

## A New Prospects to Enhance the Commercial and Economical Status in Textile Industry

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### Abstract:

The traditional concept of the term "Textiles" is no longer similar to the currently international concept related to that field. This traditional concept that used in Arab countries depends only on normal textiles and garment. But, the currently international concept has extended to contain a lot of other functional applications because of modern technologies that has been used in that field. The modern concept named "Technical Textiles". Textile industry in the Arab region has connected with the traditional concept of textiles. Therefore, this industry is limited to garment and normal textiles only. This in turn led to the decline and lack of employment opportunities and the weakness of investment opportunities in that area.

The study discussed several developmental prospects that depend on modern applications of technical textiles in several fields such as medicine, engineering, industry, environment, agriculture, protection, sport and so many other fields. The study cleared also the status of international market of technical textiles, that showed that technical textiles are reported to be the fastest growing sector of the textile industrial Sector. What is relatively new is a growing recognition of the economic and strategic potential of such textiles to the fibre and fabric manufacturing and processing industries of industrial and developing countries alike. Finally, the study showed the processes that help to transfer the technical textiles concept to Arab countries, and the role of this new concept in developing and improving the commercial and economical status in that region.

### Keywords

- *Textile industry*
- *Technical Textiles*
- *global markets*
- *Ecotech*
- *Packtech*
- *Agrotech*
- *Medtech*

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### 1. Introduction:

Technical textiles are an innovative sector, one which is highly specialized and holds great potential for the future. Technical textiles are reported to be the fastest growing sector of the textile industrial Sector. What is relatively new is a growing recognition of the economic and strategic potential of such textiles to the fibre and fabric manufacturing and processing industries of industrial and industrialising countries alike. In some of the most developed markets, technical products (broadly defined) already account for as much as 50% of all textile manufacturing activity and output. The technical textiles supply chain is a long and complex one, stretching from the manufacturers of polymers for technical fibres, coating and specialty membranes through to the converters and fabricators who incorporate technical textiles into finished products or use them as an essential part of their industrial operations. The economic scope and importance of technical textiles extends far beyond the textile industry itself and has an impact upon just about every sphere of human economic and social activity (1).

### 2. Statement of the problem:

The traditional concept of the term "Textiles" is no longer similar to the currently international concept related to that field. This traditional concept that used in Arab countries depends only

on normal textiles and garment. But, the currently international concept has extended to contain a lot of other functional applications because of modern technologies that has been used in that field. The modern concept named "Technical Textiles".

Textile industry in the Arab region has connected with the traditional concept of textiles. Therefore, this industry is limited to garment and normal textiles only. This in turn led to the decline and lack of employment opportunities and the weakness of investment opportunities in that area. But, that problem has worsened dramatically in the moment, because of many other competing countries that produce these products with high efficiency and lower price. These countries acquire a great deal of global markets. At the same time, imported textile products became a real competitor for local products, institutions and factories. That means, we will face a kind of deterioration of employment and a contraction of manufacturing and investment opportunities in that field.

### 3. Objectives:

- Focusing on the concept of technical textiles, and its role in community serving.
- Helping to find new developmental prospects and new markets in the field of textile industry, through clarifying the functional applications of technical textiles, and the role of modern technology in that kind of textiles, and how to

apply them in Arab countries.

- Development of the traditional concept of textile industry in Arab region, to be not restricted only to the garment industry, but rather to include the industry of technical textiles applications.
- Encouragement of Arab markets, to start an effective partnership with the global markets in the field of technical textiles manufacturing.
- Helping to increase job opportunities in the field of textile manufacturing in Arab countries, through opening new manufacturing

enterprises, and attracting investments in the field of technical textiles.

- To highlight the important and effective role of the research and academic institutions in spreading the concept of technical textiles through; a) development of education curriculums related to technical textiles; b) organizing of scientific conferences and workshops related to technical textiles; c) knowledge transfer with international experts related to technical textiles.













