing, resin processing tend to be overlooked since such factors are not given emphasis in present printed products and items to meet the domestic demand. However, defects in the above result in unevenness and irregularity of printing along the width or length of fabrics and these defects make it difficult to use the output as raw cloth for garment use. It is necessary to promote a further accumulation of expertise in such production technology and production control through training to be carried out by the equipment manufacturers or dyeing industries.

In order to increase the value added realized in the textile industry from the upper and midstream sectors right down to the downstream sectors and to further balanced development of the industry as a whole the upgrading of dyeing technology is an important task. **It is necessary to proceed with the rapid training of engineers possessing knowledge, expertise and experience in dyeing technology and break away from the current satisfaction with easy dyeing technology which places too much stress on printed cloth alone.**

2-2-3. Garment Manufacturing Technology

The garment industry concerned with manufacture of consumer goods encompasses planning, production and sales activities. In contrast with the upstream and midstream sectors, requirements of the final product constantly vary by region, by year and by season. At present Pakistan receives orders and does sub-contractual manufacturing for overseas buyers who carry out designing and sales. Business managers of the manufacturers visit the export destinations and study the overseas situation but the engineers who supervise and are involved in production have little opportunity to travel abroad and are not sufficiently aware of the rating of their company's output at the export points or the selling situation there. Since buyers obviously take care only to order goods of a level which they know can be met in Pakistan there are few complaints, but in order to realize the production of garments with a high value added a number of difficulties will need to be overcome.

For the time being it is best to set the main objective on fully realizing the technology involved in sub-contractual production. There are already factories where instruction in sewing machine technology is given to newly recruited personnel. It is necessary that engineers acquire production technology for a modern garment industry. The foundation for this is the effort of each individual company to acquire the technology basic to the garment industry, however **it is also desirable that the whole industry work together to implement measures**

which exceed the scope of individual enterprises, such as to plan and set up a training institute. This training institute will not only be responsible for giving technical training in each of the processes and steps of garment manufacture but will also provide an occasion to learn about the underlying thinking behind the arrangement of operations to understand why such processes and steps are necessary. This approach will also be necessary to the development of the garment industry.

It will be necessary to provide opportunities to study the structure of the garment industry and trends in the garment industry abroad in conjunction with the evolution of the garment industry in the future. In the medium range the modernizing impact of a stimulation of domestic demand for garments will also be important.

It will be desirable to devote energies to realising the following three objectives. While waiting for the garment design business to take root and flourish then a certain capacity for planning stage activities such as development of original designs and marketing strategies will be achieved;

- **Establishment of production technology in the garment factories**
- **Identification of trends in the export destinations and in overseas developments**
- **Promotion of domestic demand for garments**

PART IV PUBLIC INSTITUTIONS FOR SUPPORTING TEXTILE INDUSTRY

PART IV PUBLIC INSTITUTIONS FOR SUPPORTING TEXTILE INDUSTRY

Chapter 1 Organization and Activities of Research Institutions

1-1. Outline

An overall view of the research institutes in Pakistan for the textile industry reveals that the institutes administered by the Ministry of Food, Agriculture and Co-operatives and concerned with technical development in areas ranging from cotton plant cultivation to quality control of raw cotton proceed with their work both steadily and actively. However, **the research and development activities administered by the Ministry of Industries are not always carried out with the same thoroughness. This is partly a result of the fact that the technology relating to production processing, product research and development in sectors from spinning to weaving is still in the stage of technology transfer from the developed industrial nations.** In contrast to this the development of primary products such as cotton variety improvements in Pakistan involves a large number of regional factors so that Pakistan has been forced to develop its own autonomous research and development capacity for many of the themes in this area.
Common problems to the research institutes in both sectors mentioned above is the shortage of equipment and the drain of recruited personnel both due to insufficient governmental budgeting.

1-2. Research Institutes for Raw Cotton Production and Supply

Stages from cotton cultivation to ginning mill operations fall under the scope of the Ministry of Food, Agriculture and Co-operatives and research and development institutes of these stages are attached to the Ministry. The following two Research Institutes are representative of those working in this field.

- Pakistan Central Cotton Committee
- Pakistan Cotton Standards Institute

1-2-1. Pakistan Central Cotton Committee (PCCC)

The PCCC was established in 1953 as part of the Colombo Plan and expansion was carried out in 1958 with assistance from United Kingdom.

