CHAPTER

II  TEXTILE INDUSTRY - AN OVERVIEW

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2.1 HISTORY OF TEXTILES

Early humans started wearing the skins of a wide variety of mammals they killed for food and it provided both protection and decoration. Recent scientific research estimates that humans have been wearing clothing for as long as 1,90,000 years.¹ Over years, by experience mankind began to use a variety of animal and plant fibres for clothing and shelter. Certain fibres because of their properties and availability had a widespread use and others were more specific to an area and had limited use. Linen from wild flax of Mesopotamia, cotton from the area around the River Indus and South Mexico, Silk from Northern China and wool from Western Asia developed as early as 9000 BC.

2.1.1 Woollen

History of textiles starts with wool, a fibre successfully made into fabric in the Stone Age. By the later Stone Age, the art of using vegetable dyes from the arbutus plant and elder berries was discovered. More complex dyeing operations using colours obtained from plants such as madder, saffron weld as well as animal, such as Tyrian purple from molluscs and cochineal from insects was introduced in the Bronze Age. A very few natural green dyes were available until mid 19th century when synthetic dyes came into the scene. The earliest known world textiles are linens from Turkey during 6500 BC.

Serviceable woollen fabric has been found in Iraq even in 4200 BC and Spanish merino has become the foundation of modern

global wool industry. Wool dyeing had been established as a recognized craft by Romans around 700 BC. Woollen industry became the major industry in Britain during 14th century and surplus wool was exported to Europe. By the 16th century, England became the major exporter of fabric because of cheap labour. Inventions with fibres like cotton, silk and flax were widely used around 3000 BC as spinning and weaving were already well established as domestic crafts. Spinning in those days was a slow and tedious task that one pound of cotton yarn took several weeks and one pound of woolen blanket yarn about a week, as spinning was done between the finger and thumb using a simple spindle and whorl. Weaving was a much less tedious task took only hours.

2.1.2 Silk

Evidence of the origins of silk production in the form of dyed silk ribbons and fabrics were in use in China around 2600 BC. Trade in silk opened up during 1700 BC. Most of the early Chinese production of silk was given away as annual tributes or gifts and was not for export. The first factory in England was a six storied silk mill (not wool or cotton), constructed in 1718 driven by water power on the River Derwent near Derby.

2.1.3 Cotton

Cotton, the most important and widely used fibre today dates back to about 3000 BC as cotton plant is highly adapted to survival in xerophyte conditions. Early fabrics being found in Indian tombs and descriptions in Hindu hymns dating around 1400 BC that manufacture of cotton and weaving of cloth had an important place in Indian culture.
The archeological discoveries related the birth of cotton around 3500BC in India and 3000 BC in Peru. Spun yarn was discovered in the earliest ruins of Indus Valley and later spread around the world. India exported cotton to Persia, the fertile valleys of Tigris and Euphrates rivers. Traders took it to China. Wild cottons were identified in the coast of East Africa. Cotton migrated to the American continents from Peru and in the form of wicks in Egypt, tents in Rome and as wadding in quilts and warm clothes by Northern Tribes. When protestant weavers from Spain settled in Manchester, cotton production became a major factor in foreign trade and politics.

The cultivation of cotton spread to Egypt. By the 12th Century, Venice became a major cotton manufacturing city and sale across Europe and in turn increased cultivation of dye plants such as woad. The aim of improving the productivity and increased demand for cotton made lead to sudden interest in mechanization of all manufacturing process. The real break-through came in 1771 when Richard Arkwright successfully established a mill based on the use of the automatic continuous spinning machine called **water frame** and power supplied by water wheel.

The next step in the early mechanization of spinning was a hybrid machine combining roller drafting of the water frame with the

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3. www.textile world.com
running twist of the Jenny which could consistently produce fine yarns in 1779. The invention of the flying shuttle by John Kay in 1733 opened the way up to mechanically powered weaving. The invention of the rotary steam engine in 1782 by James Watt provided the perfect means for driving many different types of machines.

Quarry Bank Mill was established by Samuel Gregg in 1784 and to run the mill more efficiently and cost effectively, Gregg built an Apprentice House in 1788 on the site and employed all the poor children mainly aged from 10 to 12 and provided them boarding, lodging, clothes and education. By 1844 restrictions on child labour were imposed that children under 13 years could work only for 6½ hours a day and to have schooling for at least 3 ½ hours per day. Steam engines were installed in 1796 and further upgraded as powerful engines in 1836. The mechanization of the textile industry in the late 18th and early 19th century paved way for cotton industry.

2.1.4 Textile Processing

The art of herbal dyeing had its origin in India. It is the fact that India abounds in a great many substances possessing colour yielding properties. Rome has been importing dyed fabric from India since 2000 B.C. The art of dyeing was believed to be known in India as early as in the Indus Valley civilisation period. The dyeing of textile is also mentioned in the Vedas. In the 7th century, India had a virtual monopoly in the production of dyed, painted and printed textiles with natural colours. Archaeological evidence shows dyeing was an

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4. wikipedia.org/wiki/history of clothing & textiles
5. www.gatewayforindia.com
widespread industrial enterprise in Egypt, India & Mesopotamia during 3rd BC. A purple coloured piece of cotton was found in Mohanjodaro excavation (2600 BC) which from recent chemical examinations suggests to be dyed with Indian Madder (Rubia Cordifolia).  

People were reportedly using 31 species for black dye, 25 species for yellow dye, 18 species for red dye, five species for green die, one species for orange dye, 17 species for blue dye, three species for brown dye and one for violet red dye in Gujarat from different parts of plant like bark, leaves, roots, fruits, pods, pericarp, hairs of peri carp, galls, scales stem, wood total plant, flowers seeds and lac. 

Synthetic dye was accidentally discovered by Perkin in 1856, which attracted and stimulated other chemists to carry out similar experiments. Megenta dye was discovered by Verguin in 1859, azodyes by Griess in 1863, alizarin was synthesized by Graebe & Liabermann in 1863, vat dyes, the fastest dyes for cotton, linen and rayon in 1879, Clavel and Dreyfuss introduced disperse dyes in 1920. Later Chromophthatic dyes in 1957, reactive dyes synthesized for wool in 1951 / 1952 and for cellulose fibres in 1956. 

After the discovery of the first synthetic dye in 1856, the use of natural dyes receded and has slowly became the domain of hobbyists. Although, the natural dyes were used for the past many centuries for colouration, yet, lack of scientific approach to explore this resource  

subdued this enormous potential field. Synthetic dyes provide an edge over natural dyes in terms of diversity of colour, regulated quality, reproducibility and substantial quantity.

By the 19th century dyeing of fabric and yarn was still dominated by the use of natural dyes. Two semi-synthetic dyes namely picric acid (yellow) and murexide (purple) were used in 1770. William Perkin (Founder of Synthetic dye), discovered aniline purple (mauveine) in 1856 and synthesized coumarin, a pleasantly smelling aromatic compound later in life.

Over the next 50 years most of the main dye groups that are still used today were discovered. The reactive dyes, used mainly for dyeing cotton were invented in 1950s. The natural dyes could not meet the demand for coloured yarn and cloth after the rapid increase in textile production from early 19th century. For example we need 1,60,000 cochineal insects to produce one kg of red dye (cochineal) and approximately 60,000 purpura shellfish (murev animals) are required to obtain one pound of purple dye (Tyrian purple). Hence, there was a pressure to invent synthetic dyes to fill the gap. An exception to this was with woad, the natural blue dye (indigo). The discovery of high yielding plants and improved extraction techniques could make woad a commercially viable crop again.

Within a generation of the discovery of the first synthetic dye, Germany had become the major dyestuff producer and retained the

7. paint pigment /tyrian-purple.htm.
position of world leader in modern chemistry till mid 1920’s by producing 90 per cent of the synthetic dyes. The art of decorating textile fabrics by printed designs either on a dyed or plain background, originated in India about 2000 years ago. Indian printed calicos using wooden blocks were first imported into Britain in the early 17th century and it became engraved copper plates in 1752. The invention by Bell of engraved roller printing in 1783, which increased productivity significantly and brought down the price of printed goods and changed earlier slow mode of printing.

2.1.5 Synthetic Fibre

In 1862, Ozanam found how a liquid silk substance obtained from excising silkworm could be spun by forcing it through spinneret holes of different sizes and formed the basis of the nitro-cellulose extrusion process, the first significant man-made fibre. More work on cellulose led to the discovery of cellulose triacetate in 1869. In 1897 Cross supplied some viscoid (cellulose treated with acid and salt solution), to Stearn, who developed viscose by a fibre spinning process.

In the late 1920s, Carothers conducted fundamental research into macro molecular materials. In 1928, he discovered the reaction that produces a synthetic polyamide and by 1935 a pilot process for a condensation polymer from hexamethylene diamine and adipic acid or nylon66 started. Nylon was the first major synthetic fibre and from 1938 to 1978 was in the greatest production by weight.

In England, during the early years of the Second World War, Whinfield and Dixon conducted research on the teraphtalic acid and
ethylene glycol system which became the basis for the highly successful polyester fibre. After Second World War, researchers in the USA developed a solvent spinning system using demethyl formamide which produced satisfactory synthetic fibres of the acrylic type and marketed as Orlon.