Techtextil Application Areas	Areas Covered by the Definition	End-Use Segments for which Forecasts are made in the Report
Agrotech 	Agriculture, Horticulture, Forestry and Fishing	<ul style="list-style-type: none"> <li>• Cover, Protection, Collection</li> <li>• Fishing</li> <li>• Tying</li> </ul>
Buildtech 	Building and Construction Textiles	<ul style="list-style-type: none"> <li>• Protection, Display</li> <li>• Textile Construction</li> <li>• Building Components</li> <li>• Reinforcements</li> </ul>
Clothtech 	Technical Components of Shoes and Clothing	<ul style="list-style-type: none"> <li>• Shoe Components</li> <li>• Insulation, Structure</li> <li>• Sewing Products</li> </ul>
Geotech 	Geotextiles, Civil Engineering	<ul style="list-style-type: none"> <li>• Stabilisation, Separation, Drainage</li> <li>• Soil Reinforcement</li> <li>• Erosion Control</li> <li>• Linings</li> </ul>
Hometech 	Components of Furniture, Household Textiles and Floor Coverings	<ul style="list-style-type: none"> <li>• Carpet Components</li> <li>• Furniture Components</li> <li>• Cleaning, Filtration</li> <li>• Tickings</li> <li>• Composites</li> </ul>
Indutech 	Filtration, Cleaning and Other Industrial Materials	<ul style="list-style-type: none"> <li>• Filtration</li> <li>• MRGs</li> <li>• Cleaning</li> <li>• Lifting, Pulling</li> <li>• Electrical Components</li> <li>• Other</li> </ul>
Medtech 	Hygiene and Medical	<ul style="list-style-type: none"> <li>• Cleaning</li> <li>• Coverstock</li> <li>• Woundcare</li> <li>• Protection</li> </ul>
Mobiltech 	Automotive, Marine, Railways and Aerospace	<ul style="list-style-type: none"> <li>• MRGs</li> <li>• Safety</li> <li>• Trim, Insulation</li> <li>• Floorcovering</li> <li>• Protection</li> <li>• Composites</li> <li>• Other</li> </ul>
Packtech 	Packaging	<ul style="list-style-type: none"> <li>• Bulk Packaging</li> <li>• Disposable</li> <li>• Tying</li> <li>• Other</li> </ul>
Protech 	Personal and Property Protection	<ul style="list-style-type: none"> <li>• Particulate Protection</li> <li>• Chemical Protection</li> <li>• Flame Retardant</li> <li>• Cut Resistant</li> <li>• Outdoor Use</li> <li>• Other</li> </ul>
Sporttech 	Sport and Leisure Equipment	<ul style="list-style-type: none"> <li>• Luggage Components</li> <li>• Sports Equipment</li> <li>• Camping Equipment</li> <li>• Other</li> </ul>
Oekotech 	Environmental protection	<ul style="list-style-type: none"> <li>• Products extracted from the above</li> </ul>

Fig. 1: Classification of technical textiles (12)

(packing); Protech (protection of people and property) and Sporttech (sport and leisure) (6).

#### 4.2. Developmental prospects of technical textiles:

##### 4.2.1. Indutech:

Technical textiles keep the wheels of industry turning in many different ways, separating and purifying industrial products, cleaning gases and effluents, transporting materials between processes and acting as substrates for abrasive sheets and other coated products. Indutech is an extremely diverse application sector in terms of products, functions and end-uses ranging from lightweight nonwoven filters, knitted nets and brushes to heavyweight coated conveyor belting. It is also one of the largest end-use application areas. As now more precisely defined, this includes textiles used directly in industrial processes or incorporated into industrial products such as filters, conveyor belts and abrasive belts, as well as reinforcements for printed circuit boards, seals and gaskets, and other industrial equipment (11)(1).

##### 4.2.2. Agrotech:

Agriculture has numerous links with the world of technical textiles (used as aids in harvesting, or for protecting and stocking products, etc.). Among the main agrotech products, we can include nets designed for the packaging of products; fabrics providing protection from hail, sunlight, and animals; nets for sustaining creeping plants; tapes for animal enclosures. Although future volume growth rates appear to be relatively modest, this is partly due to the replacement of heavier weight traditional textiles, including jute and sisal sacking and twine, by lighter, longer lasting synthetic substitutes, especially polypropylene (4)(11)(1).