The PCCC is a large organization with about 400 staff, reflecting its long history among Pakistan's governmental institutes. There are 250 staff involved in the agricultural sector including a 50-60 member strong staff of biologists and top level researchers. The PCCC carries out a number of activities as can be seen from the

separate attachment outlining these, but its achievements in the quality improvement of raw cotton deserve special note. Traditionally Pakistani cotton was of a short fibre variety with a fibre length under 25 mm, and this put limits on the scope of its application in comparison with varieties of the USA or Egypt and kept the rating and trading price lower. However, Pakistan has recently been successful in the introduction of American Medium varieties and the fibre length of Pakistan cotton has been improved to the following ratios.

over 27 mm	: 15%
27-29 mm	: 80%
under 29 mm	: 5%

The cotton fibres over 29 mm are used for blending with polyester. Further, the 27-29 mm band which forms the major part of output can be used as 40 count carded yarn and 60 count combed yarn, so that the above changes have also contributed to quality improvement of Pakistani cotton which was traditionally used for a 20 count yarn (although this is actually still the usual rating). Other details of the PCCC have been noted below.

PAKISTAN CENTRAL COTTON COMMITTEE

Location : Karachi
Year of Foundation : 1953 (with creation of Colombo Plan)
Affiliation : Ministry of Food, Agriculture and Co-operatives
Staff numbers : About 400

Organization : (1) Agricultural Dept. : with 200-250 staff (of which 25% are scientists including biologists)

(2) Technical Dept. : with 120 staff (of which 30% are engineers.)

(3) Economic Dept. : with 35 staff (of which 35% are market research staff)

Activities : (1) Research and development of new varieties of raw cotton

(2) Provision of information on yarn counts possible with the new raw cotton varieties

(3) Quality control of raw cotton, guidance covering all stages from the cultivation to final product

(4) Training guidance (overseas trainees also received)

(5) Market research (demand trends, price trends)

Facilities : (1) Complete facilities to cover processes from blowing to spinning, although somewhat out of date.

(2) Complete testing laboratory facilities, but the raw cotton testing devices are older compared to those of the Pakistan Cotton Standards Institute. Also this testing equipment duplicates that of the TIRDC. There is no equipment relating to dyeing and finishing.

Other details : (1) As a result of improvements, fibre lengths of cotton have been increased from the traditional 25 mm and 80% of fibres are now between 27 and 29 mm.

(2) In order to increase the raw cotton harvest the area under cultivation has been increase and research directed to increase the area yield.

(3) As in other public institutes there is a constant drain of capable staff to the private sector with the exception of scientists.

(4) The institute is run using fees from individual factories and Government funding (for the payroll).

(5) Despite the fact that equipment is old, there is no renovation plan.

(6) The TIRDC and PCSI are located on the same premises.

(7) The Committee receives support from the FAO and UNDP. Specialists from the FAO are stationed here and carry out guidance.

(8) The Pakistan Cotton Standards Institute was made independent from the PCCC with the supports of FAO, UNDP and the ADB.

1-2-2. Pakistan Cotton Standards Institute (PCSI)

The Pakistan Cotton Standards Institute (PCSI) was established in 1983 inside the PCCC with the support of the Cotton Export Corporation of Pakistan (Private) Ltd. (CEC) as an FAO/UNDP Project (PAK/80/024-Cotton Grading and Classing). In 1987 gaining the support of the ADB the PCSI began its independent activities.

The main activities of the PCSI are outlined below, but its main function is the standardization of raw cotton. Since establishment the institute has hosted FAO specialists and has achieved excellent results in the field of standardization. The main activities involved are;

- Establishment of standard grading classifications for raw cotton
- Fixing of a price system for different grades of raw cotton
- Nurture of raw cotton classers and model factories
- Public relation activities to make known the improved quality of Pakistan cotton on world markets
- Advice to the Government on legal provisions to be made relating to standardization

The institute campaigns nationwide for standardization and through its model factory campaign (with a target of 110 factories) hopes to upgrade the industry and achieve a reevaluation of Pakistan cotton on the world market, and return the additional benefit thus accruing to the cotton growers and agricultural workers to provide incentives for further progress.

PAKISTAN COTTON STANDARDS INSTITUTE

Location : Karachi
Year of Foundation : 1987
Affiliation : Ministry of Food, Agriculture and Co-operatives
Staff numbers : 5 (not including workers)

Organization : Main departments; standardization of raw cotton, raw cotton inspection, educational training, arbitration, technology transfer, etc.

