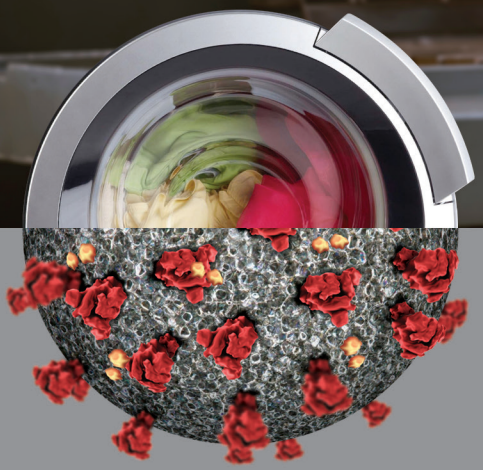

From the People of Japan

REPUBLIC OF TURKEY
MINISTRY OF INDUSTRY AND TECHNOLOGY

UNDP

COVID-19 Crisis Response and Resilience Project

MACHINERY SECTOR ANALYSIS REPORT and GUIDELINES

TR52 REGION

(Konya, Karaman)

MACHINERY SECTOR ANALYSIS REPORT AND GUIDE

TR52 Region (Konya, Karaman)

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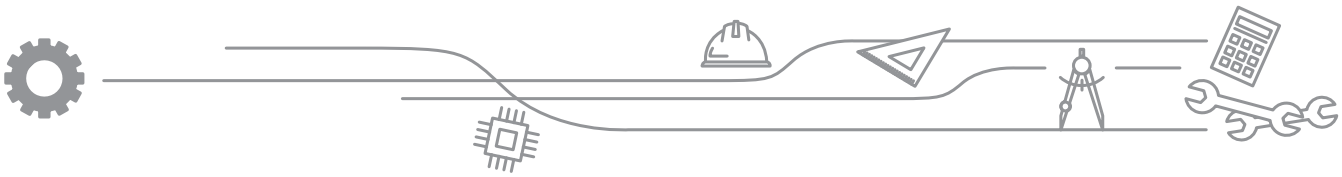

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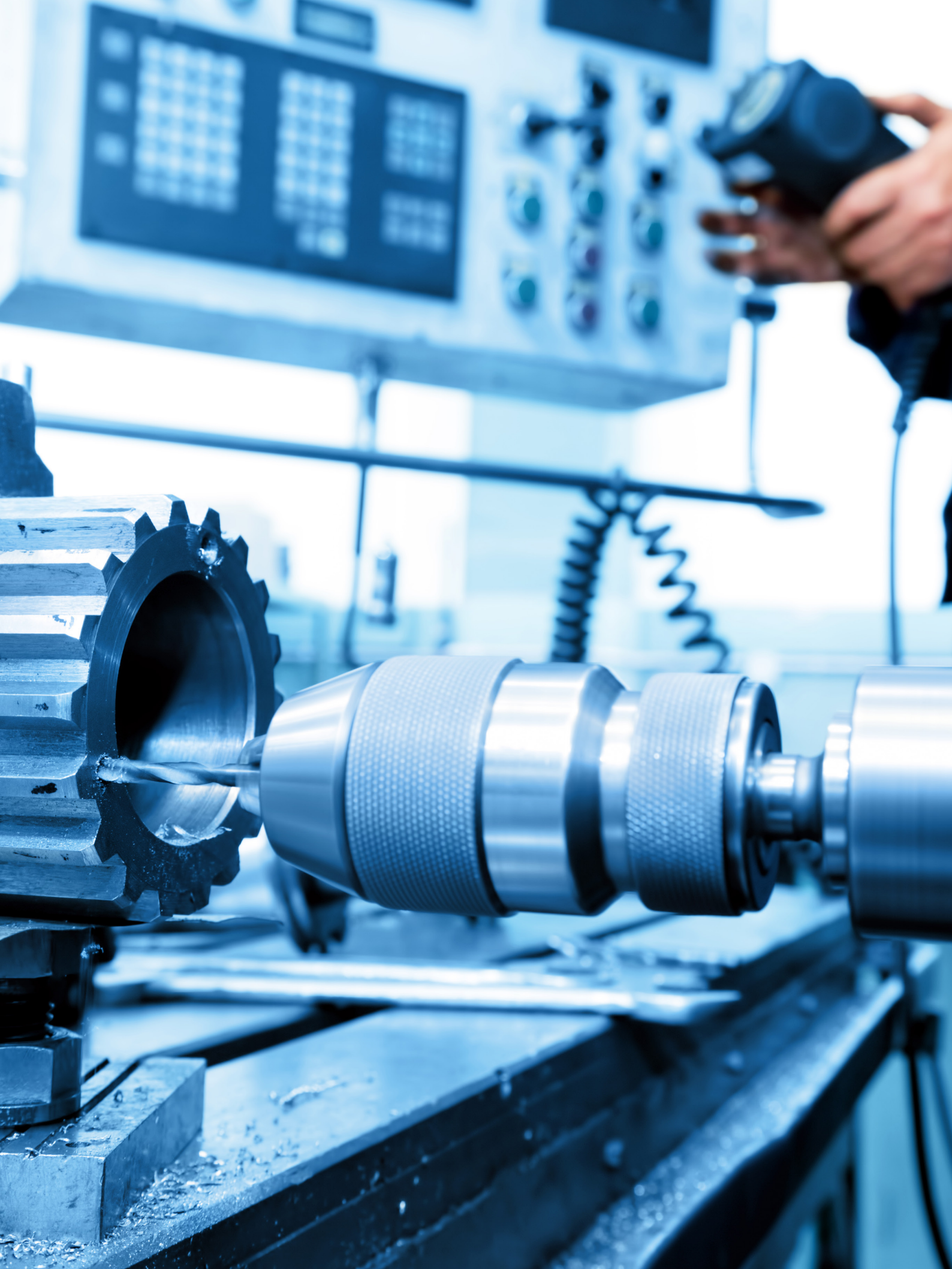

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ABBREVIATIONS

EU	European Union
USA	United States of America
ABİGEM	European Union Turkey Business Development Centers
AR/VR	Augmented Reality / Virtual Reality
R&D	Research & Development
BDDK	Banking Regulation and Supervision Agency
UN	United Nations
CAGR	Compound Annual Growth Rate
CE	Compliance with Europe
CRM	Customer Relations Management
SSO	State Supply Office
ERP	Enterprise Resource Planning
EEC	Energy Efficiency Consultancy
EURO	European Union Member States Common Currency
FSR	Fragile Sectors
SWOT	Strengths, Weaknesses, Opportunities and Threats
HS84	Harmonized System Machinery Sector Code
IE	Electric Motor Energy Efficiency Class
IoT	Internet of Things
IPA	Instrument for Pre-Accession Assistance
ISO	International Standards Organization
IT	Information Technologies
ITC	International Trade Center
HR	Human Resources
CCM	Cluster of Construction Machinery
DA	Development Agency
VAT	Value Added Tax
CGF	Credit Guarantee Fund
SME	Small and Medium Enterprises
KOSGEB	Small and Medium Enterprises Development Organization
GSC	Global Supply Chain
NACE	Statistical Classification of Economic Activities in the European Community
OECD	Organization for Economic Co-operation and Development
OKA	Central Black Sea Development Agency
OIZ	Organized Industrial Zone
PESTLE	Political, Economic, Social, Technological, Legal and Environmental
PwC	PricewaterhouseCoopers
RCEP	Regional Comprehensive Economic Partnership
SSI	Social Security Institution
U.S.S.R.	Soviet Union
MoIT	Ministry of Industry and Technology
NGO	Non-Governmental Organization
SICDP	Supporting International Competitiveness Development Program
SSO	State Supply Office
TAYSAD	Vehicle Sub-Industrialists Association
TCMB	Central Bank of the Republic of Turkey

TİM	Turkish Exporters Assembly
TOBB	Union of Chambers and Commodity Exchanges of Turkey
CCI	Chamber of Commerce and Industry
TTO	Technology Transfer Office
TÜBİTAK	Scientific and Technological Research Council of Turkey
TURKSTAT	Turkish Statistical Institute
TÜRSAB	Turkish Travel Agencies Association
TÜSİAD	Turkish Industrialists and Business People Association
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UR-GE	Supporting the Enhancement of International Competitiveness
WEF	World Economic Forum
World Bank	World Bank
WTO	World Trade Organization
3D	3 Dimensional

FOREWORD

The COVID-19 pandemic has gone beyond a health crisis and turned into a global problem, due to its impacts felt in all areas of life and all over the world. It is obvious that the problems caused by the pandemic, which has turned into a serious threat to all humanity, can be solved with a sustainable and fair understanding that requires international solidarity, cooperation, and common solution ideas.

The restrictions applied as a necessity of the pandemic led to slowdown in production, decrease in labor supply, delay in the supply of intermediate goods and raw materials, and increased logistics costs in our country as well as all over the world. Therefore, it is essential for sustainable development that policies should focus on the fragile sectors most affected by the pandemic in order to ensure the continuity of economic activities and accelerate the recovery.

By closely following the changes observed in the global system, Turkey carries out a comprehensive transformation in every field from education to health, from manufacturing industry to tourism, from industrial zones to research infrastructures.

Our development agencies, which perform their activities under the coordination of the Ministry of Industry and Technology, carry out studies at the regional level in order to reduce the negative impacts of COVID-19 on the national and regional economies and to identify the sectors most affected by the pandemic. One of our works in this field is the Government of Japan funded COVID-19 Resilience and Response Project, which we have implemented together with the United Nations Development Program (UNDP), the General Directorate of Development Agencies, and our development agencies.

Within the scope of the project, 25 region-based “fragile sector analysis reports” were prepared in the textile, logistics, food, machinery, and automotive sectors, which are of key importance for the Turkish economy. These reports, taking into account global developments and trends, offer new policy recommendations that will increase the resilience of the relevant sectors against crises. In addition, the “New Market Analysis” and “Product Space Analysis” reports, which cover studies to increase the export potential of enterprises operating in fragile sectors, were also completed within the project. These reports aimed to create road maps to support the business continuity of fragile sectors and to prevent supply chain disruptions.

We believe that the policy recommendations in these reports, which are in line with the targets within the framework of our national technology move, will support inclusive and sustainable development; it will carry Turkey to a more strategic point in the international trade and investment decisions that will be reshaped in the post-COVID-19 period and will contribute to our country's 2023 goals.

I would like to thank the Government of Japan for their generous contribution to mitigating the economic impact of the COVID-19 crisis, ensuring economic recovery, strengthening sectors, and transforming SMEs in this process.

I congratulate all our stakeholders, particularly UNDP Turkey management and project team, and the employees of the Development Agencies General Directorate and development agencies, who have made these studies realised and turn them into concrete outputs, and I hope that the reports will contribute to the future of our country.

Mustafa Varank

Republic of Turkey Minister of Industry and Technology

FOREWORD

The global context for development has fundamentally changed with the COVID-19 pandemic. The pandemic created many new obstacles to overcome as well as new problems to be solved. Although COVID-19 started as a health crisis, it has turned into both a humanitarian crisis and a development crisis.

This unprecedented crisis is pushing millions of people into extreme poverty, changing and widening existing inequalities, and disrupting progress towards the Sustainable Development Goals (SDGs). Therefore, the SDGs are now more important than ever. The 2030 Agenda remains the only option for a more prosperous future for people and planet.

The COVID-19 pandemic has also shaken the global trade and development landscape. The global health emergency turned into a global economic shock with its impacts on growth, international trade, investments, global production, value chains, employment and eventually livelihoods of people.

UNDP is responding to a growing volume of requests from countries to help them prepare for, respond to, and recover from the COVID-19 pandemic with a particular focus on the most vulnerable. As of now our focus is to help decision-makers look beyond COVID-19 recovery, towards 2030, making choices and managing complexity and uncertainty in four key areas: governance, social protection, green economy, and digital disruption.

UNDP's COVID-19 Resilience and Response Project, which is funded by the Government of Japan is a part of our rapidly developed integrated response to the COVID-19 health, humanitarian, and development crisis. Being complementary with the efforts of the Government of Turkey and other development partners and fully aligned with the country-specific needs, UNDP aims to tackle the impacts of the pandemic under three priority areas: Health system support; Inclusive and integrated crisis management and response; Social and economic impact needs assessment and response.

I am pleased to present these 25 region-based sectoral analysis reports that provide policy recommendations and action plans for key economic sectors in Turkey that are most impacted by COVID-19 pandemic. These reports, which were developed within the COVID-19 Resilience and Response Project in cooperation with Ministry of Industry and Technology and Development Agencies, formulated in the light of recent global context and trends as well as UNDP's response to COVID-19 crisis. Through this work, our aim is to support national capacities for an integrated and inclusive crisis management, ensure business continuity and prevent supply chain disruptions and speed up the development of the key economic sectors -automotive, textile, food, machinery, and logistics in different regions of Turkey and to increase competitiveness on a regional basis.

Our recovery efforts focus on rebuilding more inclusive economies and societies, moving towards a low-carbon and climate-resilient world where no one is left behind.

We believe that these reports will provide a pathway for economic recovery of sectors and development of regional competitiveness. In the reports the review of the pandemic crisis impact is accompanied by a set of policy recommendations targeting both the interventions in response to the negative effects of the pandemic and the post-COVID-19 social and economic recovery support measures. Overcoming the challenges faced by the sectors and society and ensuring better recovery can only be possible with joint efforts of the entire private sector, authorities, and the society as a whole.

In this regard, we appreciate the cooperation of Ministry of Industry and Technology, Development Agencies, and all experts for the preparation of these reports. We believe that these reports will also enable better cooperation in key economic sectors and help to accelerate the implementation of the Sustainable Development Goals in Turkey.

Louisa Vinton

UNDP Turkey Resident Representative

EXECUTIVE SUMMARY

With this report prepared specifically for TR52 Region, for the machinery sector, which is one of the 5 fragile sectors defined within the scope of "COVID-19 Resilience and Response Project" funded by the Government of Japan and conducted by the United Nations Development Program (UNDP) in cooperation with the Ministry of Industry and Technology of the Republic of Turkey; the overall assessment of the sector during the COVID-19 pandemic has been made and policy recommendations and action plans have been put forward to accelerate the development of the sector and to increase the level of regional competition in the light of global trends.

The commercial protectionism trend inherited from 2018, the trade wars between the USA and China, and the Brexit process had a serious impact on 2019. For these reasons, there was a significant slowdown in the world economy in 2019. Global growth decreased from 3.1% in 2018 to 2.4% in 2019. In 2019, world trade in goods decreased 3.0% and fell to US $ 18.25 trillion. This slowdown and the contraction of trade, combined with the decrease in demand, decreased capacity utilization rates in industries and public investment also slowed down. Accordingly, the growth in global machinery and equipment investments in 2019 was narrowed down and realized as 2.5%.

The Machinery Sector in Turkey maintains its leadership in the manufacturing industry with the input it provides to other sectors, its contribution to the development of these sectors, the employment it creates for the trained workforce, the added value it provides and its wide industrial network. When it comes to the use of technology, the importance of the machinery sector for the manufacturing industry is increasing day by day with the exemplary production models it has developed and the synergy it creates. The qualified production structure of the Machinery Sector in Turkey, generally in the middle-high technology class, is of vital importance for the future of our country. The machinery sector is a strategic sector for Turkey with its positive contribution in productivity and economic growth. For these reasons, it has become one of the 7 sectors supported by the Technology Oriented Industrial Action Program of the Ministry of Industry and Technology for the reduction of foreign dependency in medium-high and high technology products and for the rapid implementation of localization in selected machine groups.

In 2019, due to the increasing protectionism in global trade abroad, machinery and equipment investments in our country decreased by 5.5%. Although the increase in exports only compensated the contraction in domestic demand to a limited extent, the machinery sector production in 2019 decreased by 6.2% compared to 2015. Thus, the rapid growth in machinery sector production since 2010 started to shrink in 2019 for the first time.