The developments already discussed provided the basis for the expansion of the textile industry. More recent improvements in spinning and weaving technology, such as open end spinning and shuttleless weaving have helped to increase the efficiency, range, speed and quality of processing. Thus the changes in costume or fashion as it has been called in more recent times, are dictated by multitude of events, conditions and decisions such as royal whims, social mood and climate, discovery, invasion and trade.

2.2 TEXTILE INDUSTRY-CONTRIBUTIONS OF MAJOR COUNTRIES

Although Britain played a pivotal role in the birth and early development of the modern textile industry, other countries such as China, India, Japan and the United States also made a significant contribution.

China had the foresight to develop its technology even before industrial revolution, but was stagnant under restrictive system of the government.

India was the major producer of fine cotton yarn and fabric even in 17th century, when East India Company found trade in Calico would profitable. But, British did not take interest in mechanization as size
and flexibility of the workforce was more economical than mechanization. The rapid industrialization in the Engineering industry enabled **Japan** to export one-fourth of the world’s cotton yarn during First World War.

The development of the textile industry in the **United States** occurred rapidly between 1790 and 1810 as they were manufacturing their own machinery and had home-grown cotton from southern **states**.

**Asian** clothing industry had a successful history with Japan leading the way, accounting for 20 percent of world garment exports in 1940. In 1970- however high cost of production and labour shortages had compelled Japanese Textile and clothing to switch to more complex, yet profitable products such as automobiles and electronics.

During 1970, the newly industrialized economies known as “**Asian Tigers’** comprising **South Korea, Taiwan, Hong Kong and Singapore** developed garment industries in their countries. Between mid-eighties and nineties garment production rose sharply in Philippines, Malaysia, Thailand, India and Indonesia as they took the drive from the ‘Asian Tigers’. During 90s countries like **Bangladesh, Sri Lanka, Pakistan and Vietnam** entered the garment market in a big way.\(^8\)

The **Asia-Pacific** region supplies approximately 70 per cent of the global textile and clothing production. During 2001, Asian region accounted for 45 per cent of total world exports. In earlier times most

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8.wikipedia.org/wiki/history of clothing & textiles
Figure 2.1
World's Leading Exporters' Share in Textiles 2008

Source: International Trade Statistics 2007, W T O Includes significant shipments through Processing Zones Secretariat estimates & Imports are valued f.o.b.
Figure 2.2
World's Leading Importers' Share in Textiles 2008

Source: International Trade Statistics 2007, WTO. Includes significant shipments through Processing Zones. Secretariat estimates & Imports are valued f.o.b.
changes in dress were initiated at the Royal Courts and gradually filtered down to the lower classes. Only in recent times fashionable clothes have become available to a wider social range.

Regarding western fashion, different trends and styles of fabrics were used in different periods namely; the Dark Ages, the time between the collapse and withdrawal of the Roman Empire to the end of the 11th century; Medieval Times, from Norman invasion of Britain to the end of the middle Ages Circa 1450; Tudor and Stuart from the Renaissance to the Restoration of Charles II of England; Georgian period from the beginning of 18th century to Waterloo and the downfall of Napoleon; Victorian Age covering the reign of Victoria from 1820 to the start of 20th Century. The 20th century, from 1900 to the present, much influenced by the introduction of synthetic fibre, globalization of fashion, influence of the film and music industry and development of youth culture. Up to the early 1960’s, high fashion remained formal and restricted to the wealthy, followed by the hippy look of the early 1970’s, the extreme punk style in mid-seventies, during the late 1970’s and early 1980’s the trend was towards fashionable sports wear.

Fashion in the 90’s became more diverse with a multitude of themes re-visited for both youth and haute couture. This re-introduction of earlier but, modified fashion is a recurring theme throughout history.

9. yingwang@uwm.edu
10. Wikipedia.org/wiki/Victorian_era
2.3 INDIAN TEXTILE INDUSTRY

The textile industry in India has been a pioneer industry. Industrialisation in other fields has mainly been achieved on the back of the resource generation by the textile industry. The area under cotton cultivation is the largest in the world. The spinning Capacity is the second largest after China’s. India has the largest hand weaving sector and a long tradition of producing some of the finest and costliest fabrics in the world.

Rig Veda provides details about the Indian weaving processes of those times. The Ramayana and Mahabharatha have documented the existence of fabrics in that era. India has a wide range of textiles of varied designs, speciality in the weave and techniques developed on the basis of location, climate and cultural influences. Keeping in mind the uniqueness in the weave, texture and quality the textiles namely Khadi, Muga silk, Doria of Kota, Tie & Dye, Ikat, Banarass Brocade, South Indian silk, Muslin and so on, have gained name and fame.

The history of textiles in India dates back to the use of mordant dyes and printing blocks around 3000 BC. Indian textile industry holds a lot of significance for the country in terms of output, investment and employment. In contributes 14 per cent of the industrial production, 4 per cent of Gross Domestic Product, 12 per cent of the country’s export earnings and direct employment to more than 35 million people. Textile for the remaining 6 million people. For a considerable portion of the history, Indian markets were as important or more important than China.

12. www.texmin.nic.in
14. wikipedia.org/wiki/silk_Road
India produces a variety of textiles and clothing due to its diverse cultural influence, climatic conditions, geographical factors and trade. India is renowned for the Brocade of Varanasi and delicate Chikkan embroidery of Lucknow (Uttar Pradesh), Mirror work embroidery and Phul Kari embroidery work of Punjab, Vibrant colours and tie-dyed fabric of Gujarat, Paithani and Poona sarees of Maharastra, fine Chanderi sarees and Chattisgarh tribal weave of Madya Pradesh, golden Tussar silk of Bihar, Cotton Tangail, silk Jamdani and Baluchari sarees of Bengal, Pomkai, Teliarumaal, Sambalpuri of Odyssa, Pochampalli and Venkatagiri handloom weaving of Andrapradesh, Mysore silk of Karnataka, traditional off white hand woven clothing with gold border of Kerala and rich Kanchipuram silk sarees of Tamil Nadu.\textsuperscript{15} India accounts for 61 percent of the global loomage, 22 percent of the global spindleage, 12 percent of the world’s production of textile yarn and 25 percent share in the total world trade of cotton yarn.\textsuperscript{16}

\textsuperscript{15} www.india.tripplanner.com/html
\textsuperscript{16} www.indialawoffices.com
Textiles Map of India, Handloom Export Promotion Council, Government of India.
India has a strong base in raw materials and cotton dominates the industry. Nearly 56 percent of yarn produced is made of cotton. The country produces nearly 23 varieties of cotton. India is the second largest player in the world cotton trade; the largest producer in jute, second largest producer of silk, third largest producer of cotton, accounting for nearly 16 percent of global production, fifth largest producer of cellulosic fibre/yarn and eleventh largest producer of wool. Abundant availability of raw material is one of the key advantages of the Indian textile industry.

The structure of the Indian textile industry is both complex and unique. It represents a sharp contrast to the textile industry in other countries and can be characterized by the following several aspects:

- employs co-automated technology
- dualistic manufacturing structure, dominated by a fast expanding decentralized or unorganized small scale manufacturing segment
- declining, vertically – integrated, large scale composite mill segment
- dominated by cotton as a primary raw material
- existence of a large public sector composed mainly of nationalized and sick mills that have been taken over by the government
- Pre-dominance of the small scale sector and advantageous in comparison to China, as Indian textile companies are capable of producing very small amounts of cloth for its clients. Indian designers catering mainly to the domestic market.
- small sized processing units that have to be very persistent to deliver on time and super strict about the quality and sizing.

17. texmin.nic.in/annual rep/arep.htm.
• India lags in decisive factors like productivity, rate of absenteeism at work place, rejection level and delay in shipment.

• Facing competition in the domestic markets, external markets from lower cost nations and the Government’s policy in fragmenting the industry through concessions to the SSI segment and inconsistency.

• Age-old labour-intensive industry providing employment for a substantial section of population.

• Highly competitive in nature, leaving only small margins of profit.

The state of the industry also has been such as to distract the investors from pouring in more money to the age-old industry. In such a gloomy picture when, the survival of the industry, itself is more or less at stake, the only option to meet the challenge effectively is to effect maximum economy in production with minimum resources available.

The Indian textile industry has three main sectors. The organized mill sector (traditional spinning and weaving), handloom sector and the power loom sector (merchanised looms), finishing and apparel making sectors.

2.3.1 Composite mills

Relatively large-scale mills that integrate spinning, weaving and, sometimes, fabric finishing mills now account for about only 3 per cent of output in the textile sector. About 276 composite mills are now operating in India, most of them owned by the public sector and many deemed financially ‘sick’.
Table 2.1
Growth Capacity in the Organized Mill Sector

<table>
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<th>No. of Composite Mills</th>
<th>Total</th>
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<td>126</td>
<td>421</td>
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<td>2002-03</td>
<td>349</td>
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<td>2003-04</td>
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<td>2005-06</td>
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<td>2010-11</td>
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<td>70</td>
<td>450</td>
</tr>
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</table>

(as on 31.08.10)

Source: Ministry of Textiles Annual Report 2010-11 texmin.nic.in/annual rep/arep.htm

Figure 2.4
Growth Capacity in the Organized Mill Sector

Spinning is the process of converting cotton or manmade fibre into yarn to be used for weaving and knitting. It is the most consolidated and technically efficient and sophisticated sector in India’s textile industry. Average plant size remains small, technology outdated, relative to other major producers. Poor quality, contaminated and expensive cotton, made the spinning industry struggling to keep up exports. The high cost of poor quality and unreliable power supplied by the various state electricity boards is making the job tougher.