Activities : (1) Standardization of raw cotton :
fixing of prices for different grades, production of sample boxes, introduction of Pakistan cotton on world markets

(2) Textile inspection facilities :
for physical inspection of domestic cotton, classing room for grading raw cotton

(3) Educational training:
handling of raw cotton, training of personnel skilled in grading and classing.

(4) Arbitration :
arbitration on disputes concerning grades of seed cotton or lint cotton, etc.

(5) Technology transfer (TTU):

holding of seminars, support for technology diffusion activities, provision of technology information, etc.

(6) Fixing of new price standards

(7) Introduction of quality control system

(8) Advice to the government

Facilities : (1) Possesses the newest equipment for raw cotton inspection bought with assistance from the FAO

(2) Complete provision of lighting equipment for the classing room fully equipped for making up sample boxes

(3) New laboratory installation in planning (with assistance from the FAO and UNDP and with loan assistance from the ADB)

Other details : (1) Since founding the institute has trained up 187 classers and is scheduled to train between 20 and 40 new classers annually.

(2) Of the 1000 ginning mills operating nationwide the institute now operates 70 as model factories and intends to establish 110 as an immediate target.

(3) The FAO specialists are enthusiastic in their guidance and their continued efforts show positive results.

(4) The running costs of the institute are met by the Ministry of Food, Agriculture and Co-operatives.

1-3. Research Institutes for Processing from Spinning to Sewing

The areas of the textile industry concerned with spinning and subsequent processing fall under the scope of the Ministry of Industries's authority. The Government controlled institutes for research and development relating to this processing are listed below. However, a number of the educational and training institutes already explained in Chapter 2 of this PART IV also carry out research and development activities while on the other hand the research institutes listed below also have educational and training aspects.

a. Textile Industry Research and Development Centre

b. Pakistan Standards Institution
c. Central Testing Laboratories

1-3-1. Textile Industry Research and Development Centre (TIRDC)

The TIRDC is an institute for the testing, research and development of textile products which was founded in 1973 in Karachi with the cooperation of UNDP and UNIDO. It was transferred to the control of the Ministry of Industries in 1980. In addition to education and training (giving both regular training courses and training on site) its main functions are as follows:

a. Diffusion of technology and knowledge
b. Research and development of new finished products
c. Provision of market information

It consists of the following five departments

a. Spinning
b. Weaving
c. Dyeing-finishing
d. Marketing
e. Quality control

It is equipped with one set of each testing device relating to testing of spinning, weaving, and dyeing-finishing processing. Major part of the equipment is out of date and superannuated. Further, it lacks some pieces of training equipment and so the facilities of the neighboring PCCC are rented to meet these needs. One reason why training is carried out directly in factory sites is the lack of institute equipment. Moreover, **the shortage of staff in the institute is a serious problem. At present, there are only 17 teaching staff against the planned staff number of 35 teachers, and it is considered difficult to sufficiently maintain and carry out functions of the various departments of the institute in this context.**

The Centre plans to acquire a new site somewhere in Karachi City and construct new buildings, but unless there are radical improvements in the above situation and an activation of the Centre's overall activities these plans will only mean of a change of premises and will not constitute a basis for any great development of the Centre's activities in the future.

Possible improvements are as follows:

a. Reinforcement of equipment and facilities
   - renovation of existing testing devices
   - reinforcement of training equipment

b. Activation of the information services department
   - in particular strengthening of the market research activities

c. Strengthening of training and education department
   - reinforcement of facilities
   - recruit and nurture of trainers

d. Improvements in staff conditions
   - introduction of an overseas study programme
   - improvements in pay (bringing these on a par with salaries in the private sector)

e. Strengthening of relations with the textile industry
   - provision of information services
   - technical guidance (including that given by foreign specialists)
   - research on commission

The Centre has a foundation which is sufficient to enable it to become the supporting institute with the widest range of functions and much is to be expected from a reinforcement and activation of its role.

TEXTILE INDUSTRY RESEARCH AND DEVELOPMENT CENTRE

Location : Karachi

Year of Foundation : 1973 (transferred from UNIDO to come under the control of the Ministry of Industries in 1980).