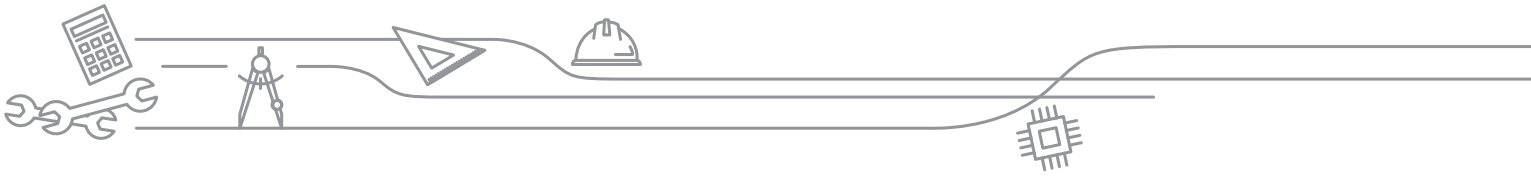
The machinery sector turnover increased by 8.2% in 2019 with the slowdown of domestic and foreign sales and reached 117.71 billion TL and showed the lowest increase in recent years. While its share in total manufacturing industry turnover rose up to 5% in 2017, it became 4.93% in 2018. Despite the 12.7% increase in the manufacturing industry turnover in 2019, the machinery sector could not follow the same increasing trend and grew by 8.2% and its share in the manufacturing industry decreased to 4.74%. This relative shrinkage is considered to be due to a decrease or pause in the global investment appetite and decreasing exports.

However, despite the shrinkage in its share in the manufacturing industry in 2019, the Compound Annual Growth Rate (CAGR) of the Machinery Sector, calculated over its turnover between 2010-2019, is 19%. This ratio clearly reveals the annual growth performance of the sector.

According to SSI data for 2019 it is seen that there are 1,107 machinery manufacturing companies in the TR52 Region, 48 of which employ 510 people in Karaman, 1,059 of which employ 14,088 people in Konya which makes a total of 14,598 employees.

In the region, the highest export figure of the Machinery Manufacturing Sector in 2020 was realized in Konya with 509 million USD. The sector is the most exporting sector of the province. In Karaman, it is observed that the sector is the second most exporting sector with an export of 15 million USD.

Along with the Covid-19 Crisis that emerged during the aforementioned global, national and regional conditions, the approach to crisis in the Machinery Sector, crisis management and the effects of the crisis and sectoral trend changes in the world, in our country and in the TR52 region were examined.



Primary and secondary data sources were used for the analysis. The survey conducted for sector representatives, the Working Group and Focus Group Meetings were used as the primary data source. As the secondary data source, the reports and statistics prepared by NGOs and global research companies representing the sector were used. In the light of these data, the national and regional results of the survey were compared and Value Chain, SWOT, PESTEL, Five Forces and Gap analyzes were conducted.

Companies quickly overcame the concerns of workers and workplace health, lack of personnel, order cancellations and not being able to receive new orders with the first shock experienced with the Covid-19 Crisis. The fact that Human Resources is a critical factor for competition has stepped up to a higher level of importance with the Covid-19 Crisis, as expressed in Focus Group meetings. It has been understood that HR, especially the strategic personnel, is the most important basis of companies to get out of crises. In order to protect this valuable resource, flexible working hours and working from home for employees with low workplace requirements have been urgently implemented throughout the sector. With the contribution of the short-time working allowance in order to prevent lay offs, there was no significant personnel reduction in the sector.

As can be understood from the information obtained during the study, in addition to the current problems of the sector, the most troublesome issues with the Covid-19 Crisis are as follows:

1. **Cash Flow Problems**
   - Difficulty in accessing Credit Guarantee Funds,
   - Lack of limit in banks,
   - Density, late response, high interest demands in Banks
   - Delays in VAT refund payments.
2. **Disruptions in the supply and logistics chain**
   - Pricing difficulty due to fluctuating exchange rates,
   - Increase in intermediate product prices,
   - Disruption of payment balance to suppliers,
   - Slowdowns in customs,
   - Cash demand from suppliers instead of maturity,
   - International logistics disruptions,
   - Increases in freight costs.
3. **Operational difficulties due to travel restrictions**
   - Inability to perform customer controls during the delivery of finished products,
   - Failure to assemble the delivered products, failure to receive payment for finished products, and delaying of subsequent orders.

Problems caused by the disruptions in the supply and logistics chain and travel restrictions, as a consequence, negatively affected the cash flow and caused the financial crisis to deepen for the companies.

There have also been opportunities in the industry with the Covid-19 Crisis. Thanks to the flexibility, rapid response and customer-oriented aspects of the sector, these opportunities have enabled companies to reach the milestones they will attain in product development and innovation in 4-5 year time within months and to increase the strategic awareness of localizing imported goods in their supply chains.

Progress in product development and innovation has enabled companies to receive new orders and even gain new customers in times of crisis. Besides, thanks to the rising motivation of localization in the supply chain, the imports of intermediate goods will decrease with the production of substitution domestic products in the short and medium term and therefore, the domestic supplier industry will gain strength. Also, the increase in the need for protective equipment and disinfection due to the pandemic was reflected in the sector as an additional machine order, enabling small SMEs to breathe during the crisis.

In order to get rid of the troubles experienced during the Covid-19 Crisis, there have been companies that switched to Crisis Management and were in search of new customers, except for

producing the orders of their existing customers. These companies saw the necessity to increase their competitiveness in order to be able to sell in markets that they did not or could not reach until the crisis period. In addition to reducing costs in order to enter these new markets, the awareness of companies about the need to make progress in the areas of Innovative Product Development, Resource Efficiency and Energy Efficiency for being more respectful to the environment and to increase competitiveness has also increased considerably.

In the Machinery Sector in the TR52 Region, the projects at hand continued due to previous orders and this enabled the effects of the Covid-19 crisis to be felt after a certain period and has given the region a very valuable extra time. The Covid-19 crisis, which manifested itself in the form of exchange rate fluctuations, logistics problems caused by a slowdown in customs, travel restrictions, problems in the supply of raw materials, caused companies to experience a shortage of cash flow as a result. Although the region has experienced bank limit difficulties and trouble reaching CGF loans, the opportunity to reach a safer point from the crisis has been created with the use of government supports such as "continue to work credit" and short time work allowance. After this initial recovery move, the sector focused on new customers in digital environments to overcome the effects of travel restrictions, and sales to new customers during the crisis period in regional companies reached 40% of their turnover. In short, the project-based works, the presence of stocks at hand, the result-oriented management style and flexibility in production and the rapid and adequate response to new customer demands have been the formula in the TR52 region to ensure resilience to the crisis.

The most important experiences that turned the crisis into an opportunity for the companies in the sector were the Knowledge Economy and Innovation infrastructures, which enable them to respond quickly to different customer demands. Investments to be made and the developments to be achieved in these two issues will bring along important opportunities in terms of private sector performance and economic growth, as well as being the key to long-term competitiveness for SMEs. It has been noticed also by them that a great opportunity stands near SMEs for achieving digital transformation with the Knowledge Economy and Innovation infrastructure, closing the shortcomings in terms of market and product diversity with smart machines faster than expected, and thus catching the 4th Industrial Revolution. With this opportunity, it has been clearly noticed that the export of the region, which is predominantly based on medium-high technology products, has the opportunity to switch to high technology products.

As a result, firms' cash flows were disrupted as the first shock with the Covid-19 Crisis, however, policies and practices that were quickly implemented enabled companies to survive financially. The crisis has shown that companies that can react to the crisis and change operationally, have found new customers and increased their sales during the crisis period, beyond surviving. These companies are the ones that respond quickly to customers, provide solutions to customer demands with innovation, and easily adapt these innovations to their production and meet customer expectations with the new product they produce, that is, companies that are resistant to crisis.

In order for all companies in the sector to gain these characteristics, certain strategies were developed and policy recommendations were made within the scope of the study. Moreover, although these strategy and policy suggestions were methods foreseen before the Covid-19 Crisis, this crisis clearly revealed the necessity of these methods in order to catch the new industrial revolution.

In this sense, the strategies developed should not only be innovative, but also should enable the regional industry to switch from low to high value added and efficient production. As with all Turkey's Machinery industry stakeholders, the machinery sector companies in TR52 Region, have a common consciousness that supports innovative and continuous development regarding the need for change and the necessary sectoral transformation. While this awareness is the most important force for the development of the Machinery Sector, which is a strategic sector for our country, it is also the most important reason to look at the future with hope. Sectoral Development, which must be completed and constantly renewed, should be supported by professional management and qualified employees. It is clear that development will be achieved through export-oriented production and in order to start or advance this cycle, it is necessary to manage digital transformation and to ensure the transition to high value-added, technology-based production across the industry.

The proposed policies, short, medium and long term strategies, sub-strategies and actions under sub-strategies to achieve these goals are shared in the relevant sections.

1. INTRODUCTION

The Covid-19 pandemic that emerged on December 1, 2019 in Wuhan, the capital of the Hubei region of China has started to spread around the world in 2-3 months. Most countries of the world have halted their economies to slow the spread of Covid-19 and have taken many measures to mitigate the short-term impact of the Pandemic Crisis. The main measure implemented has been social distancing and this resulted in a sudden stop in the services sector, a decrease in companies' cash flow and income, and a serious decline in economies with an increase in unemployment.

Turkey reported the first positive case of Covid-19 on March 11, 2020. Similar to other countries responding to the pandemic, the number of positive cases in Turkey has increased every day with the increase in the number of tests performed across the country. The fight against Covid-19 is still continuing today, however, the temporary closure of businesses has caused lower wages, unemployment, loss of income, and continues to affect all segments of the society.

Thus, the Covid-19 pandemic continues its effects on social and economic lives, public health systems, livelihoods and economy, with casualties, quarantines and job losses. In response to the medium-term impacts of Covid-19 and priority needs identified with stakeholders at national and local level; it is aimed to accelerate companies in making investments in supportive, inclusive, sustainable and climate-friendly businesses for technological transformation.

Within the scope of the report, region-based sectoral analysis and guidance were provided to increase the resilience and adaptation capacity of companies in TR52 Region Machinery sector and to support them against crises. Strategies and policy recommendations for reducing the effects of Covid-19 in the short / medium and long term for the machinery sector in the relevant region have been made into a detailed report as a result of analysis obtained from focus group meetings attended by sector representatives and surveys conducted with sector representative companies.

In order to slow the spread of the Covid-19 Pandemic, the closure and / or restriction measures taken in our country, as in the whole world, started to affect all economic activities, especially the service sector, foreign trade, industrial production and tourism, as of mid-March 2020 and the effects deepened as of April and spread to the entire economy.

In this context, the "Fragile Sectors Analysis" project is thought to contribute to the technological transformation of SMEs and to develop more inclusive, sustainable and climate / environment friendly business models as a medium and long-term response to the negative effects of Covid-19 on the economy. Within the scope of the project, while region-based sectoral analyzes and guidelines were prepared for 5 fragile sectors (Machinery, Food, Textile, Automotive and Logistics), the most important output of the studies are short, medium and long-term strategy and policy recommendations on a sectoral / regional basis.

Machinery Sector analysis and guidelines were determined according to the Code 28, which is the dual group of the NACE classification used in the European Union. The NACE Codes of the sub-sectors are as follows:

C.281: Engines, turbines, compressors, pumps, faucets, valves, bearings, gears, etc.

C.282: Ovens, furnaces, lifting machines, baling machines, office machines, cooling and ventilation equipment, general purpose machines, etc.

C.283: Agricultural and forestry machinery such as tractors, planters, trailers and semi-trailers, combine harvesters and harvesters, seed graders, animal feed preparation machinery, etc.

C.284: Metalworking machines such as lathes, milling machines, hydraulic presses, forged iron machines.

C.289: Construction Machinery, other workbenches for working with other materials such as wood, stone, glass or rubber. Special machines for other purposes such as food industry, textile, garment and leather industries, paper and card industry, rubber and plastics industry, Construction Machinery, etc.

Agricultural Machinery Sub-Sector included in the C.283 NACE Code has been predominantly structured in the TR52 Region. 6.9% of the total exports of the Turkish Machinery Sector is from

the TR52 Region [Table 10].

This report has been prepared specifically for the machinery sector in the region. Meetings with industry representatives aim to explain the conditions that developed before and after Covid-19 and the current challenges faced by companies, using the results of studies and surveys conducted. The report also aims to provide an interpretation of the sector with strategic and operational points of view, to create regional recommendations, strategies and action plans by sharing global, national and regional assessments of sectoral trends and changes.

In the report, in Section 3, where the sector profile was drawn, the data up to 2019 were used; then, the data for the year 2020, which includes the effects of Covid-19, are given in Chapter 4, where the effects of crisis are examined and again in the same section, sector performance predictions for the end of 2020 are shared in the Tab 4.2. This ordering was made in order to see the impact of Covid-19 more effectively.

2. METHODOLOGY

Interviews were held with all project stakeholders to determine the methodology. A consensus has been reached on the work flow chart detailed below to be used as the methodology as a result of the desk-based work of the project expert team of 7 from 5 sectors and one-on-one interviews.

Assumptions, Risks and Risk Reduction Methods were studied with the support of key experts and associated risks have been identified and rated; and comments have been made on the analysis, mitigation and monitoring of these risks. The time schedule of development activities is determined in the project report and sectoral meeting dates were specified within the scope of this plan and activities were started.

As seen in the Work Flow Chart shown in Figure 1, the working methodology consists of Data Collection, Analysis, Verification and Result stages.

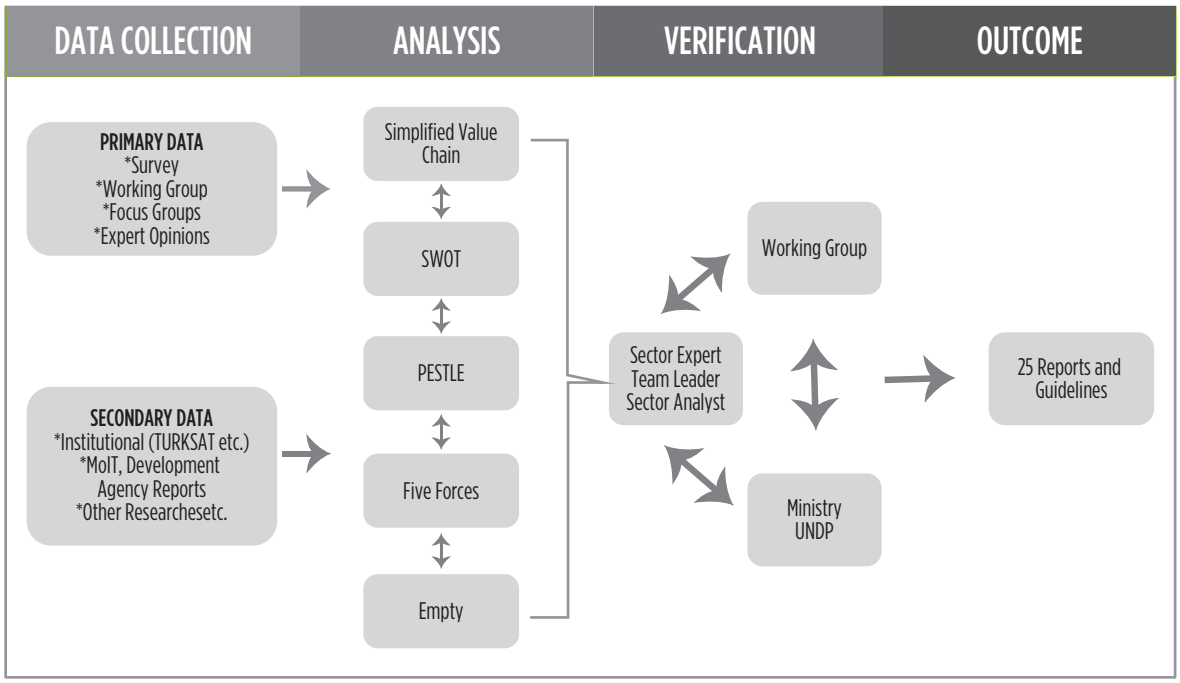


Figure 1: *Work Flow Chart*

In Data Collection, Survey Studies, Sectoral Studies, Focus Groups and Expert Opinions were considered as Primary Data. While the summary of the Focus Group meetings was given in the relevant section of the report, reference was made to the data obtained from the Focus Group meeting where necessary. The Focus Group Participant List is given in Annex 1. Working Group meetings were held in order to support the works of the Machinery Sector Experts, to provide guidance and to share information. Institutional Data Sources, Reports Prepared by the Ministry of Industry and Technology and Development Agencies, Reports prepared by Sectoral Organizations, Other Researches, Publications and Reports were discussed as the secondary data.