Weaving and Knitting converts cotton, manmade or blended yarns into woven or knitted fabric. Because it is not economical to run a composite mill, many weavers operate multiple small mills which, tend to create production bottlenecks. Most of the small weaving unit subcontract for the export market. Though Tirupur supplies 35-40 percent of India’s knitwear with sizeable knitting units located and has achieved a dominant position in the export market too, India’s knitters have to upgrade further in consonance with international standards.

2.3.2 Handloom

The word handloom evolves from the process of operation for making cloth by hand on a wooden structure called loom and is unparalleled in its flexibility and versatility, permitting experimentation and encouraging innovation. As an economic activity and in terms of employment generation, the handloom sector occupies a place second only to agriculture; provides employment to 43.31 lakhs persons is confronted with various problems such as obsolete technology, unorganized production system, low productivity, inadequate working
capacity, conventional product range, weak marketing links, accumulation of stock and so on. In many states, including the states where handlooms exist in large numbers like Tamil Nadu, the average productivity is less than five metres per day and in the entire north-east region productivity is still lower.

The level of technology is low and labour cost is very high and that makes the handloom products very costly and less competitive in its price with products from the power loom or mills. Handloom, though it exists in large numbers, lacks integration. The clusters are the major impediment for the development of common infrastructure to reduce the cost and produce materials in reasonable volumes to meet the international requirement. Rigidity of weavers and the master weavers sticking to the tradition and production of ordinary mass consumption like gada, dhotis and so on pose a major challenge to the handloom sector in its effort to fit into the present global market which demands high adaptability to the changing needs and value addition. The world market demands flexibility as it is more driven by the fast changing fashions and trends. Lack of infrastructure like processing and value addition also pose a problem in enabling this sector to produce products that would fit enough to compete in the international market.

Indian handloom products are aesthetic, unique and exclusive. Due to manual operations, several combinations are possible in handlooms with intricate designs. The functional properties like drape, texture, strength, wrinkle resistance dimensional stability, etc., can be ingeniously manipulated through appropriate designs, exclusive types of fabrics used, counts and twists if wraps and welts, with density, type of weave, type of
fashion and process employed in printing and so on. The variations in the fabrics and more feasible defects due to mechanical fault can be reduced by the use of improved looms, accessories and gadgets.

Handloom Export Development Council, the nodal agency was set up by the Government of India in 1965 to promote the exports of handloom products from India. In order to increase production and generate additional employment opportunities in the handloom sector, a scheme was introduced in 1992-93 to develop 3000 Handloom Development Centres and 500 Quality Dying units, which will benefit 30 lakhs weavers.

Project titled “Development and Transfer for Technology for use of Jute Fibre in Handloom Textiles” was sanctioned Rs.10.30 crore during 1993-94 by the Government. An Integrated Village Handloom Development Scheme, Project Packaging Scheme and National Silk Yarn Scheme were launched between 1994-95 with an outlay of Rs.63 and Rs.20 crores respectively for the eighth Five Year Plan period. During the year 1997-98, 260 Handloom Development Centres and 78 Quality Dyeing Centres were sanctioned. 18

Emphasis has been laid on Brand Development through ‘Handloom Mark’ Scheme during the XI five year plan. The Handloom Mark was launched on 28.06.2006 to serve as a guarantee for authenticity and genuineness to the handloom products to the buyer that the product being purchased is genuinely hand woven.19
Production in the handloom sector recorded a figure of 6,769 million sq.mtrs in the year 2009-10, which is about 23.23 per cent. As many as 475 handloom clusters have been taken up to December 2010 and financial assistance of Rs.101.59 crores has been realized to various implementing agencies for skill upgradation, awareness programme and formation of consortium and so on under Integrated Handloom Development Scheme in India.20 Handloom Export Development Council is the nodal agency set up by the Government of India in 1965 to promote the exports of handloom products from India.21

Handloom enjoys exclusive position in our textiles and clothing exports. Over the years, its importance has been increasing despite, large scale mechanization. Furnishing fabrics particularly upholstery and curtain fabrics have shown excellent potential for the expansion of handloom exports.

2.3.3 Power Loom

The decentralised powerloom sector plays a pivotal role in meeting the clothing needs of the country. It produces a wide variety of cloth, both grey as well as processed. Production of cloth as well as generation of employment has been rapidly increasing in the powerloom sector. There are 22.69 lakhs powerlooms in the country as on 31.10.2010 distributed over approximately 5.11 lakhs units. Powerloom sector contributes about 61 per cent of the total cloth production of the country and provides employment to about 56.64 lakhs persons. More than 60 per cent of the cloth meant for export comes from powerloom sector.22

20. www.texmin.nic.in
22. www.texmin.nic.in
Though, exports of power loom cotton cloth and ‘made ups’ grew 27 per cent annually in value and became increasingly important source of final demand and foreign exchange between 1990 and 2000, the small-scale, non-integrated, low-technology structure is ill-equipped to compete in high-quality markets and needs of large buyers.

In recent years, progressive power operators have upgraded their operations through investment in modern shuttles looms, 70 per cent of which are imported into India as second-hand equipment from the United States, Italy and Japan to produce superior-quality fabric and reduce labour costs by 75 per cent, compared with traditional shuttle looms. In order to develop this sector, the Government has launched schemes such as Power loom Service Centre [PSC], Computer Aided Design [CAD] centre, Power loom Development Export Promotion Council and Power loom Workers Insurance Scheme.

2.3.4 Fabric Finishing / Processing

Fabric processing which deals with dyeing, printing, and other cloth preparation prior to the manufacture of clothing is also dominated by large numbers of independent, small-scale enterprises. Small independent processing houses, which perform nearly 90 per cent of the industry’s processing and finishing, tend to employ very low-end technology. Most work as job processors for small garment exporters. It suffocates with the problems like lack of modernization in the textile industry, lack of process and fundamental pretreatment, lack of quality control in dyeing and printing, colourants used and colour fastness, lack of professionalism, non-adherence to ecological parameters and so on.
As a natural corollary of the restricted framework, independent power processors and processing houses in the mill sector were treated at par.

Besides being innovative, different from other competitors having the right product, right collaboration, source of supply, ecological compliance and so on, India can become a leader. India’s success depends on understanding the total supply chain. Among various avenues for effecting overall economy in the wet processing of textiles include increased productivity of man and various materials. In fact, need for increased productivity, whether it be of man or machine for prevailing set-up of any industrial activity assumes paramount importance in the present day’s context for the overall growth of any developing nation like ours, which cannot afford to go in for capital-intensive modernization.

The highly fragmented textile processing segment of the Indian textile industry can be broadly divided into four segments 1) Hand processing, 2) Hand processing units with certain exempted power processes 3) independent power processing units and 4) processing facilities attached to composite or semi composite mills. There are 10,397 hand processing units and 2510 power processing units in the country.23

2.3.5 Clothing and apparel

Apparel is produced by about 77,000 small-scale units classified as domestic manufactures, manufacturer exporters and fabricators (subcontractors). The Indian garment sector is a supplier to the top
brands the world over. It caters to the higher end of the market, leaving the lower end to emerging countries though, the Indian weaving and processing sectors lag behind in technology. Despite the glorious tradition of the textile industry, government policies have been wreaking havoc in most segments by encouraging fragmentation. Indian fabricators specialize in low-wage, labour-intensive sewing and have the flexibility to meet small custom orders but are much less competitive with large orders and those typically involving high levels of automation.

Textiles and garments are among the major items of trade between China and India. China is expected to offer a keen competition to India in textiles and garments both in India’s domestic and overseas markets. At the same time, possibilities for collaboration between the two countries in the textile as well as the textile machinery field could be explored and tapped for mutual benefits. As Indian textile industry is blessed with traditional skills and craftsmanship essential for success, unprecedented growth in made-up sector are expected in the years to come.

2.3.6 Silk

Silk is reported as the ‘Queen of Textiles’. The silk industry has a unique position in India, significant also in its textile sector and export. Silk fabrics ranges from dazzling Dupions to fine mulberry organza, taffetas, crepe, georgette, chiffon, tabby, satin and twils, silk garments designed to specification in smaller lots and different varieties, silk made-ups in the form of cushion covers and bed covers and silk carpets made by expert weavers in the state of Jammu and Kashmir are the largest categories of silk exports from India. Every region in India is famous for
its own typical weaves, such as Baluchari of West Bengal, the silks of Mursidabad, the Himroos of Aurangabad, the Brocades of Varanasi, the Matka of Champa and Bhagalpur, the printed silks of Bangalore, the heavy temple silks of Dharmavaram and Kancheepuram, the Ikats of Pochampalli, to name a few.\textsuperscript{24} India is the second largest producer of silk in the world and contributes 18 per cent of the total world raw silk production.

