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Technical Textile Industry in India – An Overview

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Chapter – 2

TECHNICAL TEXTILE INDUSTRY IN INDIA – AN OVERVIEW

After presenting the synoptic view of the research work the researcher proceeds to give an overview of the Technical Textile industry in India in the present chapter. Briefing the historical background of the industry the chapter includes present position, production, export, import and testing facilities for the Technical Textiles available in India.

2.1 Introduction

"Technical textiles are defined as comprising all those textile based products which are used principally for their performance or functional characteristics rather than for their aesthetics or are used for non-consumer (i.e. industrial) applications." (David Rigby Associates, 2010, p. 2) These textiles are accounted to be the fastest growing sector of the textile industry which is manufacturing high tech. high performance fabric designed not just to look attractive, but to present a significant added value in terms of functionality. The Textile industry is not only experiencing for clothing application but also continuing a major outlook towards non-clothing application of textiles known as Technical textiles. Technical textiles are now providing more than half of total textile production because it is growing at twice rate of textiles for clothing applications.

The distinctiveness and confrontation of technical textiles lies in the need to understand and apply the principles of textile science and technology to give solutions, in the main technological problems but also often to engineering problems as well. With the emphasis on measurable textile performance in a particular field of application, this requires the technologist to have not only deep knowledge of fibers and textile science and technology but also be aware of the application and the scientists, technologists and engineers who service it. Thus, the producer of geotextiles requires core knowledge of the world of civil engineering, and the home textile producers, need deep knowledge about the field of home furnishing, home decoration and floor coverings. This chain endeavors to bridge a gap between producer and end-user. The processes of producing technical textile products involve
the certain principles which should be followed by the manufacturers i.e. first of all raw materials are selected and then it is converted into yarns and fabrics. After that finishing, dyeing and coating of technical textiles are searched and finally theses raw materials, processing techniques, specifications, finishing, properties and special technical characteristics are applied in wide range of specific areas of application (Horrocks and Anand, 2000).

Technical Textile is one of the emerging areas for investment in India because it has immense potential to gear up the traditional textile industry. This sector is categorized under 12 segments in India out of which Hometech, Meditech, Mobiltech and Geotech are the promising fields. There is no doubt that India’s research institutions are doing a praise worthy work in promoting Technical Textiles particularly in the Hometech and Meditech fields but need lots of more efforts. It would be certainly worth to import some of the technologies from the western countries which have progressed in all application of Technical Textiles, to reach our research findings up to the next higher plane.

2.2 Historical Background of Technical Textiles in India

Technical textiles have attracted considerable attention, though the use of fibers, yarns and fabrics for applications other than clothing and furnishing is not a new concept. Nor is it entirely linked to the appearance of modern artificial fibers and textiles. The historical background of technical textiles is as old as general textiles (Mangat, 2009). It is encouraged from the use of ropes and is in use since centuries, which is one simple form of technical textiles. These ropes were used to meet some functional requirements like for sailing or for giving a strong grip to tents. The number of other usages can also be founded for technical textiles in history. “There is evidence of woven fabrics and meshes being used in Roman times and before to stabilize marshy ground for road building – early examples of what would now be termed geotextiles and geogrids” (Horrocks and Anand, 2000, p.1). Moreover, majority of technical textiles had been developed with the nonwoven techniques. But in current era, there are various other methods available for producing technical textiles like, knitting, weaving, braiding, and tufting. In spite of its increasing importance, the technical textile in Indian market have historically been very poorly documented but the information regarding certain past events of technical textiles in India have been gathered from different sources which are given as follows:
In the year 1970, Mr. Yogesh Kusumgar realized the potential of technical textiles manufacturing in India (Kusumgar Corporates, n.d.). He started a business to fulfill the ever-changing requirements of a flourishing technical textiles industry and established Kusumgar corporate. After this initiative taken by him, SRF limited came into existence in 1973 and headquartered in Gurgaon. Now, this company has capital of $ 450 million and it is operating in technical textiles, packaging films and chemical engineering plastics across India, Thailand, UAE and South Africa (“Human factor”, 2010).

By 1980, the textile industries were struggling for survival because of low cost of import and almost stagnant consumer markets. It was then, the Indian textile industries felt that non-conventional sector can become not only a growth tool of the textile industry but also can provide potential remunerative market for its development. “The term Technical textile coined in the 1980s to describe the growing variety of products and manufacturing techniques being developed primarily for their technical characteristics and function rather than their appearance or other decorative properties. It largely superseded an earlier term 'industrial textiles' which had become too restrictive in its meaning to describe the full complexity and richness of this fast growing area” (Chaudhary, 2007).

In 1985, Shri KS Trivedi promoted a company named ‘Neo corp. International Ltd’ as a private limited company on 4 July 1985 (Business Standard, 2010). Currently, this company is engaged in manufacturing Packtech, Agrotech and Geotech products of technical textiles.

In 1993, a Kanpur based integrated textile company named Shri Lakshmi cotsyn Ltd began its operation with the wide range of Technical Defense Textiles and now it is one of the fastest growing sector in the Indian Home and Technical Textile segments (Shri Lakshmi Cotsyn, 2011). After the gap of five years, “Obeetee Textiles Pvt. Ltd.” came into existence in the year 1998. This company is wholly owned subsidiary of Obeetee group which is engaged in producing technical textiles and high quality non-woven fabrics in India (Obeetee Textiles Pvt. Ltd, n.d.).

In 1999, the Union textile ministry planned to launch an integrated project for assessing the progress of the growth of industrial and technical textiles in the country. The Silk & Art Silk Mills Research Association (SASMIRA) had appointed as the
nodal research association to undertake the consolidated R&D project. “The committee valued global market for technical textiles at US $ 67 billion” (Narendranath, 1999).

In the year 1958, a company under section 25 of the companies’ act 1956 named Indian cotton mills federation (ICMF), was established for manufacturing home furnishings, cotton yarn, blended and man-made spun yarn (Confederation of Indian Textile industry, n.d.). However, it initiated the process of establishing an umbrella organization for the textile industry in August 2000 broad basing the coverage of its member associations to include independent weavers and processors. The new name of ICMF has formed in May 2005 as confederation of Indian textile industry (CITI).

In 2002, SASMIRA undertook two R&D projects on technical textiles for its development in the country. The first project was on the development of insulating material from textile substrates and the second one was on products from recycled Polyethylene Terephthalate (PET) bottles. (Mittal, 2002)

The Ministry of Textiles, on 4th July, 2002, formed an Expert Committee on Technical textiles (ECTT) to draw up an action plan for the growth of Technical textiles. The committee has recognized six major technical textile products for promoting growth namely spun bonded geo-textiles, needle punched geo-textiles, woven geo-textiles, geogrids, narrow fabric woven on needle looms and non-woven for disposable health care textiles. Speaking to Express Textile, Mr Nagesh N Mugadur, director, ROTC, Coimbatore, said "Technical textile is a vast area and includes more than 100 products based on their application" (Swaminathan, 2003).

In 2005, it was estimated that 90% of India’s demand is currently met through imports and few companies are engaged in the production of technical textiles. During this year, consumption of technical textiles in India was valued at 20,000 tons per annum. Thus, it was expecting that growth of this sector would gear rapidly in future (Economic Times, 2005, p. 6). Gradually, the government realized the potential of technical textiles and suggested to follow the recommendations given by Expert Committee on Technical Textiles (ECTT).

With the passage of time, as the demands and needs of technical textiles growing in the Indian market, industry players were being motivating towards the
venture into these new product categories (India: BCH, 2006). This increasing importance of the industry compelled the industry players to come up in this sector and to solve these problems. Department of Textile Technology, IIT Delhi organized a two-day international conference on Technical textiles in the year 2006. The conference brought together the industry, research organizations and academia involved in the field of Technical textiles.

Consequently, the centre of excellence (COE) established by the Union ministry of textiles in various sectors of Technical textiles for facilitating convenient manufacturing and infrastructure support (The Financial Express, 2008). Moreover, the government took various measures to increase the investment in textile sector during the year 2008. The measures were 5% concessional custom duty for machinery used in technical textiles, 10% capital subsidy for technical textile machinery and 5% interest reimbursement.

In 2009, due to increasing usage of technical textile products, various big companies felt necessary to go ahead and diversify their products into technical textiles. Therefore, Reuter- Indian textiles companies expanded their business in the construction, automobiles and health care sectors to tap new customers. At that time, S Kumars Nationwide (SKMK.BO), Alok industries and SRF (SRF.BO) were also very eager to enlarge their business in this promising field (Reutars, 2009).

In 2010, “Associated Chambers of Commerce and Industry of India (ASSOCHAM) estimated the market for Technical textiles at an average annual rate of 14% to touch $ 19.76 billion by 2014-15” (“Market for Technical Textiles”, 2010). Realizing the rising market and the lack of proper data for technical textiles, the baseline survey was conducted by ICRA Management consultancy services Ltd. in this year which contains the details on various aspects of Technical textiles.

As the importance of Technical textile is raising day by day, market opportunities are increasing thus the usage for the same is growing rapidly. “The domestic technical textiles market is projected to grow at an average yearly rate of over 10-12 per cent in the next four to five years because of high demand, said the president of the trade body, Ms. Swati Piramal” (“Technical Textiles” 2010). The Government of India has taken many initiatives to promote the Technical textiles but more efforts are needed to move the industry forward successfully. If government
takes, right action at the right time and do more work in the field of research and
development then it can be expected that Indian Technical textile industry will have
bright future in the coming years.

2.3 Technical Textile Industry

The technical textile is an extension of traditional textiles which combines
both performance and decorative properties and functions in equal measure. For
instance traditional fabrics, such as knits, can also be considered as Technical Textiles
if they have some advanced quality of i.e. UV resistance or reduced flammability by
adding some chemicals or synthetic fibers. Basically, The textile materials which have
technical characteristics are called as technical textiles for example Tarpaulins,
Canvases, Tents, Awnings, Filters, Automotive carpets, Facial wipes, synthetic
leather, wadding interlinings, Embroidery backing fabrics. The other terms used for
defining 'Technical Textiles' are Industrial textiles, functional textiles, performance
textiles, Engineering textiles, Invisible textiles and Hi-tech textiles.

"Technical textiles are those textiles which are used individually or as a component/part of another product." (Ministry of Textiles, 2004, p. 3) This definition
explains that a technical textile provides specific property to a traditional textile such
as fire retardant fabric for uniforms of firemen and coated fabric to be used as
awnings while as a component or part of another product, they are used to enhance the
strength, performance or other functional properties of that product as done by the
tyre cord fabrics in tyres and interlining in shirt collars.

The technical textiles supply chain is a lengthy and composite one, stretching
from the producers of polymers for technical fibers, coating and specialty membranes
through to the converters and fabricators who integrate technical textiles into finished
products or use them as vital part of their industrial operations. The economic scope
and significance of technical textiles extend far away from the textile industry itself
and has an impact upon just about every area of human economic and social activity.
There are no trouble-free paths to success and producers and converters still face the
confrontation of making economic returns equal with the risks involved in operating
in new and multifaceted markets. If anything, the steady need to build up fresh
products and applications, invest in new processes and equipment because market to
an increasingly varied range of customers is more demanding and costly than ever.
2.3.1 Types of Technical textiles

To discuss the various types of technical textiles, one of the classifications is based on its functions. Technical textiles are divided into four main classes of functions (Nemoz, 2001) which are given as under:

1. **Mechanical function** involves mechanical resistance reinforcement of material and elasticity.
2. **Exchange function** involves filtration, insulation, drainage, impermeability and absorption.
3. **Function of living being** involves antibacterial, anti dust mites, biocompatibility and bio degradability.
4. **Protective function** involves electrical insulation, Infrared radiation (IR) and UV rays, Nuclear Biological and Chemical (NBC), high visibility and electromagnetic fields.

2.3.2 Segments of Technical Textiles

The classification on the basis of different segments has been developed by Techtextil; Messe Frankfurt Exhibition GmbH which is widely used in Europe, North America and Asia. The classifications are:

**Figure 2.1: Twelve Segments of Technical Textiles**

1. **Agrotech or Agrotex:** This segment comprises technical textiles products which are used in animal husbandry, farming, fishing and horticulture. The Agrotech textiles offers unique properties in the form of controlling the harmful influences of climatic and environmental factors on crop production and cattle breeding, normalizing nutrient level intake of plants, supporting in process and post harvest operations and serving ropes, lines and nets to the fishing industry. The Agrotech products include shade nets, crop covers, mulch mats, anti-hail nets, bird protection nets and fishing nets (*Office of the Textile Commissioner, n.d.*)

2. **Buildtech or Builde:TeX:** These technical textiles are used in the construction of buildings (temporary and permanent), bridges, dams, roads and tunnels. This segment of technical textiles facilitates concrete reinforcement, foundation systems of front wall, insulations, interior construction, proofing materials, air conditioning, noise prevention, protection against sun, building safety. The Buildtech products comprise hoardings & signages, architectural membranes, cotton canvas tarpaulins, scaffolding nets, HDPE tarpaulins, and floor and wall coverings (*Ministry of Textiles, 2004*).

