

Examining the Technical Textile Production Capabilities of Denizli Textile Companies

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Abstract – The world textile industry is rapidly turning to high value-added products. Technical textile production is rapidly increasing all over the world. In this sense, world textile manufacturers are turning to the production of high value-added, high-quality textile and apparel products and innovation-intensive, know-how-intensive special products. Being one of the leading textile centers of Turkey and the world, Denizli has a developed infrastructure and experience especially in the field of home textiles and 75% of Turkey's towel exports, 65% of bathrobe exports and 55% of duvet cover exports are made from Denizli. This study aims to examine the current situation of companies operating in Denizli in technical textile production that is different from traditional production and has added value. Accordingly, at the end of the survey study, it was revealed that although the companies have a deep-rooted history and infrastructure in the field of home textiles, they are lagging behind in technical textile production.

Keywords – Technical Textile, Denizli, Capacity, Innovation.

I. INTRODUCTION

Textile products are generally divided into two groups: conventional textiles and technical textiles. Conventional textile products are designed, developed and produced for their aesthetic and decorative properties, while technical textiles stand out with their functional properties. According to Textile Terms and Definitions published by the Textile Institute, technical textiles are "textile materials and products produced primarily for their technical and performance properties rather than their aesthetic or decorative properties." Technical and performance properties can be improved by incorporating special fibers and polymers into textiles or by applying certain surface finishes and surface treatments. Technical textile products are generally divided into twelve groups when their application areas are considered. These are defined as transportation technical textiles (Mobiltech), industrial technical textiles (Indutech), hygiene and medical textiles (Medtech), home technical textiles (Hometech), clothing technical textiles (Clothtech), agricultural technical textiles (Agrotech), construction technical textiles (Buildtech), sports technical

textiles (Sportech), packaging technical textiles (Packtech), geotextiles (Geotech), protective technical textiles (Protech) and ecological technical textiles (Ecotech) [1, 2, 3].

Technical textiles are one of the fastest growing sectors in the textile industry. Since the number of technical applications is significantly higher than conventional textile applications, the production of technical textiles constitutes more than half of the total textile product production [4]. While the global technical textiles market was 213.8 billion US dollars in 2024, this figure is expected to reach 284 billion US dollars by the end of 2029. A compound annual growth rate (CAGR) of 5.8% is expected in the 2024-2029 period [5]. Asia Pacific dominated the technical textiles market with a market share of 36.03% in 2022. The technical textiles market share in the United States is expected to increase significantly by 2032, reaching an estimated value of \$85.30 billion Us dollars [6].

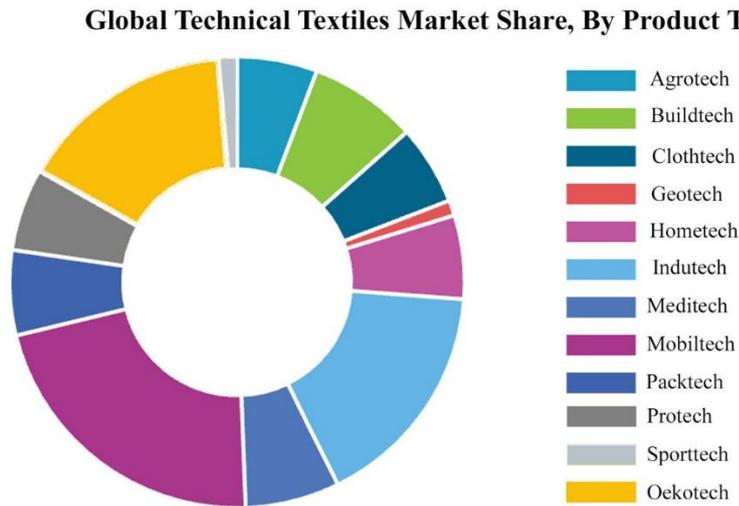


Figure 1. Global technical textiles market share by product type, 2022 [6].