Affiliation : Ministry of Industries

Staff numbers : 17 at present (planned to have a full regular staff of 35)

Organization : Executive Committee
- Chairman : Permanent Undersecretary of the Ministry of Industries

Research and Development Committee
- Chairman : Textile Commissioner

Activities : (1) Departments a) spinning, b) weaving, c) dyeing-finishing, d) marketing, e) product quality control.

(2) Activities : education, training and research work
- regular training course of TIRDC intended for middle ranking managers (5-14 students/course)
- on site training : training of operators and supervisors (72 days course)

- diffusion of technical and machinery expertise
- research and development of new products
- information services for market research

Equipment : (1) One set of each type of testing device relating to spinning, weaving and dyeing-finishing

(2) A small library

Other details : (1) The Centre makes paid use of facilities of the neighboring PCCC (under control of the Ministry of Agriculture).

(2) There is a plan for construction of new buildings and a site of 15,000 sq. m. is being prepared in Karachi the City.

(3) The textbooks and equipment is out of date and research, development and training inappropriate.

(4) Many members of staff leave the Centre for private industry and it is extremely difficult to keep on staff.

1-3-2. Pakistan Standards Institution (PSI)

PSI is under the control of the Ministry of Industries and performs the following functions.

a. Establishment of standards
b. Promotion of standard observance
c. Metrology
d. Diffusion of standards

There are 403 standards (of which 150 are for products) relating to textiles in Pakistan but these are not compulsory for the industry. However, in order to assure an appropriate rating of the textile goods of Pakistan on the international market and to aim at a comprehensive upgrading of prices in line with efforts to improve product quality, it is desirable to set up compulsory standards which can be met in cooperation with industrial groups. In particular, since the PCSI is in the process of establishing standards of raw cotton, it is advisable to undertake the systematisation of added value for all stages down to the final products of the downstream sector in order to assure the maximum national benefit.

The following is an outline of the main details of the Institution.

PAKISTAN STANDARDS INSTITUTION

Location : Karachi
Year of Foundation : 1951
Affiliation : Ministry of Industries
Staff : 152

Organization : Consist of 9 divisions including textile division
Head quarter : Karachi
Branch : Karachi, Lahore

Recruitment : University graduates or candidates with experience

Activities : (1) Setting of standards

(2) Promotion of observance of standards (issue of a mark of approval)

(3) Metrology

(4) Diffusion of standards

(5) Inspection of imported/exported goods

Other Details : (1) There are 403 textile related standards (of which 150 concern products) which are drawn up with reference to ISO, IEL, BSI, OMI standards etc. though usually slightly less rigorous.

(2) In the near future the Institution will merge with the Central Testing Laboratories to form the Pakistan Standards and Quality Control Authority. The main functions of this will be:
a. Standards formation.
b. Training
c. Testing
d. Information Services.
e. Metrology

(3) There is at present no institute which undertakes education or training of quality control in Pakistan including universities. In future, this Institution intends to carry out guidance concerning the methods of statistical quality control.

1-3-3. Central Testing Laboratories (CTL)

This is attached to the Ministry of Industries and its main duties are the testing and inspection of industrial products. A wide range of sectors is handled including organic and inorganic chemistry, machinery, electric devices, electronics, etc. and textile products forms one area concerned.
There are four staff members in the textile department and these perform the following activities.

a. physical and chemical testing
b. classing of textile products
c. approval of dye standards
d. inspection of natural fibres

As a result of the similarity of tasks of the Central Testing Laboratories with those of the Pakistan Standards Institution it has been decided to merge these two institutes to be renamed the Pakistan Standards and Quality Control Authority. Functions after merger will be as follows.

a. Standard formation
b. Training
c. Testing
d. Information services
e. Meteorology

Finally, the Laboratory carries out a large amount of commissioned testing for the private sector (in particular for small and medium size companies) for a small fee, but the equipment which the Laboratories possesses is out of date.

The following is an outline of the main details of the Laboratories.

CENTRAL TESTING LABORATORIES

Location : Karachi
Year of Foundation : 1956
Affiliation : Ministry of Industries
Staff : 110 (Karachi), 45 (Lahore)

Organization : Laboratory for testing of industrial products with the following divisions:

(1) Chemical Division : inorganic chemical items, organic chemical items, measuring devices.

(2) Physical Division : machinery, electronic devices, electrical machinery, work shop items, construction materials, textiles.