3. **Clothtech or Clothtex:** This segment of technical textiles used for the production of garments and shoes which are made with technical components such as yarns, fibres and textiles and provide functional, smart and intelligent clothing that gives strong insulation, water or fire resistance, breathability, wear resistance etc. The Clothtech products includes shoe laces, zip fasteners, interlinings, labels, umbrella cloth, velcro and sewing threads (*Office of the Textile Commissioner, 2009*)

4. **Geotech or Geotex:** The geotech textiles are used for the construction of bridges, dams, roads and pavements, railways and paths as well as embankments, cutting, dykes, rail-track bed stabilization, landfills and waste management and sub-sea coastal engineering projects. These technical textiles are permeable fabric or synthetic material, woven or non-woven which provide various unique properties such as good strength, separation or confinement, filtration, drainage, durability, reinforcement low moisture absorption, thickness and protection. The major Geotech products are geogrids, geo composites, geonets and geomembranes (*Technical Textile, n.d.*)
5. **Hometech or Hometex**: This segment of technical textile includes textile components which are used in household application. It has wide range of applications in interior decoration and furniture, carpeting, protection against sun, cushion materials, fire proofing, floor and wall coverings, textile reinforced structures that provide decoration, comfort and safety. The hometech products comprises fiberfill, carpet backing cloth, mattress and pillow components, blinds, stuff toys, HVAC filters, filter cloth for vacuum cleaners, nonwoven wipes furniture fabrics and mosquito nets *(Office of the Textile Commissioner, n.d.)*.

6. **Indutech or Indutex**: These technical textiles products are used for the industrial purposes. The industrial purposes include industrial processes, incorporation of textiles into industrial products, reinforcements for printed circuit boards, seals and gaskets and other industrial equipment. The indutech products include conveyor belts, cigarette filter rods, drive belts, bolting cloth, AGM glass battery separators, decatizing cloth, abrasives, ropes & cordages, composites, computer printer ribbon, printed circuit boards, paper making fabrics, filtration products and industrial brushes *(Wazir Advisors & EYPL, 2013)*.

7. **Meditech or Meditex**: These technical textiles products are used in the human hygiene, health and personal care and surgical application. The Meditech products are made with reusable and non-woven materials i.e. silk, cotton, silk polyester and polyamide. The products covered under this segment are baby diapers, sanitary napkin, incontinence diapers, surgical sutures surgical dressing, disposables, contact lens and artificial implants *(Wazir Advisors, 2011)*.

8. **Mobiltech or Mobiltex**: The Mobiltech textiles are used in the construction of automobiles, railways, ships, aircraft and spacecraft. The mobiltech products comprises nylon tyre cord, airbags, car body covers, seat belt webbing, automotive carpets, headliners, insulation felts, sun blinds, helmets, seat upholstery, airline disposables, aircraft upholstery webbings for aircrafts, and railways seating fabrics *(Office of the Textile Commissioner, 2009)*.

9. **Oekotech or Eco-tech or Oekotex**: These technical textiles are used for the protection of environment, waste disposal and recycling. The oekotech textiles
have wide range of applications in air cleaning, water cleaning, prevention of water pollution, recycling, floor sealing, erosion protech and product extraction (Technical Textile, n.d.).

10. Packtech or Packtex: Packtech textiles include all textiles packaging material for industrial, agricultural and other goods. This technical textile segment include various products such as Flexible Intermediate Bulk Container (FIBC), leno bags, Polyolefin woven sacks, tea bags and coffee filters, wrapping fabric, soft luggage products, jute hessian and sacks (Ministry of Textiles, 2004).

11. Protech or Protex: These technical textiles are used for various protective clothing which is manufactured with high performance fibers. These textiles provide the protection for personnel working in hazardous environment. The Protech products comprises bullet proof jackets, fire retardant fabrics, fire retardant apparels, radiation protection textile, chemical protection clothing, high visibility clothing, industrial gloves and high altitude clothing (Office of the Textile Commissioner, n.d.).

12. Sportech or Sportex: These textiles are used in sports and leisure industry that provide high level of performance by combining several practical functions with wearing comfort. The technical textile products covered under this segment are sports composites, sport nets, angling, sail cloth, swim wear, sport shoes components, balloon fabrics, parachute fabrics and sailcloth (Ministry of Textile, 2004).

2.3.3 Raw Material for Technical Textiles

Technical Textiles are manufactured from a variety of fibers and filaments based on the preferred properties of the end product. Generally, all types of fibers can be utilized in production of Technical Textiles. The fibers and filaments can be broadly categorized as natural and man-made.
Figure 2.2: Fibers used in Technical Textile Manufacturing

<table>
<thead>
<tr>
<th>Natural fiber</th>
<th>Man Made Fibres and Polymers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotton</td>
<td>Synthetic fiber</td>
</tr>
<tr>
<td>Silk</td>
<td>• Viscose</td>
</tr>
<tr>
<td>Sisal</td>
<td>• Polyamide</td>
</tr>
<tr>
<td>Flax</td>
<td>• Polyolefin</td>
</tr>
<tr>
<td>Wool, etc.</td>
<td>• Flax</td>
</tr>
<tr>
<td></td>
<td>• Polyester, etc.</td>
</tr>
<tr>
<td></td>
<td>High performance fiber</td>
</tr>
<tr>
<td></td>
<td>• Aramid</td>
</tr>
<tr>
<td></td>
<td>• UHMW Polyethylene</td>
</tr>
<tr>
<td></td>
<td>• Carbon</td>
</tr>
<tr>
<td></td>
<td>• Glass, etc.</td>
</tr>
</tbody>
</table>


1. Natural fibers

India is a rich source of natural fibers therefore, the necessary fibers for technical textiles are domestically available in plenty supply. The natural fibers predominantly used in technical textiles include Cotton, Jute, Silk, Coir, etc.

2. Man-made fibers and polymers

Man-made fibers (MMF) and man-made filament yarns (MMFY) constitute around 40% share of the total fiber consumption in the textile industry as a whole. These fibers are key raw material for the technical textile industry because of their customizable characteristics. The key man-made fibers, filaments and polymers used as raw materials in technical textiles are:

A) Synthetic Fibers / Man-made fibers and filaments

Synthetic fibers are used more in manufacturing of Technical Textiles. Some of these fibers are customized for special purposes, which lead to production of high-performance or high-tech fibers.

B) High Performance Fibers / Polymers

High-performance fibers accomplished remarkable penetration in the market and have opened new opportunities for innovation in Technical Textiles. The effects they have on the development of new products are often described as revolutionary. At
present, Technical Textile products made of high-performance fibers are used in automobiles, aerospace, protective clothing, healthcare, etc.

India is one of the world’s largest producers of MMF and MMFY, with production of 1,284.64 million kg and 1,549.80 million kg in 2010-11, respectively. Even as, production of MMF and MMFY registered growth of 1.31% and 1.78%, respectively, over the previous year alone, the last decade has witnessed a stable increase in production and consumption of major synthetic fibers and polymers, resulting in a fair degree of self-support in the domestic MMF and MMFY markets (Office of the Textile Commissioner, n.d.).

Further, the technologies used for the production of technical textiles are given below to know whether India has ability of producing technical textiles or not.

2.3.4 Technologies for Technical Textiles

India has adequate machines for manufacturing conventional textiles but technologies for producing technical textile products are majorly imported. The production of technical textiles products needs particular unconventional weaving, spinning, braiding and knitting, non-woven technologies or machinery (Office of the Textile Commissioner, 2009). These technologies and machineries used for manufacturing technical textiles are not properly available in India. In case of some technical textile products, the manufacturers are depending on imported machineries and in case of some other technical textile products, technologies are imported. An overview of technology used for manufacturing technical textiles and their applications are given as follows:

1. Spinning Technologies

i. **DREF Spinning:** DREF spinning technology is required for manufacturing core-spun yarns of having exceptional strength, consistent performance in sewing, excellence abrasion resistance and adequate elasticity. The major application areas of this technology are protech, hometech, indutech, mobiltech, meditech and packtech.

ii. **Wrap Spinning:** The wrap yarns are manufactured by this latest technology in order to produce technical textile products. The yarns manufactured using this technology is used for the production of hometech, mobiltech and clothtech products.
2. Weaving Technologies

i. **Projectile Weaving:** This new technology permits the use of any yarns: cotton, wool, mono or multifilament and even hard fibers like jute and linen for the production of agrotech, geotech, indutech and buildtech products.

ii. **Rapier Weaving:** A flexible or solid element called Rapier is used in this technology to insert the weft yarn across the shed. Rapier looms can weave very light fabrics of 20 gsm to heavy 850 gsm. The application areas of this technology are mobiltech, protech and sportech.

iii. **Air Jet Weaving:** Air jet machines are able to weave spun yarns ranging from gauze to dense woven fabrics and used for weaving filament yarns into fabrics ranging from light weight linings to tap fabrics. This technology is applied in the areas of mobiltech and sportech.

iv. **Three Dimensional Weaving (3D):** Three-dimensional weaving is a type of weaving in which harnesses with multi eye heddles are used to arrange the wraps into three sections in plane form for weaving convenience. This technology is applied in the field of buildtech, mobiltech, indutech, protech, sportech and meditech.

v. **Water-Jet Weaving:** In this technology, the weft yarn is inserted by highly pressurized water. The relative velocity between filling yarns and water jet gives the force and produces lightweight tent/tarpaulin fabrics, Inter lining fabrics and the application areas are Buildtech and clothtech.

vi. **Circular Weaving:** In this type of weaving, the wrap is circular and there are continuously circulating shuttles running around the periphery in a wave and forms ripple shed. This technology is used for the application of packtech, meditech and indutech segments.

vii. **Multiphase Weaving:** Multiphase weaving machine can form more than one shed and weave 190 cm width with 69 meters of fabric per hour. The application areas of this technology are geotech and buildtech.

3. Knitting Technologies

i. **Circular Knitting:** In this method, a fabric is formed by knitting that forms strong loops and process a wide spectrum of yarn made wide range of materials,
blends and filaments on the one and same machine. This technology has wide range of application in hometech, indutech, meditech, protech, packtech, sportech and agrotech.

ii. **Flat knitting:** The flat knitting technology produces fully-fashioned knitted products by the availability of simple trimming to high-tech machine. This machine can carry the operation of latch needles independently and is applied in the areas of buildtech, protech, mobiltech and meditech.

iii. **Warp Knitting:** “Warp knitting is a technology in which loops are made along the length of the fabric from each warp yarn and the intermeshing of loop takes place in a flat form or lengthwise basis”(Office of the Textile Commissioner, 2009, p. 76). This technology has wide range of applications in various areas of technical textiles such as geotech, agrotech, protech, meditech, sportech and clothtech. Warp knitting technology has been categorized into five technologies such as Raschel knitting technology, Tricot knitting technology, Spacer Fabrics knitting technology, Multiaxial knitting technology and Stitch-Bonding knitting technology.

6. **Finishing technology**

i) **Coating:** Coatings are largely limited to those technical textiles products which can be produced in the form of a viscous liquid and can be spread on the surface of a substrate as well (Hall, 2010). It hardens the coating by drying or curing process and applied on sleeping bags, tents, flex fabrics for hoardings, architectural membranes, interlinings, flame retardant fabrics etc.

7. **Other Technologies**

i. **Nano technology:** Nano technology is a method which applies on textiles in order to improve their properties, make them longer durable and have nicer colors etc (Heeren, 2009). This technology adds new functionalities into the textiles and applied on protective clothing, automotive textiles, filtration products, sport wears etc.

ii. **Braiding:** In this technology, two or more threads are interlaced that make them cross one another in diagonal form, which give solid and flat structure of textiles. Braiding is applied in the areas of indutech, meditech, mobiltech and sportech.
“According to the recent Global economics prospects report by the World Bank, Indian economy grew at a rate of 7.5-8% during 2010-12” (Ramkumar, 2010, p. 8). In addition, this report depicts that the FDI inflows are expected to grow because of the India’s efforts to relax investment limits and simplified foreign direct investment procedures. Therefore, the demand of technical textiles is also expected to increase rapidly but needs diversification of textile industry into technical textiles segments.

The Figure 2.3 below portrays the various raw materials and processes to produce different Technical Textile products.

**Figure 2.3: Process sequence of Technical Textile manufacturing**

2.4 International Scenario of Technical Textiles

The use of conventional textiles has reached a static level and its manufacture has become highly competitive, which illustrate through trends in the various sectors in the textile industry in many industrialized countries. Therefore, many companies are switching over to value-added technical textiles to meet functional demands for precision applications. As use of technical textiles is influenced by need, its pricing normally offers good margins. This sector has been developing with the steady growth of both production and consumption throughout the world.