#### 4. Technical textiles:

Technical textiles are one of the faster growing sectors of the global textile industry. The world textile industry is moving rapidly toward the manufacture of high-added value textile structures and products. There is a problem in finding an all-over definition for the products of technical textiles, since the general definition of textile as an assembly of textile fibers into useful product is very broad and can be spread onto other segments of flexible engineering. Even the name itself "Technical textile" is a result of broadly accepted compromise among other existing terms, such as: "Functional textile", "High performance textile", "Engineering textile" and "High-tech textile". Technical textiles are defined also 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 (5) (6) (11).

4.1. Classification of the technical textile products: Since a broad range of products exists, there are many sub-classifications of technical textile products as shown in Fig.1. At the biggest technical textile exhibitions in Frankfurt and Osaka, the products are classified according to the application in twelve main fields: Agrotech (agriculture, gardening and forestry); Buildtech (construction); Clothtech (technical components for clothing and shoes); Geotech (geotextile and road construction), Hometech (furniture components, upholstery and floorcoverings); Indutech (filtration, cleaning and other industrial applications); Meditech (medical and hygienic textile); Mobiltech (automotive industry, marine construction, railroad and aviation); Oekotech (products for environment protection); Packtech

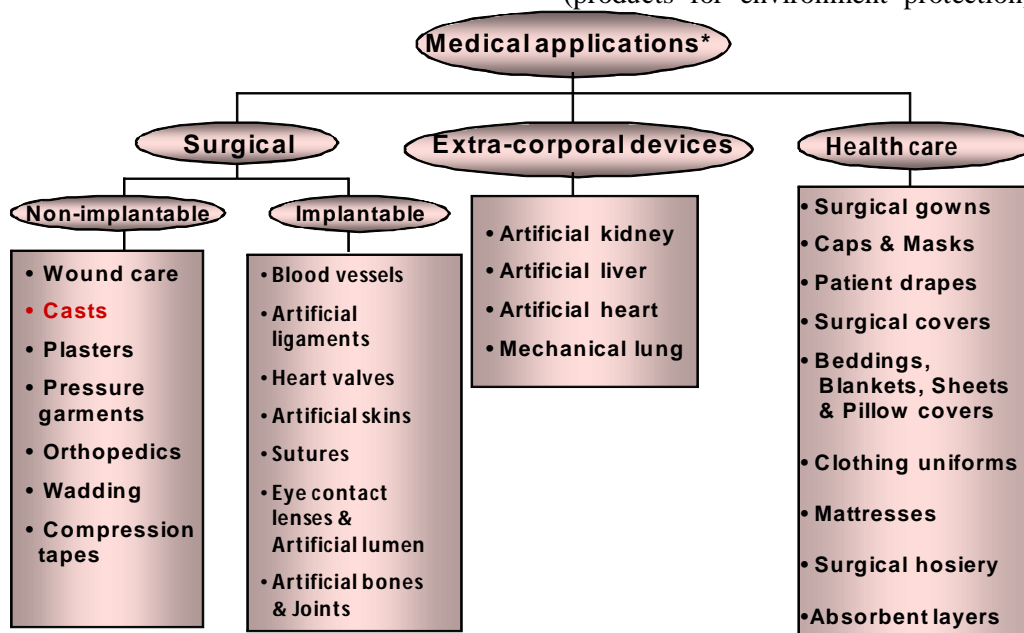


Fig. 2: Products of medical textiles (14)

to the size and value of the existing market. As in the case of sports textiles, a number of relatively high value and performance critical product areas have proved to be an ideal launch pad for a new generation of high performance fibres, most notably the aramids, but including many other speciality materials. The variety of protective functions that needs to be provided by different textile products is considerable and diverse. It includes protection against cuts, abrasion, ballistic and other types of severe impact including stab wounds and explosions, fire and extreme heat, hazardous dust and particles, nuclear, biological and chemical hazards, high voltages and static electricity, foul weather, extreme cold and poor visibility (11).