Sericulture is an important cottage industry in India providing job opportunities and livelihood for more than six million people in the rural areas.\textsuperscript{25}

\subsection*{2.3.7 Woollen}

Indian wool industry was predominantly unorganized and scattered until the economic liberalization of Indian economy in the 1990. India is the seventh largest producer of wool accounting for 3.1 per cent of total world production.\textsuperscript{26}

The major wool producing states are Rajestan, Jammu and Kashmir, Karnataka, Gujarat, Uttar Pradesh, Uttaranjal, Andhra Pradesh and Haryana. The product portfolio is equally divergent as cotton, produced textile intermediates to finished textiles, garments, knitwear, blankets, carpets and so on with small presence in technical textiles.\textsuperscript{26} The major part of the industry is rural based. The woollen textile sector is one of the promising sectors of Indian textile sector providing employment to around 27 lakhs people\textsuperscript{27}.

\begin{enumerate}
\item \textsuperscript{24} \url{www.silk epc.org}
\item \textsuperscript{25} \url{Fibre2fashion.com}.
\item \textsuperscript{26} \url{www.wwepc.org}.
\item \textsuperscript{27} \url{business.mapsofindia.com/india.industry/wool.html}.
\end{enumerate}
2.3.8 Jute

Jute called the ‘Golden Fibre’ is the cheapest vegetable fibre available after cotton. West Bengal is the major supplier of jute in India. Till 1947, Indian jute mills dominated the world jute market with 70 per cent of its products finding place in the global market. Though, this gradually declined to 30 per cent, as plastics replaced jute in all the fields, it engages a key note in Indian economy, providing direct employment to about 0.26 million workers, supporting the lives of around four million farm families and contributing to exports to the tune of Rs 1000 crores in 2007-08 in the form of home textiles, furnishings, mats and mattings, novel products of handicrafts, wall decorations, wall hangings and give away promotional bags either hand or machine made available in exquisite gorgeous colours and designs in amazing range as per customers’ choice. It is biodegradable in nature and used in woven curtains, chair coverings, carpets, rugs and backing of linoleum.

2.3.9 Micro, Small and Medium Enterprises in textile Industry

From the very inception spinning, weaving and apparel making were done at home in a very small scale, mostly for their own needs. When it became a source of income, the change in the outlook of people and the supportive schemes of the Government paved way for its growth into micro, small and medium enterprises in the organized set up.

Table 2.2 shows the performance of micro, small and medium textile enterprises towards the Indian economy. This micro, small and medium enterprises in textile industry pave way for the development of economy at grass root level and are taking a quantum leap in the recent years. Their pivotal role in employment generation is displayed in Table 2.3.

Though, textile industry in India contributes a prominent share towards its employment and income generation, saving, trade, infrastructural and rural development and so on, its future prosperity lies only on its improved performance in value addition. Therefore, it is imperative that textile processing is given keen attention for the industry as a whole to contribute better for the Indian economy.

Table 2.2

Performance of Micro, Small and Medium Textile Enterprises in 2006-07

<table>
<thead>
<tr>
<th>Industry</th>
<th>No. of Working Enterprises</th>
<th>Employment</th>
<th>Market Value of Fixed Assets (in crores Rs)</th>
<th>Total Output (in crores Rs)</th>
<th>Export (in crores Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Textiles</td>
<td>1,06,095</td>
<td>10,24,990</td>
<td>49,270.96</td>
<td>41,666.56</td>
<td>6,908.10</td>
</tr>
<tr>
<td>Wearing Apparel</td>
<td>2,13,767</td>
<td>9,00,729</td>
<td>24,780.92</td>
<td>16,888.63</td>
<td>12,275.80</td>
</tr>
<tr>
<td>Spinning, Weaving &amp; Finishing of Textiles</td>
<td>59,761</td>
<td>6,57,852</td>
<td>38,696.50</td>
<td>29,915.46</td>
<td>3,078.68</td>
</tr>
<tr>
<td>Mfr. of other Textiles</td>
<td>38,997</td>
<td>2,73,505</td>
<td>8,166.90</td>
<td>8,795.03</td>
<td>3,185.64</td>
</tr>
<tr>
<td>Mfr of Knitted Fabric</td>
<td>7,358</td>
<td>93,633</td>
<td>2,467.55</td>
<td>2,956.07</td>
<td>3,336079</td>
</tr>
</tbody>
</table>

Source: Final Report, Fourth All India Census of Micro, Small & Medium Enterprises, Registered Sector Devt. Commissioner
Table 2.3

Employment Generation of Micro, Small and Medium Textile Enterprises in 2006-07

<table>
<thead>
<tr>
<th>Enterprise</th>
<th>Micro</th>
<th>Small</th>
<th>Medium</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Textiles</td>
<td>6,30,053</td>
<td>3,32,789</td>
<td>62,148</td>
<td>10,24,990</td>
</tr>
<tr>
<td>Wearing Apparel</td>
<td>6,08,147</td>
<td>2,60,151</td>
<td>32,431</td>
<td>9,00,729</td>
</tr>
</tbody>
</table>

Source: Final Report, Fourth All India Census of Micro, Small & Medium Enterprises, Registered Sector Devt. Commissioner

2.3.10 Supportive Government policies

The Government has taken several positive steps to facilitate the smooth growth of the sector.

2.3.10.1 Technology Upgradation Fund Scheme

The Indian textiles industry does not have the same technological edge as the textile industry in developed countries. Multi Fiber Agreement (MFA) has been integrated into WTO package. As per the Agreement on Textile and Clothing (ATC), from 1st January, 2005 the quota was removed in respect of exports from India to anywhere in the world. Such change increased competition in the international market as well as the domestic markets. To meet the challenges, the industry is required to become competitive, cost effective and quality oriented. Though, the industry is gearing itself for this challenge, but simultaneous help and assistance is required from Government of India particularly for modernization of industry and to neutralize the global disadvantages faced by the Indian textile industry in the field of power, transactional cost and the cost of improving the infrastructure.
The Technology Upgradation Fund Scheme (TUFS) was launched on 01.04.1999 for 5 years, subsequently extended up to 31.03.2007 and was further extended up to 31.03.2012 for modernization and technology upgradation of existing units in the textile sector as well as to set up new units with state-of-the-art technology so that its viability and competitiveness in the domestic as well as international markets may enhance.

Any textile unit, which is eligible as per the normal lending norms of the concerned financial institutions and fulfills the benchmark criteria of the scheme, can avail of funds under the scheme. The nodal agencies under the scheme are Industrial Development Bank of India Limited (IDBI) for Textile Industry (excluding SSI sector), Small Industries Development Bank of India (SIDBI) for SSI Textile Sectors and Industrial Finance Corporation of India (IFCI) for Jute Industry.

In order to provide a network of financial organizations for sanction and disbursement of loan so as to have a wider reach to the industry in the country, the nodal agencies (IDBI, SIDBI and IFCI) have co-opted various institutions such as All India Financial Institutions, Scheduled Commercial Banks, Co-operative Banks, State Finance Corporations, State Industrial Development Corporations, National Co-operative Development Corporation and so on.

Loans under the scheme are extended by the nodal agencies / co-opted institutions to the identified segments of the industry for the projects in conformity with the scheme and financial norms of the financial institutions concerned. The Government funding is limited to interest reimbursement or capital / margin money subsidy on a project of technology up-gradation in conformity with the scheme. The Scheme
provides 5 per cent interest reimbursement plus 10 per cent capital subsidy for specified processing machinery, garmenting machinery and machinery required in manufacture of technical textiles and interest subsidy/capital subsidy/margin money subsidy only on the basic value of the machineries. Enhanced subsidy for weaving, processing, technical textiles and garmenting segments which have great potential for employment generation as well as value addition is the thrust of TUFS. It has infused an investment climate in the textile sector and in its operational life span has propelled investment of more than Rs 2,07,747 crores up to 30.06.2010.

An Inter-Ministerial Steering Committee (IMSC) under the Chairmanship of the Secretary (Textiles) has been constituted for monitoring and review. A Technical Advisory and Monitoring Committee (TAMC) under the chairmanship of the Textile Commissioner has also been constituted to interpret, or clarify any technical issues raised by any of the nodal agencies regarding the eligibility of any unit or machinery under the scheme. The scheme provides for reimbursement of 5 per cent interest paid on term loans for technological upgrading of textile machinery. In this way, the Government has assisted the Indian textile companies by ensuring that they are not over-burdened by the high rate prevailing in the country.

2.3.10.2 Integrated Textile Parks Scheme

In order to have a world-class infrastructure for textile units as well as to facilitate the need for them to meet international social and environmental standards, this scheme envisages the creation of textile parks in the public-private partnership mode.
2.3.10.3 Fiscal Rationalization

Fiscal rationalization is done to reduce the excise duty on all manmade fibres and yarns and to make manmade fibres and yarn cheaper and to increase the competitiveness of fabric and apparel manufacturers.

2.3.10.4 Technology Mission on Cotton

In February 2000, the Government launched the Technology Mission on Cotton with the objective of addressing the issues of raising productivity, improving quality and reduction of contamination in cotton. To increase marketability of silk material in the domestic and international market, the Government of India have introduced the silk mark as a symbol of quality silk products, which is affixed only on pure and natural silk products of either mulberry, tasar, eri or muga silks, so as to ensure the quality.