Data collected from institutions such as World Bank, UNDP, ITC, UNCTAD, WTO, WEF, TURKSTAT, SSI, TOBB, CBRT, BRSA, TIM, Ministry of Trade, Ministry of Industry and Technology were used as institutional data sources. Many reports have been prepared by the Ministry of Industry and Technology and Development Agencies in order to examine the effects of Covid-19. Relevant reports were used as a reference during the preparation process. In addition to these, reports prepared by professional and umbrella organizations, etc. were also examined.

The Spatial Value Chain Analysis prepared by the General Directorate of Development Agencies was taken into consideration for the analysis of the data. The current situation of companies

operating in the sector that is the subject of the reports and in the specified regions has been analyzed. For this purpose, Simplified Value Chain Analysis, SWOT, PESTEL, Porter's Five Forces Analysis and Gap Analysis, which are among the most effective analysis methods decided at the beginning of the project, were used. In addition to collecting region-specific data; the Working Group and Focus Group Studies contributed to both the analysis of the data and the verification of the analyzes.

One of the most important sources of information for the report is the Machinery Sector Working Group established by the Ministry of Industry and Technology. 9 experts were assigned within the Working Group. During the 14-week study period following the preparation of the inception report, the working group met 5 times in total every 2 weeks. The Working Group has examined the work done by the Sector Expert and made comments and served for validating analyzes, assumptions and policy / strategy proposals. Working Group meeting participant list is given in Annex.2 and meeting dates are given in Annex.3

One of the important sources of qualitative information has been the Machinery Sector Focus Group. Focus Group members selected on the basis of the sector and the region consist of Ministry of Industry and Trade, Development Agencies, Chambers of Industry and Commerce, Organized Industrial Zones, Umbrella Organizations (TAYSAD, TÜRSAB, Exporters' Unions etc.), Clustering Organizations, Universities, SMEs, Large-Scale Enterprises, UNDP, Sector Specialist, Sector Analyst and Team leader. The Focus Group contributed to the determination and prioritization of policy / strategy recommendations. In addition to the issues expressed by the participants at the meetings, the opinions of experts from different institutions and organizations, who know the relevant sector / region well, were also evaluated.

The sectoral sizes included in the report were calculated based on the Trade map data of Harmonic System 84 in order to make comparison with other countries. For this reason, the difference between the data expressed in the report and the data used by sectoral organizations such as MAKFED and prepared by TURKSTAT has been ignored since only proportional evaluation and trend analysis will be made in the report.

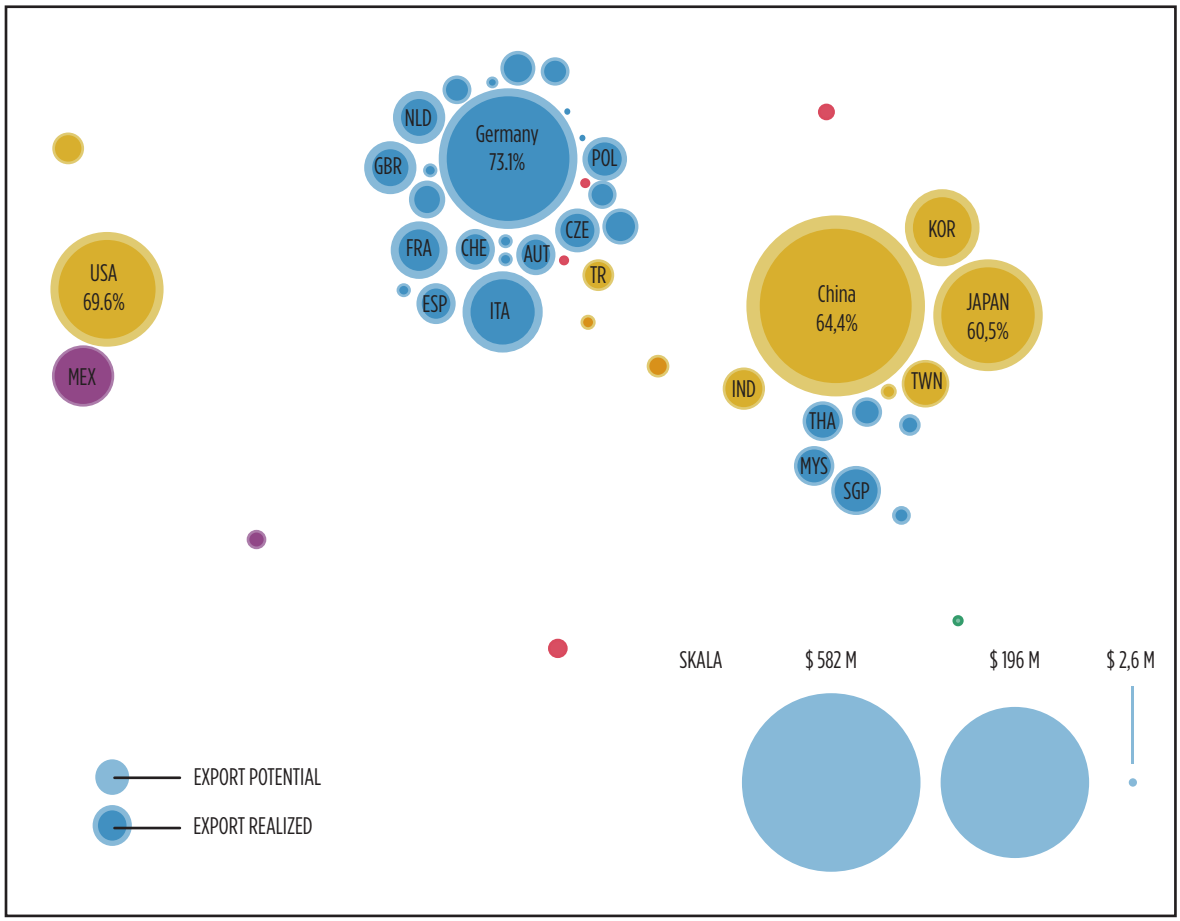
As a result of the study, a Machinery Sector Report and Guideline was created specific to TR52 Region.

3. Profile of the Machinery Sector

3.1. General Outlook of the Machinery Sector in the World

In 2018 and 2019, a transition period was experienced in the investment environment due to the effect of trade wars and investor behaviors suppressed by this effect. During this transition period, international investors sought alternative investment locations outside of China to avoid the restrictions and sanctions they may encounter. The delay in the implementation of investment decisions during this searching period firstly manifested itself as a decrease in demand in the machinery sector. As a result, the growth in world machinery and equipment investments in 2019 slowed down and realized as 2.5%.

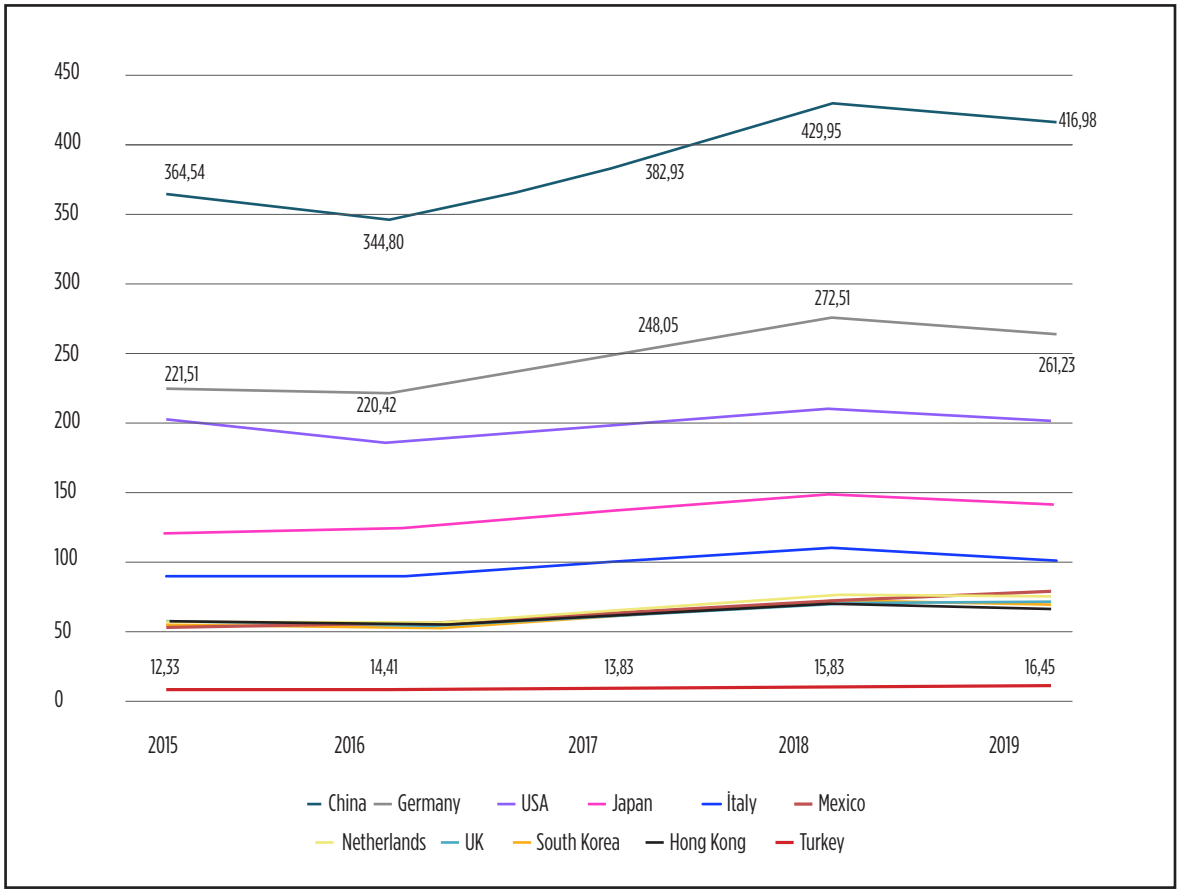
In the development process of countries, the importance of the machinery in the manufacturing industry is gradually increasing. The Machinery Sector directly affects the production, quality and competitiveness of the manufacturing industry sectors where it provides machinery and equipment. The export sizes and additional export potentials of the top 50 exporting countries in the Machinery Sector can be seen in Figure 2 below. The top countries mainly have medium and large-scale companies on the basis of turnover, which positively affects the competitiveness and market power of the countries.



[ITC_Trademap, 2021]

Figure 2: *Top 50 Countries in Machinery Sector in 2019, Their Exports and Export Potentials (HS84)*

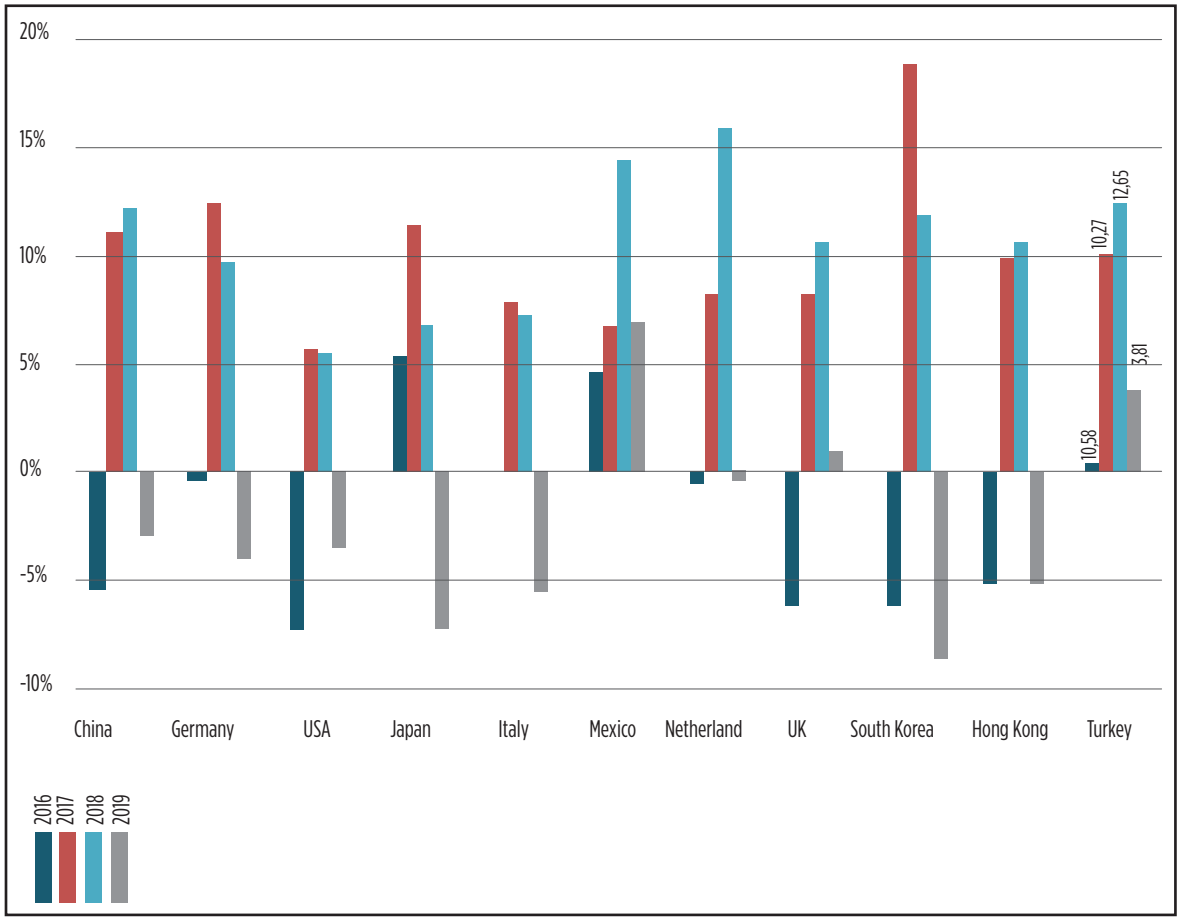
We can compare the exports of the top 10 countries and Turkey which ranked 17 between 2015-2019 in Figure 3. China, Germany, United States of America, Japan, Italy are the top exporting countries of the world in the sector.



[Trademap HS84, 2021]

Figure 3: *Export Values of Top 10 Countries and Turkey (billion USD*

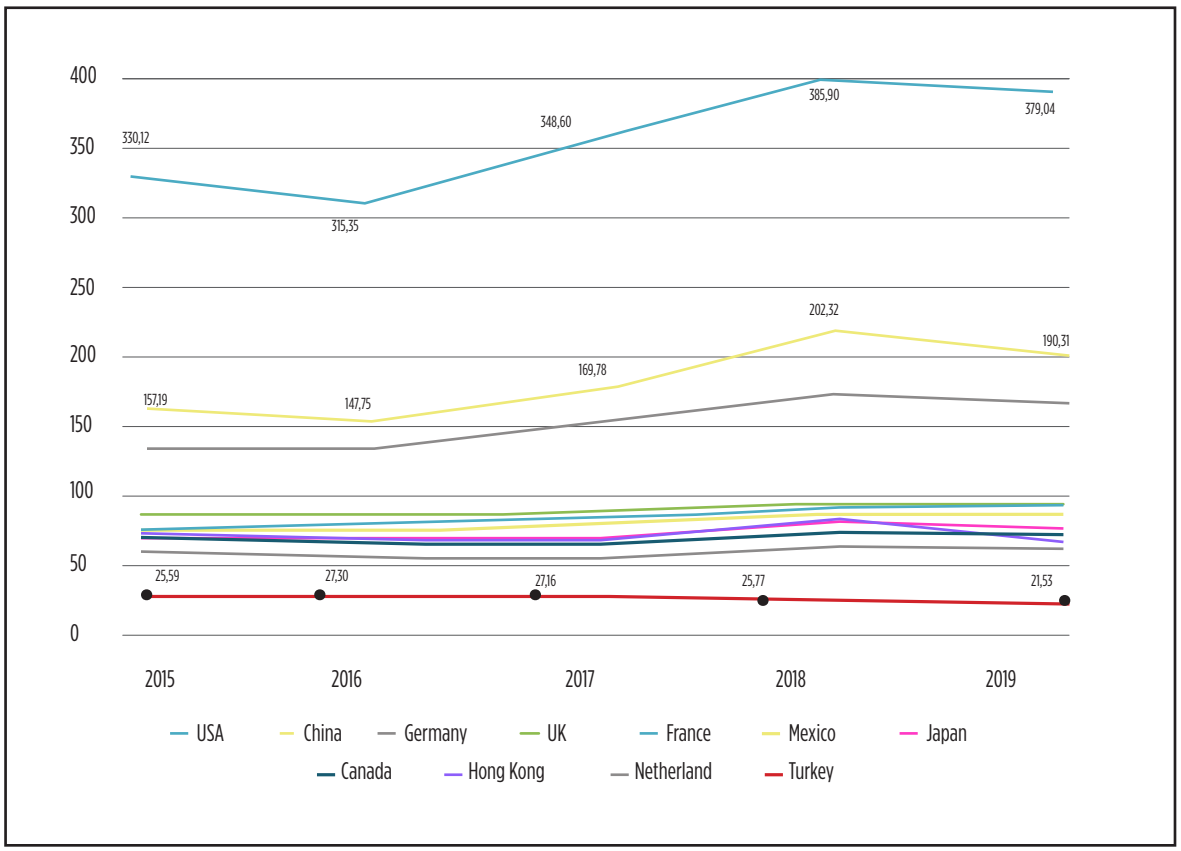
While the annual exports of machinery and equipment of major economies in the world pointed to a general decrease in 2016, there was a recovery in exports in 2017 and 2018. However, it can be seen in Figure 4 that there has been a decrease in the export figures of all countries with the decreasing investment appetite in 2019 due to the aforementioned reasons.



