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*Research Article*

# *Machinery Sector Problems and Solution Suggestions: Düzce Example*

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**ABSTRACT**

In this study, a general evaluation was carried out on the machinery manufacturing sector in Turkey in general and in Düzce specifically. To enable an orderly and consistent comparison of all data, this analysis was carried out within the scope of Code 28 (Manufacture of machinery and equipment n.e.c.), which is the binary group of the NACE classification used in the European Union. Both Türkiye and Düzce data were discussed and interpreted under this field of activity. Therefore, the expression "machinery sector" used in the study covers this production code. The problems of the companies operating in the NACE 28 production code in Düzce were determined through oral and written interviews (survey application) with selected company representatives. In addition to the companies operating with the NACE 28 code, opinions were exchanged with the 4th Professional Committee of the Düzce Chamber of Commerce and Industry (Non-Food Manufacturing Industry, Machinery, Metal, Rubber Industries and Other Manufacturing) and the problems and solution suggestions related to nearby manufacturing areas were also added to this study. In this way, it is aimed to make a much more comprehensive evaluation. Turkish Statistical Institute (TÜİK) data were mainly used in the evaluation of export, import and employment figures of the study. For Düzce, the data that cannot be accessed on the TÜİK website was obtained by officially requesting it from TÜİK.

**Keywords:** *Düzce, Employment, Machinery sector, NACE,*

# *Makine Sektörü Problemleri ve Çözüm Önerileri: Düzce Örneği*

**ÖZET**

Bu çalışmada, Türkiye genelinden Düzce ili özeline makine imalatı sektörü üzerine genel bir değerlendirme yürütülmüştür. Tüm verilerin düzenli ve tutarlı bir biçimde karşılaştırılmasına olanak sağlamak için bu analiz, Avrupa Birliği'nde kullanılmakta olunan NACE sınıflamasının ikili grubu olan 28. Kod (Başka yerde sınıflandırılmamış makine ve ekipman imalatı) kapsamında yürütülmüştür. Hem Türkiye hem de Düzce verileri bu faaliyet alanı altında tartışılmış ve yorumlanmıştır. Bu nedenle, çalışma içerisinde geçen "makine sektörü" ifadesi, bu üretim kodunu kapsamaktadır. Düzce'de NACE 28 üretim kodunda faaliyet gösteren firmaların sorunları, seçilen firma temsilcileri ile yapılan sözlü ve yazılı (anket uygulaması) mülakatlarla belirlenmiştir. Bununla birlikte, NACE 28 kodu ile faaliyet gösteren firmalara ek olarak Düzce Ticaret ve Sanayi Odası 4. Meslek Komitesi (Gıda Dışı İmalat Sanayi, Makine, Metal, Kauçuk Sanayileri ve Diğer İmalatlar) ile görüş alışverişi yapılarak yakın imalat alanları ile ilgili sorunlar ve çözüm önerilerinin de bu çalışmaya ilave edilmesi sağlanmıştır. Bu sayede çok daha kapsayıcı bir değerlendirme yapılması hedeflenmiştir. Çalışmanın ihracat, ithalat ve istihdam rakamlarının değerlendirilmesinde ağırlıklı olarak Türkiye İstatistik Kurumu (TÜİK) verileri kullanılmıştır. Düzce özeli için TÜİK internet sitesinde ulaşılamayan veriler TÜİK'ten resmi şekilde talep edilerek temin edilmiştir.

**Anahtar Kelimeler:** Düzce, İşsizlik, Makine sektörü, NACE.

## I. MACHINERY SECTOR IN THE FRAMEWORK OF TÜRKIYE AND DÜZCE

### *A. A General Overview of the Machinery Sector in Türkiye*

The industrial move of the Republic of Türkiye came to life with the İzmir Economic Congress, the Industrial Promotion Law and subsequently the First Industrial Development Plan of 1934 (Kalkınma Ajansları; Doğu Marmara Kalkınma Ajansı, 2022). Although many investment moves took place during this period, the acceleration of the development process of the machinery sector started in the mid-1900s.

In the 1950s, a significant movement began in the machinery sector with the effects of large-scale public investments such as sugar and cement factories. With the increase in these large-scale investments, the installation, maintenance and repair needs in factories have also increased. However, during this period, the difficulties in supplying machinery from abroad, especially due to foreign exchange problems, and the renewal needs in the sector increased the interest of private enterprises in this field, and thus the first machinery manufacturing initiatives began (Düzce İli Sektörel SWOT Analizi, 2017).

In the 1970s, there were very important developments in the development of the machinery industry in Türkiye. State Economic Enterprises (KİT) established during this period, such as the Machinery and Chemical Industry Corporation, Machine Tools Industry, Turkish Motor Industry Trade Inc., Turkish Electromechanical Industry, Turkish Electronic Industry, have been milestones in the development of the machinery industry in Türkiye (Düzce İli Sektörel SWOT Analizi, 2017).

Due to changing economic policies after 1980, the roles of KİTs began to change. By the 2000s, most of the KİTs were privatized. Although it has been seriously affected by factors such as global economic fluctuations, political turmoil, etc., the machinery sector has always maintained its role as a leading sector for Türkiye.

At this point today, the machinery sector continues to be one of the key growth mechanisms of the Turkish economy. According to the 2021 Machinery Sector Analysis and Guide prepared by the Ministry of Industry and Technology, TR52 Region data; Türkiye is Europe's 6$^{th}$ largest machinery manufacturer and approximately 80% of the sector consists of Small and Medium Businesses (KOBİ) with fewer than 20 employees. Turkish machinery industry is a leading sector that exports to more than 200 countries, including free zones (T.C. Teknoloji ve Sanayi Bakanlığı; Makine Sektörü Analiz Raporu ve Kılavuzu, 2021).

The machinery sector makes significant contributions to Türkiye's exports. According to 2020 TÜİK data, Türkiye's total exports were 169.6 billion dollars. In the same year, machinery sector exports amounted to approximately 10.6 billion dollars. Thus, the contribution of the machinery sector to total exports for 2020 was 6.25% (Saygılı and Saygılı, 2011).

The sector, which had a difficult year in 2020 due to the global epidemic and economic turmoil, recovered in 2021 and its total exports approached 13.6 billion dollars. With this export figure, the sector made a 6% contribution to Türkiye's exports, which amounted to approximately 225.2 billion dollars in 2021 (TÜİK; Dış Ticaret İstatistikleri, 2022). During this period, approximately two-thirds of machinery exports were made to the most competitive markets such as the European Union countries, the USA and the UK, which are considered the most stable markets on a global scale (Anadolu Ajansı; Ekonomi, 2022).

The machinery industry in Türkiye has a KOBİ structure, as it does on a global scale, and has representatives from all scales, large, medium and small, in line with general and special-purpose machinery branches. When it is looked at the distribution of exports among companies in the machinery sector, it is seen that approximately 60% of exports are carried out by companies with less than 250 employees (Table 1). This circumstance provides information about the magnitude of the added value that will be created by KOBİs in the sector making progress in innovation and efficiency (T.C. Teknoloji ve Sanayi Bakanlığı; Makine Sektörü Analiz Raporu ve Kılavuzu, 2021).