#### **4.2.7. Clothtech:**

The Clothtech sector covers those textile products which represent functional (and largely hidden) components of clothing and footwear such as interlinings, sewing thread, insulating fibrefill and waddings. The level of component sophistication is steadily increasing, driven by new, 'high performance' garment fabrics and the development of better performing products by fiberfill companies. Although the world's consumption of clothing and therefore of these types of technical textile continues to increase steadily, the major problem faced by established manufacturers is the relocation of garment manufacturing to lower cost countries and therefore the need to develop extended supply lines and marketing channels to these areas, usually in the face of growing local competition (1)(11).

#### **4.2.8. Hometech:**

Technical textiles play an essential role in the construction of many household textiles, furnishings and floorcoverings. Applications include carpet backings, curtain tapes, fibrefill and waddings for furniture and mattresses. By far the largest area of use for other textiles as defined above, that is other than fabrics, nonwovens and composite reinforcements, over 35% of the total weight of fibres and textiles in that category, lies in the field of household textiles and furnishing and especially in the use of loose fibres in wadding and fibrefill applications. Hollow fibres with excellent insulating properties are widely used in bedding and sleeping bags. Other types of fibre are increasingly being used to replace foams in furniture because of concern over the fire and health hazards posed by such materials. Technical textiles are also widely employed in the furniture sector, whether for the comfort and safety specifications offered by certain fibres, or for increasingly relevant factors related to practicality (1)(4).

#### **4.2.3. Medtech:**

Medical textiles are one of the most rapidly expanding sectors in the technical textile market, according to reports, and hosiery products with medical industry applications are among a long list of textile products being consumed in that market (Fig. 2). Combination of textile technology and medical sciences has resulted into a new field called medical textiles. New areas of application for medical textiles have been identified with the development of new fibers and manufacturing technologies for yarns and fabrics. Development in the field of textiles, either natural or manmade textiles, normally aimed at how they enhance the comfort to the users. Development of medical textiles can be considered as one such development, which is really meant for converting the painful days of patients into the comfortable days (10).

#### **4.2.4. Mobiltech:**

The transport sector is one of the most important outlet markets for technical textiles, where they are employed for furnishings, technical and structural functions. Transport applications (cars, lorries, buses, trains, ships and aerospace) represent the largest single end-use area for technical textiles, accounting for some 20% of the total. Products range from carpeting and seating (regarded as technical rather than furnishing textiles because of the very stringent performance characteristics which they must fulfil), through tyre, belt and hose reinforcement, safety belts and air bags, to composite reinforcements for automotive bodies, civil and military aircraft bodies, wings and engine components, and many other uses (1).

#### **4.2.5. Sporttech:**

Sports and leisure activities, whether at a professional or amateur level, are increasingly growing in importance. Many sports garments, as well as a great variety of other objects, employ technical textiles to offer high technical performances (anti-friction fabrics, protective and breathable fabrics). Growth rates are well above average and unit values are often very high. The sports sector is receptive to innovation and developers of new fibres, fabrics and coatings often aim them at this market, at least initially. Many of the products and ideas introduced here eventually diffuse through to the volume leisure market and even the street fashion market (4).

#### **4.2.6. Protech:**

Protech encompasses all those textile materials and products used in the production of protective clothing of various types. Textiles for protective clothing and other related applications are another important growth area which has attracted attention and interest somewhat out of proportion

and sub-sea coastal engineering projects. The economic and environmental advantages of using textiles to reinforce, stabilise, separate, drain and filter are already well proven. Geotextiles allow the building of railway and road cuttings and embankments with steeper sides, reducing the land required and disturbance to the local environment. Revegetation of these embankments or of the banks of rivers and waterways can also be promoted using appropriate materials. There has been renewed interest in fibers such as woven jute as a biodegradable temporary stabilizing material in such applications. Nonwovens already account for up to 80% of geotextile applications. This is partly a question of economics but also of the suitability of such textile structures for many of the filtration and separation duties that they are called upon to perform. Current interest is in 'composite' fabrics which combine the advantages of different textile constructions such as woven, knitted, nonwoven and membrane materials. To supply the diversity of fabrics needed for the many different applications of geotextiles, leading specialist manufacturers are beginning to assemble a wide range of complementary capabilities by acquisition and other means (1)(11).