[ITC_Trademap, 2021]

Figure 4: *Export Increase Rates of Top 10 Countries and Turkey between 2016-2019 in World Exports*

In terms of world machinery imports, the size of the machinery imports of the country is directly proportional to the size of the investment made by the industry of that country in production. Therefore, attention should be paid to a strategy that pays attention to the balance of foreign trade in the machinery sector and to increasing sectoral production and scale. The import ranking also shows the production capacity of the countries in other sectors. Investments made by the manufacturing sectors in machinery and equipment are among the most important components in increasing production capacity and capabilities. Top 10 Countries with the Highest Import in the Machinery Sector in 2016-2019 and the import values (billion USD) of Turkey, which ranked 27th in the machinery import list, are shown in Figure 5. Of course, meeting the relevant machinery imports from domestic manufacturers directly affects both the development of the machinery sector and the ratio of country's exports to its imports and eventually its current account deficit.



[Trademap HS84, 2021]

Figure 5: *Import Values of Top 10 Countries and Turkey (billion USD)*

According to the data of 2015-2019, the United States, China, Germany, England and France are the world's largest machinery importers. As seen in Figure 5, increasing machinery imports in these countries indicate that investment is being made in manufacturing sectors.

While the annual increase in machinery and equipment imports of major economies in the world indicates a general decrease in 2016, it is recovering in 2017 and 2018 as in exports. However, it is seen in Figure 6 that in 2019, with the decreasing investment appetite due to the reasons we mentioned earlier, there was a greater decrease in all countries compared to exports.

What is important for a developing country is not that imports are less, but the higher ratio of export to import. However, the overall sharp decline in machinery imports indicate that investors are avoiding risks or that the investment climate does not attract investors.
[ITC_Trademap, 2021]

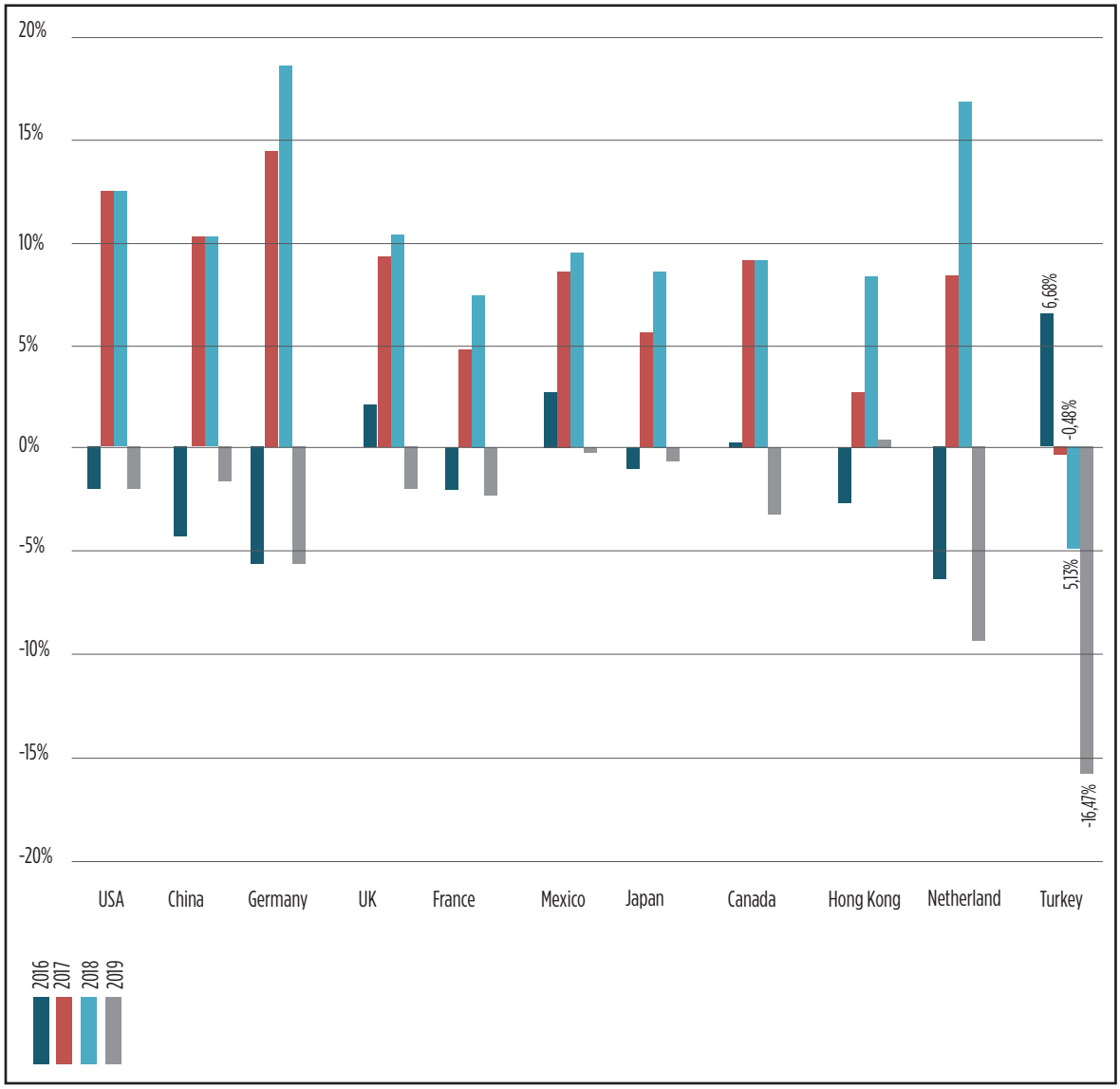


Figure 6: *Import Increase Rates of Top 10 Countries and Turkey between 2016-2019*

As seen in Figure 6, while machinery import of Turkey is decreasing, there is no significant decrease in imports of Asian, Eastern European and African countries for the same period [ITC_Trademap, 2021].

3.2. General Outlook of the Machinery Sector in Turkey

The Machinery Sector is one of the key growth factors of Turkey's economy and the driving force of industrialization. Turkey is the 6th largest machinery manufacturer in Europe and around 80% of the sector consists of SMEs with less than 20 employees. Turkey's Machinery Sector has increased the ratio of exports to imports from 61.4% in 2018 to 76.5% in 2019 and increased its production value 3.5 times in 10 years (2010, 22.5 million TL; 2019, 99.5 million TL) and is a pioneering sector of development, exporting to more than 200 countries, including free zones.

Table 1: Turkey's Machinery Sector Export-Import Balance Between 2015-2019

	2015	2016	2017	2018	2019
Export [Billion Dollars]	12,33	12,41	13,83	15,83	16,45
Export Increase Rate [%]	-	0,58	11,45	14,48	3,96
Import [milyar dolar]	25,59	27,30	27,16	25,77	21,53
Import Increase Rate [%]	-	6,68	-0,48	-5,13	-16,47
Balance (Deficit)	-13,25	-14,89	-13,34	-9,94	-5,07
Coverage Ratio [%]	**48,20**	**45,45**	**50,90**	**61,42**	**76,44**

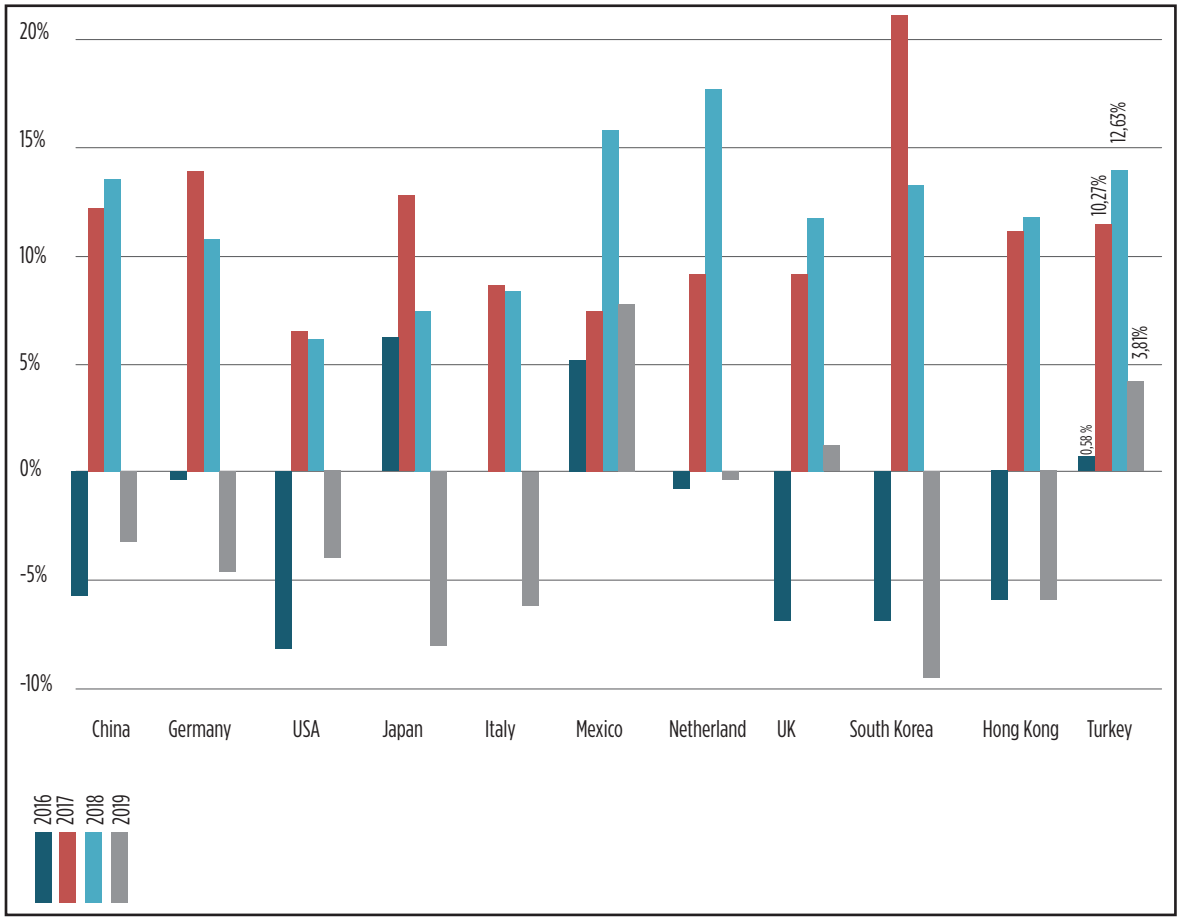
[ITC, Trademap, 2021]

As seen in Table 1, Turkey's machinery exports increased by 14.48% in 2018 to USD 15.83 billion, and in 2019 it increased by 3.96% to USD 16.45 billion. Despite the declining investment appetite in 2019, the sector was able to increase its exports and its coverage ratio between exports and imports from 61.4% in 2018, to 76.4%. However, it should not be ignored that the shrinkage in machinery imports, as seen in Figure 6, is due to the consecutive decline in demand after the exchange rate fluctuations in our country's economy in 2018 and 2019.

In the upcoming period, imports can be expected to increase faster than exports with the investment appetite, provided that the deferred investments are realized and economic confidence is ensured. In this case, even if the lowest trade deficit of the last five years (Balance, $ 5.1 billion in Open Position, Table 1) occurred in 2019, the deficit may increase drastically despite the mitigating effect of the increase in exports. In the following parts of the report, an evaluation will be made within the scope of the data obtained for the year 2020.

The future of the sector and the maximum benefit of our country can be achieved by finding new markets and increasing sales in existing markets thanks to structural developments that will be achieved through innovative and technological developments, and by permanent raise in the export-Import balance.

As can be seen in Figure 7, Turkey, which ranked 17th within machine export figures in 2019, is one of the countries with the highest rate of export growth and has the potential to force higher ranks in the list. Among the top 10 most exporting countries in the machinery sector, the countries that showed growth success in 2019 were Mexico with 7.1% and the United Kingdom with 1.0%. In 2019, when the world export average decreased by 2.8%, Turkey's 3.8% growth performance is an indication that our country has a high potential to rise to a higher position in the following years in the export ranking.



[ITC_Trademap, 2021]

Figure 7: *Export Increase Rates of Top 10 Countries and Turkey between 2016-2019*

The Machinery Sector provides 4.3% of our country's industrial production, 10% of its exports, 6% of employment and 5.7% of its added value. As in all over the world, it is mainly composed of SMEs and has representatives from all scales; large, medium and small enterprises, in line with general and special purpose machinery branches. As seen in Table 2; the machinery sector consists of about 17,400 manufacturers classified within the Harmonized System HS84, of which 17,200 are in the class "Machinery Not Otherwise Classified" (NACE 28) and it employs approximately 243,000 people.

Table 2: Number of Machinery Sector Enterprises

Years	Machinery Industry	Manufacturing Industry	Share of Machinery Sector (%)
2010	12.895	326.925	3,94
2011	13.317	335.571	3,97
2012	13.591	354.256	3,84
2013	13.921	365.723	3,81
2014	14.528	371.911	3,91
2015	15.347	375.480	4,09
2016	16.101	379.894	4,24
2017	16.707	391.024	4,27
2018	17.189	395.816	4,34
2019 GT	17.210	396.410	4,34

[TURKSTAT, 2021]

The sector has made a great leap forward in the last 20 years and by achieving an average growth rate of 12.2% in exports, 59% of which were made by small and medium-sized enterprises, it grew 10 times by catching the second largest acceleration after China in the period when the world grew only twice. The figure for 2019 exports is US $ 16.45 billion [Trademap HS84, 2021], and this figure rises to US $ 19 billion when free zones are included.

Turkey's economy faced a significant financial shock in 2018, and the economy and real sector were adversely affected. In the first two quarters of 2019, the economy contracted, a recovery was experienced in the last quarter, and the year was closed with a 0.9% cumulative growth [TURKSTAT, 2021]. In 2019 increasing protectionism in global trade and decreasing domestic investments have created restrictive effects in the machinery sector. Depending on these developments in the economy, machinery and equipment investments decreased by 5.5% in 2019, while machinery sector production decreased by 6.2% in 2019 compared to base year 2015. Growth in export could only compensate for the contraction in domestic demand to a limited extent and the rapid growth in machinery sector production since 2010 paused for the first time in 2019 (Table 3).

Table 3: Machinery Sector Production Value (million TL)

Years	Machinery Industry	Manufacturing Industry	Share of Machinery Sector (%)
2010	22.458	538.842	4,17
2011	32.144	712.234	4,51
2012	36.072	771.754	4,67
2013	40.163	866.169	4,64
2014	47.967	996.977	4,81
2015	54.503	1.116.847	4,88
2016	60.395	1.220.497	4,95
2017	78.297	1.574.831	4,97
2018	102.133	2.089.572	4,89
2019	99.537	2.217.955	4,48

[Makfed, 2021]

As can be seen in Table 4; while the share of the machinery sector in the total manufacturing industry turnover rose to 5% in 2017, it decreased to 4.93% in 2018. Despite the 12.7% increase in manufacturing industry turnover in 2019, the machinery sector could not follow the same

increase and grew only by 8.2% and its share in the manufacturing industry decreased to 4.74%. It is evaluated that this relative contraction is due to the decrease or pause in the global investment appetite and the falling growth rate of Turkey's machinery exports, as seen in Table 1.