Table 1. Export shares by company size (T.C. Teknoloji ve Sanayi Bakanlığı; Makine Sektörü Analiz Raporu ve Kılavuzu, 2021)

| Years | Small and medium-sized companies | | | | |
|---|---|---|---|---|---|
| | 1-9 employees (%) | 10-49 employees (%) | 50-249 employees (%) | Total share of 1-249 employees (%) | Total share of over 250 employees (%) |
| 2015 | 19.1 | 22.4 | 19.7 | 61.2 | 38.8 |
| 2016 | 19.0 | 22.5 | 19.9 | 61.4 | 38.6 |
| 2017 | 18.6 | 22.0 | 20.6 | 60.9 | 39.1 |
| 2018 | 17.9 | 21.1 | 20.3 | 59.3 | 40.7 |
| 2019 | 17.3 | 21.0 | 20.4 | 58.7 | 41.3 |

All these developments are also reflected in the number of enterprises and employment figures of the sector. According to TÜİK data for 2020, the number of enterprises in the field of Machinery Not Elsewhere Classified reached 18310. 72.52% of these enterprises are micro-scale, 21.66% are small-scale, 4.96% are medium-scale and 0.86% are large-scale enterprises. In summary, approximately 99% of startups are in the KOBİ category (TÜİK; Küçük ve Orta Büyüklükteki Girişim İstatistikleri, 2020).

According to TÜİK data, the total number of employment in this field in 2020 was 255459 people. Approximately 70% of this employment occurred in businesses in the KOBİ category (TÜİK; Küçük ve Orta Büyüklükteki Girişim İstatistikleri, 2020). When the employment data for 2021 was examined, it was seen that employment increased by approximately 11% compared to 2020 and reached 282603 (TÜİK; Ücretli Çalışan İstatistikleri, Ocak 2022). According to 2021 TÜİK data, the machinery industry constitutes approximately 5.7% of Türkiye's total manufacturing industry employment and approximately 1% of total employment (TÜİK; İşgücü İstatistikleri, 2021).

For the machinery sector, as in every sector, Research and Development (R&D) expenditures, production, turnover, added value and capacity utilization rates (CUR) data are very important in drawing the road map and seeing the current position of the sector. Table 2 gives these data for the machinery sector by year (MAKDEF, 2021). In 2020, when the deep effects of Covid-19 were experienced, the sector brought added value of around 42 billion TL to the country's economy, in return for a turnover of nearly 160 billion TL. While 107 large enterprises account for 37% of production and turnover values, this value has increased to 42% in added value production (MAKDEF, 2021).

Table 2. R&D expenditures, production, turnover, added value and CUR data of the machinery sector (MAKDEF, 2021).

| | | 2018 | 2019 | 2020 |
|---|---|---|---|---|
| **R&D Expenditure** | | 1,074,485,412 | 1,300,752,923 | 1,640,918,060 |
| **Production -** | **(TL)** | 103,295,782,140 | 110,155,393,174 | 146,384,167,921 |
| **Endorsement-** | | 110,252,999,234 | 119,57,369,844 | 159,549,723,212 |
| **Added Value -** | | 28,343,943,745 | 30,795,044,883 | 41,679,423,616 |
| **CUR** | **(%)** | 74.58 | 68.12 | 65.90 |

The importance given to R&D activities and the expenditures at this point shed light on the sustainability of the sectors and their renewal speed. The R&D expenditure of the machinery industry in 2020 increased by 26% compared to the previous year and reached 1 billion 640 million TL. As of January 2022, the sector ranks first with 174 centers among 1,254 R&D Centers approved by the Ministry, and fourth with 38 centers among 338 Design Centers (MAKDEF, 2021). When the CUR data is examined, it is seen that this rate decreased significantly in 2019 and 2020. One of the biggest reasons for this circumstance is the COVID-19 process and global fluctuations. The CUR of the sector, which decreased to 66% in 2020, increased to 75% at the end of 2021. The sector's employment index, which exceeded that of the manufacturing industry in 2020, continued this course in 2021. Therefore, despite the COVID-19 process, direct employment, which increased to 255 thousand, continued to increase in 2021 and exceeded 282 thousand. (MAKDEF, 2021 ve TÜİK; İşgücü İstatistikleri, 2021).

TOBB Industry Database data was used to evaluate the general distribution of the sector in our country. According to these data, there are a total of 10395 companies registered in NACE (Nomenclature of Economic Activities) 28 fields of activity in Türkiye (TOBB Sanayi Veritabanı, 2022). When the distribution of companies on a Turkish scale is examined, it is seen that the sector is concentrated in industrially developed regions (Şekil 1). These regions stand out as TR10 (İstanbul), TR52 (Konya-Karaman), TR41 (Bursa-Eskişehir-Bilecik), TR42 (Kocaeli-Sakarya-Düzce-Bolu-Yalova), TR31 (İzmir) and TR51 (Ankara). These regions differ from other regions with features such as ease of access to raw materials, logistics advantages, access to labor and strong infrastructure.

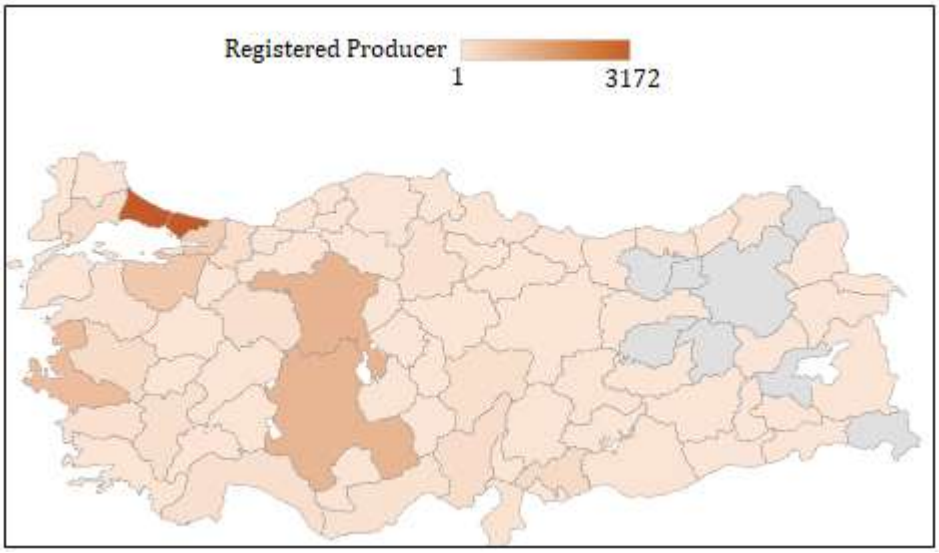


Figure 1. Distribution of companies by province in the field of Manufacturing of Machinery Not Elsewhere Classified (NACE 28), industrial registry records (TOBB Sanayi Veritabanı, 2022).

*B. A General Overview of the Industrial Sector in Düzce*

Düzce province is located in the Western Black Sea Region of Turkey and has a surface area of 739.1 km$^2$. Düzce deeply felt the devastating effects of the earthquakes in 1999, both economically and socially. The existing industrial infrastructure of the province was seriously damaged, especially after the second earthquake (November 12, 1999) centered in Düzce-Kaynaşlı, and production losses and therefore unemployment became an important problem. Following the earthquakes, a new process began in Düzce, which was separated from Bolu and gained provincial status on December 9, 1999, and efforts to eliminate the effects of the earthquakes began (Düzce İli Sektörel SWOT Analizi, 2017).