2.3.10.5 Handloom Mark Scheme

With an ultimate aim of having exclusive name and fame for handloom fabrics and to boost up its sales, ‘Handloom Mark’ scheme was launched on 28.06.2006 by the Textile Committee under the administrative control of Ministry of Textiles, Government of India. So far, 861 Weavers’ Cooperative Societies including Co-optex and 3,357 private / master weavers / exporters have registered under this scheme.31

2.3.10.6 Silk Mark

The ‘Silk Mark’ scheme launched by the Indian Silk Corporation, under Central Silk Board. Out of the 88 silk Weavers’

31. www.texmin.nic.in.
Cooperative Societies, 32 Silk Weavers’ Cooperative Societies and 17 Cotton and Silk Weavers’ Cooperative Societies have registered with Silk Mark Organisation of India (SMOI) as approved silk mark users.

### 2.3.11 Import and Export

Textile export presently accounts for 12 per cent of the country’s total export earnings and is the single largest earner of foreign exchange. Another notable feature of textiles and clothing exports is its low import intensity, as compared to other major export products. The major imports of India are synthetic yarn and fabrics. The textile imports were Rs.3358.81 crores and as a percentage it had gone down 2.35 per cent in 2009-2010.

![India’s Import of Textile Items](image_url)

**Figure 2.5**

India’s Import of Textile Items

Source: Monthly statistics of the Foreign Trade of India, DGCIS, Kolkata

32. [www.indialawoffices.com](http://www.indialawoffices.com).

Table 2.4
India’s Exports of all Commodities vis-à-vis Textiles & Clothing

Value in Rs crores

<table>
<thead>
<tr>
<th>Year</th>
<th>All commodities</th>
<th>Textiles &amp; Clothing</th>
<th>% share</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007 - 08</td>
<td>6,55,863.52</td>
<td>89,120.85</td>
<td>13.59</td>
</tr>
<tr>
<td>2008 - 09</td>
<td>8,40,755.06</td>
<td>96,311.91</td>
<td>11.46</td>
</tr>
<tr>
<td>2009 - 10</td>
<td>8,45,533.64</td>
<td>90,682.06</td>
<td>10.73</td>
</tr>
<tr>
<td>2010 - 11</td>
<td>11,42,648.97</td>
<td>1,02,082.66</td>
<td>8.93</td>
</tr>
</tbody>
</table>

Source: http://commerce.nic.in/ftpp/comgrp.asp

It may be observed from the above Table that the share of Textiles & Clothing in country’s export basket has dropped to 8.93 per cent in the year 2010-11. The reason for falling share of textile sector in overall export is low demand in the international market, lack of investments, outdated technology, capacity constraints and so on.

European countries continue to be India’s major export market, the US is the single largest buyer of Indian textiles and apparel and the UAE, Saudi Arabia, Canada, Bangladesh, China, Turkey and Japan are in the top export list. India also excelled in the export of readymade garments and carpets. Its export basket consists of cotton textiles, textiles made from man-made fibre, wool and woolen goods, silk, handicrafts, coir and jute.

India’s textiles and clothing industry is one of the main stays of national economy and the largest contributing sectors of India’s exports worldwide. Indian exports suffered in 2007-08 due to the meltdown of

financial sector, economic slowdown in international markets, liquidity crunch and increased cost of production in the form of material, power and other inputs. Export led growth in textile in a global market scenario is possible only with large investments in the key areas of industry, particularly in weaving, knitting processing and apparel and enhancing its competitiveness in cost, quality timely review of global market conditions. The technology in these critical sub-sectors of the textile industry needs immediate up gradation to international levels.

**Figure 2.6**
India’s Textile Export

Source: Monthly statistics of the Foreign Trade of India, DGCIS, Kolkata Value US $ Mn

**2.3.12 Research and Development**

In order to provide systematic training to fashion designers and help them to compete in the international market in an effective manner,
National Institute of Fashion Technology Centres (NIFT) are established at New Delhi, Mumbai, Hyderabad, Calcutta, Chennai and Gandhinagar. Synthetic and Art Silk Mills Research Association (SASMIRA), Man-made Textile Research Association [MANTRA], Ahmedabad Textile Research Association (ATRA), Bombay Textile Research Association(BTRA), South India Textile Research Association (SITRA), Northern India Textile Research Association (NITRA), Indian Jute Industries Research Association [IJITRA] Kolkata were established under the administrative control of the Ministry of Textiles for the principal activities of Research & Development, provision of technical services, testing and training facilities.

India with a strong domestic market, the per capital purchase of textiles registered an increase of 6.09 per cent in quantity and 8.81 per cent in value in 2007 over 2006 which is confirmed by the National Household survey by the Textile committee. The Indian textile industry needs to move forward with greater sense of urgency and purpose. The government is bound to provide substantial incentive to textile machinery manufacture using India’s reputation internationally for its engineering skills. The Indian textile industry have to make serious efforts for landing high-value acquisitions overseas, the way to get entry for value added products in the competitive markets.

2.4 INDIAN COTTON

Cotton, the white gold, the most widely used natural fibre in clothing today, is the most famous textile material associated with the Indian subcontinent. The Indian textile industry is predominantly cotton based with 65 per cent of the fabric production in the country

35. www.texmin.nic.in
being accounted for by cotton. Indian cotton plants had been described by ancient Greek travellers, historians and Roman naturalists as ‘vegetable wool’, ‘a net of woven wind’ and ‘fleece of tiny lambs growing on trees’, and were cool, light, comfortable, more colourful, more easily washable and less appealing to fabric consuming insects. Cotton fabrics are said to be the pearl of Indian weaving.\textsuperscript{36}

Cotton played an important role in the history of India and continues to be an important crop commodity. The Indian cotton industry was well developed and some methods used in cotton spinning and fabrication continued to be used until the modern industrialization of India. The Indus valley civilization spun cotton since at least 3500 BC as indicated by the ruins of Mohenjo-daro. Cotton was mentioned in Hindu hymns in 1500 BCE.\textsuperscript{37}

India’s cotton industry struggled in the late 19th century because of un-mechanized production and American dominance of raw cotton export. India, failing to be a major exporter of cotton goods, became the largest importer of British cotton textiles.\textsuperscript{38} Gandhiji, in his commitment to Indian independence, believed that cotton was closely tied to Indian self determination.

\textsuperscript{36} www.texprocil.org
Figure 2.7

Area, Production and Yield of Cotton in India

Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation.

*Yield rates given above have been worked out on the basis of production and area figures taken in ‘000 units.
In the second half of the 20th century, a downturn in the European cotton industry led to a resurgence of the Indian cotton industry that India began to merchandize and was able to compete in the world market. Cotton Corporation of India, a public sector agency established in 1970, under the Companies Act 1956, engaged to diverse activities related to trade, procurement and export of cotton.\(^{39}\) In the early years of the 20th century, Coimbatore emerged as an important centre for cotton textiles and earned the epithet ‘Manchester of South India’. Production of raw cotton varies from year to year due to rainfall and climatic conditions.

India is also the pioneering country to develop, introduce and cultivate hybrid cottons from 1970s and that has ensured commercial success as on today in over 3 million hectares. India’s cotton area is 24.7 per cent of global cotton area, production about 13-14 percent and yield or productivity level 50 per cent of global average. India features in the second rank of 10 countries that plant biotech crops in more than 50,000 hectares.

In the past, cotton mill industry suffered from incompetent and selfish managing agents, who were interested in their own profits and did not take sufficient interest in accumulating financial reserves and maintenance and modernization of machinery. The other factors, which have spelt disaster to the industry in the last three decades, are government’s textile policy and growth of the power loom sector and as a result many textile mills became inefficient and uneconomic, one-third of mills became sick and many mills were closed down. Cotton textile industry

\(^{39}\) wikipedia.org/wiki/cotton-corporate_of_India
has suffered badly due to the problem in supply of raw material and power, obsolete machinery, need for modernization and competition from the decentralized sector.

The government set up the National Textile Corporation [NTC] in April 1968 for managing the affairs of sick textile mills in the private sector taken over by the Government and it regularly pumped money to rehabilitate and modernize such mills. The government has approved Draft Rehabilitation Scheme [DRS] for rehabilitation of viable mills and closure of unviable mills.\(^{40}\)

In India, the state of Maharashtra tops in area used in cotton cultivation, Gujarat in cotton production and Tamil Nadu in yield of cotton.\(^{41}\) India is one among the five leading exporters of cotton in 2011 with the United States, Brazil, Australia, Uzbekistan and stood second in the world cotton production with 27 million bales.\(^{42}\) India ranks first in cotton -cultivated area and second in production among all cotton producing countries in the world, next to China.

Indian cotton is at the verge of a major boom, with its variety and unmatched luster, dye absorption and reps; Indian cotton is at the threshold of capturing major international market share. Its success and importance is increasing with the introduction of BT cotton in 2002, prior to which cotton production suffered huge loss due to its susceptibility to insects and pests.

\(^{40}\)  www.ntcltd.co.in


\(^{42}\)  National cotton council of America – Rankings. cotton.org.
International Cotton Advisory Committee (ICAC), an association of governments of cotton producing, consuming and trading countries, was formed in 1939 and currently it has 41 members. Technology Mission on Cotton (TMC) was launched in February 2000 to improve the quality and productivity of cotton, reduce contamination and the cost of production of cotton, provide competitive advantage to the Indian textile industry and to ensure attractive returns to farmers by strengthening the Research and Development of high yield and hybrid varieties, transfer of technology and improvement of marketing infrastructure.

Though the quality of Indian cotton is not bad, much has to done to improve yield and reduce contamination. Intensive agronomy research and farmer friendly regulations are to be initialed to improve yield, to bring down prices and in turn to improve the competitiveness of the textile industry.