However, despite the contraction in its share in the manufacturing industry in 2019, the Compound Annual Growth Rate (CAGR) calculated over the turnover of the Machinery Sector between 2010-2019 has become 19%. This ratio clearly reveals the annual growth performance of the sector.

Table 4: *Turnover of Machinery Sector (million TL) and its Share in Manufacturing Industry*

Years	Machinery Industry	Manufacturing Industry	Share of Machinery Sector (%)
2010	24.432	577.275	4,23
2011	35.694	761.945	4,68
2012	39.754	833.932	4,77
2013	45.721	930.896	4,91
2014	52.134	1.076.277	4,84
2015	59.281	1.203.634	4,93
2016	65.424	1.314.067	4,98
2017	84.834	1.695.855	5,00
2018	108.803	2.205.284	4,93
2019	117.710	2.485.514	4,74

[Makfed, 2021]

Although the non-performing loans in the machinery sector were relatively low, there was an increase in 2019 due to the cash flow difficulties. As can be seen in Table 5; the ratio of loans used in the machinery sector in 2018 and 2019 to loans used in the manufacturing industry is 4.04%. Despite this, in 2019, the share of the machinery sector in the manufacturing industry increased from 3.58% to 3.95% with regard to non-performing loans.

Table 5: *Domestic Loan Usage in Machinery Sector (million TL)*

Years	Total Loans			Non-Performing Loans		
	Machinery	Manufacturing	Share of Machinery (%)	Machinery	Manufacturing	Share of Machinery (%)
2014	9.246	250.486	3,69	159	7.086	2,24
2015	1.184	280.609	0,42	341	8.093	4,21
2016	12.962	315.557	4,11	502	11.339	4,43
2017	16.514	387.586	4,26	503	13.035	3,86
2018	19.471	481.363	4,04	693	19.334	3,58
2019	22.469	556.466	4,04	1.133	28.719	3,95

[Makfed, 2021

Considering the distribution of exports in the machinery sector among company groups, approximately 60% of exports are made by companies with less than 250 employees (Table 6); and this gives information about the magnitude of the added value that SMEs in the sector will create if they make progress in innovation and productivity.

Table 6: *Export Shares According to Scales in the Machinery Sector*

Years	Small and Medium Enterprises					
	1-9 Employees	10-49 Employees	50-249 Employees	1-249 Employees Total Share (%)	250+ Employees Total Share (%)	Total (Million Dollars)
2015	19,1	22,4	19,7	61,2	38,8	8.658
2016	19,0	22,5	19,9	61,4	38,6	8.582
2017	18,6	22,0	20,6	60,9	39,1	9.719
2018	17,9	21,1	20,3	59,3	40,7	11.489
2019	17,3	21,0	20,4	58,7	41,3	12.364

[TÜİK, 2021]

3.3. General Outlook of the Machinery Sector in TR52 Region

Konya is the largest province in Turkey with an area of 38.873 km2, and as of 2019, it is the seventh most populous province with a total population of 2,250,020, of which about 67.5% are of working age and 15.9% have university and higher education [TURKSTAT, 2021]. The center of Konya, which has 31 districts, is an area where universities, technology development centers, organized industrial zones, strong clusters of sectors and non-governmental organizations are concentrated.

Karaman has an area of 9.163 km2 and as of 2019, it is the 64th most populous province with a total population of 192,314, of which about 68% are of working age and 15.1% have university and higher education [TURKSTAT, 2021]. In the center of Karaman, which has 6 districts, there is one university and one technology development center.

Konya has a gross domestic product of approximately 90 billion 740 million TL and a share of 2.1% according to 2019 data [TURKSTAT, 2021]. In foreign trade, Konya has a share of 1.4% in the country with an export of 2.19 billion USD and is the 11th most exporting province [TİM, 2021].

According to 2019 data, Karaman has a gross domestic product of approximately 11 billion 872 million TL and a share of 0.3%. In foreign trade, Karaman has a share of 0.2% in the country with an export of 251 million USD and is the 38th most exporting province [TİM, 2021].

When the sectoral components of Konya and Karaman economies are examined, it is seen that an economic structure with a focus on food and industry sectors has been formed.

When looking at the number of enterprises on the basis of the machinery sector, according to the data of 2019 in Table 7 [SSI, 2021] it is seen that there are 1,107 machinery manufacturing companies in the TR52 Region, 48 of which employ 510 people in Karaman, 1,059 of which employ 14,088 people in Konya which makes a total of 14,598 employees.

Number of Companies and Employees in Class NACE 28 in TR52 Region	Karaman	Konya	Total
Number of Companies	48	1.059	1.107
Number of Insured Employees	510	14.088	14.598

In Table 8, it is observed that there is a concentration in the sub-sector of Agricultural Machinery with 203 companies in Konya in TR52 Region in 2018. In Karaman, on the other hand, there is a concentration in the food sector.

Table 8. Number of Machinery Manufacturing Companies by City (2018													
Class	Machinery Groups	İstanbul	Ankara	Kocaeli	Bursa	İzmir	Eskişehir	Konya	Manisa	G.Antep	Mersin	Adana	Sakarya
2811	Engines Turbines	30	22	16	16	24	2	48	1	1	1	6	2
2812	Fluid Power Eq.	110	80	19	24	58	2	103	1	4	1	9	3
2813	Pump & Comp.	215	78	25	23	85	5	74	4	6	2	9	10
2814	Taps & Valves	239	25	26	10	28	4	37	10	1	1	7	1
2815	Bearings & Gears	142	25	11	15	41	4	77	13	1	1	7	7
2821	Ovens & Furnaces	173	54	27	15	32	1	28	8	6	4	4	
2822	Lifting Handling	544	236	86	74	146	26	179	24	30	28	32	17
2823	Office Machinery	14	3			1	1	1					1
2824	Power Hand Tools	12	1	1	1	4		4	1		1	1	1
2825	Cooling Mach.	345	116	57	41	118	17	44	29	19	3	19	12
2829	Other Gen. Mach.	617	158	83	41	163	14	84	16	19	11	22	25
2830	Agr. & Forestry	46	44	16	31	77	17	203	40	12	13	32	17
2841	Metal Forming	314	71	41	119	61	10	81	6	6	5	12	10
2849	Machine Tools	168	69	34	161	42	11	34	6	2	3	4	11
2891	Metallurgy	49	10	24		19	4	14			1	7	
2892	Construction	105	355	33	15	71	7	50	12	12	11	17	7
2893	Food Mach.	200	67	11	40	121	21	165	14	60	16	14	31
2894	Textile Mach.	252	15	5	34	40		20	2	67	4	10	4
2895	Paper Mach.	54	6	9	3	15		8	2	8		6	
2896	Plas. & Rub. Mach.	221	13	27	24	31	4	15	3	21	3	7	11
2899	Other Spec. Mach.	309	112	41	69	86	13	54	27	9	2	7	4
Total		4.159	1.560	592	756	1.263	163	1.323	219	284	111	232	174

When the Machinery Manufacturing sector investment incentive documents between the years 2015-2020 in TR52 Region are examined in Table 9, It is understood that there was no investment incentive certificate received by foreign investors in the region in the relevant period. It is seen that local investors prefer Konya province for investment in the machinery sector, and Konya is far ahead in terms of the size of the investment made.

Table 9. Investment Incentives Received Between 2015-2020 In TR52 Region under NACE 28						
INVESTMENT INCENTIVES BETWEEN 2015-2020 IN TR52 REGİON NACE 28	DOMESTIC INVESTOR			FOREIGN INVESTOR		
	Number of Incentives	Amount of Investment [Million TL]	Employment Provided	Number of Incentives	Amount of Investment [Million TL]	Employment Provided
Karaman	3	22	42	0	0	0
Konya	118	905	1.544	0	0	0

[MOIT, 2021]

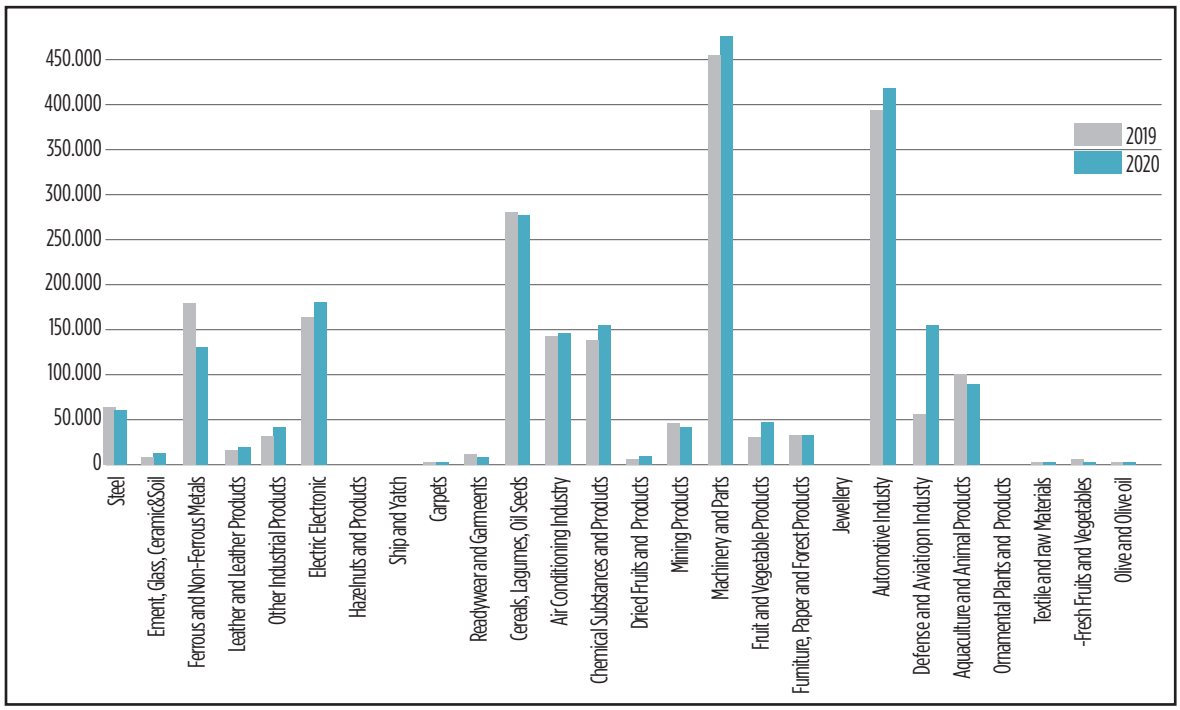
As can be seen in Table 10, TR52 Region has grown by 11% in the Machinery and Parts sector in 2020, with an export amount of 524 million USD, compared to the same period of the previous year, and its share within Turkish machinery industry exports, which decreased by 3.7% in the same period, is increased from 6 to 6.95%. With these figures, there was a noticeable growth in Konya and Karaman Machinery Industry exports in 2020, despite the decrease in Turkish machinery exports by 3.71%.

Table 10. Top 20 Cities in Machinery Exports in 2020 and Export Shares (Thousand USD						
MACHINERY EXPORT RANKS	1 January-31 December					
	CITY	2019	Share	2020	Share	Difference
1	İSTANBUL	2.852.388	36,4%	2.628.887	34,9%	-7,8%
2	ANKARA	1.207.172	15,4%	1.140.353	15,1%	-5,5%
3	BURSA	806.518	10,3%	686.714	9,1%	-14,9%
4	İZMIR	574.502	7,3%	533.762	7,1%	-7,1%
5	**KONYA**	**460.402**	**5,9%**	**508.934**	**6,7%**	**10,5%**
6	KOCAELI	471.293	6,0%	469.943	6,2%	-0,3%
7	MANISA	107.752	1,4%	137.851	1,8%	27,9%
8	MARDİN	21.290	0,3%	135.500	1,8%	536,4%
9	GAZİANTEP	146.239	1,9%	130.715	1,7%	-10,6%
10	ESKIŞEHIR	104.015	1,3%	101.954	1,4%	-2,0%
15	ÇORUM	75.017	1,0%	63.269	0,8%	-15,7%
18	SAMSUN	47.984	0,6%	53.533	0,7%	11,6%
30	**KARAMAN**	**11.665**	**0,1%**	**14.857**	**0,2%**	**27,4%**
62	KİLİS	861	0,0%	1.331	0,0%	54,5%
66	ADIYAMAN	1.664	0,0%	1.001	0,0%	-39,8%
70	AMASYA	468	0,0%	482	0,0%	3,0%
71	TOKAT	541	0,0%	356	0,0%	-34,3%
	Türkiye Toplam	**7.832.002**	100,0%	**7.542.293**	100,0%	

[TİM, 2021]

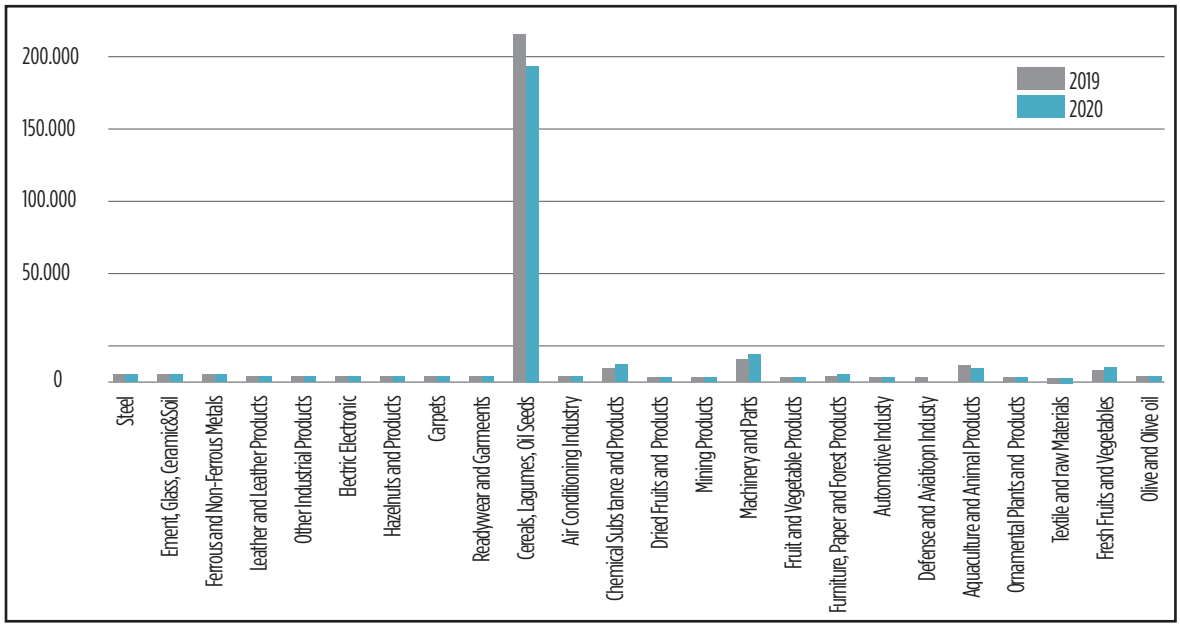
While the most exported countries from TR52 Region are the USA, Italy, Iraq, Azerbaijan, Uzbekistan, the highest import is from Italy, Germany, France, China and India [MAKFED, Agriculture and Machinery..., 2020].

When we examine the distribution of exports from Konya to sectors in Figure 8, in 2020, the Machinery Manufacturing Sector became the most exporting sector of Konya. When the distribution of exports from Karaman to sectors is examined in Figure 9, the Machinery Manufacturing Sector became the second most exporting sector in 2020, following the Grains, Pulses, Oil Seeds.



[TURKSTAT, 2021]

Figure 8: *Exports of Manufacturing Industry Sectors in Konya in 2019-2020 (Thousand USD)*



[TÜİK, 2021]

Figure 9: *Karaman İli İmalat Sanayi Sektörleri 2019-2020 Yılı İhracatları (bin ABD doları)*

Konya is the 8th province with the highest number of R&D centers with 25 R&D centers in the fields of machinery, automotive supply industry, automotive design and engineering, packaging, furniture, chemistry, transportation and logistics, foundry, medicine and banking. Karaman has 2 R&D centers, one in the field of machinery and equipment and one in the field of food [MoIT, 2021].