One of the most important of these studies was the Investment Incentive Law No. 5084, which was published and entered into force in February 2004. After the relevant law, Düzce became one of the most advantageous provinces due to its geographical advantage among the provinces included in the scope, thus attracting intense interest from investors. In addition, with the "Decision on State Aids in Investments", which came into force after being published in the Official Gazette dated 19.06.2012 and numbered 28328, Düzce benefited from the 4$^{th}$ Region advantages until 2021 (T.C. Düzce Valiliği; Sanayi ve Ticaret, 2022).

According to the database of the Ministry of Industry and Technology of the Republic of Turkey, there are 5 Organized Industrial Zone (OIZ)s, 1 Technology Development Zone, 10 R&D and 2 Design Centers in Düzce, 3 of which are active (I. OIZ, II. OIZ and Gümüşova OIZ). When region-specific advantages are added to these data, Düzce is an important investment center (T.C. Sanayi ve Teknoloji Bakanlığı; MEYDİP, 2022 ve T.C. Sanayi ve Teknoloji Bakanlığı; AR-GE, Tasarım Merkezleri ve TGB Veritabanı, 2022).

Depending on all these developments, the population of the province is constantly increasing. The population, which was 159960 in 2000, has reached 400976 people today. The province's net migration rate is 6.60% and its gross domestic product per capita is 43749 TL, according to 2019 TÜİK data (TÜİK; Coğrafi İstatistik Programı, 2022).

According to TOBB Industry Database Data (as of May 05, 2022), the number of companies in Düzce is 456, the number of capacity reports is 484 and the number of employees in these companies is 31693.

Details of the number of employees of companies operating in Düzce are given in Table 3. As can be seen from the table, a large portion of the companies operating in Düzce have KOBİ status - as is the case in Türkiye (TOBB Sanayi Veritabanı; İl Genel Durumu, 2022).

Table 3. Employee distribution by range for Düzce province (TOBB Sanayi Veritabanı; İl Genel Durumu, 2022).

| Number of employees | Number of capacity reports | Total employees |
|---|---|---|
| 1-10 | 157 | 936 |
| 11-20 | 75 | 1120 |
| 21-50 | 107 | 3866 |
| 51-100 | 60 | 4312 |
| 101-250 | 60 | 9358 |
| 250+ | 25 | 12101 |
| **Total** | **484** | **31693** |

The sectors that have the most facilities and provide employment in Düzce are the textile industry, forest industry, furniture industry, metal-machinery industry, food industry, rubber-tyre-plastic industry, mining industry, construction industry, automotive industry and chemical-pharmaceutical industry (T.C. Düzce Valiliği; Sanayi ve Ticaret, 2022). According to TOBB Industry Database Data, the top 15 most coded activity areas on a provincial basis are given in Table 4. As seen in the table, the textile industry, forest industry and furniture industry are very effective areas of activity in Düzce (TOBB Sanayi Veritabanı; Faaliyetlere Göre İl Genel Durumu, 2022).

Table 4. The top 15 most coded activity areas in Düzce.

| Order | Code | Explanation | Number of capacity reports |
|---|---|---|---|
| 1 | 14.14 | Underwear manufacturing | 44 |
| 2 | 16.10 | Mowing and planning trees | 41 |
| 3 | 14.13 | Manufacture of other outerwear | 28 |
| 4 | 13.99 | Manufacture of other textiles not elsewhere classified | 25 |
| 5 | 16.21 | Wood veneer panel and wood-based panel manufacturing | 23 |
| 6 | 31.09 | Manufacturing of other furniture | 18 |
| 7 | 10.39 | Processing and storage of fruits and vegetables not elsewhere classified | 18 |
| 8 | 14.31 | Knitted (knitwear) and crocheted socks manufacturing | 15 |
| 9 | 38.32 | Recovery of sorted materials | 15 |
| 10 | 22.21 | Manufacturing of plastic sheets, sheets, tubes and profiles | 15 |
| 11 | 25.11 | Manufacturing of metal structures and building parts | 14 |
| 12 | 29.32 | Manufacture of other parts and accessories for motor vehicles | 13 |
| 13 | 16.22 | Manufacturing of combined parquet flooring | 12 |
| 14 | 14.19 | Manufacture of other clothing items and clothing accessories | 12 |
| 15 | 08.11 | Quarrying of decorative and building stones and limestone, gypsum, chalk and slate (slate) | 11 |

*C. Current circumstance of the Machinery Sector in Düzce*

The machinery sector activity field data, which is the focus of this section, was also obtained from the TOBB Industry Database and discussed. According to these data, the number of registered companies operating in the NACE 28 (Manufacture of machinery and equipment not classified elsewhere) sector in Düzce is 33, the number of capacity reports is 33 and the total employment in this field is 1380. To make a general evaluation, the number of companies in this field corresponds to 7.2% of the companies operating in Düzce, and employment in this field corresponds to 4.3% of the total employment of the province (TOBB Sanayi Veritabanı; İl Genel Durumu, 2022).

The district-based distribution of companies operating in the machinery sector in Düzce is shown in Figure 2 (TOBB Sanayi Veritabanı; Sektör Seçimli İl Genel Durumu, 2022). As can be seen, approximately 58% of the companies are clustered in the city center. One of the important reasons for this circumstance

is the logistic advantage and the other is the location of two large organized industrial zones in the central district. However, it is seen that the most companies are located in Gümüşova district after the Central district. The fact that this district is on the TEM highway and the D-100 highway is a great advantage, especially in terms of logistics. In addition, the impact of Gümüşova OIZ is also quite great.

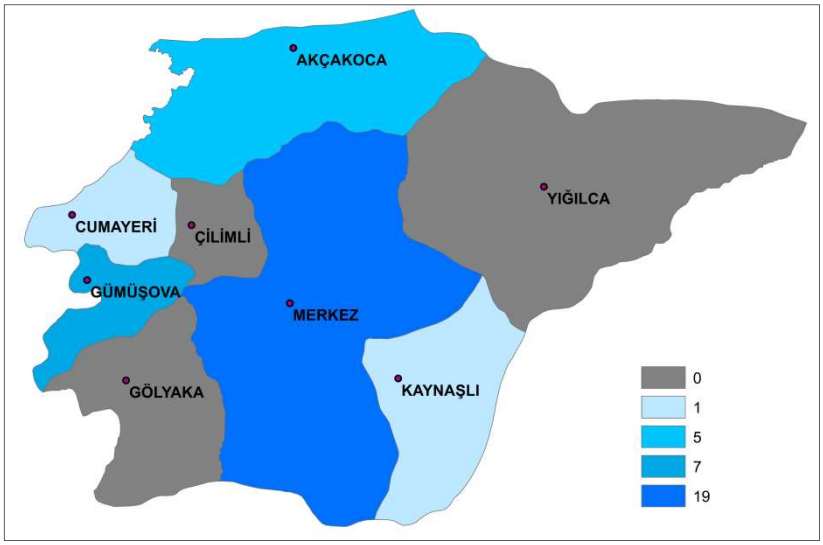


Figure 2. District-based distribution of companies operating with NACE 28 code in Düzce (TOBB Sanayi Veritabanı; Sektör Seçimli İl Genel Durumu, 2022).

The information of the companies operating in Düzce with the NACE 28 code (in addition to their production in different activity codes) and the production details of these companies are given in Table 5 (TOBB Sanayi Veritabanı; Sektör Seçimli İl Genel Durumu, 2022).