(3) Textile Division : with a staff of four personnel
   a. Physical and Chemical Testing
   b. Grading of Textile Goods
   c. Identification of Dye Standards
   d. Natural Fibres

(4) Regional offices in Lahore (with another planned for Peshawar)

Recruitment : By newspaper advertisement

Activities : Specializes in inspection and measurement work commissioned by the government and private sector, tests and inspections being carried out for a very small fee.
The laboratory handles between 410 and 610 cases per year with a very large number of textile tests.
Most of the clients from private sector are middle and small size companies which do not have their own in-house testing equipment.

Facilities : Uster single yarn strength tester and yarn evenness tester, Lea strength testing device, twist testing devices ; with the exception of a few pieces of equipment almost all is out of date.

Other Details : (1) Use of TIRDC equipment is made (rarely)

(2) As a result of increased investment in the Faisalabad area work at the Lahore office is increasing

(3) Advice to effect equipment renovation was received from a Japanese mission team some year and a half ago.

Chapter 2 Organization and Activities of Training Institutions

2-1. General Education System and Number of Schools

The educational system in Pakistan consists of three main stages with five years of primary education, five years of secondary education (junior high school and senior high school) and two to six years of higher education (intermediate college, technical school, two year colleges and four year universities). The five years of primary schooling is followed by three years of junior high school, after which two years of senior high school follows and then a further two years of intermediate college after which the various specialist educational programmes begin. After the first eight years of schooling the first phase of specialist training for three years takes the form of vocational training. Students who have finished 10 years of study are accepted in the technical colleges which award diplomas to candidates after three years of study in the college. Entrance qualifications for colleges awarding academic qualifications and universities awarding degrees are completion of 10 years of schooling followed by two years of study at an intermediate college. College study requires two years and university study requires four years. School attendance figures are 45.3% for primary school, 22.8% for junior high school, 19.5% for senior high school, 6.7% for intermediate college, 5.6% for two year colleges and universities and 1% for other educational establishments. Further the following table indicates the numbers of educational institutions under the control of the Ministry of Education, together with the number of students and teaching staff.

	No.of Schools (girls' schools in brackets)	No.of Students (1,000) (girls in brackets)	No.of Teachers (girls schools in brackets)	Student-teacher ratio
Primary School	90,942 (27,319)	8,595 (2,862)	212,000 (69,000)	40.5
Junior High	7,117 (2,206)	2,402 (667)	68,600 (19,800)	35.0
High School	5,816 (1,725)	816 (218)	99,900 (31,400)	8.2
Higher Vocational Schools	305 (109)	65 (12)	4,902 (1,069)	13.2

Two Year Colleges (Humanities, Sciences)	592 (187)	429 (137)	27,786 (11,441)	15.4
Two Year Technical Colleges	99 (8)	83 (22)	4,012 (1,041)	20.7
Universities	22 (-)	73 (10)	4,304 (638)	17.0

2-2. Vocational Training Schemes

In general, there are two main types of scheme for vocational training which are in a) technical colleges under the control of the Ministry of Labour (or other Government authorities) and b) the Apprenticeship Training System which is combined with on job training. The Apprenticeship Training Ordinance of 1962 stipulates that firms employing more than 50 operatives and firms employing more than five operatives for processes specified by law have a duty to carry out such training of operatives. At present about 80% of all firms carry out such training. Operatives concerned by this training are required to have completed eight years education (primary) qor ten years education (secondary). Candidates who have received less than two years of such training are generally classed as operatives, those having completed the two years are known as Certificate Level and are of supervisor class in factories. Operatives who have completed ten years of schooling followed by three years of training in government controlled technical training colleges are classed as Diploma Level. The training courses for apprentices are a six month Job Entry Course, a one year Semi-skilled Course and a two year Skilled Course. The main public training establishments which provide such training are as follows.

Name	Location	Training period
National College of Textile Engineering	Faisalabad	four years
Government College of Technology	Karachi	three years
Government Woolen Centre	Jhang	two years
Government Weaving and Finishing Institute	Shahdara	one-two years
Government College of Technology	Multan	three years
Pakistan- Swedish Institute of Technology	Karachi	three years

Labour Directorates Literate of Punjab and Sindu Government	-	six-eight months
Pakistan Institute of Cotton Research and Technology	Karachi	two-twelve weeks
Textile Industry Research and Development Centre	Karachi	short periods

2-3. Central Government Bodies

2-3-1. National Training Bureau

Industrial training being carried out is controlled by the Ministry of Labour, while the National Training Committee of the Ministry of Labour is responsible for the drawing up of policies. The National Training Bureau is responsible for implementation and guidance of these policies. Further, while offices under the control of the Ministry of Education also carry out vocational training, the National Training Board is the competent supervising authority and is responsible for adjusting the levels of training curricula and testing systems of the various educational and training institutes.