When the Konya Machinery Manufacturing sector is examined, the biggest sub-sector is the Agriculture and Forestry Machinery Sector. The production of agricultural machinery developed in order to modernize the intensive agricultural activity in the province has grown in parallel with the increasing agricultural production and has been able to go beyond national growth with exports. The tractor, agricultural tool machinery and equipment manufacturing in Konya has 65% of the Turkish market and makes 45% of Turkey's agricultural tools and machinery exports [MoIT, 2021].

In addition, flour, semolina, pasta factories and equipment are exported to many countries within the scope of mill machinery production, which belongs to the food machinery sub-sector in the province. Konya also has shown significant improvements, especially in on-board equipment industry.

When the industrial production in Karaman is examined, the food machinery sub-sector comes to the fore as a developed industrial branch in parallel with the biscuit production in the province.

Clustering activities for the sector in Konya are also at an important level. KONTARKÜM is a cluster of 45 companies that are specialized in various sub-branches of the Agriculture and Food Machinery Sector, which has been developing and continuing its activities since 2012 and producing domestic products.

Central Anatolia Machinery and Accessories Exporters Union, TARMAKBİR, TARMAKDER are non-governmental organizations operating in Konya and Karaman provinces.

Although the production range in the sector is quite wide, the products produced in Konya and Karaman include all kinds of agricultural machinery, milling machines, on-board equipment, welding machines, compressors, metal processing machines, guillotine shears, presses, hydraulic cylinders, hydraulic pumps, engine renovation machinery and machine tools.

Agricultural Machinery companies producing in Konya and Karaman have achieved a lot of success in national and international rankings. İmaş, Anıl and Kayahan Machinery are among the companies that are well-known in the sector.

4. The Effects of the Covid-19 Pandemic on the Machinery Sector

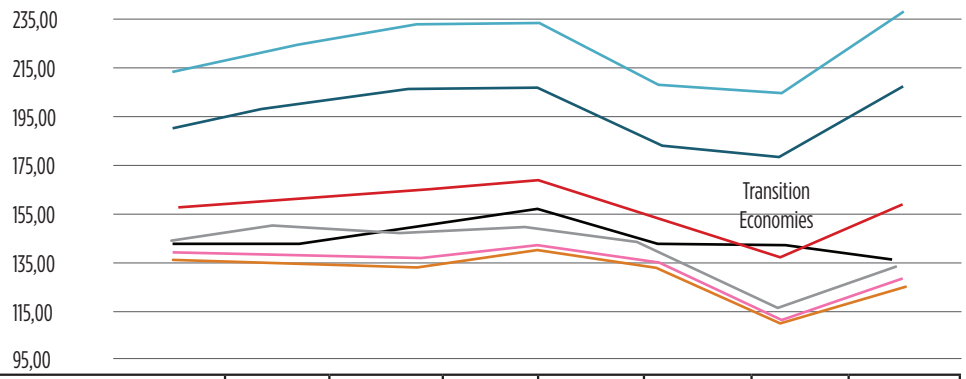
Most countries of the world have taken many measures to mitigate the short-term impact of the Pandemic Crisis. The main measure implemented has been social distance and this resulted in a sudden stop in the services sector, a decrease in companies' cash flow and income, and a serious decline in economies with an increase in unemployment.

The Covid-19 pandemic caused a significant contraction in the world economy and trade in 2020. The assumptions that the pandemic will take place in a single wave, that it will be taken under global control at the end of the summer months and the vaccine will be found and implemented in 2021 are the basis of optimism in predictions regarding the world economy and trade.

4.1. Comparison Before and After the Pandemic

By using the data finalized as of January 2021, the world total and export volume and export growth rates in various economic regions can be examined in Figure 10 and Figure 11. As can be seen in Figure 10, it is seen that the decline in export volumes of both the world and economic regions with the onset of the pandemic in the first quarter of 2020 reached the bottom point at the end of the 2nd quarter and returned from this point, approaching the 1st quarter figures at the end of the 3rd quarter. However, in Transition Economies of the Former USSR (Russia, Ukraine, Belarus, Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan and Tajikistan) there is an almost stable progress in the second and third quarters with a relatively low retreat at the end of the 1st

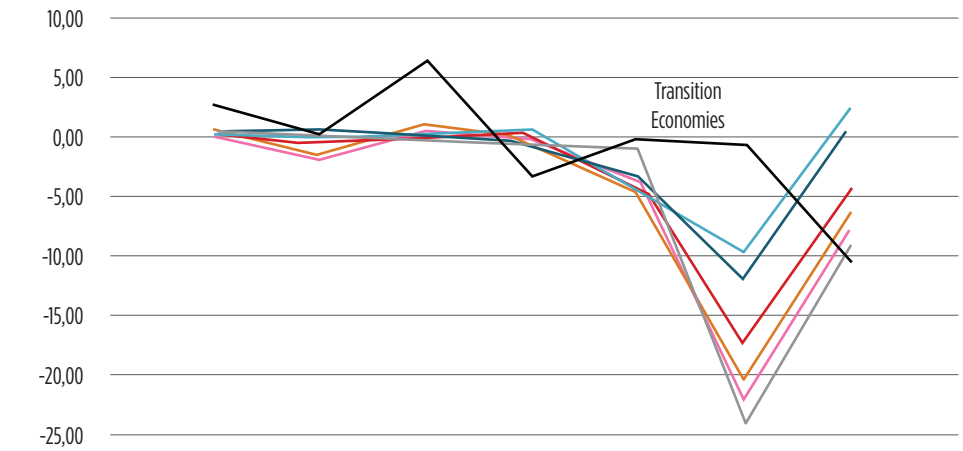
quarter. This might be due to the fact that countries of transition economies have implemented quarantine and travel ban practices taken against the pandemic later and more flexibly.



	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
World	156,80	160,76	161,41	165,17	152,19	134,40	155,55
America	143,63	150,64	148,65	150,44	142,82	116,30	136,76
Asia	211,61	222,80	231,49	233,04	205,11	203,03	238,01
Europe	136,67	135,60	133,10	139,18	131,36	109,42	125,60
Developing Economies	188,45	199,15	205,30	206,37	183,15	176,54	207,28
Transition Economies	143,06	142,80	150,73	157,73	143,54	142,57	136,03
Developed Economies	140,20	140,71	137,94	142,92	135,74	111,26	128,58

[UNCTAD, 2021]

Figure 10: *Export Volumes of the World and Various Economic Regions [2005=100]*



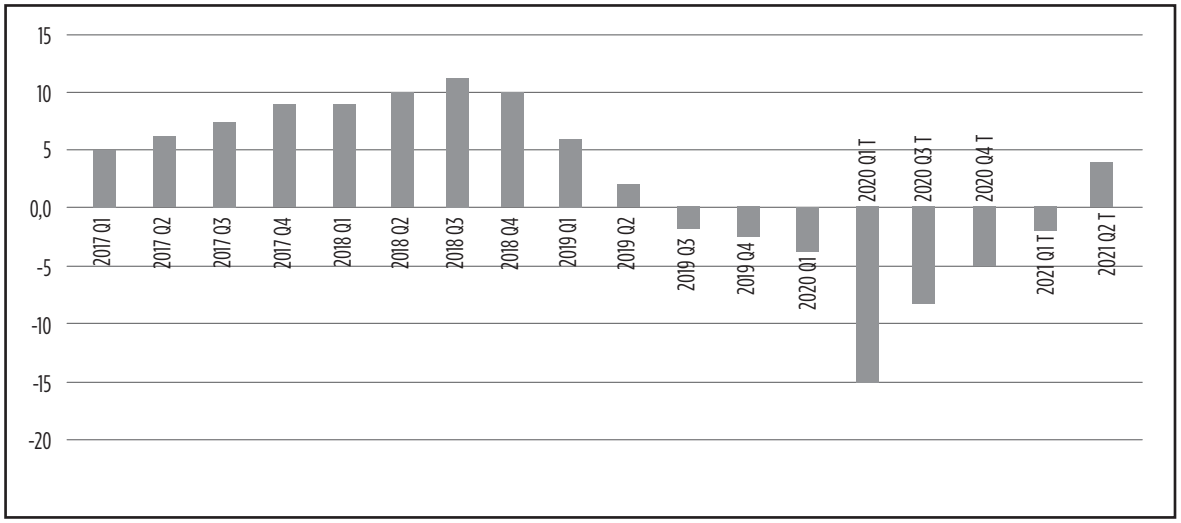
	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
World	0,62	-0,20	0,84	0,22	-2,94	-16,40	-3,66
America	0,94	0,29	0,49	-0,37	-0,57	-22,80	-8,00
Asia	0,84	0,66	0,31	0,97	-3,07	-8,87	2,81
Europe	1,05	-1,10	1,42	0,39	-3,88	-19,31	-5,63
Developing Economies	0,59	1,14	0,43	0,55	-2,81	-11,35	0,96
Transition Economies	3,00	0,67	6,53	-2,53	0,33	-0,16	-9,75
Developed Economies	0,53	-1,24	0,92	0,25	-3,18	-20,93	-6,79

[UNCTAD, 2021]

Figure 11: *Export Growth Rates of the World and Various Economic Regions Compared to the Previous Period*

The same is true for export growth rates, as can be seen in Figure 11. It is highly probable that in the 4th quarter the export growth rates of the transition economies will follow the rest of the economies and will make a comeback as other economies have performed in the 4th quarter.

While the current information and expectations of the world economy are like this, UNCTAD's predictions regarding world machinery and equipment investments are as follows: As can be seen in Figure 12; world machinery and equipment investments will likely recess in parallel with the world economy; however, its recovery will take a longer time. World machinery and equipment investments shrank by 4.0 percent in the first quarter of 2020. It is estimated that there was a 15.0% shrinkage in the second quarter. In the third and fourth quarters of the year, contractions are expected as 8.0% and 5.0%. After a limited contraction in the first quarter of 2021, the first growth figure in world machinery and equipment investments is expected to be 4.0% in the second quarter of 2021.



[UNCTAD, 2021], (Compared to the same period of the previous year

Figure 12: *World Machinery Investments Growth Rates (%)*

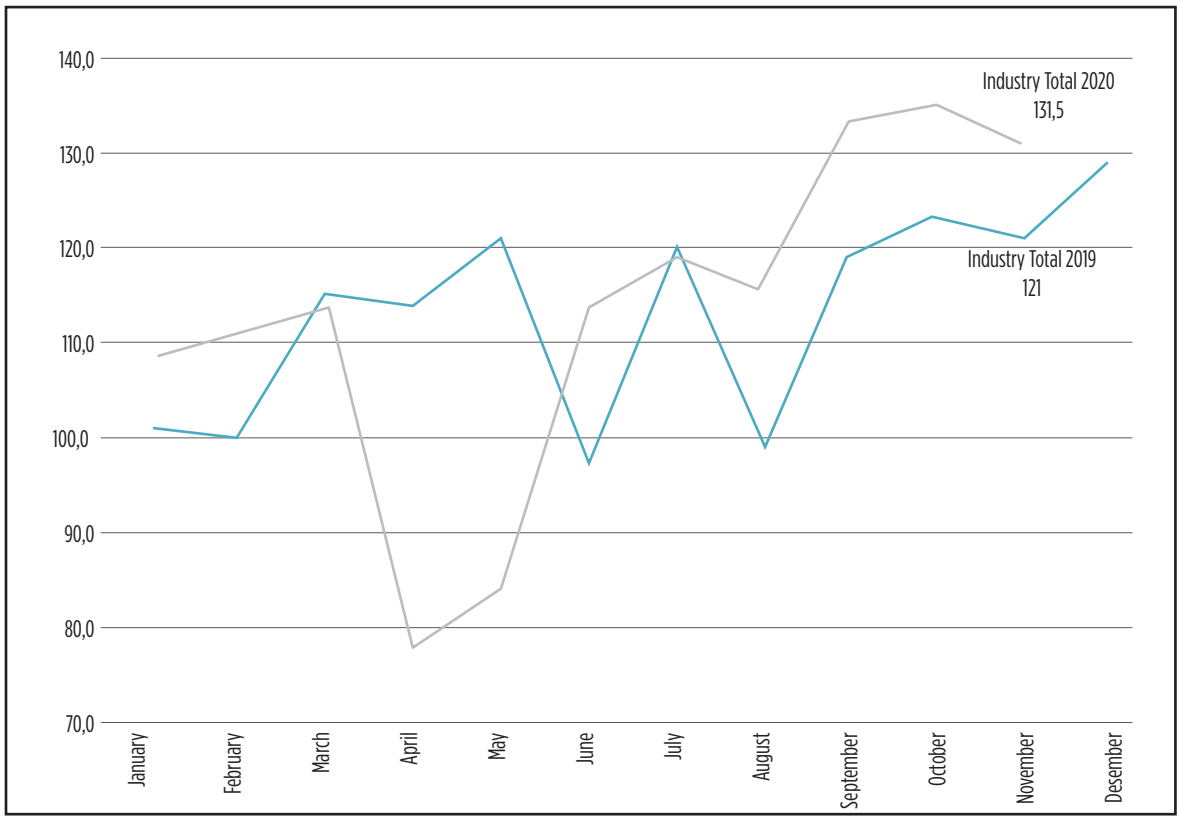
These expectations and the export growth rates shown in Figure 11 do not match. Along with the recovery in world export volume and growth rate, a recovery in the machinery sector should be expected in parallel with the export growth rate. As a matter of fact, TURKSTAT data for 2020, which will be shared below, and monthly improvement comparisons of the manufacturing and machinery sectors also indicate a faster recovery.

In response to the Covid-19 Crisis, the Manufacturing Industry and Machinery Sector has taken hygiene and social distance measures in the workshop and business services in general to minimize the impact of the virus on production and employees with chronic illnesses and / or those over 55 years old were given the opportunity to take leave. A home-based working system has been introduced for white-collar personnel who are not obliged to actually work in the workplace. As a result, it has become evident that most white-collar workers can do their jobs remotely.

In this period when the fight against the virus is at a high level; efforts were made to produce with additional working hours in order not to interrupt the infrastructure services such as energy, water, sewage, cleaning and hygiene, infrastructure services such as elevators, air conditioning, cold chains, and to maintain agricultural production for food security of our country with the aim of protecting public health and eliminating the risks that may hinder social life. In this critical period, the machinery sector was able to take quick actions in areas such as respirators and mask manufacturing machines, and put the necessary work into practice very quickly.

As can be seen in Figure 13, in 2020, when the Manufacturing Sector of Turkey started well during the Covid-19, the shrinkage, which continued increasingly from March to the end of April, started to return back in May and recover rapidly in June. The manufacturing sector index, which captured

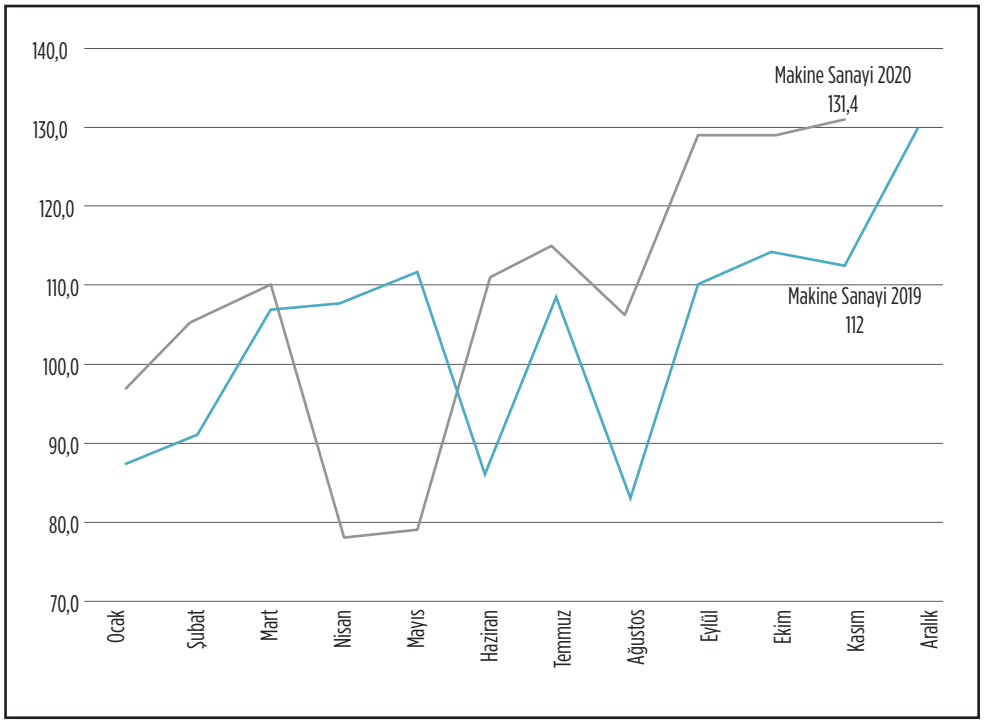
the figures of 2019 in July, managed to reach from August to November, parallel to the trend in the same period of 2019, but with a better performance. If the same trend continues, it is highly likely that there will be a rise again in December..