As can be seen from the table, a large number of machinery needed in Turkey and the world can be manufactured in Düzce province. Although the manufacturing of agricultural machinery and forest products processing machines seems to be at the forefront since Düzce is an agricultural and forest region, many machinery production such as machine parts manufacturing, mold manufacturing, plastic injection machines and foundry machines are also carried out.

Table 5. Companies operating in the Machinery Sector (NACE 28) in Düzce (TOBB Sanayi Veritabanı; Sektör Seçimli İl Genel Durumu, 2022).

| Company Name | District | Product Codes | Company Product Description |
|---|---|---|---|
| Türkan Makina Plastik İmalat Sanayi Ticaret Limited Şirketi | Center | 25.73.60.65.00 | - Various Mold Manufacturing<br>- Plastic and Wooden Machine Molds |
| | | 28.22.17.70.00 | - Various Mold Manufacturing<br>- Plastic and Wooden Machine Molds |
| | | 28.22.18.40.00 | - Hydraulic Freight Lifts |
| | | 28.30.86.30.00 | - Tree Length Sizing Machine<br>- Stoylok (Tree Peeling Apparatus and Channel Opening) Production and Spare Parts |
| | | 28.41.31.40.00 | - Plywood Cold and Hot Deck Press |
| | | 28.49.12.33.00 | - Sheet Machine |
| | | 28.49.12.75.00 | - Slitting Machine<br>- Papel Dryer Front Loading and Rear Discharge Apparatus<br>- Papel Peeling and Drying Machine |
| | | 28.95.11.17.00 | - Wallpaper Machines |
| | | 28.95.11.90.00 | - Lacquering Machine (Glue Applying)<br>- Papel Glue Applying Machine |
| | | 28.96.10.75.00 | - Laminating Machine<br>- Plastic Packaging Machine<br>- Bag Machine |
| | | 28.99.14.50.00 | - Intaglio Machine |

| | | | |
|---|---|---|---|
| | | 28.99.31.30.00 | - Impregnation Drying Oven<br>- Timber Drying Ovens<br>- Drying Ovens |
| | | 28.99.39.15.00 | - Various Bag Filter Dust Silos and Transport Screws |
| Kefeli Tarım Aletleri, Otomotiv ve Elektrik Malzemeleri Sanayi ve Ticaret Limited Şirketi | Center | 28.30.59.30.00 | - Automatic Hazelnut Collecting Machine<br>- Vacuum Hazelnut Collecting Machine |
| | | 28.30.86.30.00 | - Branch Grinding Machine<br>- Dryer<br>- Straw Shredding Machine |
| | | 28.93.20.00.00 | - Sorting and Classifying Machine |
| Uluçınar Yapı Malzemeleri Makine Orman Ürünleri İnşaat Sanayi ve Ticaret Limited Şirketi Düzce Şubesi | Center | 28.30.86.30.00 | - Forestry Goods Marking and Barcoding System Set (Or-Set) |
| TEMSAY Asansör Sanayi ve Ticaret Anonim Şirketi | Center | 28.22.16.30.00 | - Elevator Installation |
| 6 Gen Mühendislik ve Asansör Sanayi Ticaret Limited Şirketi | Center | 28.22.16.30.00 | - Elevator Installation |
| Şafak Makina Yedek Parça Sanayi ve Ticaret Anonim Şirketi Düzce Şubesi | Center | 28.41.12.40.00 | - CNC Machining Center (Dental Processing) |
| | | 28.41.31.40.00 | - CNC Pipe Bending Machine<br>- NC Pipe Bending Machine |
| | | 28.41.31.80.00 | - Countersink Pressing Machine |
| | | 29.32.30.90.00 | - Automotive Sub-Industry Products |
| Kuzeytek Makina Gemi İnşa Sanayi ve Ticaret Limited Şirketi | Akçakoca | 28.30.31.40.00 | - Tractor Rear Digger |
| | | 28.30.33.50.00 | - Shredding Machine<br>- Tractor Front Loader |
| | | 28.30.34.30.00 | - Solid Fertilizer Spreader |
| | | 28.30.70.40.00 | - Tractor Trailer |
| | | 28.30.83.00.00 | - Feed Mixing Machine |
| | | 29.20.30.30.00 | - Snow Plow Machine<br>- Mop<br>- Front and Rear Scraper |
| Kummucit Makina Sanayi ve Ticaret Limited Şirketi | Center | 24.20.13.50.00 | - Economical Stove Pipe |
| | | 28.30.34.30.00 | - Subsoil Fertilizer Spreading Machine |
| | | 28.30.39.00.00 | - Branch Cutting Tool |
| | | 28.30.51.30.00 | - Mower |
| | | 28.30.60.90.00 | - Hazelnut Picking Machine<br>- Snow/Animal Manure Plowing Machine |
| | | 28.93.17.60.00 | - Hazelnut Cracking Machine |
| Hamit Gülerim-Han Makina | Center | 28.49.12.63.00 | - Brush Handle Back Rounding Machine<br>- Brush Handle Sanding Machine |
| | | 28.49.12.75.00 | - Wood Profile Machine<br>- Brush Handle Machine<br>- Multiple Slitting Machine |
| | | 28.49.12.79.00 | - Brush Handle Threading Machine |
| ASTM As Teknik Mühendislik Ticaret Limited Şirketi | Center | 28.49.22.30.00 | - Apparatus and Fixture<br>- Machine part |
| DÜZMAKSAN Kalıp Makine Tasarım İmalat Danışmanlık Sanayi ve Ticaret Limited Şirketi | Gümüşova | 24.33.11.10.00 | - Cold Formed Sheet Metal Parts |
| | | 25.62.20.00.00 | - Various Machine Parts |
| | | 25.73.50.20.00 | - Various Machine Mold (Plastic Injection, Rubber Injection, Hair Forming, etc.) |
| | | 28.49.21.40.00 | - Various Mounting Apparatus (Fixtures, Templates, etc.) |
| DHM Dökümhane Sistemleri Sanayi ve Ticaret Anonim Şirketi | Gümüşova | 28.29.22.30.00 | - Sandblasting Machine |
| | | 28.91.11.30.00 | - Foundry Machinery |
| Gerd Wolff Makina Sanayi Ticaret Limited Şirketi | Gümüşova | 28.91.11.57.00 | - Metallurgical Machinery/Cold Rolling Machines |
| | | 28.91.12.50.00 | - Cold Rolling Machine Roll |