2-3-2. National Staff Training Institute

The National Staff Training Institute is attached to the National Training Bureau and is the only body specially responsible for the training or retraining of instructors of the various vocational training institutes. The conditions of eligibility for receiving training here are a) two years of practical experience or five years of supervisory experience b) possession of a diploma following completion of 10 years of schooling followed by two years of supervisory experience.

A wide range of sectors are covered including welding, metal working, civil engineering design, etc. and support is received from the World Bank, CIDA, UNDP, ILO, etc. for training equipment and dispatch of specialists. Nevertheless the facilities are not always to a satisfactory level.

The institute provides training (free) in response to requests received from industry. Moreover similar institutes in the textile field for retraining of instructors of vocational colleges are the textile department of the Faisalabad vocational college and the two training institutes located in the North West Frontier Province (N.W.F.P.) and at Hyderabad.

2-4. Outline of the Activities of the Main Educational Institutes

Outlines are provided for the following main educational institutes:

A. National College of Textile Engineering (Faisalabad)
B. Government College of Technology (Karachi)
C. Government College of Technology (Multan)
D. Pakistan-Swedish Institute of Technology (Karachi)

In addition to the above the TIRDC (Textile Industry Research and Development Centre) is an important institute with educational functions but since the activities of this have already been outlined in Chapter 1 of this PART IV when this centre was treated with the research institutes these details are omitted here.

2-4-1. National College of Textile Engineering (NCTE)

Location : Faisalabad
Year of Foundation : 1954
Affiliation : Ministry of Industries (the Minister of Industries is the Chairman of the Board of Directors)

Organisation : (1) Faculties : there is only a textile faculties
annual number of students enrolled about 70 (there is a plan to double student intake)

(2) Length of study : four years

Details of the Textile Faculty :

(1) Departments : Spinning Department,Weaving Department and Textile Processing Department

(2) Student numbers : spinning (174), weaving (56), textile processing (25)

(3) Number of instructors : spinning (15), weaving (12), textile processing (11), laboratory (6) and Engineering dept. (10), Basic Science dept. (11); total 42.

(4) Required period of Study : 4 years

(5) Entrance requirement : completion of intermediate college (12 years of schooling)

Facilities : Buildings : lecture room block , administration building, physics and chemistry laboratories, library, practical training block, other buildings.

Equipment : 10 types of equipment relating to spinning (16 units), 10 types of equipment relating to weaving (32 units), 28 types of equipment relating to textile processing (43 units), 21 types of laboratory equipment (21 units) and 11 other pieces of equipment (11 units). Most of the equipment dates from 1960 (the year of foundation) and is of European origin (United Kingdom, etc.). The equipment has been well maintained and managed but is inappropriate for teaching purposes because of superannuation and reinforcement of equipment is planned to take place in the near future with a grant aid from JICA.

Administration : The Minister of Industries is Chairman of the Board of Directors which entrusts the actual running of the College to the Executive Running Committee, chaired by the Additional Secretary of the Ministry of Industries with the Vice-Chancellor of University of Engineering and Technology, Lahore, the Textile Commissioner, the Deputy Commissioner, Faisalabad, etc. The running budget is met with a Board Fund consisting of Government grants and loans together with a Cess Fund collected from textile factories nationwide.

Other Details : (1) This is the only four year university in Pakistan which awards Bachelor of Engineering degrees in the textile field.

(2) In addition to its educational activities the College carries out work commissioned by the private sector and provides consulting services.

2-4-2. Government College of Technology

Location : S.I.T.E., Karachi
Year of Foundation : 1955
Affiliation : Ministry of Education of Sindu Provincial Government

Organisation : (1) Departments : there are 11 departments and a textile technology departments are two of these (spinning and weaving)
annual number of students enrolled : 500

(2) Length of study : three years (with the award of a diploma equivalent to that given in two year colleges)

Details of the Textile Department :

(1) Number of department : spinning technology department and weaving technology department

(2) Student numbers : 100 students enrolled annually in the two departments taken together

(3) No. of instructors : 2

(3) Required years of study : three years

(4) Entrance requirement : High school graduation, 9% of student places on APTMA recommendation

Facilities : All facilities are outdated and inadequate for teaching purposes. There are equipment renovation plans but no budget provision to realize these.