[TÜİK, 2021]

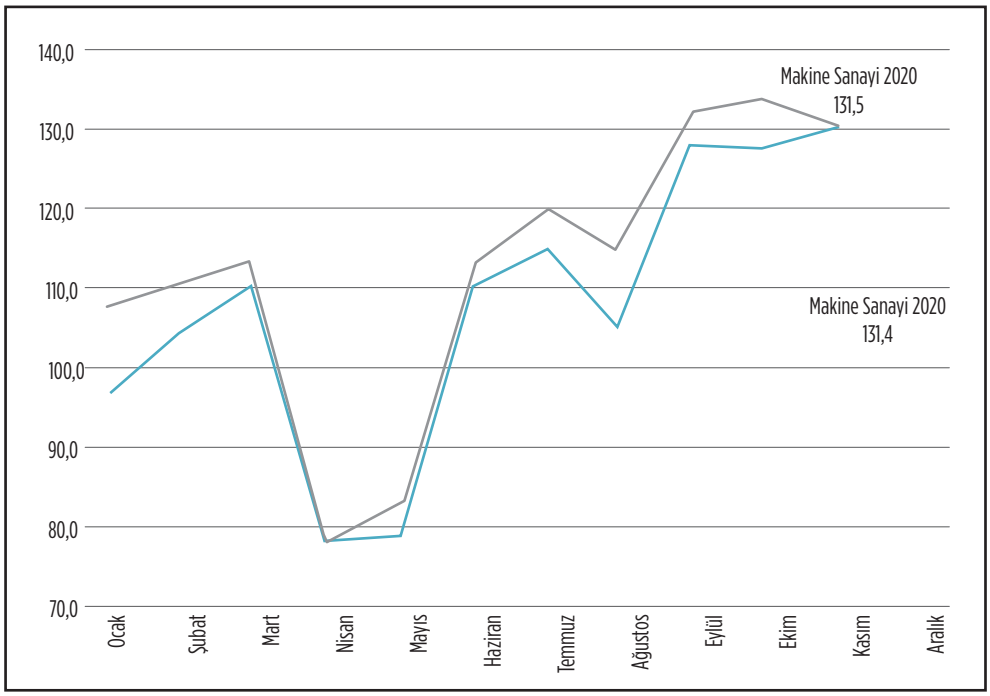
Figure 13: *İmalat Sanayi Üretim Endeksi 2019-2020 Aylık Karşılaştırması [2015=100]*

As can be seen in Figure 14, in 2020, when the Machinery Sector started well just like the manufacturing sector; the shrinkage, which continued increasingly from March to the end of April, started to return back in May, and recover rapidly in June. The machinery sector index, which captured the figures of 2019 in July, managed to reach from August to November, parallel to the trend in the same period of 2019, but with a better performance. If the same trend continues, it is highly likely that there will be a rise again in December.



[TURKSTAT, 2021]

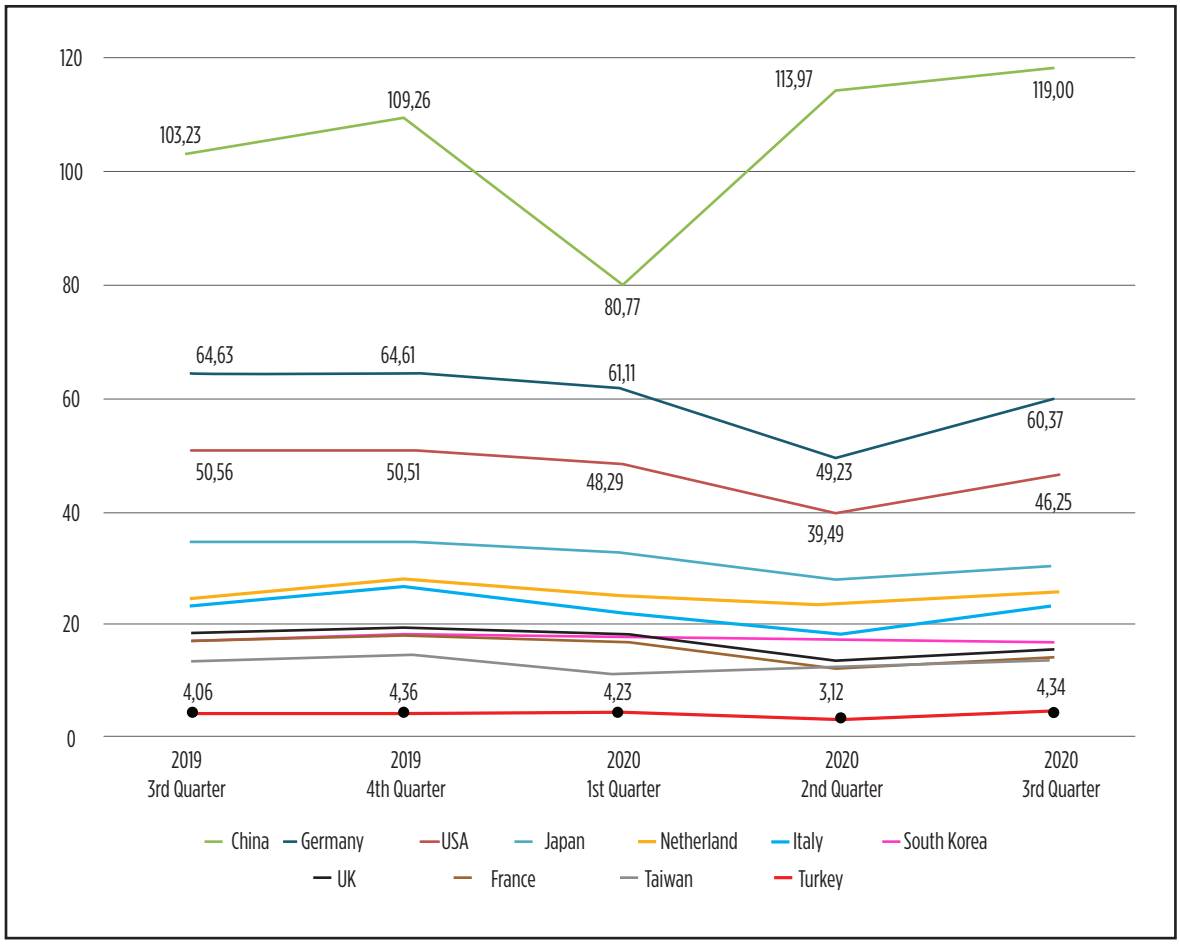
Figure 14: *Machinery Sector Production Index 2019-2020 Monthly Comparison [2015=100]*



[TURKSTAT, 2021]

Figure 15: *Comparison of Manufacturing and Machinery Sector Production Index for 2020 [2015=100]*

As can be seen in Figure 15, Manufacturing and Machinery Sector generally followed the same trend with the beginning of the pandemic. However, in November 2020, the Machinery Sector performed better than the Manufacturing Industry and signals that it will perform even better in the period after December.



[ITC_Trademap, 2021]

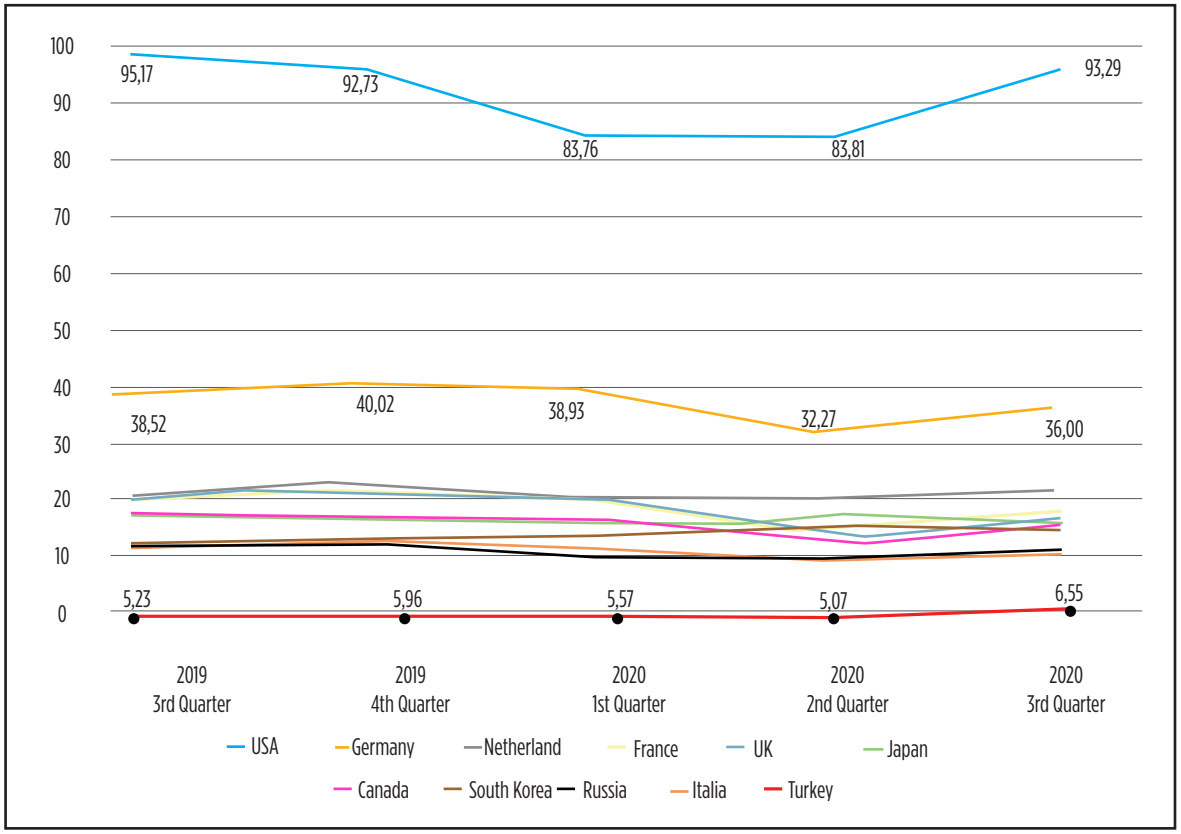
Figure 16: *Impact of Covid-19 Crisis on Top 10 Countries and Turkey in Machinery Export (billion USD)*

As seen in Figure 16, in China, the country that experienced the crisis first in the world, the impact of the crisis on machinery exports manifested itself in the 1st quarter of 2020 and completed the recovery process in the 2nd quarter (For China, which has not yet shared the results of the 3rd quarter of 2020, the export value of the machinery sector for the 3rd quarter has been estimated.)

In all countries except China; the decrease that started in the export figures of the 1st quarter when the crisis started, reached the lowest level in the 2nd quarter and returned to the level of the end of the 1st quarter in the 3rd quarter. With the realization of the accumulated investment demands in the 4th quarter, export values can be expected to rise above the 1st quarter levels.

The machinery sector in Turkey is one of the few countries that have stepped out of this export trend and exceeded the 1st quarter level in the 3rd quarter of 2020, reaching the 3rd quarter level in 2019, when the decline started. As it can be understood from here, it is obvious that the Turkish machinery sector would have been capable of displaying a much different export and growth performance in 2020, if it were not for the crisis. Although the sector's performance in the first half of 2020 was not at the desired level, it closed the year approximately 15% above 2019 with its 3rd quarter and 4th quarter performances and it is expected to reach an export level of US $ 4.45 billion.

This rapid recovery is due to the Turkish Machinery Sector's ability to achieve flexibility, rapid response to change, customer focus and innovation potential. After the crisis, these characteristics of the sector representatives immediately manifested themselves and accelerated the actions taken following the first shock.

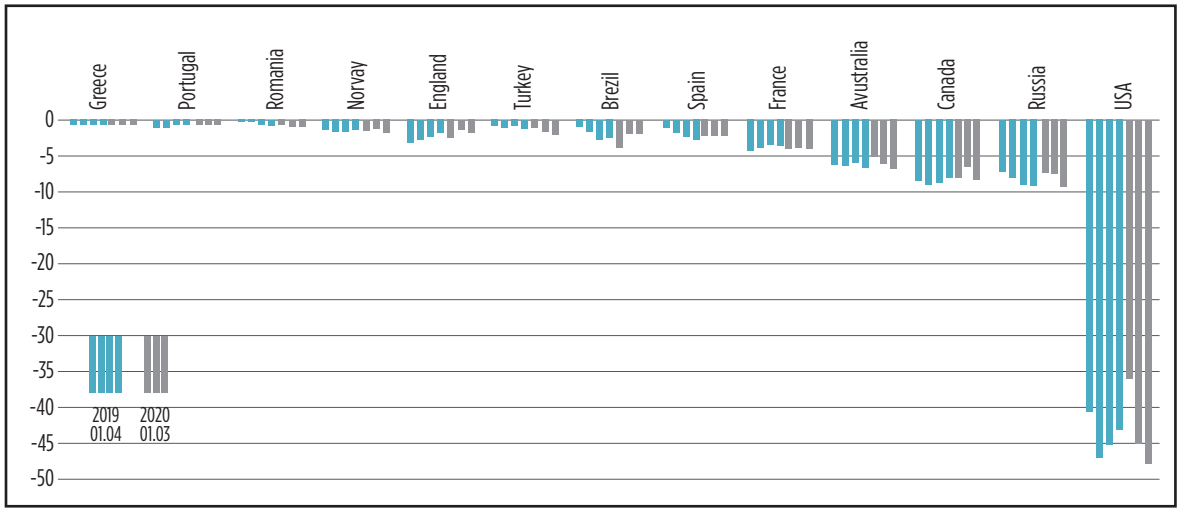


[ITC_Trademap, 2021]

Figure 17: *Impact of Covid-19 Crisis on Top 10 Countries and Turkey in Machinery Imports (billion USD)*

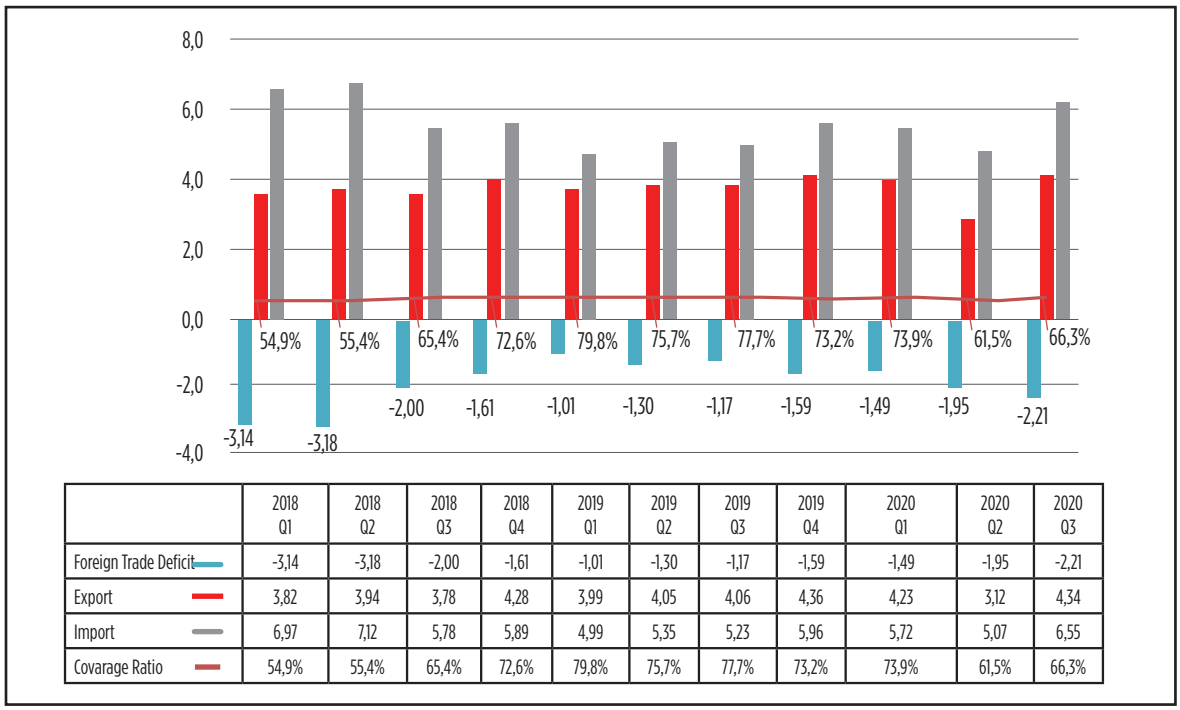
However, in the machinery sector, import is a topic that should be handled as carefully as export. The sector has a foreign trade deficit. As seen in Figure 17, it is seen that the decreased appetite for investment due to Covid-19, generally caused a decrease in imports in the 1st and 2nd quarters of 2020 although there are a few exceptional countries. The declining import in Turkey, unfortunately, did not decrease as fast as exports and completed its return faster than exports. Although the third quarter is 7% higher in exports compared to the same period of the previous year, this rate is unfortunately 25% in imports.