#### **4.2.12. Ecotech:**

The final category of technical textile markets, as defined by Techtextil, is technical textiles for protection of the environment and ecology. This is not a well defined segment yet, although it overlaps with several other areas, including industrial textiles (filtration media), geotextiles (erosion protection and sealing of toxic waste) and agricultural textiles (e.g. minimising water loss from the land and reducing the need for use of herbicides by providing mulch to plants). Apart from these direct applications, technical textiles can contribute towards the environment in almost every sphere of their use, for example by reducing weight in transport and construction and thereby saving materials and energy. Improved recycleability is becoming an important issue not only for packaging but also for Products such as cars (1).

### **5. Common materials of technical textiles:**

#### **5.1. Spacer fabrics:**

The basic construction of three dimensional spacer fabrics is formed of two textile layers held by spacer threads in a defined spacing. This structure provides tortuous spaces which let heat and moisture to be transferred through the fabric with air easily. These characteristics of the spacer fabrics make them suitable to use for medical purpose such as beds, supporting pillows, bandages, shoes, operation tables and so on (2)(15).

#### **5.2. Carbon fibers:**

#### **4.2.9. Buildtech:**

Textiles are increasing their market share in construction and architectural applications, where their mechanical properties are equal, or often superior, to traditional materials. They offer desired characteristics such as lightness, strength and resilience as well as resistance to many factors such as creep and degradation by chemicals and pollutants in the air. Textiles are employed in many ways in the construction of buildings, both permanent and temporary, dams, bridges, tunnels and roads. A closely related but distinct area of use is in geotextiles by the civil engineering sector. Temporary structures such as tents, marquees and awnings are some of the most obvious and visible applications of textiles. Where these used to be exclusively made from proofed heavy cotton, a variety of lighter, stronger, rot-, sunlight- and weatherproof (also often fireproof) synthetic materials are now increasingly required. A relatively new category of 'architectural membrane' is coming to prominence in the construction of semi-permanent structures such as sports stadia, exhibition centers and other modern buildings (1).

#### **4.2.10. Packtech:**

Packaging is an ideal and long established application for textiles. At one end Packtech includes heavyweight woven fabrics used for bags, sacks, Flexible Intermediate Bulk Carriers (FIBCs) and wrappings for textile bales and carpets. At the other it includes lightweight nonwovens used as durable papers, tea bags and other food and industrial product wrappings. The demand for tying products and bulk packaging materials is closely correlated with economic growth, industrial production and trade. New technologies have the effect of depressing demand for textile packaging products. For example, the use of synthetic materials prolongs product life. Non-textile solutions including pressuresensitive tapes and shrink-wrap plastics are also growing. Strong, lightweight spunbonded and equivalent nonwoven paper-like materials are particularly useful for courier envelopes while adhesive tapes, often reinforced with fibres, yarns and fabrics, are increasingly used in place of traditional twine. Woven strappings are less dangerous to cut than the metal bands and wires traditionally used with densely packed bales. (11)

#### **4.2.11. Geotech:**

Geotextiles are defined as all woven, nonwoven and knitted textile materials used to provide a range of functions such as support, drainage and separation at or below ground level. Geotextiles are used in a wide range of applications including the construction of buildings, bridges, dams, roads, railways and paths as well as embankments

### 5.5. Coated Fabrics:

The use of coated textiles for protective clothing, shelters, covers, liquid containers, and so forth, dates back to antiquity. Historically, the earliest recorded use of a coated textile is by the natives of Central and South America, who applied latex to a fabric to render it waterproof. Today, coated fabrics are essentially polymer-coated textiles. Advances in polymer and textile technology have led to the phenomenal growth in the application of coated fabrics for many diverse end uses. Coated fabrics find an important place among technical textiles and are one of the most important technological processes in modern industry. The final properties of a coated fabric depend on the type of polymer used and its formulation, the nature of the textile substrate, and the coating method employed. The subject of coated textiles is thus interdisciplinary, requiring knowledge of polymer science, textile technology, and chemical engineering. The organization of this book is based on these considerations (13).