2.5 TEXTILE INDUSTRY IN TAMIL NADU

Tamil Nadu is the seventh most populous state in India with a population of 72,138,958 (5.96 per cent of India’s population as per census 2011 figure). The textile Industry of Tamil Nadu has a significant presence in the National and State economy, as it is the forerunner in industrial development and in providing massive employment in the State. Handloom, Powerloom, Spinning, processing, Garment and Hosiery are the various sectors of the textile industry in Tamil Nadu.

Handloom sector occupies a place of pride in preserving the country’s heritage and culture and plays a vital role in the economy of the state with its long tradition par excellence in its craftsmanship. It provides
employment to 6.08 lakhs weavers. Out of 34.86 lakhs handlooms in India
4.13 lakhs handlooms are in Tamil Nadu and 2.28 lakhs looms under 1187
Handloom Weavers’ Cooperative Societies and 1.85 lakhs looms under
private and non-cooperative fold. Handloom sector in Tamil Nadu has
also been playing an important role in meeting the clothing needs of the
people, stands next only to Assam in terms of number of looms. As many
as 54 handloom clusters schemes are launched in Tamil Nadu with
Central and State assistance under Integrated Handloom Development
scheme.

Tamil Nadu holds the second position in the country in terms of
the number of power looms installed. There are 22.24 lakhs registered
power looms in India, of which Tamil Nadu has 4.46 lakhs registered
power looms with 11.16 lakhs workforce. The cloth production in the
power loom sector in India is about 54,000 millions sq. mtrs of which,
the state contributes about 10,800 million sq. mtrs and 43,000 power
looms are under 189 Power loom Weavers’ Cooperative Societies. The
readymade garments and home textile sectors which are mainly for
foreign or international market, heavily dependent on the powerloom
sectors to meet their fabric requirement.

Textile sector in Tamil Nadu is ‘predominantly spinning-oriented’
and that too of cotton spinning. There are 2950 large, medium and small
spinning mills in India, of which, 1734 mills are located in Tamil Nadu
producing 1660 million kg yarn accounting for 40 per cent of India’s total
yarn production and stands the No.1 producer of various varieties of yarn
in the country.

43. O/o Directorate of Handlooms and Textiles.
These include 5 Cooperative Spinning Mills, 8 National Textile Corporation Mills and 26 Composite Mills. The spinning capacity of these Mills is 16.44 million spindles with a labour force of about 2.31 lakhs. The textile sector in Tamil Nadu is predominantly in the private sector, spinning oriented and labour-intensive and enables the Government preponderance of decentralized sector in most of segments of the industry, to earn substantial revenue besides foreign exchange through exports.\(^{44}\)

Out of the 10,397 hand processing units in the country, 2614 hand processing units are located in Tamil Nadu. Similarly out of 2510 power processing units in India, 985 power processing units are located in the state.\(^{45}\) Textile is the state’s oldest and most deeply rooted manufacturing sector. Textile mills are present around the city of Coimbatore. Cities of Tirupur and Erode are the country’s largest exporters of knitwear.

They are well known for textile manufacturing industries and export to such extent that districts Coimbatore, Tirupur and Erode are referred to as ‘Textile valley of India’. Kanchipuram, Arni and Tirubuvanam are famous for their handloom and silk weaving industries.\(^{46}\)

Tamil Nadu contributes about one third of the total textile production in the country and predominantly cotton based. Kanchipuram silk sarees, Bhavani Carpet (Jamukkalam), Madurai Sungudi, Salem Silk Dhothies, Erode and Karur home textiles, Tirupur knit wear garments are universally recognized for the excellent

\(^{44}\) O/o Directorate of Handlooms and Textiles.  
\(^{45}\) Ministry of Textiles, Govt. of Tamil Nadu, Reports, May 2011 Wikipedia.  
\(^{46}\) wikipedia.org/wiki/Tamil_Nadu_District.
craftsmanship and their uniqueness. The state textile sector provides direct employment to around 40 lakhs people.

The cities of Coimbatore, Erode, Tiruchencode and Tirupur in Tamil Nadu are the largest garment exporters in India. Around 7000 garment units in Tamil Nadu provide employment opportunity to more than one million people. About 62 per cent of India’s textile trading takes place only in the city of Erode and 56 per cent of India’s total knit wear exports come from Tirupur. Karur generates around $750 million a year in foreign exchange. Foreign exchange earned is through bed linen, kitchen linen, table linen, wall hangings and so on made in Tamil Nadu.47

2.6 TEXTILE INDUSTRY IN ERODE DISTRICT

Erode district is located on the north-western part of Tamil Nadu, covering an area of 8162 sq. km. The total population of the district is 25,74,067 comprising 13,06,039 males and 12,68,028 females as in August 2010.48 Until the year 1996, Erode District was called Periyar District, and was a part of Coimbatore District until September 17, 1979. Mathematician Ramanujam and Social Reformer Periyar were from this District.

Erode city is a municipal corporation and headquarters of the Erode district. The city population has crossed 7.10 lakhs.49 covering an area of 74sq.km.

47. The challenge of reform: How Tamil Nadu’s Textile and apparel industry is facing the pressure of liberalization? by Meenu Tewari for the Government of Tamil Nadu, India and the Centre for International Development, Harvard University, Cambridge, 2004.
48. Erode District @ yahoo.com.
Males constitute 51 per cent of the population and females 49 per cent with an average literacy rate of 78 per cent, higher than the national average of 59.5 per cent.\(^{50}\) Erode is well known for production and export of handloom, powerloom products, home textiles knitwear and readymade garments and hence it is called Loom City of India or Tex Valley of India. Erode produces about 47 per cent of state’s total textile needs.\(^{51}\) Products such as cotton sarees, bed spreads, carpets, lungies, printed fabrics, towels, dhotis are marketed to the tune of Rs 5 crores every week approximately in the weekly marketing place (shandy) on every Tuesday, where textile merchants from all over the country directly visit and purchase their requirements. About 62 per cent of India’s textile trading takes place only in the city of Erode.\(^{52}\)

Erode District is one among the industrially developed districts. Industries and trade occupy a place of prominence in the economy of the district. It is also an important market centre for Turmeric, a spice commonly used in curries and as a fabric dye. The agricultural and industrial activities are well supported by the rivers Cauvery, Bhavani and Amaravathi, Noyal and Uppar and Parambikulam Aliyar projects.

Textiles play a vital role in the industrial production of Erode district that out of 64 large scale industries in Erode district, 31 are textile industries. It had 3467 units dealing in cotton textiles (41.9 per cent), 61 units in wool, silk and synthetic fibre, 21 units in jute, hemp and mesta and 1814 units in hosiery and garments (21.9 per cent) registered under SSI / MSME as on 31.03.2011.\(^{53}\) Further it had 240

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50. wikipedia.org/wiki/erode.
51. wikipedia.org/wiki/textile_market.
52. publications/erode4.htm
53. www.erode.tn.nic.in/ssi
units in cotton textiles, 12 units in wool, silk and synthetic fibre, 4 units in jute, hemp and mesta and 79 units in hosiery and garments units in 2010.\textsuperscript{54} In mid 2005, Bhavani Jamakalam was registered as a Geographical indication by the Government of India.\textsuperscript{55}

The role of textiles in the employment of people in Erode district is also quite significant, that it had 41,135 handlooms engaging 32,908 families and 12,693 powerlooms engaging 2345 families by the year 2010.\textsuperscript{56}

Table 2.5

<table>
<thead>
<tr>
<th>Sector</th>
<th>No. of Ginning Mills</th>
<th>No. of Spinning Mills</th>
<th>No. of Weaving Mills (Decentralized Powerloom units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Private</td>
<td>15</td>
<td>280</td>
<td>27</td>
</tr>
<tr>
<td>TOTAL</td>
<td>15</td>
<td>282</td>
<td>27</td>
</tr>
</tbody>
</table>

Source: Deputy Chief Inspector of Factories, Erode, year 2010)

In Tamil Nadu out of 1187 Handloom Co-operative Societies, 2.28 lakhs handlooms under cooperative fold, 2.13 lakhs handlooms under non-cooperative fold and Rs.1098.24 crores production in Tamil Nadu, Erode Districts tops with 183 Handloom Cooperative Societies, 38,546

\textsuperscript{54} District Industrial Centre, Erode.
\textsuperscript{55} www.census.tn.nic.in
\textsuperscript{56} o/o Assistant Director of Handloom, Erode
handlooms under cooperative fold and 24,845 handlooms under non-cooperative fold. Erode district stands second in production with Rs.271.39 crores next only to Tirupur District. In respect of powerlooms in cooperative sector, Erode District stood second in number of powerlooms with 11,808 powerlooms. However, the Erode district based powerloom societies achieved the highest level of production of powerlooms fabrics to the extent of 760.82 lakhs metres out of 1094.75 lakhs metres produced in cooperative sector in Tamil Nadu which accounted for 69.49 per cent of total production. Similarly, the turnover of Erode based cooperative societies reportedly be the highest to the tune of Rs.150.73 crores which accounted for 52.54 per cent of total turnover in Tamil Nadu.