The following Table 2.1 shows the segment wise world market for technical textiles from year 2000 to 2010

Table 2.1: Segment-wise Global market size of technical textiles

<table>
<thead>
<tr>
<th>Technical Textile Sectors</th>
<th>Volume - '000 tonnes</th>
<th>Value - US$ mn.</th>
<th>Year</th>
<th>Volume</th>
<th>Value</th>
<th>Volume</th>
<th>Value</th>
<th>Volume</th>
<th>Value</th>
<th>CAGR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobiltech</td>
<td>2479</td>
<td>25629</td>
<td>2000</td>
<td>2828</td>
<td>26861</td>
<td>3338</td>
<td>29282</td>
<td>3.02</td>
<td>1.34</td>
<td></td>
</tr>
<tr>
<td>Indutech</td>
<td>2205</td>
<td>13405</td>
<td>2005</td>
<td>2624</td>
<td>16687</td>
<td>3257</td>
<td>21528</td>
<td>3.98</td>
<td>4.85</td>
<td></td>
</tr>
<tr>
<td>Sporttech</td>
<td>989</td>
<td>13897</td>
<td>2010</td>
<td>1153</td>
<td>16052</td>
<td>1382</td>
<td>19062</td>
<td>3.40</td>
<td>3.21</td>
<td></td>
</tr>
<tr>
<td>Buildtech</td>
<td>1648</td>
<td>5872</td>
<td></td>
<td>2033</td>
<td>7296</td>
<td>2591</td>
<td>9325</td>
<td>4.63</td>
<td>4.73</td>
<td></td>
</tr>
<tr>
<td>Hometech</td>
<td>2186</td>
<td>6750</td>
<td></td>
<td>2499</td>
<td>7622</td>
<td>2853</td>
<td>8778</td>
<td>2.70</td>
<td>2.66</td>
<td></td>
</tr>
<tr>
<td>Clothtech</td>
<td>1238</td>
<td>6070</td>
<td></td>
<td>1413</td>
<td>7014</td>
<td>1656</td>
<td>8306</td>
<td>2.95</td>
<td>3.19</td>
<td></td>
</tr>
<tr>
<td>Meditech</td>
<td>1543</td>
<td>5391</td>
<td></td>
<td>1928</td>
<td>6670</td>
<td>2380</td>
<td>8238</td>
<td>4.43</td>
<td>4.33</td>
<td></td>
</tr>
<tr>
<td>Agrotech</td>
<td>1381</td>
<td>5541</td>
<td></td>
<td>1615</td>
<td>6568</td>
<td>1958</td>
<td>8079</td>
<td>3.55</td>
<td>3.84</td>
<td></td>
</tr>
<tr>
<td>Protech</td>
<td>238</td>
<td>5193</td>
<td></td>
<td>279</td>
<td>5873</td>
<td>340</td>
<td>6857</td>
<td>3.63</td>
<td>2.82</td>
<td></td>
</tr>
<tr>
<td>Packtech</td>
<td>2552</td>
<td>4393</td>
<td></td>
<td>2990</td>
<td>5329</td>
<td>3606</td>
<td>6630</td>
<td>3.52</td>
<td>4.20</td>
<td></td>
</tr>
<tr>
<td>Geotech</td>
<td>255</td>
<td>740</td>
<td></td>
<td>319</td>
<td>927</td>
<td>413</td>
<td>1203</td>
<td>4.94</td>
<td>4.98</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>16714</td>
<td>92881</td>
<td></td>
<td>19681</td>
<td>106899</td>
<td>23774</td>
<td>127288</td>
<td>3.59</td>
<td>3.20</td>
<td></td>
</tr>
<tr>
<td>of which oekotech</td>
<td>214</td>
<td>800</td>
<td></td>
<td>287</td>
<td>1039</td>
<td>400</td>
<td>1389</td>
<td>6.45</td>
<td>5.67</td>
<td></td>
</tr>
</tbody>
</table>

The above Table 2.1 demonstrates the segment wise world market for technical textiles from year 2000 to 2010. In the year 2000, the market size for technical textiles was estimated to have a volume of 16.7 mn. tones with a value of US$ 92.88 billion. During 2005, it was at 19.6 mn. tones with a value of US$ 106 billion and further, during 2010 it was at 23.77 mn. tones with a value of US$ 127 billion. Average annual world-wide growth in volume terms was estimated 3.60 percent during the period 2000 to 2010.

The following Table 2.2 shows the contribution of the different segments to the market size of the technical textiles.

Table 2.2: Segment-wise Global market size of technical textiles

<table>
<thead>
<tr>
<th>Technical Textile Sectors</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>% to Total</td>
<td>Value</td>
<td>% to Total</td>
</tr>
<tr>
<td>Mobiltech</td>
<td>25629</td>
<td>27.59</td>
<td>26861</td>
</tr>
<tr>
<td>Indutech</td>
<td>13405</td>
<td>14.43</td>
<td>16687</td>
</tr>
<tr>
<td>Sporttech</td>
<td>13897</td>
<td>14.96</td>
<td>16052</td>
</tr>
<tr>
<td>Buildtech</td>
<td>5872</td>
<td>6.32</td>
<td>7296</td>
</tr>
<tr>
<td>Hometech</td>
<td>6750</td>
<td>7.27</td>
<td>7622</td>
</tr>
<tr>
<td>Clothtech</td>
<td>6070</td>
<td>6.54</td>
<td>7014</td>
</tr>
<tr>
<td>Meditech</td>
<td>5391</td>
<td>5.80</td>
<td>6670</td>
</tr>
<tr>
<td>Agrotech</td>
<td>5541</td>
<td>5.97</td>
<td>6568</td>
</tr>
<tr>
<td>Protech</td>
<td>5193</td>
<td>5.59</td>
<td>5873</td>
</tr>
<tr>
<td>Packtech</td>
<td>4393</td>
<td>4.73</td>
<td>5329</td>
</tr>
<tr>
<td>Geotech</td>
<td>740</td>
<td>0.80</td>
<td>927</td>
</tr>
<tr>
<td>Total</td>
<td>92881</td>
<td>100.00</td>
<td>106899</td>
</tr>
</tbody>
</table>


As shown in the above Table 2.2, Mobiletech was the largest segment in 2000 which contributes about 28 percent in value terms but its share declined to 23 percent in 2010. It is observed that largest segments of the technical textile industry are Indutech, Mobiletech, and Sporttech which contribute about 55 percent to 57 percent...
of the market share. Mobiletech, Hometech, Clothtech and Protech are the segments whose shares were declined in the year 2010.

The following table 2.3 reveals the major Technical Textile producing countries and their activities.

**Table 2.3: Major Technical Textile (TT) Producing Countries**

<table>
<thead>
<tr>
<th>Country</th>
<th>Technical Textile Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>Leading TT producer and consumer in Europe</td>
</tr>
<tr>
<td></td>
<td>Significant synergy with manufacturer of Textile machinery</td>
</tr>
<tr>
<td>France</td>
<td>380 companies active in Technical Textiles</td>
</tr>
<tr>
<td></td>
<td>Well-financed and Well-organized Industry</td>
</tr>
<tr>
<td>Japan</td>
<td>Innovation and power</td>
</tr>
<tr>
<td></td>
<td>R&amp;D centers and strategic production sites</td>
</tr>
<tr>
<td>UK</td>
<td>Around 200 medium sized Tech Tex manufacturing companies</td>
</tr>
<tr>
<td>Korea</td>
<td>Presence of research centers, developing brands of clothing known worldwide. Increasing the share of textiles produced for technical markets (from 25% in 2005, to 55% in 2015)</td>
</tr>
<tr>
<td>USA</td>
<td>Comprehensive protectionist measures since 2001</td>
</tr>
<tr>
<td></td>
<td>Leader: automotive and industrial sectors</td>
</tr>
<tr>
<td>China</td>
<td>Increasingly considerably R&amp;D targeting technical textiles</td>
</tr>
<tr>
<td>India</td>
<td>New government measures to support targeted growth sectors (TT and Technology Upgradation Fund Scheme)</td>
</tr>
</tbody>
</table>


The following Table 2.4 reveals the region wise world end-use consumption of Technical textiles (1995-2010)
Table 2.4: World end-use consumption of technical textiles by broad region, 1995-2010 (000 tons)

<table>
<thead>
<tr>
<th>Region</th>
<th>Years</th>
<th>CAGR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>95-00</td>
<td>00-05</td>
</tr>
<tr>
<td></td>
<td>1995</td>
<td>2000</td>
</tr>
<tr>
<td>America</td>
<td>4,288</td>
<td>5,031</td>
</tr>
<tr>
<td>Europe</td>
<td>3,494</td>
<td>4,162</td>
</tr>
<tr>
<td>Asia</td>
<td>5,716</td>
<td>6,963</td>
</tr>
<tr>
<td>Rest of the World (ROW)</td>
<td>473</td>
<td>558</td>
</tr>
<tr>
<td>Totals</td>
<td>13,971</td>
<td>16,714</td>
</tr>
</tbody>
</table>


The above Table 2.4 exhibits the world end-use consumption of technical textiles by broad region during 1995-2010. The consumption of America grew by 3.2% and 2.8% during 2000 and 2005 respectively. In 2010, it grew by only 3.4% per annum on average. The consumption of Europe grew by 3.6% in 2000, 2.8% in 2005 and 3.2% in 2010. Asia was grown with annualized consumption growth rates of 4% in 2000, 4.1% in 2005 and 4.6% in 2010. The consumption of ROW grew by 3.3%, 2.4% and 3.1% during 2000, 2005 and 2010 respectively.

2.5 Technical Textiles - An Indian Scenario

Technical textile industry in India comes under an initial stage as it contributes only 3% of total consumption. But, it would be mistaken to say that India’s technical textile industry is still inactive. It has awakened to the vast potential of the technical textile sector and is predicted to grow faster in next two decades than the growth endured by US and Europe in last three decades. This wish can be contented by the growing middle class, young and educated population. It is expected that Technical Textile would be one of the most promising sectors in this growth because the factors like strong government support, global economic change, the introduction of appropriate legislation, the development of tests and standards, widespread recognition of the need for more trained personnel etc. are playing important role in driving the industry to the farthest destination (Patel, 2010). Thus it will be right to
say that Technical Textiles in India is like latent volcano which is preparing to explode.

The Indian industry produces items of all the twelve segments of the technical textile industry, but not all of them are produced domestically. Some items are produced in large quantity while some other items are produced in small quantity; therefore, demand is met through imports. The production of technical textiles in India and with substantial exports are not very R&D intensive such as tarpaulins, jute carpet backing, hessian, crop covers, fishnets, surgical dressings etc. While the products that need R&D are imported largely like adult diapers, baby diapers, polypropylene spun bond fabric for disposables, hoses, wipes and protective clothing etc.

Kusumgarh corporate, Supreme Nonwovens Pvt. Ltd., Techfab unimin, Garware wall ropes, Pacific nonwoven etc are some large domestic players in this industry but size of these manufacturing units varies to a large extent. There are number of multinational large players as well engaged in technical textiles who have set up their manufacturing facilities in India like Du pont, 3M, SKAPs, Procter & Gamble, Johnson & Johnson, Kimberly clark etc. (Office of the Textile Commissioner, 2009)

There are over 3000 units which are engaged in manufacturing technical textiles in India. These units are mostly operating in small scale sector out of which around 2/3rd of the production is of commodity products and only 1/3rd is high-ended. Hometech, Packtech, Clothtech and Sportech are the leading segments which primarily include commodity products but they are not very research and development intensive. “Though, India is the second largest textile economy after China, its contribution in the global technical textile industry is only 9% to the total consumption” (Joshi, 2011, p.12).

India can play a major role in this field because of the availability of abundant raw materials and highly skilled and technical work force. India is a largest producer of Clothtech, Packtech, and Sportech segments of technical textiles. The overall growth of technical textiles is estimated at 14% per annum and the market size for technical textiles will increase from Rs. 37100 crores in 2007-08 to Rs. 62420 crores in 2012-13 (ICRA study 2009) at a CAGR of 11%.
The consumption of Indian technical textiles is low in comparison of other developed countries. USA accounts 23% share of the total consumption followed by Europe which constitutes 22% share. China is having a share of 13% while India contributes only 4% share of the global consumption of Technical Textiles (Ministry of Textiles, 2006)

The constraints in the growth of Indian technical textile industry are lack of basic infrastructure, skilled work force, testing facilities, lack of comprehensive database on technical textiles, lack of awareness, non-availability of main raw materials etc. that are needed to be taken into account for the promotion of technical textiles in India. Some strategies should be implemented related to application areas, raw material, manufacturing facilities, R&D and quality assurance, development of domestic and export market of technical textiles. Although, the government has taken various initiatives to emerge this sector realizing that India has great potential to make an impact on technical textile industry in near future.

Cost Competitiveness of India vis-a-vis other Countries

The below table reveals the India’s overall position in terms of competitiveness in manufacturing technical textiles:

The Competitive assessment of India in comparison with other countries exposes that India has the advantage of cost competitiveness for labor intensive technical textiles products over the major industrialized countries like Germany, US, UK, etc. But, as far as poor infrastructure which results in higher cost of logistics, higher cost of power, higher interest rates and taxes (including indirect taxes with anomalies on account of CST and VAT) are concerned, India lacks competitive advantage in comparison with other South Asian countries like China. (Ministry of Textiles, 2011)
Table 2.5: Cost Competitiveness of India vis-a-vis US, Europe and China

<table>
<thead>
<tr>
<th>Overall Cost</th>
<th>India</th>
<th>US</th>
<th>Europe</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Least competitive</td>
<td>More competitive</td>
<td>More competitive than India by around 5.5-6%</td>
<td>More competitive than India by around 9%</td>
</tr>
<tr>
<td>Labour cost (including the impact of productivity)</td>
<td>Strong labour cost advantage primarily in labour intensive technical textiles products</td>
<td>Labour cost disadvantage of around 8% as compared to India</td>
<td>Labour cost disadvantage of around 7% as compared to India</td>
<td>At par with India</td>
</tr>
<tr>
<td>Technology</td>
<td>Dependent on import of technology and machinery for most of the high end technical textiles products (incl. Non-woven)</td>
<td>Strong</td>
<td>Extremely Strong</td>
<td>Availability of low cost machinery and technology (quality of products manufactured is not very good if cheaper technology is used)</td>
</tr>
</tbody>
</table>


For various high-end technical textiles products, India has high cost disadvantage in compare to US and Europe because of having advantage of large economies of scale. The reasons for this cost disadvantage in various high end technical textiles in India are lower scale of production with resultant higher fixed cost per unit of production, shortage or unavailability of specialized raw-materials. Conversely, in case of labor intensive technical textile products like surgical dressings, surgical sutures, nylon tyre cord, seat covers, insulation felts, footwear components, etc), the total cost advantage from the labor cost in India compensate the negative impact of the other cost factors. This occurs in case of labor intensive technical textiles products because labor cost accounts for 15% to 20% of the total cost in India (Ministry of Textiles, 2011).