Figure 1 shows the global technical textiles market share by product type in 2022. The vehicle technical textiles segment had the highest technical textile market share in 2022. The segment growth in vehicle technical textiles is due to the increasing use of technical fabrics in automobiles, aviation, railways and other transportation applications. The increasing use of components such as seat upholstery, seat belts, tire cords is expected to further increase the demand for technical textiles in transportation. The increasing research and development of cellulose nanocrystals, bacterial cellulose, biocomposite, keratin substrates, natural tannins and nanocomposite hydrogels for eco-coloring and other applications are expected to drive the growth of the ecological technical textiles segment and increase it in the upcoming forecast period. In addition, the industrial technical textiles and sports technical textiles segments are also expected to grow significantly [6].

The product group in which Turkey stands out in the technical textiles sector is impregnated nonwovens. This product group is followed by durable sacks called bigbags, inner-outer rubber fabrics, plastic impregnated-coated-coated fabrics and bags and sacks produced for packaging [7]. In 2018, Turkey's technical textile exports were recorded as approximately 1.8 billion US dollars. In 2019, this figure reached 108.7 billion US dollars [8].

II. MATERIALS AND METHOD

Denizli, one of the first cities that comes to mind when it comes to home textiles in Turkey, is one of the largest production centers in Turkey, especially in cotton textile, towel and bathrobe production. The purpose of this research is to examine the technical textile production capacities of textile companies operating in Denizli (Turkey) and the infrastructure and capacities of companies that aim to switch to

technical textile production in the upcoming periods, if any. Companies taken from the Denizli Chamber of Industry and Denizli Chamber of Commerce records that are active in the Denizli textile sector were examined. When the company lists taken from both professional organizations were examined, it was determined that all of the companies in the Chamber of Industry records were in the Chamber of Commerce records. The businesses registered in the Chamber of Commerce, which has the widest scope of the list, were divided into fields of activity (those engaged in yarn and retail trade and companies that only engage in sales were excluded with the help of NACE codes) and 342 textile businesses that actively produce including apparel production were determined as the population of the research.

A survey method was chosen to obtain data in the research. The technical textile research questions to be applied to the companies were designed via Google Forms and remained in the system online for 2 months. The survey was designed using data obtained from literature review and interviews with business managers. In the first part; there are 9 questions about the person filling out the survey and his/her business. In the second part; 6 questions in the multiple-choice group consisting of technical issues related to technical textile production were asked.

First, the official web pages of the determined companies were visited and their contact information was obtained. In the second stage, information about the survey and the survey link were sent to the e-mails accessed from the official web pages of the companies and their responses were awaited. In the third stage, the companies were reached by phone and the relevant people were reached and the survey link was sent to these people. As a result, the survey questions were sent to all 324 companies that constitute the main body of the research, and responses were received from 80 businesses (24% of the research population). The reasons for the companies that did not respond or did not want to respond were; they did not want to share their information by stating that their workplace information was confidential, or they did not participate in the survey by stating that they could not spare time due to workload. The data obtained from the relevant surveys are given in the findings and discussion section.

III. FINDINGS AND DISCUSSION

In the first part of the findings section, demographic characteristics of the people who answered the survey and their companies are given. Accordingly, Table 1 shows the positions of the people who participated to the survey in their companies.

Table 1. Position of Respondents in Their Companies

| Department (Position) | Frequency | % |
|---|------------------|----------|
| Company Owner | 19 | 24 |
| R&D (Director, expert, engineer, support staff) | 10 | 13 |
| Production (Director, chief, responsible) | 20 | 25 |
| Purchasing | 1 | 1 |
| Human Resources | 21 | 26 |
| Marketing | 8 | 10 |
| Other | 1 | 1 |

When the positions of the respondents in the enterprises participating in the survey are examined in Table 1, it is seen that 19 (24%) people are company owners, 10 (13%) are in the R&D department; managers, experts, engineers, support personnel, 20 (25%) are in the production department; managers, chiefs and responsible, 1 (1%) person is in purchasing, 21 (21%) in human resources, 8 (10%) in marketing and 1 (1%) is in the administrative units of the enterprises.