### 6. Market of Technical Textiles:

The technical textile industry is one where applications, technologies and companies are constantly changing and therefore exports tend to change as well. Figure.3 shows the production rates of several applications of technical textiles. The demand for technical textiles in many countries is growing causing existing markets to expand and also leading to new ones. As the market share of technical textiles consumed in the emerging economies relative to textile products overall is increasing, many countries meet their domestic demand for many of these advanced textiles through imports. North America is the largest regional consumer of technical textiles due to the presence of the majority of end-use industries (Fig. 4). Europe and Asia Pacific follow North America in terms of current consumption; however, development in emerging markets including India, China, Japan, Korea and Taiwan is expected to increase overall technical textile demand.(3)

There is a wide range of choice of carbon fibres, which are suited to different applications. Development of carbon fibres was driven during the 1980s by use in composites for military aircraft. Since carbon fibre composites allowed for reduction in weight and improvement in range, payload and performance, their value-in-use was very high. Adoption in commercial aircraft followed quickly. Because they made new levels of performance possible, carbon fibres also found their way into sporting goods, medical devices, industrial applications and infrastructure. Carbon fibre found its way into tennis racquets, golf club shafts, fishing rods, skis and many similar applications, to the extent that virtually all major producers authorized capacity increases (7).

### 5.3. Glass Fiber:

Glass fibres are used in a number of applications which can be divided into four basic categories: (a) insulations, (b) filtration media, (c) reinforcements, and (d) optical fibres (7).

### 5.4. Composites:

Fiber composite technology is based on taking advantage of the high strength and high stiffness of fibers, which are combined with matrix materials of similar/dissimilar natures in various ways, creating inevitable interfaces. In fiber composites, both the fiber and the matrix retain their original physical and chemical identities, yet together they produce a combination of mechanical properties that cannot be achieved with either of the constituents acting alone, due to the presence of an interface between these two constituents. The growing number of uses for fiber reinforced composites in many engineering applications has made the issue of interface a major focus of interest in the design and manufacture of composite components. A classic definition of the interface in fiber composites is a surface formed by a common boundary of reinforcing fiber and matrix that is in contact with and maintains the bond in between for the transfer of loads. It has physical and mechanical properties that are unique from those of the fiber or the matrix (8).

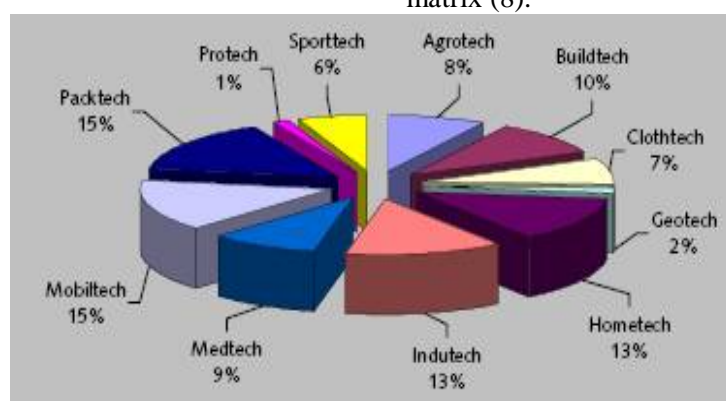


Fig. 3: Production rates of technical textiles applications (11)

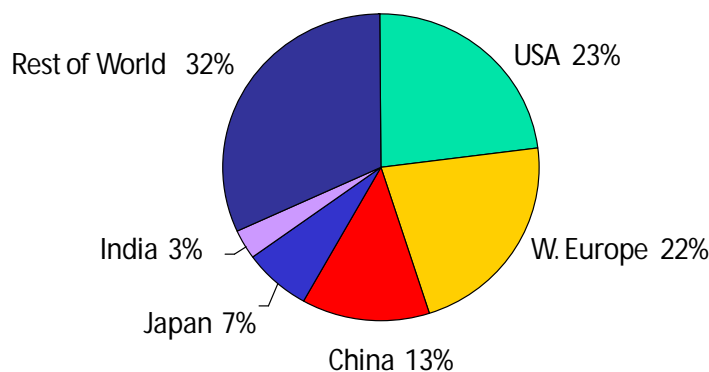


Fig. 4: Consumers of technical textiles (9)