There are seven mechanized processing mills in medium and large scale sector; about 30 semi mechanized processing units and around 1200 manually processing tiny sector units in Erode district engaged in dyeing of yarn, cloth and printing of fabrics providing employment to 18000 persons approximately.  

2.7 TEXTILE PROCESSING FUNCTIONS

Fabric as it comes off the loom is known as greige (gray) goods. It is rough, irregular and full of blemishes Most fabrics undergo a number of treatments to convert the greige goods into finished commercial fabric. Two major operations carried out on fabrics made from all kinds of fibres are dyeing and printing. When Yarn is made into fabric, the interesting and intricate constructions bring to add beauty of appearance as well as service

57. publications/erode4.htm
ability. The various finishing processing suggest additional means of enhancing the appearance of the newly formed fabric to improve the qualities of durability and serviceability. In addition to dyeing and printing, some more be given to improve the specific performance characteristics in fabrics. Such important processing functions of cotton /polyester fabrics are discussed below.

2.7.1 Desizing

Desizing is the first process during which impurities such as starch, gums and so on can be converted into water soluble products which are then removed easily by washing and prolonged boiling.

2.7.2 Scouring

Grey cotton fabrics contain many unwanted impurities such as waxy substances, seeds and starch added during warp singing, lubricating and blends. These impurities are to be removed in order to get fabric dyed, bleached or printed. The wet fibres then come into intimate contact with the scouring agent (alkali / soap) and the waxy and fatty matter is removed or emulsified in fine globules.

2.7.3 Kier Boiling

The Kier is a vertical cylindrical vessel made up of mild steel and lined internally with special cement. The Kier is used for cotton materials. This vessel is connected externally to a circulating pump and a steam heater, so that the liquor from the main vessel can be continuously drawn and pumped through the heater and put back in the Kier. For pressure boils, the Kier will be covered with a lid and clamped air tight to get the required temperature and pressure.
2.7.4  Mercerising

The process of mercerizing consists of treating a cotton material for 45 to 60 seconds with strong caustic soda solution, of concentration 30-50 degree. Caustic is finally removed from the material by washing and neutralizing. Mercerizing is an important preparatory process for cotton fabric which is usually singed before mercerizing. But mercerizing can either precede or follow bleaching. Mercerizing causes the flat, twisted, ribbon like cotton fibre to swell into a round shape and to contract in length. The fibre’s affinity for direct vat and reactive dyes is much greater. The improvement more than pays for the cost of processing. Mercerizing of cloth produces a permanent luster, increased strength and improved dyeing qualities.  


2.7.5  Bleaching

If cloth is to be finished white or is to be given surface ornamentation, all natural colour must be removed by bleaching. This is also necessary if discoloration or stains have occurred during the previous Manufacturing process. Bleaching can be done in the yarn stage as well as in the constructed fabric. The kind of chemicals to be used depends upon the kind of textile fibre of which the fabric is composed.

All the bleaching processes reduce the strength of the fibre. Sunlight is still a principal bleaching aid for fine linen, which is spread out on the grass for several weeks with intermediate washing.
Figure 2.8
Sequence of Process of polyester Blends

Grey Inspection and seal
  ↓
Stitching
  ↓
Souring
  ↓
Naturalising
  ↓
Naturalising
  ↓
Heat setting
  ↓
Polyester portion dyeing
  ↓
Rebleaching
  ↓
Drying
  ↓
Finishing
  ↓
Zero – Zero Finishing
  ↓
Folding
  ↓
Packing

Mercersing
  ↓
Naturalising
  ↓
Drying
  ↓
Heat setting cum tinting (For white)
  ↓
Grey Inspection and seal
  ↓
Stitching
  ↓
Souring
  ↓
Naturalising
  ↓
Drying
  ↓
Printing disperse
  ↓
Aging
  ↓
Carbonising
  ↓
Drying
  ↓
Finishing
  ↓
Zero-Zero
  ↓
Folding
  ↓
Packing

Cotton portion dyeing
  ↓
Drying
  ↓
Finishing
  ↓
Zero – Zero Finishing
  ↓
Folding
  ↓
Packing
Figure 2.9
Sequence of Process of Cotton Varieties

Grey Inspection and sealing
  ↓
Stitching
  ↓
Desizing
  ↓
Kier boiling
  ↓
Bleaching
  ↓
Souring
  ↓
Naturalising
  ↓
Seutcher
  ↓
Drying
  ↓
Dyeing
  ↓
Neutralising
  ↓
Mercerising
  ↓
Drying
  ↓
Mercerising

Peroxide bleaching
  ↓
Drying
  ↓
Finishing
  ↓
Zero-Zero/Felt
  ↓
Folding
  ↓
Packing
  ↓
Batching
  ↓
Printing
  ↓
Polymerising / Finishing
  ↓
Finishing
  ↓
Zero-Zero/Felt
  ↓
Folding
  ↓
Packing

Drying
  ↓
Bleaching
  ↓
Souring
  ↓
Naturalising
  ↓
Seutcher
  ↓
Drying
  ↓
Dyeing
  ↓
Neutralising
  ↓
Mercerising
  ↓
Drying

Mercerising

Drying

Drying

Dyeing

Mercerising

Neutralising
between grassings, known as grass bleaching. Synthetic goods like Nylon and rayon are bleached in stronger oxidizing agents such as peracetic acid or sodium chlorite. Polyester and acrylics namely orlon, acrilan, geslan and zefran may be bleached with chlorine. In addition to usual bleaches, mills sometimes utilize optical bleaches, which are not true bleaches but fluorescent white chemicals that are absorbed into the fabric and give off a bluish white light, thereby hiding yellowish look. Thus, bleaching is conducted to produce a pure absorbent material or to produce a good white, not necessarily accompanied by a high degree of purity in the material. It is the process of removal of impurities, fatty and waxy material with which most textile fibres are associated.

2.7.6 Neutralisation

It is done by means of acid treatment and then thoroughly washed by water.

2.7.7 Scutcher

It is the process done after the scouring, bleaching and neutralisation process, the cloth to be opened from rope form to open width by using scutcher.

2.7.8 Drying

It is a process to dry the fabrics before dyeing and before finishing Cylinder dryers are used for drying in which the cylinders are heated by using steam and the fabric is passed through the cylinder or steam-heated rollers. Of late, hot-air dry is also used.
2.7.9  Dyeing

Dyeing is the process of colouring of the textile material different stages by various chemical and mechanical methods. In the dyeing process, fibre, yarn or fabric is impregnated with dye stuff. The dyeing process is divided and subdivided into various forms. In direct dyeing and mordanting, the dye is fixed to the material to be dyed by the addition of a chemical agent, called a mordant, which may be applied to the material or added to the dye. Some dyes may impart any one of several colour to material, depending upon the mordant used. The material to be dyed is then immersed in the dye solution, and the dyed material is exposed to air from which the oxygen acts on the dye to produce the desired colour.

In stock dyeing the fibre (stock) is dyed before being spun into yarn. This method achieves good colour penetration. The mass of fibre placed in a revolving drum in a large vat or kier, of dye and the drum circulates the fibre through the dye. Some machines are constructed so that the fibres are held stationary and the dye is circulated through them.

Man-made fibres can be dyed while they are still in solution. The desired colours are added to the solution before it is extruded through the spinneret to form filaments. This solution dyeing, also known as dope dyeing produces clear uniform colours which have excellent fastness to light and will not washout.

Worsted cloth is dyed by the top-dyeing method. The fibres are combed into silvers which are then wound on perforated spools,
forming balls (known as tops) two or three feet in diameter. The tops are placed in cans in a dye vat, and the dye is forced through the tops by means of the perforated spools.

The most economical and commonly method of dyeing used today is **piece dyeing** or dyeing the fabric in pieces after it has been woven. Sometimes the cloth is dyed by passing it through a dye bath in rope form, and sometimes a full width of cloth is run through a colour box and then through rollers to squeeze out the excess dye. When the fabric contains two fibres which have different affinities for the same dye, a two-tone effect is produced known as **cross dyeing**. When the dye imparts the same colour to different fibres, the process is known as **union - dyeing**.60

The **beck dyeing** is done when long lengths of cloth are to be dyed on a continuous process by passing the fabric in tension free rope form through the dye bath.

**Jig dyeing** method utilises the basic procedure of beck dyeing except, the fabric is held on rollers at full width rather than in rope form as it is passed through the dye bath.

In **pad dyeing** the fabric held at full width is passed through a rough containing dye and then between two heavy rollers which force the dye into the cloth and squeeze out the excess. It is generally done on a continuous dye range which can accommodate a large amount of fabric. The material is seen in one operation through pad, into a heat or steam chamber to set the dye, then successively into a washer, a rinser and a dryer.

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60. Collier’s Encyclopedia 22 - page 220
**Beam dyeing** method is similar to the warp - beam dyeing to yarn. Only light weight fabrics of relatively open construction can be beam - dyed as the fabric is wound on a beam and dye liquor cannot circulate through more compactly constructed material. Beam dyeing does not subject the fabric to stress or tension. It is rapid and economical.

**Jet dyeing**, mainly used for polyester fabrics, the fabric is jet - dyed by placing it in a heated tube or column where jobs of dye solution is forced through it at pressures up to 300 pounds per jet. The fluid moves faster than the cloth so that the cloth floats through the tube without touching the walls.