Table 2. Company Production Area

| Area | Frequency | % |
|--|-----------|----|
| Underwear | 0 | 0 |
| Outerwear (T-shirts, shirts, pants, etc.) sportswear, etc.) | 15 | 19 |
| Sportswear | 0 | 0 |
| Home textiles (bed linens, towels, bathrobes, etc.) | 57 | 71 |
| Children's and baby clothing | 2 | 3 |
| Technical textiles (protective clothing, medical textiles, sportswear, etc.) | 6 | 8 |

The companies participating in the survey operate in the areas shown in Table 2. Accordingly, when the table is examined, the majority of Denizli enterprises participating in the survey (71%) operate in the home textile sector.

Table 3. Company Facility Structure

| Structure | Frequency | % |
|---|-----------|----|
| Integrated facility | 8 | 10 |
| Weaving – Garment | 32 | 40 |
| Knitting (Flat / Round) – Garment | 3 | 4 |
| Weaving – Finishing – Garment | 15 | 19 |
| Knitting | 3 | 4 |
| Garment | 16 | 20 |
| Finishing (dyeing, printing, finishing) | 1 | 1 |
| Nonwoven surfaces | 1 | 1 |
| Other | 1 | 1 |

According to the company facility structure in Table 3, the areas supporting home textile production have a total rate of 59% as weaving - garment and weaving finishing garment enterprises.

Table 4. Total number of employees in the company

| Number | Frequency | % |
|---------------------|-----------|----|
| 1-49 people | 11 | 14 |
| 50-149 people | 15 | 19 |
| 150-299 people | 12 | 15 |
| 300 people and more | 42 | 53 |

According to Table 4, more than half of the enterprises participating in the survey (53%) have 300 or more employees. This shows that the enterprises participating in the survey are large-scale and have certain experience, technical capability and institutionality.

Table 5. Company export status

| Status | Frequency | % |
|------------------------------|-----------|----|
| Exports available | 69 | 86 |
| No exports (domestic market) | 11 | 14 |

The export status of the companies is given in Table 5. Accordingly, 86% of the companies export to various countries. The companies participating in the survey export with high production volumes and make significant contributions to the economy of Denizli and Turkey.

Table 6. Brand used in manufactured products

| Brand | Frequency | % |
|------------------------|-----------|----|
| Own company brand | 5 | 6 |
| Customer desired brand | 23 | 29 |
| Both | 52 | 65 |

Table 6 shows the brands used in the products produced. Accordingly, it is understood that 29% of the companies produce like large subcontractors while using only the brand requested by the customer. The rate of companies using only their own brand is a low rate of 6%. According to the results of the 2024 research conducted by the Turkish Reputation Academy [9], which determined the most reliable brands in the country, Denizli is one of the largest production centers in Turkey in cotton textile, towel and bathrobe production, but the absence of major brands from Denizli in this list has shown that the sector remains deficient in branding and perception management. This result is consistent with the results of the survey study.

Table 7. The biggest problem experienced in Denizli textile industry

| Problem | Frequency | % |
|---|------------------|----------|
| Product deficiencies (inability to produce knowledge-based, technological and value-added products) | 25 | 31 |
| Lack of expert personnel | 40 | 50 |
| Insufficient capital | 13 | 16 |
| High costs | 1 | 1 |
| Distance to target markets | 1 | 1 |

According to Table 7, 50% of the enterprises participating in the survey stated that the most important problem of Denizli textile industry is the lack of expert personnel. The second is seen as the inability to produce technological and value-added products that contain missing information. These two problems indicate a very important problem with 81%.

Table 8. R&D and/or Design Center

| Status | Frequency | % |
|---------------|------------------|----------|
| Yes | 69 | 86 |
| No | 11 | 14 |

According to Table 8, almost half of the enterprises participating in the survey (46%) do not have an R&D or Design Center.

Table 9. New technical product development situation in the company

| Status | Frequency | % |
|---------------|------------------|----------|
| Yes | 33 | 41 |
| No | 47 | 59 |

Table 9 indicates whether companies have developed new products (technical fabrics, technical clothing, smart clothing, innovative products) in recent years. 60% of the companies participating in the survey have not developed new products.