Administration : The College is run with a budget financed by the Sindu Provincial Government

Other details : (1) Problems
- shortage of instructors (because of the large disparity of wages in comparison with those paid by private sector companies for similar personnel skills)
- insufficient budget (making equipment renovation impossible)

(2) Requests
- system for overseas training of instructors
- reception of overseas supervisors
- renovation of equipment

(3) Others
- all graduates of the textile departments find employment in textile factories
- the textile departments are the next most popular choice with students after the electrical and machinery departments
- actual training is carried out in private sector textile factories

2-4-3. Pakistan-Swedish Institute of Technology

Location : Landhi, Karachi
Year of Foundation : 1956
Affiliation : Ministry of Education of Sindu Provincial Government (when founded the Institute was under the Ministry of Industries of the Central Government)

Organization : Departments

(1) Mechanical Technology
(2) Electrical Technology
(3) Welding Technology
(4) Wood Processing Technology
(5) Sewing Technology

(addition of a Printing Technology Department is scheduled to take place in the near future).

Details of the Sewing Technology Department :

(1) No. of sections : a training section for sewing technology (education, training sections)

(2) Commissioned sewing section (profit earning section)

(3) Student numbers : 30 students enrolled annually with a total student body of about 90 students

(4) No. of instructors : 6

(5) Required years of study : three years

(6) Entrance requirement : high school graduation

Facilities : Several dozen sewing machines (old type Singer and Juki models)
The facilities of the training section are poor in comparison with those of the commissioned sewing section. A list of equipment desired to effect renovation has been submitted to the government (containing units of each type of sewing machine).

Administration : Part of the profit realized through sewing done by contract workers (with some of the trainees participating) is put towards the running of the College.

Other details : (1) This is the only training institute in Pakistan for sewing technology.

(2) Female trainees are not accepted so far.

(3) It is desired that instructors implement overseas training programmes.

2-5. Problems Facing the Educational Institutes

With the exception of a very few sections of the institutes concerned, it was found that many aspects of the education and training activities of the educational and training institutes are insufficient.

Common problems encountered which impair the efficacy of these institutes are as follows;

a. Insufficient teaching equipment and facilities

- no longer functional because of superannuation
- inappropriate for teaching purposes because out of date
- do not function because of poor maintenance

b. Lack of instructors

- very few institutes had filled all staff posts
- many instructors are enticed away by private industry
- poor conditions for instructors make it difficult to fill vacancies

c. Other problems

- inadequate provision of textbooks and curriculum
- inadequate technical data and of information

In short, many of the above problems result from inadequate budgetary provisions. Given this context even if reinforcement of facilities is carried out with the assistance of developed countries or of international bodies, as long as the running budgets for these institutes remain inadequate and in particular unless there are improvements in the salary paid to instructors, it will continue to be difficult to employ qualified instructors and so in the end there will be little increase in the teaching efficiency and capacity of the institutes concerned.

The following proposals are made to improve this situation:

a. **Cooperation of private industry in the running of educational and training institutes must be strengthened and broadened as much as possible.** An input of private sector capital is to be secured (in the form of training fees, payment for commissioned works, consulting fees, etc.).It is desirable that each educational institute deepen its ties with related industries in its local area and an actual case of such cooperation can be seen in the case of the National College of Textile Engineering, Faisalabad. Moreover the reception of foreign experts by the educational institutes should be arranged in cooperation with advanced industrial nations and international organisations, and provision made for their dispatch to private industry to carry out advisory

activities, etc.

b. It is desirable that the Government of Pakistan, based upon a vital recognition on significant position of the textile industry in the national economy, take the following key steps to accomplish enhancement in technology of the entire textile industry: **to request international organizations and foreign countries their assistance for strengthening facilities of educational organizations and R & D organizations of Pakistan, inviting foreign experts, overseas training of technology, etc.; to take more positive measures to intensify governmental supports to these national organizations in terms of personnel, finance and political provisions required for ensuring sound upkeep and operation of these organizations.**

c. Establishment of textile information Centre

It is necessary to develop the information centre which collects the informations of the technology and market on textiles in the world and provides information services to private companies.