| | | | |
|---|---|---|---|
| | | 28.91.12.70.00 | - Cold Rolling Machinery Parts and Parts |
| CEMA Makina ve Kalıp Sanayi Anonim Şirketi | Center | 25.40.14.00.00 | - Miscellaneous Weapon Parts |
| | | 28.41.40.50.00 | - Machine Spare Part |
| Koçaloğlu Makina Sanayi ve Ticaret Limited Şirketi | Akçakoca | 28.41.32.60.00 | - Guillotine Scissors |
| ENDMAKSAN Mühendislik Makine İnşaat Sanayi ve Ticaret Limited Şirketi | Center | 25.11.23.60.00 | - Various Steel Construction<br>- Stainless Steel Pressure Tank |
| | | 25.11.23.70.00 | - Aluminum Pressure Tank |
| | | 28.92.28.00.00 | - Snow Knife |
| | | 28.92.30.90.00 | - Asphalt Patching Robot<br>- Salt Unit |
| | | 28.92.62.00.00 | - Various Steel Machinery/Industrial Equipment |
| | | 29.20.23.00.00 | - Trailer/Frigo/Trailer |
| Aktaş Grup Makina Cam Sanayi ve Ticaret Anonim Şirketi Düzce Şubesi | Center | 28.49.11.70.00 | - Glass Cutting Line<br>- Glass Cutting Machine<br>- Glass Loading Machine<br>- Insulating Glass Production Machines<br>- Laminated Glass Cutting Machine |
| Uçak Plastik Kalıp Metal İthalat İhracat Sanayi ve Ticaret Anonim Şirketi | Gümüşova | 22.22.13.00.00 | - Plastic Injection Products |
| | | 28.96.20.00.00 | - Plastic Goods Mold and Machine Parts |
| Pronom Makine Sanayi Ticaret Anonim Şirketi | Center | 28.99.39.55.00 | - Special Purpose (Specific) Machine |
| Talyum Endüstriyel Mutfak ve Mutfak Banyo Ekipmanları Sanayi Ticaret Limited Şirketi | Kaynaşlı | 28.93.32.00.00 | - Fryer Basket Made of Tin-Coated Steel<br>- Stainless Steel Fryer Basket |
| Mustafa Onur Çatak Onur Makine | Akçakoca | 28.92.40.30.00 | - Hazelnut Crushing, Yield Machine |
| Egemak Makina Sanayi ve Ticaret Limited Şirketi | Center | 28.93.15.30.00 | - Rotary Oven<br>- Deck Oven<br>- Tunnel Oven |
| | | 28.93.17.70.00 | - Rest Tunnel<br>- Bread Packaging Machine<br>- Various Dough Processing Machines |
| CİSA Pres Döküm Sanayi ve Ticaret Limited Şirketi | Gümüşova | 28.14.12.33.00 | - Bathroom battery<br>- Sink Mixer<br>- Sink battery |
| | | 28.14.12.35.00 | - Brass Faucet |
| Anadolu Rulman İmalat Sanayi ve Ticaret Anonim Şirketi | Cumayeri | 28.15.10.30.00 | - Ball Radial Bearing |
| | | 28.15.10.90.00 | - Roller Bearing |
| | | 28.15.39.50.00 | - Ground Honed Shaft |
| Orent Orman Ürünleri Makina İnşaat Taahhüt Turizm Tarım Nakliyat Ticaret ve Sanayi Limited Şirketi | Center | 25.11.10.30.00 | - Cable Degassing Chambers |
| | | 25.93.12.30.00 | - Tobacco Drying |
| | | 28.21.13.55.00 | - Steaming Ovens and Equipment<br>- Heat Treatment Furnaces<br>- Drying Ovens and Equipment |
| Karlas Lastik Sanayi Ticaret ve Turizm Limited Şirketi | Center | 22.19.30.55.00 | - Concrete Pump End Hose |
| | | 22.19.73.47.00 | - Gaskets and Wedges<br>- Rubber Piston Wedge |
| | | 24.20.40.73.00 | - Concrete Pump Intermediate Pipe |
| | | 24.51.30.30.00 | - Double Wall Elbow |
| | | 25.62.10.05.00 | - Machined Steel Semi-Finished Parts |
| | | 28.13.31.00.00 | - Pump 1st outlet<br>- Pump 2nd Output<br>- Pump Pants Pipe<br>- Pump S-Tube |

| | | | |
|---|---|---|---|
| | | 29.32.30.90.00 | - Mixer Folding Trough |
| Mas-Daf Makina Sanayi Anonim Şirketi | Center | 25.29.11.30.00 | - Expansion Tank |
| | | 28.13.13.20.00 | - Gear Pumps (0.75-10 HP) |
| | | 28.13.14.13.00 | - Submersible Type Single Stage Centrifugal Pumps (1-750 HP) |
| | | 28.13.14.30.00 | - Self-Priming Horizontal Shaft Centrifugal Pumps (1-200 HP)<br>- Column Pumps (0.5-750 HP) |
| | | 28.13.14.51.00 | - Dry Rotor "In-Line" Type Centrifugal Pumps (0.5-750 HP)<br>- Single Stage Horizontal and Vertical Shaft Centrifugal Pumps (0.5-2500 HP) |
| | | 28.13.14.55.00 | - Double Suction Detachable Casing Horizontal and Vertical Shaft Centrifugal Pumps (15-6000 HP) |
| | | 28.13.14.60.00 | - Multistage Horizontal and Vertical Shaft Centrifugal Pumps (1.5-5000 HP) |
| | | 28.13.14.80.00 | - Complete Stainless Vertical and Horizontal Shaft Centrifugal Pumps (0.5-5000 HP)<br>- Automatic Suction Systems<br>- Package Booster Systems (1-200 HP)<br>- Fire Extinguishing Groups (3- 1000 HP) |
| TGM Kule Vinç Sanayi ve Dış Ticaret Limited Şirketi | Gümüşova | 28.22.14.40.00 | - The tower crane |
| Volta Motor Sanayi ve Ticaret Anonim Şirketi | Gümüşova | 28.22.15.70.00 | - Electric Three Wheel Freight Vehicle |
| | | 29.10.59.90.00 | - Gasoline ATV<br>- Electric ATV |
| | | 30.91.11.00.00 | - Gasoline MOPED<br>- Gasoline Three Wheel MOPED |
| | | 30.91.12.00.00 | - Gasoline Motorcycle |
| | | 30.92.10.50.00 | - Bicycle<br>- Electric bike<br>- Electric MOPED<br>- Electric Motorcycle<br>- Electric Three Wheel MOPED<br>- Electric Personal Vehicle |
| Yağmur Traktör Sanayi ve Ticaret Anonim Şirketi Düzce Şubesi | Center | 28.30.10.00.00 | - Tractor |
| | | 28.30.21.00.01 | - Pickup Truck Type Tractor (Tracar) |
| Isı-Tan Isıtma Soğutma Yedek Parça ve Makina Sanayi Ticaret Limited Şirketi Düzce Şubesi | Center | 28.25.13.90.00 | - Process Coolers |
| | | 28.29.60.90.00 | - Mold Conditioner (Heater)<br>- Process Heaters |
| Akafor Membran Sistemleri Sanayi ve Ticaret Limited Şirketi | Akçakoca | 28.29.12.50.00 | - Anionic-Cationic Resin System<br>- Cataphoresis Anode Cell<br>- Cataphoresis Electrode 316<br>- Cataphoresis Uf Module and Circulation System<br>- Stainless Bag Filter Case<br>- Stainless Uf Module Cover Set<br>- Ro-Nf System |
| SESA Filtre ve Plastik Sanayi ve Ticaret Limited Şirketi | Akçakoca | 28.29.13.30.00 | - Bag Filter |

The machinery sector in Düzce employs 1380 people. The distribution of employees within this employment is given in Figure 3. As can be seen from the graph, a large portion of the employees have the status of workers (891 people), and their rate in total employment is approximately 65%. This rate is an expected circumstance, especially for a labor-intensive sector such as machinery manufacturing. However, the proportion of those working as masters or technicians in total employment is only 2.5%. This rate is

worrying in terms of activities such as improving product quality, maintaining and raising the service standard, and training newly employed personnel.