**Foam dyeing** follows the technique of applying dyestuff suspended in liquid that is foamed with a special mixer and applied to the fabric. It is a relatively recent development to conserve energy in steaming and dyeing, and to reduce water consumption and pollution.

**Solvent dyeing**, a recent technique using liquids such as ammonia, perchlorethylene and trichloro benzene which are better dye solvents to penetrate better into a wide variety of man - made fibres. Further, it saves energy and cost because high temperatures for drying are not needed, the exhausted solvents are recoverable, are thereby non-polluting. To improve further the dye penetration, a machine called pulsar is also used.

**2.7.10 Printing**

Textile printing is the application of colours on a fabric in a predetermined pattern by a various chemical and mechanical methods.
This process is similar in principle to ordinary letter press printing in which, the raised portions of prepared blocks receive dye and then transfer it to the material to be printed. Attractive prints may be obtained by different methods used.

The **direct roller printing**, the most widely used method is direct roller printing. The fabric is passed between a large drum and one or more copper rollers, which prints up dye in the form of printing paste and apply it directly to the fabric. Each roller prints a separate colour, and as many rollers are used as the design calls for. Great speed is possible with this method as machines are capable of printing up to 200 yards (183 meters) a minute. When both the sides of the fabric are printed at the same time, the technique is known as **register or duplex printing**.

**Discharge printing** also utilises the roller method. In this process the fabric is first dyed a solid colour. Colour is then removed from certain areas by rollers carrying colour - removing chemicals rather than printing paste. The result is a white pattern on a coloured background. Direct printing may then be done on the fabric if additional colour is wanted.

In **Stencil or screen printing** method the design to be transferred to the fabric is applied to a piece of silk or bolting cloth, stretched across a frame. The non-printing areas of the design are covered with an impenetrable material and the printing areas are left open. After the frame has been positioned over the fabric to be printed, dye is placed in the frame and worked back and forth with a squeegee. The dye penetrates the bolting cloth only in the uncovered areas. Separate screens are used for different colours.
**Resist printing** is done by covering certain areas of the goods with a dye-resisting agent, usually of the tannin-mordant dye. When the goods are then piece-dyed the covered areas repel dye. The resisting agent is then removed by chemical means and white areas appear on the dyed background. A variety of effects can be achieved by using successive dye baths in different colours.

**Warp printing** is a special process in which the warp threads are coloured in certain areas before the fabric is woven. Colour may be applied to the warp threads before they are fed into the loom or they may be roller printed after being warped. A subtle effect is produced when the design is broken up by the unprinted filling threads.

In **Rotary Screen Printing** the machine employs a rotary screen for each colour, as in flat screen printing. As the fabric to be printed is fed under uniform tension into the printer section of the machine, its back is usually coated with an adhesive, which causes it to adhere to conveyor squeegee in each rotary screen forces the paste through the screen on to printing blanket. The fabric passes under the rotating screens through which the printing paste is automatically pumped from pressure tanks. The cloth then passes into a drying oven, cured to set the colour and washed.

Literally moving a design from one surface to another is known as **transfer printing**. A typical well known technique is that of iron-on prints of emblems and decorations, which are generally made of pigments in a paraffin or thermoplastic base that can be melted and bound by heat and pressure onto a fabric surface. A more sophisticated and effective method of transfer printing is that of transferring a design intact by vaporizing it from the paper to a fabric by either dry heat transfer or wet heat transfer.
In **Jet Spray Printing**, designs may be imparted into fabrics by spraying colours in a controlled manner through nozzles.

**Micro Jet Printing**, originally developed for carpets, applied to other pile fabrics and materials too. This technique uses rows of very fine jets to force dye into a fabric according to a predetermined pattern. The operation of the jets is controlled by computer.

**Electro static printing** is a process of mixing a finely powdered dye with a carrier, such as a natural or synthetic resin, that has high dielectric properties for electro static printing. The dye is spread on a screen bearing mixture is pulled by the electro static field through the pattern area onto the design and the fabric is passed into an electro static field under the screen, which is held about ½ inch (12 mm) above the cloth. The dye is initially fixed by infrared heat. The fixation is subsequently reinforced by the suitable process for the kind of dye used.

In **Photo Printing**, the fabric is coated with a chemical that is sensitive to light. Any photograph may be printed on the fabric as in a paper.

**Differential printing** is a technique of printing tufted material made of yarns having different dyeing properties. The design can consist of a solid - colour background with super imposed motifs, which may have contrast colour areas of differentially dyed colours. 61

2.7.11 **Finishing**

Finishing is a process by which the fabric is subjected to further operation to improve the feel and look. Various finishing operations are done

using various machinery according to fabric varieties and customer requirements. These functional treatments are given in order to provide required characteristics which are not inherent in fibre or fabric and to improve the specific performance characteristics namely strength, elasticity, resilience, drapability, heat conductivity, absorbency, cleanliness and washability for normal and regular fabrics and shape - retentive finishes, wrinkle -resistant finishes, permanent press finishes, water repellency, stain repellency, flame retardants, moth proofing, mildew proofing, antibacterial finishes, slip resistance, anti static finishes, heat - reflectant finishes, foam laminating finishes for special fabrics. The functional operations in the finishing process are discussed below.

**Bleaching** is a chemical process of whitening by removing undesirable colouring matter that may be present in the cloth.

**Singeing** is burning -off straggly or protruding fibres from the face of the cloth to give a clearer, more lustrous surface.

**Sizing** gives degrees of stiffness to materials through the use of various types of starch.

**Calendering or pressing** is the process of ironing or pressing of cloth by means of heated rollers and proper pressures. A very slight increase in the speed of one roller over another will enhance luster due to the added friction is known as friction calendering.

**Mercerizing** of cloth produces permanent luster, increased strength and improved dyeing qualities. To mercerize the cloth, it is bathed in a cold, strong caustic soda solution of the cloth to raise the nap.

In **water - resisting**, material is treated chemically to resist water or may be given a ‘waxing’ to make it repellent.
The trade mark “Sanforized” is applied to fabrics that have been shrunk by the compressive-shrinkage process and indicates that the residual shrinkage of the fabric is less than one percent.

Shearing cuts and evens-off the nap or pile in a uniform manner. The cloth is passed through a shearing machine which stimulates a lawn mower with its series of blades.

Burling or Mending or Knotting is an operation that removes all loose threads and knots by means of burling irons - a type of tweezer. Many knots are pulled or worked to the back of the cloth, since if there were cut there would be the possibility of holes in the fabric. Specks, burrs and other objects that might impair the final appearance of the cloth are removed with tweezers or burling irons.

Fulling or Milling or Felting is performed on the material which is placed in warm, soapy water in the fulling mill. The cloth is pounded and twisted to make the fibres in the yarns interlock. This application of heat, moisture and pressure, followed by a cold rinse, does much to ready the cloth for future treatments. Sometimes chemicals are used to help moisten, soften and lubricate the minute fibres so that desirable matting will result. Fulling causes considerable shrinkage and also gives the material additional thickness and a firmer, fuller texture.

Crabing is a treatment given to set the yarn-twist and the cloth permanently. The material is passed over several cylinders that rotate in hot water and then immersed quickly in a cold-water bath. The cloth is held firm and tight to prevent wrinkling. Repetition of the treatment with increased pressure results in setting the cloth and the finish.
The purpose of **teutering** is to bring the cloth to the desired width and to strengthen and level the material. The cloth is moistened to make it supple so that a uniform stretching will be possible. Teutering is done on a long machine in which both edges of the fabric are held by clamps, an endless chain picks up the cloth, carries it along the frame and then releases it at the front of the machine.

**Decating or decatizing** is a shrinking operation, done wet or dry. In decating, the cloth is shrunk by tension - winding it on a perforated cylinder through which steam is passed and prevents shrinkage in the finishing fabric and makes it ready for the cutters.

A **napping, gigging or raising** treatment is given by passing the tightly stretched cloth over a revolving cylinder or roller inlaid with teasels.

**Sanding or Emerizing** in order to produce a soft, chamois like nap to the fabric by passing them through a series of emery-covered rollers.

**Tigering** finish is given to lift and comb the nap so as to improve or modify its height and remove loose fibres. The tiger roll has long fine wires that penetrate to the ground of the fabric to lift up fibres not raised by the napper rolls.

**Electrofying** is a polishing process in which the pile fabric is passed under cylinders with helical grooves arranged to rub the fabric at widely different angles in rapidly alternating succession. The action whips and beats the fibre back and forth, removing their crimp and
entanglements. The friction on the pile caused by the smooth surfaced parts of the cylinder straightens the fibres and imparts sheen. The addition of a lubricant such as water, alcohol, or silicone solution may be used to facilitate the process.

**Conditioning** process is done to give back the natural moisture through a machine which sprays them and thus makes the fabric to quickly regain the moisture and the strength lost, after application of dry heat is singeing.

**Washing - off** is a simple operation to ensure that all the unfixed colouring matters and so on are cleaned out of the fabric. As the action is mechanical, normally cold water is used.

**Drying** is usually effected by passing the fabric round a series of steam - heated rollers or hot - air dry.

### 2.14.12 Folding and Packing

After the required processes are completed based on the nature of the fabric, its end use and user’s need, then the fabric is to be folded metre wise and then to be imparted and segregated as per the quality, such as sound, seconds and damages. Then after inspection and cutting, they are stamped as per the specification in each piece, bundled and baled as per the required norms.