The following table 2.6 reveals the segment wise Technical textiles production and its growth in India during 2002-07 and 2007-12.
**Table 2.6: Production of Technical textiles in India during First five years (2002-2007) and Next five years (2007-2012)**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Clothtech</td>
<td>6071.7</td>
<td>6833.2</td>
<td>7198.5</td>
<td>7583.3</td>
<td>7988.7</td>
<td>6908</td>
<td>8157.3</td>
<td>8483.1</td>
<td>8808.9</td>
<td>9454</td>
</tr>
<tr>
<td>growth (%)</td>
<td>12.54</td>
<td>5.35</td>
<td>5.35</td>
<td>5.35</td>
<td>5.35</td>
<td>-13.53</td>
<td>18.09</td>
<td>3.99</td>
<td>3.84</td>
<td>7.32</td>
</tr>
<tr>
<td>Packtech</td>
<td>3614.6</td>
<td>4086</td>
<td>4588.3</td>
<td>5124.2</td>
<td>5785.9</td>
<td>14630</td>
<td>11337.2</td>
<td>12955.3</td>
<td>14373.4</td>
<td>23710</td>
</tr>
<tr>
<td>growth (%)</td>
<td>13.04</td>
<td>12.29</td>
<td>12.29</td>
<td>12.29</td>
<td>12.29</td>
<td>152.85</td>
<td>-21.14</td>
<td>12.29</td>
<td>10.95</td>
<td>64.96</td>
</tr>
<tr>
<td>Sporttech</td>
<td>1417.5</td>
<td>1534.1</td>
<td>1649.3</td>
<td>1773.2</td>
<td>1906.3</td>
<td>2851</td>
<td>2611.6</td>
<td>2820.2</td>
<td>3028.8</td>
<td>4297</td>
</tr>
<tr>
<td>growth (%)</td>
<td>8.23</td>
<td>7.51</td>
<td>7.51</td>
<td>7.51</td>
<td>7.51</td>
<td>49.55</td>
<td>-8.40</td>
<td>7.99</td>
<td>7.40</td>
<td>41.87</td>
</tr>
<tr>
<td>Mobitech</td>
<td>1270.9</td>
<td>1381.5</td>
<td>1454.9</td>
<td>1532.1</td>
<td>1613.5</td>
<td>3183</td>
<td>2640.3</td>
<td>2885.9</td>
<td>3131.5</td>
<td>4689</td>
</tr>
<tr>
<td>growth (%)</td>
<td>8.70</td>
<td>5.31</td>
<td>5.31</td>
<td>5.31</td>
<td>5.31</td>
<td>97.27</td>
<td>-17.05</td>
<td>9.30</td>
<td>8.51</td>
<td>49.74</td>
</tr>
<tr>
<td>Buildtech</td>
<td>1114.4</td>
<td>1181.5</td>
<td>1254.8</td>
<td>1332.7</td>
<td>1415.4</td>
<td>2157</td>
<td>1939.6</td>
<td>2085.0</td>
<td>2230.4</td>
<td>2980</td>
</tr>
<tr>
<td>growth (%)</td>
<td>6.03</td>
<td>6.20</td>
<td>6.20</td>
<td>6.20</td>
<td>6.20</td>
<td>52.39</td>
<td>-10.08</td>
<td>7.50</td>
<td>6.97</td>
<td>33.61</td>
</tr>
<tr>
<td>Hometech</td>
<td>883.3</td>
<td>1029.7</td>
<td>1199.7</td>
<td>1397.8</td>
<td>1628.7</td>
<td>5025</td>
<td>3797.5</td>
<td>4321.0</td>
<td>4844.6</td>
<td>7831</td>
</tr>
<tr>
<td>growth (%)</td>
<td>16.56</td>
<td>16.51</td>
<td>16.51</td>
<td>16.51</td>
<td>16.51</td>
<td>208.52</td>
<td>-24.43</td>
<td>13.79</td>
<td>12.12</td>
<td>61.64</td>
</tr>
<tr>
<td>Indutech</td>
<td>887.5</td>
<td>961.9</td>
<td>1050.6</td>
<td>1147.5</td>
<td>1253.3</td>
<td>3206</td>
<td>2486.2</td>
<td>2774.7</td>
<td>3063.2</td>
<td>4892</td>
</tr>
<tr>
<td>growth (%)</td>
<td>8.38</td>
<td>9.22</td>
<td>9.22</td>
<td>9.22</td>
<td>9.22</td>
<td>155.79</td>
<td>-22.45</td>
<td>11.60</td>
<td>10.40</td>
<td>59.70</td>
</tr>
<tr>
<td>Meditech</td>
<td>851.8</td>
<td>932.9</td>
<td>1036.7</td>
<td>1152.1</td>
<td>1280.3</td>
<td>1669</td>
<td>1635.7</td>
<td>1769.6</td>
<td>1903.5</td>
<td>2298</td>
</tr>
<tr>
<td>Protech</td>
<td>425.1</td>
<td>520.2</td>
<td>652.6</td>
<td>818.7</td>
<td>1027.1</td>
<td>1302</td>
<td>777.03</td>
<td>792.9</td>
<td>808.8</td>
<td>1890</td>
</tr>
<tr>
<td>growth (%)</td>
<td>22.36</td>
<td>25.45</td>
<td>25.45</td>
<td>25.45</td>
<td>25.45</td>
<td>26.76</td>
<td>-40.32</td>
<td>2.05</td>
<td>2.01</td>
<td>133.66</td>
</tr>
<tr>
<td>Geotech</td>
<td>196.2</td>
<td>350</td>
<td>591.4</td>
<td>999.4</td>
<td>1688.9</td>
<td>272</td>
<td>1189.8</td>
<td>1336.9</td>
<td>1484.1</td>
<td>410</td>
</tr>
<tr>
<td>growth (%)</td>
<td>78.38</td>
<td>68.99</td>
<td>68.98</td>
<td>68.98</td>
<td>68.98</td>
<td>-83.89</td>
<td>337.43</td>
<td>12.37</td>
<td>11.01</td>
<td>-72.37</td>
</tr>
<tr>
<td>Agrotech</td>
<td>281.4</td>
<td>303.5</td>
<td>337.6</td>
<td>375.5</td>
<td>417.7</td>
<td>553</td>
<td>535.7</td>
<td>579.3</td>
<td>622.9</td>
<td>751</td>
</tr>
<tr>
<td>growth (%)</td>
<td>7.84</td>
<td>11.23</td>
<td>11.23</td>
<td>11.23</td>
<td>11.23</td>
<td>32.37</td>
<td>-3.11</td>
<td>8.14</td>
<td>7.52</td>
<td>20.55</td>
</tr>
<tr>
<td>Oekotech</td>
<td>0</td>
<td>14.7</td>
<td>24.7</td>
<td>41.5</td>
<td>69.9</td>
<td>68</td>
<td>84.1</td>
<td>97.4</td>
<td>110.6</td>
<td>135</td>
</tr>
<tr>
<td>growth (%)</td>
<td>68.16</td>
<td>68.16</td>
<td>68.17</td>
<td>68.17</td>
<td>68.17</td>
<td>-2.73</td>
<td>23.81</td>
<td>15.71</td>
<td>13.58</td>
<td>22.01</td>
</tr>
</tbody>
</table>

**Total**

| 17015.7 | 19129.59 | 21039.64 | 23306.8 | 26076.1 | 41756 | 37392.6 | 40901.9 | 44411.2 | 63202 |

growth (%) | 12.43 | 9.98 | 10.78 | 11.88 | 60.13 | -10.45 | 9.39 | 8.58 | 42.31 |

**Source:**


3. Data for the years 2008-09, 2009-10 and 2010-11 have been calculated by the researcher using interpolation.
The above Table 2.6 exhibits the segment wise details of Technical Textiles production and its growth rates in India during 2002-07 and 2007-12. During the first five years, the technical textile production was at Rs. 17015.06 cr. in the year 2002-03, after that it kept on rising and reached to 26076.1cr. at the end i.e. during 2006-07. During next five years, we see an exceptional improvement by 60.13 per cent on previous year in 2007-08. In the following year 2008-09, it got negative by 10.44 per cent due to the financial crisis during this period but thereafter it started improving and reached to 63202 cr. in 2011-12 registering the growth rate of 42.31 per cent.

The following charts 2.1 and 2.2 exhibits the Technical textiles production and its growth during 2002-2012

**Chart 2.1: Technical Textile Production (Cr.) from 2002 to 2012**

![Technical Textile Production Chart](image)

*Source: Developed on the basis of data given above*
Chart 2.2: Technical Textile Production Growth (%) from 2002 to 2012

Source: Developed on the basis of data given above

Following table 2.7 gives the details of the domestic consumption of technical textiles during 2007-08 and tries to predict the consumption in 2012-13.

Table 2.7: Segment-wise consumption of technical textiles in India

<table>
<thead>
<tr>
<th>Sr.no.</th>
<th>Domestic consumption (Rs. cr.)</th>
<th>2007-08</th>
<th>Share in % to total</th>
<th>2012-13 (Projected)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Agrotech</td>
<td>487</td>
<td>1.25</td>
<td>709</td>
</tr>
<tr>
<td>2</td>
<td>Meditech</td>
<td>1,514</td>
<td>3.89</td>
<td>2,263</td>
</tr>
<tr>
<td>3</td>
<td>Mobiltech</td>
<td>3,161</td>
<td>8.13</td>
<td>5,137</td>
</tr>
<tr>
<td>4</td>
<td>Packtech</td>
<td>14,067</td>
<td>36.22</td>
<td>25,913</td>
</tr>
<tr>
<td>5</td>
<td>Sportech</td>
<td>2,632</td>
<td>6.77</td>
<td>4,358</td>
</tr>
<tr>
<td>6</td>
<td>Buildtech</td>
<td>1,726</td>
<td>4.44</td>
<td>2,655</td>
</tr>
<tr>
<td>7</td>
<td>Clothtech</td>
<td>6,570</td>
<td>16.91</td>
<td>9,665</td>
</tr>
<tr>
<td>8</td>
<td>Hometech</td>
<td>4,791</td>
<td>12.33</td>
<td>8,420</td>
</tr>
<tr>
<td>9</td>
<td>Protech</td>
<td>1,259</td>
<td>3.24</td>
<td>2,021</td>
</tr>
<tr>
<td>10</td>
<td>Geotech</td>
<td>185</td>
<td>0.47</td>
<td>326</td>
</tr>
<tr>
<td>11</td>
<td>Oekotech</td>
<td>68</td>
<td>0.17</td>
<td>160</td>
</tr>
<tr>
<td>12</td>
<td>Indutech</td>
<td>2,443</td>
<td>6.29</td>
<td>4,455</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>38,835</td>
<td></td>
<td>65,722</td>
</tr>
</tbody>
</table>

According to the table 2.7, the domestic consumption of the Technical textiles was estimated at 38835 cr. in 2007-08 and expected to reach Rs. 65722 cr. by 2012-13. The Packtech constitute largest share around 36.22 per cent of total domestic consumption of technical textiles. Agrotech was at Rs.487 crore in the year 2007-08 having 1 per cent share of domestic consumption and is expected to grow at the rate of 8 per cent year on year to reach Rs.709 crore by 2012-13. Meditech has around 4 per cent share of total domestic consumption and is expected to achieve moderate growth at around 8 per cent. Mobiltech constitute around 8 per cent share which is expected to grow at 11 per cent by 2012-13. Packtech constitute 36 per cent share and would reach to Rs.25,913 crore by 2012-13. Sport tech constitute 7 per cent share which is expected to have a growth potential of around 11 per cent by 2012-13. Buildtech having 4 per cent share is expected to achieve a growth at 8 per cent year on year for the next five years. Clothtech has over 17 per cent share which is expected to achieve a growth of 8 per cent year on year by 2012-13. The Hometech having a share of around 12 per cent, expected to register a growth of around 11 per cent year on year and reach Rs.8,420 crore by 2012-13. Protech has a share of 3 per cent which would increase at a growth rate of 9 per cent year on year by 2012-13. Geotech constitute 0.5 per cent share and is expected to reach around Rs.326 crore by 2012-13. Oekotech constitutes very small share around 0.2 per cent, which is expected to reach Rs.160 crore by the year 2012-13. Indutech has 6 per cent share of the domestic consumption and is expected to grow at 12 per cent year on year for the next five years.

Among the various segments, Protech, oekotech, sportech, geotech and packtech have the maximum growth potential in Indian technical textile industry. The consumers are still not aware about the usage of technical textiles in India. For the purpose of increasing consciousness among consumers, government should take initiatives for its application and strict supervision should be conducted in order to ensure the adequate use. However, due to the absence of proper database for technical textile industry in India, the government is not able to make firm policies to promote the growth of Technical textiles in the country. Therefore, the Expert committee on Technical textiles (ECTT), in yr. 2004 decided to express precisely an action plan for promoting the growth of technical textiles in India, which details the complete survey on status and potential of the Indian technical textile industry. In addition, the office
of the textile commissioner had appointed ICRA Management consultancy services (IMaCS), 2009 to assess the demand supply scenario of technical textiles products in India.