Table 10. Attending a training in technical textiles and production processes

| Status | Frequency | % |
|---------------|------------------|----------|
| Yes | 39 | 49 |
| No | 41 | 51 |

According to Table 10, the rate of those who attended (49%) and did not attend (51%) training on technical textiles and production processes is almost equal.

Table 11. Technical textile groups which companies have production/investment activities

| | Frequency | % |
|-----------|------------------|----------|
| Mobiltech | 0 | 0 |
| Indutech | 3 | 4 |
| Medtech | 1 | 1 |
| Homotech | 24 | 30 |
| Clothtech | 11 | 14 |
| Agrotech | 2 | 3 |
| Buildtech | 1 | 1 |
| Sportech | 0 | 0 |
| Packtech | 0 | 0 |
| Geotech | 0 | 0 |
| Protech | 1 | 1 |
| Ecotech | 1 | 1 |
| None | 36 | 45 |

In Table 11, the technical textiles produced by the companies were asked and due to the lack of technical knowledge of the person filling in the question, traditional home textiles and home technical textiles were confused and the results do not reflect the truth. The research revealed that there is a lack of education.

Table 12. Knowledge of yarns used in Technical Textiles (reflective yarns, UV protective yarns, metal yarns, antimicrobial yarns, etc.)

| Status | Frequency | % |
|---------------|------------------|----------|
| Yes | 47 | 59 |
| No | 33 | 41 |

According to Table 12, 41% of the participants do not know the yarns used in technical textile production.

Table 13. Familiarity with technical textile fabric structures (three-dimensional hollow sandwich knitted fabrics - spacer etc.)

| Status | Frequency | % |
|---------------|------------------|----------|
| Yes | 32 | 40 |
| No | 48 | 60 |

According to Table 13, 60% of the participants do not know technical fabric production methods.

Table 14. Familiarity with the finishing processes and coating methods applied to technical textiles

| Status | Frequency | % |
|---------------|------------------|----------|
| Yes | 39 | 49 |
| No | 41 | 51 |

According to Table 14, 51% of the participants do not know the technical fabric finishing methods.

Table 15. Knowledge of test methods applied to technical textiles in the field of fiber, yarn and fabric

| Status | Frequency | % |
|---------------|------------------|----------|
| Yes | 42 | 53 |
| No | 38 | 48 |

According to Table 15, 48% of the participants do not know technical fabric testing methods.

IV. CONCLUSION

The future expectation is that the amount and importance of technical textiles will increase even more. In the near future, the production and use of multifunctional, smart (interactive) technical textile products that can provide other services, especially in the fields of health, security and information, in addition to covering and adorning those who wear and use them, will increase. The ordinary and cheap textile products that are being abandoned by the rich information society will be replaced by multifunctional, smart (interactive) technical textiles that are researched and developed with strong R&D opportunities, require serious know-how and therefore cannot be easily imitated and will therefore remain under the dominance of strong industrial countries for many years to come. The following suggestions should be taken into consideration by industrialists with the support of research findings:

- Turkey, which has the largest textile and apparel production capacity in Europe, needs to invest in technical textile products that are in an attractive market position in the long term instead of ordinary, cheap textile products, which have and will have the largest excess supply in the world.
- For this reason, it is very important for Turkey to start researching and developing these products. However, as revealed in this research, it is a fact that Denizli Textile Industry is not in a position to meet the research and development needs with its current structure.
- It will take time for this sector to focus on technical textile products and fashion brand product groups that appeal to the upper class. Urgent and serious measures should be taken in this area and all institutions, especially universities, that conduct textile education, training and R&D studies in Turkey should be ensured to focus on the multifunctional technical textile issue with sensitivity.
- In this context, it is important to rapidly accelerate the training of R&D experts in new R&D centers with sufficient budget and infrastructure.
- For the vision of Denizli, which is one of the important textile centers of Turkey and the world; it is necessary to try to increase its share in world trade with high value-added, innovative, competitive and technology-inclusive smart (interactive) technical textile products.

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