Additionally, employment of engineers constitutes approximately 6.1% of the total employment in this field. A large part of this rate is concentrated in companies that are already engaged in R&D activities or have to employ engineers due to legal regulations. Of the 33 companies examined, 9 have no engineers, 10 have no technicians, and 4 have no employees in the master category. With the new incentive packages announced by Small and Medium Enterprises Development Organization (KOSGEB), it is predicted that the employment of university graduates will increase in companies.

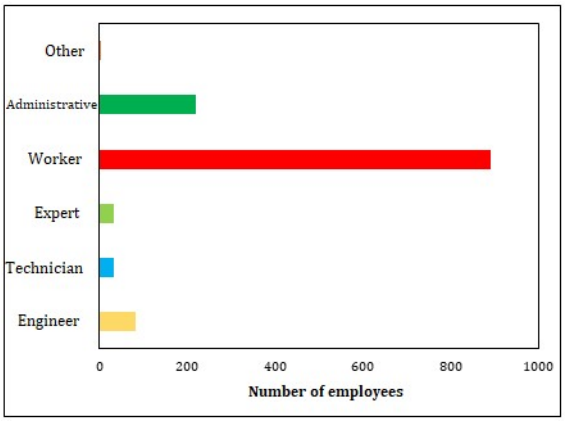


Figure 3. Distribution of Employees in Düzce Machinery Sector (TOBB Sanayi Veritabanı; Sektör Seçimli İl Genel Durumu, 2022).

*D. Import and Export Circumstance of Düzce and Düzce Machinery Sector*

In this section, import and export data are compared both for Turkey-Düzce in general and for Türkiye-Düzce Machinery Sector specifically. The contribution of Düzce province to Türkiye's exports over the years is very important in terms of creating the road map of this study.

Export and import figures by year, created from TÜİK data, are given in Figure 4a and Figure 4b, respectively (TÜİK; Dış Ticaret İstatistikleri, 2022). When Düzce's export figures are examined, it is seen that the total exports of Düzce province are 280 million 617 thousand dollars, according to TÜİK data for 2021. With this export figure, Düzce is the 44th province with the most exports. Considering that Türkiye's total export figure for 2021 is approximately 225.2 billion, Düzce's proportional contribution to Türkiye's exports is approximately 0.12% (TÜİK; Dış Ticaret İstatistikleri, 2022). Considering important factors such as Düzce province's logistics advantages, industrial infrastructure and proximity to big cities, it becomes clear that this export figure must go much higher.

While Türkiye's total imports in 2021 were 271.4 billion dollars, the imports of Düzce province were 216 million dollars. With this import figure, Düzce became the 31st province with the most imports (TÜİK; Dış Ticaret İstatistikleri, 2022).

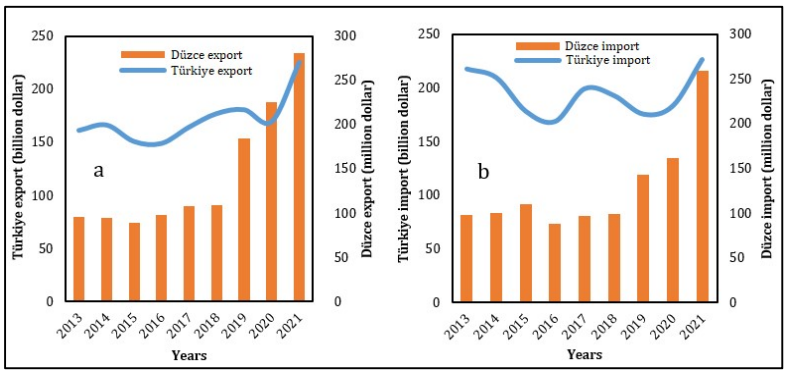


Figure 4. Comparison of export (a) and import (b) data of Türkiye and Düzce province (TÜİK; Dış Ticaret İstatistikleri, 2022).

The changes in Düzce-specific machinery and equipment manufacturing export and import data examined within the scope of this study were requested from TÜİK by official correspondence and compiled from the database and given in Figure 5.

As seen in the figures, there is a significant jump in the export data of machinery and equipment manufacturing not classified elsewhere in Düzce (Figure 5a) in 2019 and onwards. The most important reasons for this circumstance are the serious increase in the activities of I. OIZ, II.OIZ and Gümüşova OIZ as of this date. In addition, other important factors are the increase in the number of capacity reports, which were low before 2019, and the increase in foreign labor costs. Although Türkiye turned into an alternative to China during the global epidemic period, sector exports tended to decrease in 2020, the year in which the epidemic showed its effects most deeply, but recovered in 2021. According to 2021 data, total exports in this field reached 61.9 million dollars with 15 thousand tons of products. When it is remembered that Düzce's total exports for the same year were approximately 280.7 million dollars, it can be seen that the machinery sector alone met approximately 22% of the province's total exports. These export figures are important as they show that the machinery sector is a locomotive sector for Düzce.

When import data for the same sector is examined (Figure 5b), it is seen that the import figures of the sector have also increased as of 2019. Since this period, increasing industrial investments and imported machinery inputs have been factors in the increase in import figures. As a result of increasing exchange rates, machinery imports have increased greatly, especially from countries such as China or Taiwan. According to 2021 data, 18.65 thousand tons of products and 94.43 million dollars were imported in the machinery sector. This value constitutes approximately 44% of the province's total imports for the same year. The size of this ratio is very important as it reveals the importance of efforts to reduce imports in the machinery sector.

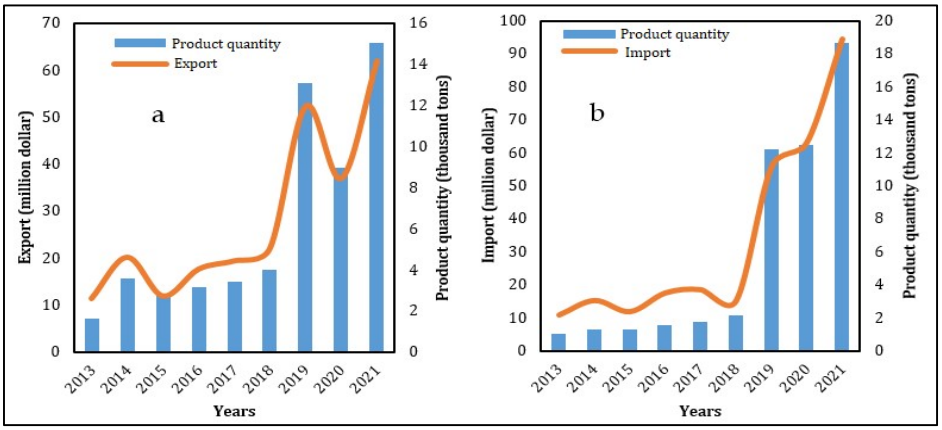


Figure 5. Export and import data of Düzce province Machinery Manufacturing Not Elsewhere Classified.

In Düzce, the top five activity areas with the highest export and import figures in the machinery sector in 2021 are given in Table 6. As seen in the table, the most important field of activity in the field of export in Düzce is the manufacturing of agricultural and forestry machinery. Düzce has been in a very good position in the field of forest industry for many years. For this reason, companies producing machinery in this field are very experienced and have high export capabilities. Especially drying and steaming ovens, wood peeling and sizing machines are important export items in the field of forestry in Düzce.