There are limitless possibilities in this sector for employment generation. Foreign Direct Investment (FDI) and exports, perhaps much more than other non-textile sectors and traditional textile (Ministry of Textiles, 2006). These possibilities can be turned into reality, if public sector, private sector and government jointly take action plans for the promotion of technical textiles. Now it is trying to elaborate the present position of the technical textile industry, emphasizing how important the sector is because the sector is important enough to draw attention and generate awareness amongst the masses.

### 2.6 Present Position of the Technical Textile Industry in India

The Report of the expert committee on Textiles policy states that “the Committee is disappointed to note that a country like India with vast geographical area and the second largest population in the world does not find a significant place for its global contribution by way of production or consumption in the area of technical textiles at present. So far the contribution of Indian textile industry towards technical textiles was restricted to a few low technologies and less sophisticated items like tarpaulins, industrial filter fabrics, bolting cloth, decatising fabrics, tyre cords and beltings, though in the last five years the use of textiles for luggage application has increased substantially.” (Ministry of Textiles, 1999, p. 156)

Technical textiles have been realized to be one of the most active, energetic and promising area for the textile industry. The advancement of polymer, fibers, yarns, chemical technology and fabric technologies are the driving forces for the development of Technical textiles. Industry is coming out into view because people are now ready to spend their money for achieving comfort in their tough life and technical textiles are able to satisfy those needs that cannot be fulfilled by traditional textiles. Therefore, Indian textile industry should enter into more value added products that provides profit margin with less operational cost.

Due to the increasing income levels of the middle class people, high GDP growth and rising importance of this sector International Nonwovens and Disposables Association (INDA), David Rigby Associates and European Disposables and
Nonwovens Association (EDANA) are projecting double digit growth in India (Marimuthu, 2010). Indian textile industries are trying to produce technical textile products in all the twelve segments but most of the products like baby diapers, adult diapers, household products sold by multinationals like Proctor and Gamble, Johnson & Johnson, 3M and Kimberly Clark are imported. India is one of the largest exporters of garments and home textiles that make strong market base for Clothtech and Hometech. Hometech, packtech and Clothtech are the commodity products, for that reason, it is mostly produced and consumed by the Indian technical textile industry.

The presence of India is still absent in many key segments of the technical textiles like Indutech, Mobiltech, Meditech and nonwovens segments but, the industry has been growing rapidly since 2008 due to the setting up of new roll goods producers like Ginni filaments, Alpha foam, Ahl Strom producing spun lace, spun bond and Spun bond Melt Blown Fabric and Spun lace Fabric (SMS) which are catering mainly to export market as there is low domestic demand for these products. In addition, around thirty Chinese spun bond machines with an investment of Rs. two crores each have set up in year 2008 for the manufacture of polypropylene spun bond fabrics for shopping bags and disposable medical garments (Marimuthu, 2010).

The manufactures like Supreme non-woven, Unimin, Fiber web, Techfab, Skap and SRF, Hitkari high tech fibers, Century Enka and Entremonde polycoaters are doing well in comparison of roll goods manufacturers due to domestic as well as export demands. As far as technology is concerned, the unconventional spinning, knitting, weaving, braiding and non-woven technologies are used for manufacturing technical textiles that are available in the hands of Indian technical textile industry. However, the technologies used by small and medium scale units are mostly traditional due to the non-availability of indigenous machineries and lack of knowledge about the latest technology.

The estimated numbers of employees in various segments of technical textile industry with breakup of the Technical and non technical manpower as reported in Baseline survey report on technical textile industry (2009) is given in the table below:
Table 2.8: Segment-wise Employment in Indian Technical Textile Industry

<table>
<thead>
<tr>
<th>Product segments</th>
<th>Technical Manpower</th>
<th>Non-technical Manpower</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agrotech</td>
<td>9,000</td>
<td>56,000</td>
<td>65,000</td>
</tr>
<tr>
<td>Meditech</td>
<td>20,000</td>
<td>12,000</td>
<td>32,000</td>
</tr>
<tr>
<td>Mobiltech</td>
<td>22,000</td>
<td>6,000</td>
<td>28,000</td>
</tr>
<tr>
<td>Packtech</td>
<td>140,000</td>
<td>170,000</td>
<td>310,000</td>
</tr>
<tr>
<td>Sportech</td>
<td>70,000</td>
<td>18,000</td>
<td>88,000</td>
</tr>
<tr>
<td>Buildtech</td>
<td>33,000</td>
<td>30,000</td>
<td>63,000</td>
</tr>
<tr>
<td>Clothtech</td>
<td>50,000</td>
<td>20,000</td>
<td>70,000</td>
</tr>
<tr>
<td>Hometech</td>
<td>75,000</td>
<td>45,000</td>
<td>120,000</td>
</tr>
<tr>
<td>Protech</td>
<td>1,500</td>
<td>500</td>
<td>2000</td>
</tr>
<tr>
<td>Geotech &amp; Oekotech</td>
<td>2,000</td>
<td>500</td>
<td>2,500</td>
</tr>
<tr>
<td>Indutech</td>
<td>65,000</td>
<td>35,000</td>
<td>100,000</td>
</tr>
<tr>
<td>Total</td>
<td>487,500</td>
<td>393,000</td>
<td>880,500</td>
</tr>
</tbody>
</table>


As per information given in the above table 2.8, the Technical textile industry provides employment to 880500 people, out of whom 55 per cent employees are technical and remaining 45 per cent belongs to non technical manpower. Packtech segment comprise of around 35 per cent (310000 people) of the manpower employed in the technical textile industry followed by Hometech 14 per cent (120000 people) and Indutech 11 per cent (100000 people). There are large numbers of non technical manpower engaged in Hometech, Packtech and Agrotech segment due to the labor intensive nature of these industries whereas Protech and Geotech engages 75 and 80 per cent technical manpower.

**India’s Trade in Technical Textiles**

The following table 2.9 gives the details of exports, imports and trade balance of Technical textiles in India during 2002-07:
Table 2.9: Trade Trends of India’s Technical Textiles (2002-07)

<table>
<thead>
<tr>
<th>YEARS</th>
<th>Technical Textile (TT) Exports (Rs. Cr.)</th>
<th>% Export Growth</th>
<th>% share to India’s total export</th>
<th>Technical Textile (TT) Imports (Rs. Cr.)</th>
<th>% Import Growth</th>
<th>% share to India’s total import</th>
<th>Trade balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002-03</td>
<td>5486.87</td>
<td>2.15</td>
<td>1843</td>
<td></td>
<td>325.30</td>
<td>2.16</td>
<td>3643.87</td>
</tr>
<tr>
<td>2003-04</td>
<td>12632.81</td>
<td>130.24</td>
<td>4.31</td>
<td>7838.35</td>
<td>35.01</td>
<td>2.12</td>
<td>4794.46</td>
</tr>
<tr>
<td>2004-05</td>
<td>14897.82</td>
<td>17.93</td>
<td>3.96</td>
<td>10582.84</td>
<td>31.28</td>
<td>2.14</td>
<td>4314.98</td>
</tr>
<tr>
<td>2005-06</td>
<td>13292.11</td>
<td>-10.78</td>
<td>3.18</td>
<td>13893.64</td>
<td>31.28</td>
<td>2.14</td>
<td>-601.53</td>
</tr>
<tr>
<td>2006-07</td>
<td>16214.74</td>
<td>21.99</td>
<td>2.82</td>
<td>18453.98</td>
<td>32.82</td>
<td>21.05</td>
<td>-2239.24</td>
</tr>
</tbody>
</table>


Table 2.9 exhibits the Trade trends of India’s Technical Textiles during 2002-07. In 2002-03, technical textile exports and imports were at Rs. 5486.87 cr. and Rs. 1843 cr. During 2003-04 the technical textile exports and imports witnessed exceptional improvement by 130.37 per cent and 325.30 per cent respectively. In the following year 2005-06 export declined by 10.78 per cent but improved by 21.99 per cent at the end i.e. 2006-07. The import continuously increased during the period but at the decreasing growth rates over the previous years. As regards trade balance, it was negative during 2005-06 and 2006-07 which indicate the larger amount of imports over the exports.

The following table 2.10 gives the details of exports, imports and trade balance of Technical textiles in India during 2007-12:

Table 2.10: Trade Trends of India’s Technical Textiles (2007-12)

<table>
<thead>
<tr>
<th>YEARS</th>
<th>Technical Textile (TT) Exports (Rs. Cr.)</th>
<th>% Export Growth</th>
<th>% share to India’s total export</th>
<th>Technical Textile (TT) Imports (Rs. Cr.)</th>
<th>% Import Growth</th>
<th>% share to India’s total import</th>
<th>Trade balance (Rs. Cr.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007-08</td>
<td>22163.27</td>
<td>3.33</td>
<td>21401</td>
<td></td>
<td>2.16</td>
<td>762.27</td>
<td></td>
</tr>
<tr>
<td>2008-09</td>
<td>27092.84</td>
<td>22.24</td>
<td>3.2</td>
<td>29318.23</td>
<td>36.99</td>
<td>2.15</td>
<td>-2225.39</td>
</tr>
<tr>
<td>2009-10</td>
<td>28685.61</td>
<td>5.88</td>
<td>3.33</td>
<td>31597.64</td>
<td>7.77</td>
<td>2.37</td>
<td>-2912.03</td>
</tr>
<tr>
<td>2010-11</td>
<td>39658.83</td>
<td>38.25</td>
<td>3.56</td>
<td>40021.84</td>
<td>26.66</td>
<td>2.24</td>
<td>-363.01</td>
</tr>
<tr>
<td>2011-12</td>
<td>47085.37</td>
<td>18.73</td>
<td>50533.82</td>
<td></td>
<td>26.27</td>
<td>-3448.45</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.10 portrays the trade trends of India’s Technical Textiles during 2007-12. As trend shows, exports and import tremendously increased with slight fluctuations during the study period. As far as trade balance is concerned, it represented negative growth during the period except 2006-07.

The following chart 2.3 shows the Exports and Imports growth of Technical Textiles in India during 2002-12.

**Chart 2.3: Exports and Imports growth of Technical Textiles in India (2002-12)**

![Exports and Imports growth of Technical Textiles in India (2002-12)](chart2_3.png)

*Source: Developed on the basis of data given above*

The following chart 2.4 shows the Export, Import and Trade Balance of Technical Textiles in India.

**Chart 2.4: Export, Import and Trade Balance of Technical Textiles in India (2002-12)**

![Export, Import and Trade Balance of Technical Textiles in India (2002-12)](chart2_4.png)

*Source: Developed on the basis of data given above*
India’s import of Technical Textiles Products from other countries

Following list gives the details of countries from which India imports Technical Textiles products:

1. Contact lens – It imports from US, Ireland, Singapore, Canada, Korea, Taiwan, UK & Malaysia
2. Baby diaper & incontinence - Singapore, Saudi Arabia, Malaysia, China, UAE, Taiwan, Hong Kong and United States of America(USA)
3. Surgical disposable - China, Singapore, USA, Germany, Australia, Denmark and United Kingdom (UK)
4. Artificial implant - USA, Brazil, Italy, Netherlands, UK, Germany, France, Singapore, Japan and Egypt
5. Aircraft webbing - USA, UK and Germany
6. Nylon tyre cord fabric - China, Thailand, Indonesia, Taiwan, Egypt and United Arab Emirates(UAE)
7. Seat belt webbing - Korea, Thailand, Japan, China, Malaysia, Turkey and Philippines
8. Soft luggage - China, Hong Kong, France, Italy, Singapore, Vietnam, Malaysia and UK
9. Swimwear - China, Italy, France, Sweden, UK, Spain and Tunisia
10. Flex - China, Korea, UAE and Taiwan,
11. Architectural membrane - Germany, Australia and China
12. Non woven carpets - UAE, USA, UK, Netherlands and Egypt
13. Non woven fabric - China, Iran and Belgium
14. Polypropylene (PP) carpets & carpets of synthetic material / machine tufted carpet - UAE, China, Pakistan, Netherlands, Indonesia, Saudi, USA, Singapore and Malaysia
15. Floor covering - Korea, France, China and Thailand
16. Polyvinyl Chloride (PVC) floor coverings - Taiwan, Singapore, Pakistan, UK, Germany, Sweden, Hungary & Australia.
17. Umbrella cloth - China
18. Artificial leather - China, Taiwan, Korea, Canada and USA
19. Flock fabric - China, USA and Belgium
20. Velvet fabric - China, Italy, Hong Kong and Turkey
21. Filter media - Germany, Netherland, Taiwan, China and USA
22. High Efficiency Particulate Air (HEPA) filters - China, Malaysia, USA and Netherland
23. Synthetic coated fabric strips - Taiwan and China
24. Ready blinds - Germany, Australia and USA
25. Non woven wipes - China, Singapore, Canada, Germany, USA and UAE
26. High altitude clothing - Switzerland, Australia and Italy
27. Glass fibre - China, Germany, USA, UK and Korea
28. Drive belts - China, Thailand, Czech Republic, Italy, Korea and Japan

India's Export of Technical Textiles to other Countries

Following list gives the details of the countries to which India exports Technical Textiles products:

1. Crop covers – It exports to UAE, Saudi Arabia, Oman
2. High Density Polyethylene (HDPE) Shade nets - UAE, Ireland, Maldives, Srilanka, Sudan
3. Disposable non-woven shoe covers - USA
4. Nylon tyre cord - Indonesia, Thailand, Philippines and Iran
5. Rayon tyre cord - Japan and Italy
6. Sleeping bags - France and Netherlands
7. Sport nets - USA, Finland, Belgium, Denmark, Caribbean, UK, Netherlands, Kenya, New Zealand, Switzerland, Sweden and Srilanka
8. Inflatable balls - UK, USA, Australia and Germany
9. Boxing equipments - UK, USA, South Africa and Australia
10. Cricket protective gears - UK, Australia, South Africa, New Zealand and USA
11. PVC vinyl floor & wall coverings - UAE, Saudi Arabia, S. Africa, China, Israel, Slovenia, Greece, Germany, USA, Australia, Kenya, Sudan, Uman, Tanzania, Qatar, Ghana and Vietnam
12. Elastic fabrics - Egypt and Srilanka
13. Fiberfil & Furniture fabric - Argentina and USA
14. Drive belts and Conveyor belts - Australia, USA and South Africa
As the given table 2.8 reveals that Indian technical textile industry is employing 0.88 million peoples from which 55% of the total employed manpower is technical and rest are non technical manpower. Among all segments, packtech has big contribution in providing employment around 35% of the employment in the technical textile industry. According to the baseline survey report India’s production for technical textiles was at 41756 cr. in 2007-08 which increased to Rs. 63202 cr. in the year 2011-12. While, ministry of commerce valued exports and imports at Rs. 21817.72 cr. and 21850.03 cr. in the year 2007-08 respectively which increased to Rs. 47085.37 cr. and 50533.82 cr. in the year 2011-12 respectively. This data discloses the fact that India can build strong position in this sector, if it would not depend on import of technical textile machinery. India imports machinery from Germany, Italy, Austria and other European countries which are needed for DREF spinning and warp spinning, knitting and weaving (Office of the Textile Commissioner, 2009). It is a real problem that the technologies required for technical textiles production are available but their machines are imported.

Investments

Technical textile is the fastest rising segment in textiles in India and has made noteworthy investor interest in the recent past. Following are the major investments from foreign companies in India’s technical textiles sector:

Table 2.11: Major investments from foreign companies in India’s technical textiles sector

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the Company</th>
<th>Investment Type/Size</th>
<th>Year of Investment</th>
<th>Segment of Technical Textiles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Johnson and Johnson</td>
<td>Subsidiary/ NA</td>
<td>1947</td>
<td>Meditech</td>
</tr>
<tr>
<td>2</td>
<td>Procter &amp; Gamble</td>
<td>Subsidiary/NA</td>
<td>1951</td>
<td>Meditech</td>
</tr>
<tr>
<td>3</td>
<td>3M</td>
<td>76% of Stake in JV/ NA</td>
<td>1988</td>
<td>Nonwovens, Indutech, etc.</td>
</tr>
<tr>
<td>4</td>
<td>Dupont</td>
<td>Subsidiary/US$ 65.80 million</td>
<td>1994</td>
<td>Protech</td>
</tr>
<tr>
<td>5</td>
<td>Kimberley-Clark</td>
<td>JV/NA</td>
<td>1994</td>
<td>Meditex</td>
</tr>
<tr>
<td>6</td>
<td>Maccaferri</td>
<td>Subsidiary/ US$ 13.16 million</td>
<td>1997</td>
<td>Geosynthetics</td>
</tr>
<tr>
<td>7</td>
<td>Freudenberg</td>
<td>Subsidiary/ NA</td>
<td>1998</td>
<td>Indutech and Non-wovens</td>
</tr>
<tr>
<td>8</td>
<td>KARL OTTO BRAUN GmbH</td>
<td>Subsidiary/ US$ 9.21 million</td>
<td>1998</td>
<td>Meditex</td>
</tr>
<tr>
<td>9</td>
<td>Huntsman</td>
<td>Subsidiary/NA</td>
<td>2000</td>
<td>Mobiltech, Geotech</td>
</tr>
</tbody>
</table>
Following are the latest investments in Technical Textiles in India:

Table 2.12: Latest Investments in Technical Textiles in India

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the Company</th>
<th>Investment Type/Size</th>
<th>Year of Investment</th>
<th>Segment of Technical Textiles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shri Laksmi Cotsyn</td>
<td>Own/US$ 171.07 million</td>
<td>2011</td>
<td>Protech</td>
</tr>
<tr>
<td>2</td>
<td>Lectra</td>
<td>Subsidiary/NA</td>
<td>2012</td>
<td>Indutech</td>
</tr>
<tr>
<td>3</td>
<td>Alliance Polysacks Pvt. Ltd.</td>
<td>Own/NA</td>
<td>2012</td>
<td>Packtech</td>
</tr>
<tr>
<td>4</td>
<td>Alok International</td>
<td>JV/NA</td>
<td>2012</td>
<td>Hometech</td>
</tr>
<tr>
<td>5</td>
<td>Caparo Group</td>
<td>Subsidiary/NA</td>
<td>2012</td>
<td>Composites/Mobitech</td>
</tr>
<tr>
<td>6</td>
<td>Precot Meridian Ltd</td>
<td>Own/NA</td>
<td>2012</td>
<td>Nonwovens</td>
</tr>
<tr>
<td>7</td>
<td>Toho Tenax Co Ltd. &amp; Hindooostan Technical Fabrics</td>
<td>JV/NA</td>
<td>2012</td>
<td>Composites</td>
</tr>
<tr>
<td></td>
<td>Limited</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Global Nonwovens</td>
<td>Own/US$ 251.32 million</td>
<td>2012</td>
<td>Nonwovens</td>
</tr>
<tr>
<td>9</td>
<td>IKEA</td>
<td>Subsidiary/US$ 1,973.85 million</td>
<td>2012</td>
<td>Hometech</td>
</tr>
<tr>
<td>10</td>
<td>Sanrhea Technical Textiles</td>
<td>Own/NA</td>
<td>2012</td>
<td>Nonwovens</td>
</tr>
</tbody>
</table>

Seeing the growing investment, demand and consumption of technical textiles in India, some reasons for rising importance of technical textiles are being explained for further studies.

2.7 Factors responsible for rising importance of Technical Textiles in India

The textile industry is taken into account as traditional sector but now a days it has diversified into technical textile sector by process innovation which reduces costs, provide dynamic and interactive products, comfort and performance and able to offer protection since, these technical textiles have unique characteristic of having abundant opportunities in both domestic and export markets (Ram Kumar, 2009). For that reason, the industrialists are going ahead in this sector and taking initiatives to make its base solid in India. The technical textile products are not designed to look attractive, but also provide highest performance, comfort standards and ensure a better quality of life that is why, the significance and demand of technical textiles is increasing in our daily lives. Following are some certain reasons for rising importance of technical textiles in India:

1. **Rising Aspirations:** In today’s globalized world, when trade relations of India have improved with other countries the Indian consumers have become ambitious, self-indulgent and self expressed. Indian consumers are moving towards Technical textile products due to the rising desires to get style and safety. Rising aspirations is helpful in encouraging higher consumption of these products.

2. **Changing Life Style:** As people are being educated. Their thinking, standard of living and life style are on rise. They want comfort in their tough schedule as well as style that could make them well suited for new trends. Therefore, awareness about these advanced qualities of technical textile is rising resultantly; the consumption of technical textile products is rapidly increasing that meet the requirement of safety and comfort.

3. **Industry sectors growth:** The technical textile products are largely consumed by different industries, like automotive, infrastructure, healthcare, oil & petroleum, etc. Therefore, the industrial sector is poised for considerable growth
with increase in investments in industry sectors, higher consumption and growing exports.

4. **Rising income levels of the middle class:** The most important factor for rising importance of technical textiles in India is the increasing level of salaries. "Middle class population is expected to grow in India and reach half billion by 2030" *(Ministry of Textiles, 2004, p. 95).* Middle class people are considered as the main consumer of Technical textiles. Therefore, rising income level of the middle class makes them able to afford expensive products of Technical textiles that eventually lead the growth of the Technical textiles sector in India.

5. **Infrastructure development:** The government of India is rightly increasing the spending on infrastructure of the country that drives the applications of geo textiles in sea erosion control, airports, roads, dams etc.

6. **Foreign Direct Investment (FDI) promotion initiatives by government:** Government of India has allowed up to 100% foreign direct investment under automatic route for the technical textiles segment for facilitating higher incorporation of technology into manufacturing processes and end-products *(Wazir Advisors & EYPL, 2013).* This enables leading global manufacturers of technical textiles products to set up manufacturing units in India, either alone or through partnerships with Indian industries.

7. **Agriculture Practices:** India is an agricultural economy but its agriculture practices are not sufficient in today's modern world. Therefore, the need for agrotech products are increasing because it provides improved quality of agriculture practices such as advantageous in terms of increase in yield, soil borne pathogens control, lesser crop diseases, water saving, weed control, etc.

8. **Indispensable needs:** The medical textiles provide the fabric or product that meets the indispensable needs of the customer such as fire retardant fabric, sutures, medical bandages, surgical gowns etc. Therefore, India is rightly emerging in this sector to meet the rising demand of its consumers.

9. **Growing Population:** Rising population growth in India is favorable for the growth of the technical textile industry. As population growth increases, the need and consumption of baby care products increases i.e. diapers, baby wipes etc. Growing population does not increases the consumption of only baby care
products but also accelerate the consumption of almost all segments of technical textiles such as home textiles, clothing textiles, medical textiles, agro textiles etc.

2.8 Testing Facilities for Technical Textiles in India

The Ministry of Textiles, Government of India has nominated some TRAs (Textiles research associations) to set up Centre of Excellence for specific segments of technical textiles. The various testing facilities for technical textiles available at the TRAs in the country which are given below:

1. Synthetic & Art Silk Mills' Research Association (SASMIRA)

The Synthetic & Art Silk Mills' Research Association (SASMIRA) established on 12th January 1950. This cooperative venture was set up by the man-made textile industry of India after independence as a multi-functional institute in order to provide its scientific and technological needs (Synthetic & Art Silk Mills' Research Association, n.d.). SASMIRA is providing scientific and technical assistance to textile and allied industries. Some of the activities being carried out are development of technical textiles, product development, Effluent treatment, water recycling and waste re utilization and Development of energy conservative processes. It provides facilities for Technical textiles such as testing, evaluation and investigation of fiber, polymer, garment, yarn and other textile related products. Specialized testing facilities have been added for Agro textiles and Geo textiles. Moreover, SASMIRA has been chosen as the Lead agency jointly with other agencies viz, MANTRA, NAU and IIT Delhi to set up a Centre of Excellence in Agro textiles.

Mechanical Testing- Following types of equipments are available at SASMIRA (Office of the Textile Commissioner, 2009)

1. Universal tensile machine
2. Photo microscope
4. Melt flow Index tester
5. Crimp Contraction tester
6. Crimp rigidity tester
7. Yarn evenness tester
8. Twist tester
9. Yarn strength tester
10. Fabric tensile strength tester- 440 kgs  
11. Quick UV tester  
12. Water permeability tester  
13. Tear tester  
14. Cone drop tester  
15. Air permeability tester  
16. Bursting strength tester  
17. Crease recovery tester  
18. Densometer  
19. Thickness tester  
20. Thermal conductivity tester  
21. Water vapor permeability tester  
22. Fabric friction tester  
23. Flexing tester  
24. Abrasion tester  

**Chemical testing**- Various equipment available at the Chemical testing laboratory at SASMIRA are *(Office of the Textile Commissioner, 2009):*  
1. Hydrostatic head tester  
2. Spray tester  
3. Dome tester  
4. Bundesmann tester  
5. Xeno test  
6. Light fastness tester  
7. Crock meter  
8. Static charge tester  
9. Atomic absorption spectrophotometer  
10. Perspiro meter  
11. Static resistivity tester  
12. pH Meter  
13. Viscometer  
14. Flammability tester  
15. Spectro quant for detection of metals and other elements.
2. **Man-Made Textile Research Association (MANTRA)**

The Man-Made Textile Research Association (MANTRA), Surat is a Textile Research Association registered under the Societies Act of Gujarat. This is one of the Textile Research Associations which is fulfilling diverse needs of the textile and allied industry at large. The main aim of Man-Made Textile Research Association is to planned and healthy growth of the decentralized textile industry (*Synthetic & Art Silk Mills' Research Association, n.d.*). The COE for Agro textiles has been assigned to Man-Made Textiles Research Association (MANTRA), jointly with (SASMIRA) as the lead agency jointly with Navsari Agricultural University (NAU), Navsari. For technical textiles, it provides the activities of Product development, Research and development, Technical services, consultancies, Testing and allied activities.