first. However, this largely reflects an anticipated upturn in global economic activity after a period of slow growth (and in many countries actual recession) around the turn of the century. Average growth rates (in volume terms) of 3.5% per annum between 1995 and 2005, and 3.8% per annum from 2005 to 2010 remain relatively attractive, especially in comparison with most other, non-technical, textile markets (11)(12)(16).

Technical textiles and nonwovens play a much more important role worldwide than is commonly acknowledged. According to DRA's estimates (Fig. 5), world consumption of technical textiles in 2000 amounted to just over 16.7 mn tons of fibre and polymer with a finished textile product value of US\$92.9 bn. In weight terms, this represents over one-quarter of the estimated 62.2 mn tons of fibres consumed across all end-uses in that year. Figure 5 indicates a rather higher growth rate over the second half of the current decade than for the

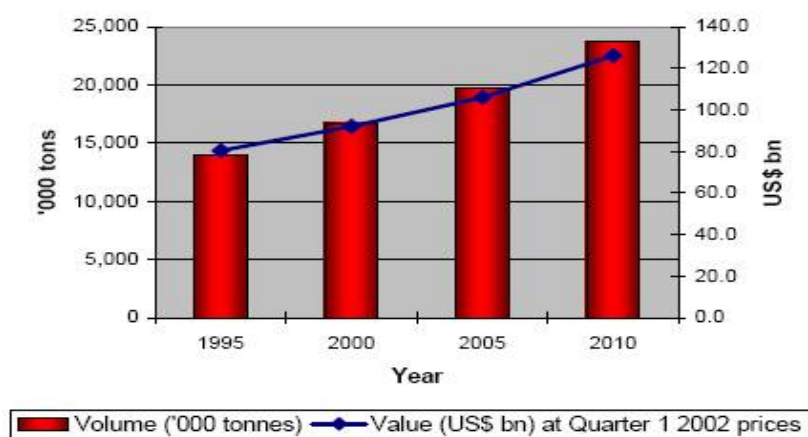


Fig. 5: Technical textiles production volumes (11)

new markets and manufacturing areas that help to increase employment and production chances in textile industry sector.

In order to realize the previous concepts of technical textiles in arab countries, there are some of basic steps should be considered, such as:

1. The academic and research institutions should play a role to spread the concept of technical textiles and their applications, and to clear the technology that used in that new field. They should also highlight the role and importance of technical textiles in community serving. This process can be done by; a) curriculums developing (by adding technical textiles technology); b) training programmes for students to connect between theoretical and practical concept of technical textiles; c) knowledge transfer between local and international universities by experts exchange; d) organizing and attending of international

## 7. Conclusion

### How to develop technical textiles in arab countries?

As mentioned above, modern concept of textiles is not restricted only to normal textiles and clothing products as known in arab countries. Technical textiles contribute significantly to open new developmental prospects in textile industry sector by their several applications in several fields such as medicine, engineering, industry, environment, agriculture and so many other fields as noted. The field of technical textiles and their applications is considered as a new and important field that includes new technologies, materials and products, that should be developed and applied in arab countries. Because of its importance in society, this field should find a good economic climate in arab countries that should provide all required facilities for a good start. Technical textiles and their applications contribute effectively to open

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- conferences and workshops about technical textiles, in order to clear economic, social and commercial benefits of technical textiles.
2. Encouragement of local and international investment in the field of technical textiles manufacturing in arab countries, and carrying out international partnerships with interested international organizations and manufacturers to transfer the international experience, and also to find out the latest techniques and technology that used in that new field.
  3. Governmental and non-governmental interested organizations should offer all kinds of support for young investors who have interest to invest in that new field. They should also organize international exhibitions and fairs for technical textiles, in order to build a bridge of real cooperation between the local and international interested companies.

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