Table 6. Düzce machinery sector export and import figures for 2021.

| Export | | Imports | |
|---|---|---|---|
| **Activity name** | **Number (Million dollars)** | **Activity name** | **Number (Million dollars)** |
| Agricultural and forestry machinery manufacturing | 34.13 | Agricultural and forestry machinery manufacturing | 51.05 |
| Other pump, compressor, tap and valve manufacturing | 13.46 | Manufacturing of metal processing machines and machine tools | 13.49 |
| Manufacture of other special-purpose machines | 3.64 | Manufacturing of other general purpose machines | 11.80 |
| Manufacturing of other general purpose machines | 2.76 | Manufacturing of bearings, gear/gear sets, transmission and drive elements | 9.02 |
| Manufacturing of lifting and carrying equipment | 2.21 | Other pump, compressor, tap and valve manufacturing | 2.31 |

When the import section of the same table is examined, it is seen that the primary field of activity in imports is the manufacturing of agricultural and forestry machinery. The reason for this circumstance is that, due to increasing domestic costs, companies, especially in the forestry sector, import and install tree peeling and drying machines from China. Especially in recent years, machines of Taiwan and China origin have shown themselves in every sector, and this has increased the amount of imports. The reason for the high imports of the metal processing machines and machine tools manufacturing activity area, which ranks second in the import rankings, is also the same. Especially in recent years, Taiwan and China have been preferred for CNC manufacturing.

## II. EXPORT AND IMPORT PROBLEMS OF DÜZCE MACHINERY INDUSTRY

### *A. Factors Affecting the Use of Imported Inputs in Düzce Machinery Sector and Reasons for Imported Dependence*

According to the export and import data specific to Düzce province, which is examined in detail in Section 2, although there was a significant increase in export figures after 2019, import data also increased significantly. The reasons for this increase in import figures, both in terms of foreign currency and product amount, have been evaluated under this heading, based on the meetings held with Düzce TSO 4th Professional Committee Members and the results of the survey filled out by company representatives.

There was a significant increase in capacity reports in Düzce in 2019 and afterwards. For this reason, there is a significant increase in both export and import figures after this year. The biggest reason for the increase in import figures in the Düzce machinery sector, especially in recent years, is the shift of machinery supply abroad as a result of increasing exchange rates and rising costs (labor, energy, etc.).

Machinery installations for the agriculture and forestry sector in Düzce constitute one of the largest markets of the Düzce machinery sector. In recent years, due to increasing domestic costs, equipment such as drying facilities, woodworking machines, etc. have started to be supplied from countries such as China and Taiwan. Although the machines coming from these countries are lower in quality than domestic companies, economic factors direct companies to import. Similarly, it is seen that import figures are quite high in the field of metalworking machines and machine tools manufacturing. The most important reason for this circumstance is that CNC machines and benches are imported from countries such as China and Taiwan.

Meetings held and observations made in the sector have shown that one of the important obstacles to reducing imports and increasing exports is short company lifespans and limited sustainability. As is the case throughout Türkiye, company lifespans are quite short in Düzce. This circumstance creates a deficiency in institutionality, experience and trust and limits global competition. However, examples of company mergers or collective work, which are important in terms of increasing exports, are quite limited in Düzce.

Therefore, companies struggle only with their individual competitiveness, which is not enough in most cases.

Another important problem in the Düzce machinery sector is the problems experienced in after-sales services in the sector. In fact, although this circumstance is directly related to the employment of qualified personnel, it is seen as important in terms of creating trust and continuity problems in both the domestic and international markets.

*B. Foreign Trade Advantages and Disadvantages in Düzce*

Düzce is in a very important position as it is located in the middle of two big cities such as İstanbul and Ankara. However, it is also very close to industrial centers such as Gebze, İzmit, Sakarya and Bursa. For this reason, Düzce is an advantageous city in terms of logistics. These advantages have brought Düzce to an important position in terms of production and industrialization, especially in the last 10 years. Düzce is a very important production center for companies with a very high export capacity throughout Türkiye and many of the local machinery sector companies serve as suppliers. This is an important advantage in terms of increasing the production capacity of the sector and improving the quality of production.

Düzce is also located very close to the ports. Sakarya-Karasu and Zonguldak-Ereğli ports are very accessible. This minimizes logistics costs. Although Düzce has the coastal district of Akçakoca, this district does not have a commercial port. As a result of the discussions about whether this circumstance creates any disadvantages, some company officials said that Karasu and Ereğli ports are sufficient and that the sector does not need a port for now, while others stated that a port project to be built in Akçakoca could be beneficial.

In the interviews held with sector companies, it was stated that the energy quality problems experienced in electricity transmission in the past years have been largely resolved and infrastructure problems are few. All these points are important advantages in terms of export and production.

Düzce was included in the third region in investment incentive practices with the publication of the Presidential Decree No. 31220 dated 21 August 2020 in the Official Gazette. For this reason, it has lost some of the advantages it previously had within the scope of the fourth region. This change causes companies operating in Düzce Central District, Akçakoca and Gümüşova to benefit less from important support items such as tax deduction, insurance premium support, interest or dividend support, in terms of duration or rate. However, according to the same decision, 5 districts of the province (Çilimli, Cumayeri, Gölyaka, Kaynaşlı and Yığılca) continue to benefit from sub-regional incentives (4$^{th}$ Region). For this reason, these districts are expected to be an important investment point. However, if the company's investments are within the scope of OIZ, it is possible to benefit from the 4$^{th}$ Region incentives. The fact that there are 5 OIZs in Düzce, 3 of which are active, is very important for investors who want to benefit from these incentives.

According to the Annex-2B (Sectors that can benefit from Regional Supports) section of the Presidential Decree No. 31220 dated 21 August 2020, the Machinery and equipment manufacturing sector in Düzce can benefit from incentives. This is important for promoting regional sector investments and exports.

Düzce province is in the drinking water basin of İstanbul and is in the İSKİ protection area. Therefore, very strict restrictions apply. Although these restrictions are quite appropriate in terms of environment and health, they cause some companies in the sector not to invest, and they cause existing companies to not be able to carry out some production operations in Düzce. For example, galvanized coating must be applied to a large part of the machine parts, but this is not allowed. For this reason, sector companies receive this service from other cities, which increases costs.

The lack of customs in Düzce is also a factor that negatively affects exports. Düzce sector companies use Sakarya for customs. This circumstance increases logistics costs significantly. However, since there is no customs in Düzce, customs services cannot be carried out on-site. This circumstance emerges as another important factor affecting companies.

*C. Qualified Personnel Employment Problems in Düzce*

Verbal interviews with both professional committees and companies show that the employment of qualified personnel is one of the biggest problems facing production and exports in Düzce. Companies operating in the sector are experiencing serious difficulties in meeting the need for not only qualified but

also unqualified personnel to be trained. According to the titles of the employees, the greatest demand is for workers, technicians and technicians, respectively. These professional groups are the backbone of the machinery manufacturing industry and are very important in terms of production continuity and quality. The biggest problem regarding the employment of engineers, which is also one of the important needs of the sector, is the distant attitude of some newly graduated engineers towards working in the labor-intensive manufacturing sector.

In Düzce, many companies experience workforce losses, especially in August, when the hazelnut harvest begins. During this period, absenteeism and even work stoppages increase. In addition to periodic workforce loss in Düzce, another important problem regarding employment is the low corporate affiliation of employees. For this reason, company changes occur frequently. These problems not only lead to the need for new personnel, but also lead to significant losses in terms of material and production due to the training of new personnel.