Following are the testing facilities available at MANTRA for centre of excellence in Technical Textiles:

1. WIRA TOG Tester
2. Lenzing Water Permeability Tester (GE-TE-FLOW)
3. Lister
4. Wetback
5. Surface Resistivity Meter
6. Air Permeability Tester
7. Flammability Tester
8. ADMET Universal Strength Tester
9. WIRA Spray Rating Tester
10. WIRA Shower Tester
11. WIRA Run-off Tester
12. WIRA Liquid Wicking Rate Tester
13. WIRA Liquid Absorption Capacity Tester
14. WIRA Liquid Absorbency Time Tester

Following are the testing facilities available at MANTRA for centre of excellence in Agrotextiles:

1. Vibrodyne
2. Hydrodynamic Sieve Tester
3. **Bombay Textile Research Association (BTRA)**

The Bombay Textile Research Association (BTRA) was established on 1954 as an autonomous cooperative research association. Since 1980, BTRA involved with technical textiles and started work specially on geotextiles in 1985 (*Office of the Textile Commissioner, 2009*). The various geotextiles products tested at BTRA (as per international standards) are Geotextiles-woven and non-woven, Geogrids, Geocells, Geocomposites, Gabions, Geonets, Geomembranes, Geosynthetics clay liners, Prefabricated vertical drains, Coated fabrics (woven and non woven) – Rubber coated, Polyurethane (PU) foam coated and Aluminum coated, Laminated fabrics (woven and non woven) – Foam laminated, PVC laminated and HDPE laminated and Low Density Polyethylene (LDPE) laminated.

Other Technical Textile products tested are Protective Clothing, Automotive Carpet (Moulded), Interlining / Cover Stock, Wadding (High Loft), Floor Mats / Rugs / Carpets, Medical Textiles / Pads, P.U. Foam and Felts (Woolen)

The Testing facilities available at BTRA are:

1. Abrasion resistance (Flat / Flex )
2. Absorbency
3. Air Permeability
4. Bending Length
5. Breaking strength: Wide width tensile
6. Bursting Strength (Ball & Diaphragm)
7. Carbon Black Content
8. CBR Puncture Resistance
9. Compressional Recovery
10. Cone Drop Test
11. Dynamic Loading
12. Electrical Resistivity
13. Electrostatic charge
14. Environmental Stress Cracking Resistance (ESCR)
15. Grab strength - Single rip / double rip
16. Grams Per Square Meter (GSM)
17. Hexapod Tumbler Test
18. Hydraulic Transitivity (In-Plane Water Permeability)
19. Impact Resilience test
20. Index Puncture Resistance
21. In plain Permeability
22. Liquid Strike Through Time
23. Lisson Test
24. Melt Flow Index
25. Peel bond strength
26. Pilling
27. Pore Size (Apparent Opening Size)
28. Thickness
29. Trapezoidal Tear strength
30. Water Permeability (Through-Plane)

4. South India Textile Research Association (SITRA)

SITRA was registered in May 1951 as an autonomous scientific research organization under the Societies Registration Act (XXI) of 1860. It is one of the best of laboratories in the country which is supported by the Ministry of Textiles, Government of India and sponsored by the textile industry (The South India Textile
Government of India has designated SITRA as a centre of excellence for Medical Textiles which is offering following Testing facilities:

1. Air permeability tester – of hospital linen, bandage cloth
2. Fabric drape tester – Coefficient of drape for surgical gown, surgical spreads
4. Universal testing machine
5. Friction/Peel strength tester
6. Thickness meter
7. Abrasion tester
8. Laundero meter

5. Northern India Textile Research Organization (NITRA)

Northern India Textile Research Organization was jointly established by the textile industry and Ministry of Textiles, Government of India in 1974. The purpose behind the foundation was carrying out scientific research and providing support services to Indian textiles industry (Northern India Textile Research Organization, n.d.). In the year 2009, a Centre of Excellence (Protech) for protective textiles was established at NITRA with support from Ministry of Textiles. The CoE offers the activities for Technical Textiles are product development, preparation of standards/specifications, testing, training manpower, organizing workshops and seminars, and information dissemination as a resource center.

Following are the Testing facilities available at NITRA:

1. Xenon air cooled light fastness and weather ability tester
2. Launder-o-meter
3. Motorized crock meter
4. Perspirometer
5. Sublimation tester
6. Wet scrub abrasion tester
7. Spectrophotometer for colour matching
8. UV-Spectrophotometer
9. IR dyeing machine
10. Taber Abrasion tester
6. **Ahmedabad Textile Industry's Research Association (ATIRA)**

Ahmedabad Textile Industry's Research Association was established on 13th December 1947 which began to work in the year 1949 as an autonomous non-profit association for textile research after due recognition by the Council of Scientific and Industrial Research under the Ministry of Science and Technology, Government of India. Now, it is linked with the Ministry of Textiles, Government of India (Ahmedabad Textile Industry's Research Association, n.d.). ATIRA offers testing services for technical textiles, fibers, fabrics, garments, solid fuels, yarns, effluents, chemicals, drinking water (both chemical and biological), biological parameters of
textiles and trace analysis of toxic substances. ATIRA has been recognized as a Centre of Excellence for Geotextiles.

ATIRA has procured the following equipments under the project (Office of the Textile Commissioner, 2009):

1. Universal Testing Machine
2. Weatho-meter

Following are the Testing facilities for technical textiles available at ATIRA:

1. Flame & Heat Protective Tests
2. Tests for High Visibility Clothing
3. Tests for Geosynthetics
4. Tests for Non-Woven Material

7. Indian Jute Industries’ Research Association (IJIRA)

Indian Jute Industries’ Research Association was established in the year 1937 by the Jute Industry. In 1952, it installed its own campus by the first Prime Minister of India, Pandit Jawaharlal Nehru (Indian Jute Industries Research Association, n.d.). IJIRA provides product development, technology transfer support and testing services to the Indian Jute Industry. It has been actively involved in the development of Jute Geotextiles and Jute Agro textiles.

Testing facilities at IJIRA include:

- Chemical testing
- Biological testing
- Testing for Geotextiles
- Physical testing

The following tests are available at IJIRA’s laboratory for Geotextiles:

1. Weight
2. Ends x Picks /dm
3. Thickness
4. Width
5. Apparent Opening Size (AOS)
6. Grab Tensile Strength
7. Wide Width Tensile Strength
8. Bursting Strength
9. Water Permeability
10. Puncture Resistance
11. Copper content
12. Bitumen content

8. Wool Research Association (WRA)

Wool Research Association was established in 1963 by the Woolen & Worsted industry as a Textile Research Association. WRA is continuously engaged in the development of technical textiles since last two decades and it has also carried out few sponsored projects regarding Mobiltech, Sportech, Indutech, etc (Wool Research Association, n.d.). WRA has been selected for centre of excellence in Sportech and has also undertaken research initiatives in the area of technical textiles such as Design and development of heat resistant and flame retardant interior textiles with special emphasis on automobiles, Development of economic friction spun multi-component yarn for technical textiles (industrial fabrics).

Following are the Testing facilities available at WRA:

1. Testing of raw fibers
2. Testing of yarn
3. Testing of fabric
4. Testing of carpets and floor coverings

2.9 Centers of Excellence (COEs) for Technical Textiles in India

“The Ministry of Textiles has upgraded existing and established new Centers of Excellence (COEs) for technical textiles under the Technology Mission on Technical Textiles (TMTT) launched by Ministry of Textiles in 2010 to cover 6 product-focused COEs and 2 process-oriented COEs.” These centers of excellence are ingenious for the industries which are willing for diversifying into and in the Indian technical textiles sector with ongoing collaborations with foreign institutes and laboratories, and wealth of experience and knowledge in the technical textile industry. Thus, centers of excellence play a major role in facilitating Indian industries to recognize their potential in dealing with demand and scaling attractive opportunities in each segment of technical textiles (Wazir Advisors & EYPL, 2013, p. 24).
A. Product – Focused COEs: There are 6 product-focused COEs in India which are given as follows:

1. **COE on Agrotech**

   The Synthetic & Art Silk Mills' Research Association (SASMIRA) is a cooperative venture which was established by the Man-made Textile Research Association (MANTRA) after independence as a multi-functional institute for serving its scientific and technological facilities. The Ministry of Textiles, Government of India has designated SASMIRA as a centre of excellence for Agrotech since March 2008. Now, SASMIRA has entirely equipped laboratories in order to perform testing, evaluation and investigation of a variety of textile and allied materials, with specialized services for technical textiles. The laboratory is accredited nationally and internationally for Mechanical, Chemical and Microbiological testing of textiles and allied substrates. The COE for Agrotech supports the industry with training demonstration, creating awareness and knowledge sharing.

2. **COE on Geotech**

   "The Centre of Excellence on Geotech was launched in 2008 in partnership with Bombay Textile Research Association (BTRA), and is supported by Ahmedabad Textile Industry's Research Association (ATIRA). BTRA has established a new Geotech Laboratory with testing facilities to test Geotextiles, Geomembranes, Geocomposites, Gabions, Geosynthetic Clay Liner, Geogrids, Prefabricated Vertical Drain, etc" (Wazir Advisors & EYPL, 2013, p. 26). BTRA is also escalating its information resources on Geotech by acquiring various books and international test methods such as ASTM, INDA, EDANA, ISO, etc. In addition, BTRA also provides training to users and entrepreneurs in Geotex and other fields of technical textiles. The COE also serves technical consulting services to entrepreneurs in order to assist the establishment of new manufacturing facilities for geosynthetics.

3. **COE on Meditech**

   "A Centre of Excellence (CoE) for Medical Textiles has been established at SITRA under SGDTT and upgraded under TMTT promoted by Office of the Textile Commissioner, Ministry of Textiles, Government of India" (Wazir Advisors & EYPL, 2013, p. 26). The Centre of Excellence for Meditech offers consultancy assignments, skill development, preparation of detailed / bankable project reports for
potential entrepreneurs, creation of an information resource centre which keep books, journals, periodicals and back volumes, published national and international standards related to Medical Textiles. The Centre of Excellence offers best pilot plant facilities as well as state-of-the-art laboratory test instrumentation to accomplish development of prototypes and turn into full range of incubation services to prospective entrepreneurs.

4. COE on Protech

The COE for Protech was set up by NITRA in association with IIT, Delhi under Scheme for Growth and Development of Technical Textiles (SGDTT), which is being upgraded under TMTT. NITRA provides infrastructure facilities for quality evaluation that include six NABL-accredited QC laboratories capable of analyzing materials as per IS, ASTM, DIN, BS, ISO, JASO, AADTCC, EN and other customized standards. NITRA's library and information centre keeps about 4,000 books, including 170 of NITRA's own publications. About 110 national and international journals are subscribed by the COE. The library and information centre is accessible for textile industry professionals and associated individuals. NITRA is an ISO-9001 certified textile research organization which has established a protech laboratory with state-of-the-art testing instruments. In addition, it has a “Fire Testing Lab” which test textile and allied products for heat, flame and safety-related characteristics as per International and IS standards.

5. COE on Composites

In the year 2012, Ahmedabad Textile Industry's Research Association (ATIRA) was chosen as the center of excellence on composites. ATIRA aims to develop highly developed composites through new and innovative processes for providing weight reduction quality, high mechanical properties and cost competitiveness. The COE also aim to increase the knowledge base in composites through research, development and training. In January 2011, ATIRA has obtained accreditation from North West Composites Center (NWCC) in Manchester, UK. Additionally, ATIRA's Library and Information Centre maintains over 70,000 books, reports and publications. ATIRA also has a well entrenched and prominent incubation center with equipment in order to develop prototypes for poly fiber in forced rope, testing carbon-fiber and glass-fiber products and nano-fiber lab.
6. COE on Indutech

PSG College of Technology is one of the many educational institutions look after by PSG & Sons Charities Trust which was established in 1951. The college is government aided, independent, ISO 9001 2008 certified and associated to Anna University. In 2010, the Department of Textile Technology, Fashion Technology and Automobile Engineering of PSG College of Technology were authorized with Co E in Industrial Textiles by Ministry of Textiles under Technology Mission on Technical Textiles (TMTT) scheme. The main purpose of this COE is to construct an infrastructure especially for Industrial Textiles, which assists high quality research and industrial collaboration. It will offer a stage for the industry and for the new entrepreneurs in order to develop new products, upgrade their existing products, standards development, and utilize pilot scale facilities for rapid prototype development. In addition, COE also transfers knowledge to the industry through organizing workshops, seminars and conferences.

B. Process - Oriented COEs: There are 2 Process - Oriented COEs in India which are given as follows:

1. COE on Nonwovens

The D.K.T.E. Society's Textile & Engineering Institute was founded in 1982. DKTE Society's Textile & Engineering Institute – Ichalkaranji is one of the leading textile engineering institutes in India which has 175 full time academic staff, 8 departments and 2960 full time students. The Center of Excellence for Nonwovens under TMTT is operated by DKTE which facilitates physical testing and manufacturing facilities and now continuously progressing in the development of prototypes and conducting incubation activities. Activities of DKTE COE in Nonwovens are training, testing, rapid prototyping, technology business incubation, Research & Development, support for business start-ups and consultancy (Wazir Advisors & EYPL, 2013).

2. COE on Sportech

Wool Research Association (WRA) is a Textile Research Association founded in 1963 by the woolen and defeated industry. Since last two decades, it is modestly engaged in the development of technical textiles. It has taken few sponsored projects concerning to Sportech, Indutech, Mobiltech, etc. In 2012, WRA was assigned as a
Center of Excellence for Sport textiles which has already started a number of training 
activities and seminars. It is hope that the COE will also acquire the necessary 
equipment for implementing testing and prototype development activities in year to 
come.