Although the employment of qualified personnel is very critical, especially in a high-tech field such as machinery manufacturing, some companies train and employ unqualified personnel or untrained personnel in the relevant field in order to complete their deficiencies at this point. This circumstance can cause disruptions and malfunctions in the operation of expensive and critical equipment such as CNC and lathes.

## III. CONCLUSION AND SUGGESTIONS

The surest way to reduce imported input use and import dependency is undoubtedly to increase domestic production. Only in this way can foreign dependency on purchasing machinery and equipment be reduced. Especially in recent years, domestic production costs have increased significantly in the machinery sector, as in all sectors. The most important of these costs are raw material, logistics, energy and employee costs. All these costs also increase the price of the machinery and equipment produced. In summary, the most effective solution to reduce imported input use and import dependency is government incentives.

Although there are incentives from institutions such as the Ministry of Industry and Technology, KOSGEB, etc., it is considered important that these incentives are constantly updated according to changing market conditions. However, perhaps the most striking point in the interviews held with the sector was that some sector representatives stated that they did not have enough information about the supports. At this point, especially Düzce Chamber of Commerce and Industry has important duties. Recently, Düzce Chamber of Commerce and Industry has been organizing visits to the chamber members and providing information about the Ministry of Industry and Technology, KOSGEB, Ministry of Commerce, İŞKUR and SGK incentives and grants. It would be appropriate for these information activities to continue and even for representatives from relevant institutions to participate in these information activities.

Customs duty exemptions, both in Düzce and throughout Türkiye, are very important for the sectors. Customs duty exemption is applied for investment goods, machinery and equipment to be procured from abroad within the scope of the Investment Incentive Certificate by the Ministry of Industry. However, this exemption only covers new machinery and equipment. In other words, used or renewed machinery and equipment cannot be procured within the scope of the incentive certificate. For this reason, sector companies import new machinery and equipment, even if it is more expensive, which leads to an increase in import figures. In the interviews with sector companies, it was particularly emphasized that it is important to include the purchase of second-hand machinery and equipment within the scope of incentives. In some cases, especially from European countries, there are very high quality second-hand machines, but since they are not within the scope of customs duty exemption, the sector is forced to turn to countries such as China or Taiwan. At this point, it may be recommended to provide customs duty exemption, albeit at certain rates, for used machinery and equipment with expertise certificates issued by independent organizations.

It is possible to examine the problems experienced in employment in Düzce in two main frameworks. The first of these is the periodic decrease in the workforce and the other is the problems in accessing qualified personnel. Hazelnut, an important agricultural product in Düzce, is a source of income for many families. As of August, when the hazelnut harvest begins, permit usage increases in many companies. Using permits simultaneously puts a strain on sector companies in terms of production. Another important problem that emerged during this period is the increase in absenteeism and turnover. It seems that the most important

step in reducing the effects of this problem is to accept the problem. Considering that hazelnuts are an important source of income for Düzce and that many people are engaged in hazelnut farming, it becomes clear that companies should take action according to this reality. In fact, when some examples of companies across Düzce are examined, it can be seen that steps have been taken to eliminate this problem. The effects of this problem can be reduced by measures such as reducing company activities during this period and scheduling annual leave usage accordingly. However, devoting this period to maintenance-repair-renovation activities can also be an important alternative.

Problems in accessing qualified personnel and solutions to these problems are a much more detailed issue. In the process that started with the increase of uninterrupted education to 12 years, difficulties began to be experienced in finding personnel to be trained in all branches of industry and commerce. Employment in this age range is limited since most high school graduates tend to receive a university education. The decrease in student enrollment in vocational high schools and the low academic levels of students enrolled in these high schools also affect the sector. Some regulations made by the Ministry of National Education to increase interest in vocational education are quite promising. With the new regulation made in the Vocational Education Law No. 3308, the payment of fees to those who register to vocational training centers and the insurance against work accidents and occupational diseases increases the interest in these institutions. Students registered here receive theoretical training at school 1 day a week and practical training in businesses 4 days a week. This regulation is expected to bring beneficial results to all sectors. In addition, the establishment of vocational training centers in all OIZs so that OIZs can benefit from this opportunity has been a pleasing development. Another justified expectation of the sector at this point is to open private or public vocational high schools within OIZs in Düzce province, as in some cities, that can provide education in line with the employment needs of these regions. It is thought that this practice will be useful in training personnel suitable for regional needs.

The interviews held on increasing the employment of associate and bachelor's degree graduates, which is important in meeting the needs of the sector, showed the inadequacy of internship practice. Since the internship practice in many academic units is generally in the summer months, the backlog in this period cannot be spread over the year. Moreover, this period is often insufficient for the employer to get to know the student with employment potential. One of the main demands from the sector in this regard is the dissemination of the workplace training model called 3+1 and 7+1 to the relevant units of Düzce University. It is an important expectation of the sector that the 7+1 system applied in Düzce University Faculty of Engineering programs on an undergraduate basis, especially in the form of 3+1 in associate degree programs. Although this model is seen as useful for both students and employers, it should be implemented by taking into account the problems coming from different universities. The biggest concern with this model is the difficulties that all students may experience over time in finding a company where they can continue their workplace training. For this reason, it is thought that the transition to this practice should be initiated not in all academic programs, but only in programs where the problem of finding a company is less.

At this point, it is possible to say that the "Employment Angel" project, launched by Düzce University in the Spring semester of the 2021-2022 academic year, is capable of meeting the needs of the sector in this regard. The relevant project ensures that students are matched one-on-one with companies while they are still in their education life. Associate degree students and undergraduate students are matched with companies starting from the fifth semester and receive training at the company within the scope of the course until they complete their education. In this way, students gain experience, expand their skills and learn business discipline while they are still in their education life. Companies both guarantee the employment cycle and are largely relieved of the burden of training their new, inexperienced personnel. It is thought that it is very important to introduce this project to the sector and to include sector companies in this project.

Finally, it should be noted that the wage policies of the sector companies and the social rights they offer to their employees are of critical importance in meeting the need for qualified personnel and increasing the belonging of the working personnel. It seems that companies also have important duties in this regard.

It has been discussed in the previous sections that one of the most important problems mentioned by the companies operating in the sector, specifically in Düzce, is that there is no customs in the city. Although Düzce is a bridge between major cities and close to industrial centers, the logistics costs of companies

increase due to the lack of customs, and the lack of on-site customs service puts difficulties on companies at the point of export. The most important suggestion at this point would be to open a customs office in Düzce. Work in this direction continues and it is expected that the customs office will be put into service in a short time. This has been a pleasing development in terms of facilitating exports. It is recommended that this customs office, which is planned to be opened, be located within the OIZ.

Düzce is located in a very advantageous area in terms of location. It dominates the D-100 and TEM highways and is close to the ports. The TEM exit built in Düzce city center after Gölyaka and Kaynaşlı and located close to both the first and second OIZs was also very useful. There is no problem in transferring products to customs, ports or delivery points throughout Düzce. At this point, the most important problem is the high fuel prices, which is also a problem for the country in general. High fuel prices directly affect companies' costs. Another problem cited by the sector regarding logistics is road and bridge tolls. It is clear that state support is required to solve both problems. Making certain discounts from fuel taxes and road tolls depending on the export and/or production amounts of companies can reduce the problems at this point.

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