2.10 Technical Textile Associations in India

Technical Textile sector is one of the most ground-breaking branches of the 
industry in the world. It comes under one the five high tech sector’s with the greatest 
potential for development. The technical textiles are successful because of the 
innovation, creativity and flexibility in fibers, yarns, knitted, woven, nonwoven 
fabrics with applications spanning an immense variety of uses. Technical textiles are 
able to combine with others and with each other to generate new functional products 
which serves limitless prospect to growth. In India, a technical textile is one of the 
fastest rising sectors of the economy. “It has registered compounded annual rate of 
growth of 11% during 11th five year plan and the working group report for the twelfth 
five year plan has projected growth of 20% for technical textiles. This translates into 
market size increasing from USD 13 billion to USD 36 billion by 2016-17.” The 
industry is expanding and developing mainly due to the entrepreneurial inventiveness, 
creativity and skills of the Indian industry which are supplement by the scheme of the 
government of the India incentivizing the investment in the sector. The government of 
India also recognized the necessity for active participation of the industry to carry out 
the concerns, issues and suggest policy framework that would put down the 
foundation for this sector (Indian Technical Textile Association, n.d.). Resultantly, 
five associations for the growth and development of Technical Textiles in India have 
formed which are given as follows:

1. Indian Technical Textile Association (ITTA) 

Indian Technical Textile Association was registered in the year 2010 under 
section 25 of the company act 1956 by the office of the Textile Commissioner, 
Ministry of Textiles, Government of India. As on 06.11.2012, it is the only 
association of the technical textile industry in the country with 158 members. Indian 
Technical Textile Association membership signify the whole technical textile value 
chain from raw materials to finished goods producers, consultants, machinery,
manufacturers, centre of excellence and research and development institutes (Indian Technical Textile Association, n.d.).

Indian Technical Textile Association aims to promote, support, develop and increase consumption, productions, and export of technical textile to make India a power house of technical textiles in the coming days. With the fact that government policy have played a critical role in the progress of technical textiles, the association is keeping close interaction with government of India in formulation of various policies focusing on removing the vagueness in the system which will help to encourage usage in India and suggesting fiscal and non fiscal norms which would assist the industry to achieve its true potential.

The objective of ITTA is to become the leading organization for representing the industry's interests and for creating a policy environment that brings together and addresses the concerns of stakeholders in the technical textile sector. ITTA would develop into an ideal forum for overseas and domestic companies to discover the enormous potential available for JVs, strategic and marketing alliances, joint product development, etc, by organizing business meets with delegates from various countries. ITTA will broadcast various policies, market information and relevant statistics to its members.

The Cotton Textiles Export Promotion Council of India (TEXPROCIL)

The Cotton Textiles Export Promotion Council of India was established as an autonomous, non-profit export promotion body in 1954. Now, this association effectively facilitating exports and has become the international face of Indian Cotton Textiles. Moreover, it has opened the complete variety of Indian cotton fabrics, yarns, and made-ups for the foreign buyers becoming the only one source for them. At the same time, it has also fetched within reach opportunities afforded by the global market for the discerning Indian sellers (Office of the Textile Commissioner, n.d.).

The Council encourages exports of cotton yarns raw cotton, and blended yarns, grey and processed cotton and blended woven and knitted fabrics, grey and processed home textiles such as kitchen linen, bed linen, bath towels and other linen), technical textiles such as protective, performance, medical and geo textiles.

The council membership comprises very huge vertically integrated mills with billions of dollar turnover to small units in the rural areas which are producing
specialty products. The council grants export promotional services to over 3,500 members as well as spinning units, composite mills, weaving units, process houses, knitting units, and merchant exporters displaying an amazing collection of cotton textile products across the value chain (TEXPROCIL, n.d.).

External activities for the foreign buyers, TEXPROCIL has opened a wide collection of yarns, fabrics and made ups, including home textiles in its entire splendor, and has turned out to be a major source of supply of these items. Other activities include buyer seller meets, organizing fairs and overseas trade delegations giving information to overseas customers about Indian companies when asked market information, seeding the export activity through delegations defending Indian exporters from non tariff barriers, anti subsidy investigations and trends and forecasts identification of potential new markets etc.

It has made available opportunities for the Indian exporters to trade that exist across the globe. Other activities involve working with Indian government on export promotion policies in order to offer industry data on duties and taxes suffered with documentary proof to arrange refund of the same after exports through well thought out draw back mechanism supporting the government in bilateral negotiations bringing to the table the domestic viewpoint help members understand the various actions and policies of the government help members reach out to customers through the various export promotion efforts taken on make available data and trends in Export/Import.

2. Federation of Indian Chambers of Commerce and Industry (FICCI)

Federation of Indian Chambers of Commerce and Industry was established in 1927 and now it is the largest and oldest apex business organization in India. Its historical background is intimately interlinked with India's struggle for independence. Its background including its industrialization and emergence as one of the fastest rising global economies is collected through debates, articulated views of private sectors and influencing policies which was contributed by FICCI. FICCI is a non-government, not-for-profit organization being the voice of businesses and industries of India. FICCI represents its membership from the corporate sector, both private and public, together with small and medium enterprises and Multinational corporations.
and as well as benefit from indirect membership of over 250,000 companies from a range of regional chambers of commerce (Office of the Textile Commissioner, n.d.).

For the development of technical textiles sector in India, the association has a dedicated committee on technical textiles which works closely with Ministry of Textiles. Moreover, it assists Ministry of Textiles in identification of HS Codes for Technical Textile sand has also organized conferences, seminars, and Technotex 2011 which was the biggest event on technical textiles in India.

FICCI organize buyer and seller meetings on technical textiles jointly with Ministry of Textiles for assessing the industry about the requirements of institutional buyers as well as over passing the knowledge gap between them. The association has already organized buyer and seller meetings with institutional buyers in the past like Navy, Air Force, Border Security Force, Army Delhi Police, Central Reserve Police Force(CRPF), Central Industrial Security Force(CISF), Armed Forces Medical Services (AFMS), Dr R M L Hospital, National Highway Authority of India (NHAI), Border Roads Organization (BRO),Central Road Research Institute (CRRI), Indian Roads Congress (IRC), Ministry of Road Transport and Highways, Railways and Research Design and Standards Organization (RDSO), Central Public Works Department &Public Works Department (PWD), Haryana Agriculture University and Indian Council of Agricultural Research(ICAR),National Committee on Plasticulture Applications in Horticulture (NCPAH)etc. (FICCI, n.d.).

3. Bureau of Indian Standards (BIS)

The Bureau of Indian Standards was established in the year 1986 by the Bureau of Indian Standards Act, which came into effect on 23 December 1986. It is the national standards body which is working under the guidance of Food and Public Distribution, Ministry of Consumer Affairs, Government of India. The Minister in charge of the Ministry or Department is ex-officio President Emaad Amin of the BIS having administrative control of BIS. The organization was set up under the Resolution of the then Department of Industries and Supplies No. 1 Std.(4)/45, dated 3 September 1946 which was previously known as the Indian Standards Institution (ISI). The ISI was registered under the Societies Registration Act, 1860. The Bureau aims at recognition, formulation and promotion of the Indian Standards which is also
operating on the standards for Technical Textiles with the support of Ministry of Textiles (Office of the Textile Commissioner, n.d.).

4. Synthetic & Rayon Textiles Export Promotion Council (SRTEPC)

The Synthetic & Rayon Textiles Export Promotion Council was established by the Government of India, Ministry of Textiles in the year 1954. The Council has its head office in Mumbai and regional offices in Delhi and Surat having membership of over 3500. The items come under the purview of this council are fabrics, fibers and made-up. The council provides aid to Indian exporters and manufacturers for competing successfully in the world markets such as “identify markets for their products, introduce them to appropriate overseas importers, assist them financially or otherwise in their efforts, advise them on situations in the different overseas markets by conducting studies & surveys, provide opportunities to give them and their products exposure in the overseas markets by sponsoring their delegations and items, advise them on import export policy and procedures, resolve their problems about shipping and transport, maintain liaison with the authorities to convey to them the requirements of industry and trade and arrange adaptation of policy framework accordingly (Office of the Textile Commissioner, n.d.).

2.11 Major producing States for Technical Textiles

The technical textiles sector is continuously encouraging in various states of India. The states which are proactive and successful in technical textile sector are Tamil Nadu, Gujarat, Karnataka, Maharashtra, Andhra Pradesh, Rajasthan, Punjab and Madhya Pradesh. Following are the contribution of these states in the field of Technical Textiles:

1. Gujarat: Gujarat is playing a major role in the national technical textile sector, contributing 25% to the national technical textile industry. About 900 technical textile units are engaged in each of the 12 subsectors of technical textiles in Gujarat moreover, the state is a key producer of commodity products for the technical textile and downstream industries. Key players in the state which are engaged in technical textile industry include Anjani Udyog Pvt Ltd, Ginni Filaments Ltd, Reliance Industries, Supreme Nonwovens Pvt Ltd, Ambika Polymer, etc. The state also dwelling a number of international firms like American Hygienic Corporation and Austrian firm Ten Cate Geosynthetics and Finnish firm Ahlstrom. Gujarat is rapidly
moving towards innovation in the national technical textile sector. Several companies are manufacturing exclusive technical textile products, such as Sanrhea Technical Textile Ltd with the manufacturing of nylon chafer cloth for tyres, APCO industries with the creation of fibre glass battery separators, Tuflex India with the making gabions and geo-membranes, etc.

2. Tamil Nadu: Tamil Nadu is also a rapidly rising focal point of technical textiles in the Indian economy. The state is one of the leading producers of medical technical textiles, agrotextiles, sport technical textiles and nonwovens. The COE for meditech (The South India Textile Research Association) is situated in Coimbatore, which is specialized in medical technical textiles. Besides, the state has textile parks which are exclusively dedicated to technical textiles. “The Government of Tamil Nadu has approved the establishment of US$ 21.30 million technical textile park in Pallavada, which is expected to commence production in 2013. Furthermore, a 200-acre US$ 27.30 million technical textile zone was planned to be established in Tirupur, Tamil Nadu in 2008” (Wazir Advisors & EYPL, 2013, p. 54).

3. Maharashtra: Maharashtra is offering noteworthy spur to the domestic technical textiles industry being a key manufacturer of woven technical textiles, agro textiles, ropes and cordages, coir fibre, and Indutex. The key players which are located in Maharashtra are Kwality Nets, Malmo Exim Ltd, B&V Agro, etc. The state is also encouraging the research and development in the national sector because of having four of the country's eight centers of excellence on technical textiles which are Geotech (Bombay Textile Research Association), Agrotech (Synthetic & Art Silk Mills' Research Association), Non-wovens (DKTE) and Sporttech (Wool Research Association). The technical textile in Maharashtra has also fascinated considerable investment interest and furthermore, the state’s first technical textiles park is also developing in Ichalkaranji with an investment of US$ 20 million, which involves a large number of stakeholders of the whole textile, value chain.

4. Karnataka: Karnataka is one of the rising players in the field of technical textiles which has fascinated investments of US$ 104 million between 2008 and 2011 as well as targeted additional investments of US$ 154 million in the sector between 2011-2012 and 2012-13. The state fascinated US$ 891 million in investments in its textile sector alone during the state's Global Investor Meet 2012 which was held from June 6-8, 2012. “These investments included proposals for the establishment of two...
technical textile mega projects for US$ 60 million and US$ 18.2 million in Hassan SEZ and Bellary, respectively.” Moreover, the state has also promoted technical textiles as a focal point in its new industry-friendly textiles sector in January 2013 (Wazir Advisors & EYPL, 2013, p. 55).

5. Rajasthan: Rajasthan is another state which is setting up new boundaries in the national technical textiles sector. The state is a well-known leader in the global textiles sector, and is now promoting the growth of technical textiles for the progress of its leadership all over the textile value chain. Bhilwara has especially come out as one of the largest producing centers for viscose-polyester textiles. A seminar in September 2010 was organized by the Rajasthan State Industrial Development and Investment Corporation Ltd (RIICO) to emphasize the opportunities for Rajasthan in order to turn out to be a national and global leader in the technical textiles field.

6. Andhra Pradesh: Andhra Pradesh is well-known leader in the agro textiles sector and also a chief consumer in Mobiltech and Protech. The state is a center for the defense industries, national textile and aerospace and also an essential consumer of Protech hand Indutech products.

7. Punjab: Punjab is demonstrating promising market for Indian Sportech producers. India's largest sports industries are located in the state. Moreover, the state is also a key supplier to the Indian Raffia, ropes and cordages industries. The state displays considerable potential for the development of exciting and booming industry for sports technical textiles due to the increasing demand for sport technical textiles, and ready supply of downstream industries in the technical textile value chain.

8. Madhya Pradesh: Madhya Pradesh is also displaying promising growth in the technical textiles sector. The state has created positive industrial environment through a stable government and numerous initiatives, good connectivity and infrastructure with all major parts of the country which are very favorable for the technical textiles industry (Wazir Advisors & EYPL, 2013).
2.12 Conclusion

India is an arising economy and the use of Technical textile is bound to grow because of growing globalization. In whatever way, there is a great need of educating consumers about the advantages of these products. Manufacturers can really achieve this target by producing high quality products and investing in to bring into existence good brands. Big players are suddenly attacking into the market that will lead to decrease in price enabling these products available at affordable rates and moving into increased consumption. Constantly decreasing import taxes, 100% foreign direct investment ownership, assistance of government in areas of production and R&D. undoubtedly offer very attractive market conditions for foreign business in the Indian Technical textile area.
2.13 References


Market for Technical Textiles seen at $20 billion by 2015 (2010, April 21).