In Figure 18, there is a comparison of the countries with the highest foreign trade deficit in the machinery sector in 2019 and 2020 (countries with missing information are not included) on a quarterly basis. While the foreign trade deficit decreased in almost all countries in at least one of the first and second quarters of 2020, when the restrictions started and economies slowed down due to the pandemic, it is seen that Turkey was negatively different from them. Although Turkey's machinery sector foreign trade deficit improved in Q1 2020 compared to Q4 2019, it continues to rise in the second quarter of 2020 from where it left off.



[ITC_Trademap, 2021]

Figure 18: *Countries with Highest Foreign Trade Deficit in Machinery Sector (billion USD)*



	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3
Foreign Trade Deficit	-3,14	-3,18	-2,00	-1,61	-1,01	-1,30	-1,17	-1,59	-1,49	-1,95	-2,21
Export	3,82	3,94	3,78	4,28	3,99	4,05	4,06	4,36	4,23	3,12	4,34
Import	6,97	7,12	5,78	5,89	4,99	5,35	5,23	5,96	5,72	5,07	6,55
Covarage Ratio	54,9%	55,4%	65,4%	72,6%	79,8%	75,7%	77,7%	73,2%	73,9%	61,5%	66,3%

[ITC_Trademap, 2021]

Figure 19: *Machinery Foreign Trade on the Basis of Quarters between 2018-2019-2020 (billion USD)*

Figure 19, where Turkey's deficit in foreign trade of machinery is examined in detail, shows the development of the foreign trade deficit, export, import and coverage ratio in 2018, 2019 and 2020 on a quarterly basis.

The positive trend that continued from the 1st quarter of 2018 to the 1st quarter of 2019 started to reverse in the 2nd quarter of 2019 and although there was a pause with the Covid-19 pandemic, the foreign trade deficit continued to grow despite the increasing exports. As it can be understood from here, the foreign trade deficit of the machinery sector has been continuing its growth trend

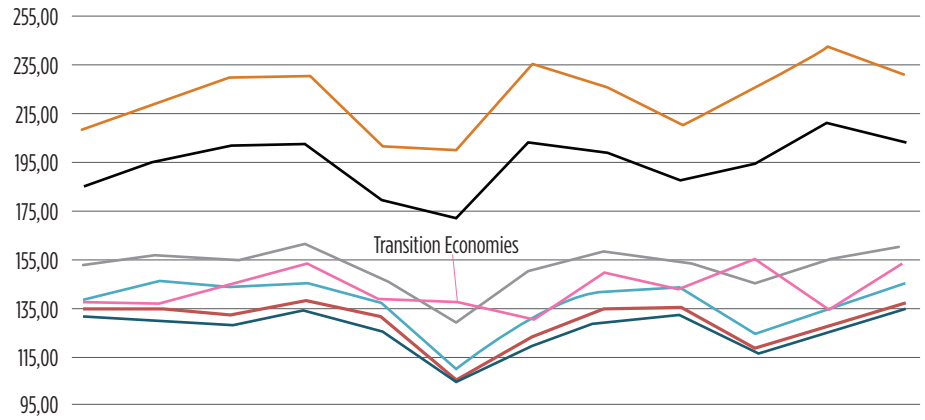
for the last seven quarters, regardless of the pandemic effects. The necessary sectoral strategy and policy recommendations for reversing this trend will be shared in the relevant sections..

4.2. Possible Changes in the Sector After the Pandemic

Although various growth estimates are made by various authorities for the world economy [T.R. Presidency, 2020 / 1-2], it can be predicted that the World Economy will grow by 5% with a reactive return from shrinking in 2021.

It can be estimated that the machinery sector, which shows a growth performance above the world economy, will show a growth performance of 9% worldwide. It is a fact that the Machinery Sector of Turkey shows higher performance than the World Machinery sector, and the sector may achieve a growth performance of over 9% in 2021.

In the light of these forecasts, the graphics shared above were projected into December 2020 and 2021, and global export volume estimates on the basis of the World and Economic Regions can be seen in Figure 20 (Machinery Sector Expert Forecasts, 2021 through UNCTAD data). Accordingly, the figures of the last quarter of 2019 were obtained in the last quarter of 2021, however since the total export volumes within the year will spread more homogeneously, the export performance is expected to be 5.0% above 2020 in total.



	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020	Q3 2020 T	Q1 2021 T	Q2 2021 T	Q3 2021 T	Q4 2021 T
World	156,80	160,76	161,41	165,17	152,19	134,40	155,55	161,86	158,27	150,53	160,21	165,10
America	143,63	150,64	148,65	150,44	142,82	116,30	136,76	147,43	148,53	130,25	140,87	136,76
Asia	211,61	222,80	231,49	233,04	205,11	203,03	238,01	228,38	213,32	227,40	245,15	232,95
Europe	136,67	135,60	133,10	139,18	131,36	109,42	125,60	136,40	136,62	122,55	129,37	139,13
Developing Economies	188,45	199,15	205,30	206,37	183,15	176,54	207,28	202,24	190,48	197,73	213,50	206,28
Transition Economies	143,06	142,80	150,73	157,73	143,54	142,57	136,03	154,58	149,28	159,68	140,11	157,67
Developed Economies	140,20	140,71	137,94	142,92	135,74	111,26	128,58	140,06	141,17	124,61	132,44	142,86

[UNCTAD, 2021]

Figure 20: *Export Volumes of the World and Economic Regions for 2021 [2005=100]*

Based on the same estimates; when Turkey's Machinery Sector manufacturing index is projected to December 2020 and to 2021, it can be expected to perform well in 2021 compared to 2020 and as a result, as can be seen in Figure 21, it may achieve at least 15% growth in the total year compared to 2020.

	Ocak	Şubat	Mart	Nisan	Mayıs	Haziran	Temmuz	Ağustos	Eylül	Ekim	Kasım	Aralık
Machinery Ind. 2020	96,6	105,3	110,1	77,8	78,8	110,9	115,6	105,7	129,3	128,8	131,4	135,3
Machinery Ind. 2019	86,9	90,7	106,6	107,3	111,3	85,0	108,6	82,5	109,8	114,1	112,1	129,5
Machinery Ind. 2021 (T)	124,5	125,8	127,0	121,9	123,1	124,4	125,0	118,8	119,9	128,3	133,5	149,5

[TÜİK, 2021]

Figure 21: *Turkish Machinery Sector's Production Index in 2019-2020-20212 (Estimated) [2015 = 100*

Apart from its effects on economic data, the Covid-19 pandemic had serious effects on the real economy. A restructuring is expected in global supply chains after the crisis caused by the pandemic.

Awareness about high dependence on China and other Asian countries in production and imports has increased. Especially developed countries had to face the difficulties of being dependent on a small number of suppliers in many industries, intermediate inputs and final products. This process will pave the way for restructuring of supply chains in the short and medium term in the upcoming period. Main elements of the new structuring will be reducing dependency on a small number of suppliers, using more suppliers and procuring inputs from domestic suppliers.

As in almost all sectors in supply chains, there is an expectation for restructuring in the supply chain of the machinery and equipment sector. Europe is the center of high technology in the machinery and equipment industry and has an important supply chain. For the machinery and equipment industry of Turkey, the most important expectation for restructuring the supply chains will be to increase the supply share in the new restructuring in Europe. However, considering the location of Turkey and the suitability of the technological competence level, it is highly likely that the sector will catch a larger potential business volume in Africa, which is although a smaller market compared to Europe, and Asia, the world's largest machinery market.

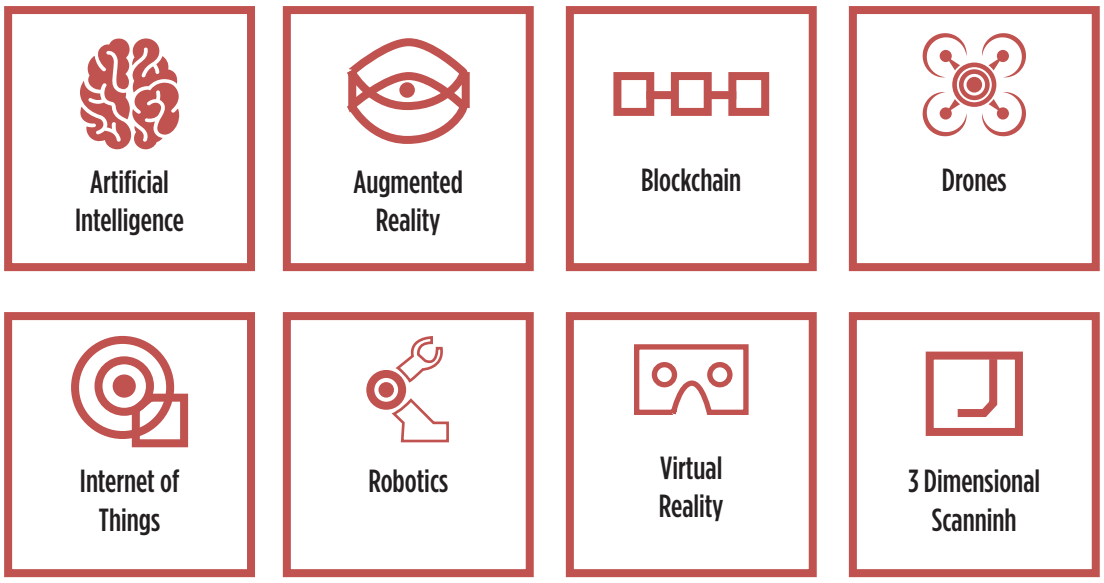
Before the Covid-19 crisis, rapid advances in technology were expected to encourage innovation in industrial machinery manufacturing and thus drive the market in the next 5 years. With the crisis, high-tech machinery exports, which is one of the most important competitive advantages in attracting new customers and overcoming the crisis, paved the way for sector representatives to rapidly renew their products without waiting for 5 years. In this way, with the effect of the crisis; the R&D, innovation and product development efforts, which are planned to be carried out in the future, were brought forward and the added value of the sector was increased. Moreover, digital technologies such as 3D printing, artificial intelligence, IoT and big data analytics started to be used more in production and this significantly helped protect the sector representatives from the effects of the crisis by enabling them to achieve higher productivity, lower operating costs and higher profit margins.

5. Special Trends in the Machinery Sector

5.1. Sectoral Trends in the Machinery Sector in the World

Robotic Automation, Enhanced Digitalization in the Supply Chain and Additive Manufacturing were identified as the 3 most important trends among the Latest Trends in World Industrial Policies [UNCTAD, World Investment Report, 2020].

PwC, on the other hand, states that the technologies it defines as "Essential Eight" (Figure 22) will be the main driving factors in the progress of companies after Covid-19 as before



[PwC, 2021]

Figure 22: "Essential Eight" Technology

Additive Manufacturing, including 3D printing, is rapidly transforming business models in the industrial world. This less wasteful and more efficient new approach to production is changing the rules of production and industry regarding minimum intermediate stock levels, minimum operating stock and storage, facility location and design, spare parts and maintenance.

Global sectoral trends can be grouped under the following headings;

1. Increasingly Rising International Competition

In recent years, there has been an increase in international competition in the sector, especially with the effect of developing countries. For example, fastening products (screws, fasteners, clamps, etc.) and products such as valves have been affected by increased international competition. In particular, there is an increase in competition from Eastern Europe, North Africa and China. China has developed the "Made in China 2025" strategy, which aims to increase innovation and added value in the sector. This strategy has caused countries with low production costs to produce less value-added products.

2. Implementation of Strategic Actions to Increase Competitiveness

Increasing international competition has enabled countries to implement plans to increase their competitiveness. The ability to compete with standard machine production is decreasing day by day. For this reason, countries develop new strategies to increase the added value of their product

groups by providing technology and quality improvements in products and services. On-Time Delivery, Modular Design and High Quality Assembly are those with the highest added value. Rather than the production of standard machines or low-tech and easy-to-produce machines, the production trend of medium-high and high technology machines is increasing. This situation has become necessary both to stay away from competition and to increase profit margin.

Cooperation with Start-ups has become a strategic trend applied by companies that cannot develop partnerships and cooperation to achieve high technology. Start-ups offer unique opportunities for the development and renewal of the machinery sector, especially in terms of R & D and innovation of small and medium-sized companies, as well as to renew their product line and increase their engineering competencies.

Awareness of the demand for remote access and automation in the sector has increased, and although it has not yet spread to the general public, there is a significant increase in the number of companies adding these features to their products through investments and developments. The Covid-19 crisis has had a compelling effect on companies taking quick steps to switch machines to remote access with a simple adaptation and increase the level of automation.

Maintenance of machines stands out as an important area that every manufacturing company should address. Manufacturing companies are trying to perform planned maintenance with different strategies based on working hours, the number of products processed, or a certain period of time. To avoid failures and adapt to the company-specific operating systematics, a large amount of data is produced with sensors adapted to the machines, and the establishment of a remote monitoring system in which the machine's operating status is monitored provides a significant competitive advantage, ensuring that it can perform predictive maintenance.

3. Industry 4.0 and Technological Developments

Another trend in Modern industrial policies is digital development, improvement of internet connection infrastructure and wider adoption of information and communication technologies in companies. Information technology has provided opportunities to increase productivity and create new sectors across all sectors. This allowed industrial policies to expand its scope to include neighboring service industries rather than the condition that manufacturing was the sole focus.

Information technology has long been integrated into various departments of companies (Management, Production, Marketing, etc.). Digitalization, computer-based controls and full automation in production systems are also increasing day by day, and there is a rapid upward trend towards Industry 4.0. Recently, the technological development of modern industrial policies has been on the shoulders of the areas of digital transformation and operational technology.

By combining technologies such as mechanical, micro-electronic, computer, optical, sensor, which are recently easy to reach in machinery manufacturing has enabled even small companies to catch the high technological level of certain large companies. Digital solutions and technologies that companies use to adapt to industry 4.0 include:

- Industrial Internet of Things
- Big Data
- Cloud Computing
- Additive Manufacturing
- Robotic Machines
- Augmented and Virtual Reality

4. Increasing Trend in Outsourcing

There is an increasing tendency to redirect some of the production activities to suppliers in order to increase flexibility. In the machinery sector, it is very common to outsource works like casting and machining.

5. Tendency of Customers to Procure Service Instead of Machinery

In recent years, machinery sector customers have entered a trend of demand shifting to service procurement instead of plants and systems. This means that machinery manufacturers start to provide services not only for machines, but also for software, management and above all.

6. Internationalization and Branding

In recent years, the number of companies focused on foreign markets in the sector has increased either by exporting or by establishing production or sales branches abroad. The measure of good internationalization of companies has begun to be measured by how less they are affected by the negative effects of crises in the countries where they are located. In machinery manufacturing, exports are the most important factor of internationalization and have been a safe zone for companies, especially in times of national and regional crisis. Internationalization, which had a limited effect at first during the Covid-19 crisis, has again shown itself as a way out of the crisis with the rapid transformation of alternative solutions offered to customers to exports.

The need for companies to be more international has increased the demand for international sales professionals and especially trade professionals who speak English and other languages well, and the growing demands have also led to changes in the desired professional profiles. The production of final products has forced companies to internationalize intensively in recent years, leading to the establishment or development of export departments.

Branding, which is one of the most important steps of internationalization, has become a factor that has been accumulated with the services provided over the years and has become a factor that gives the company after a certain level, a power that cannot be purchased with money and still continues its existence as an active trend. Companies not only exporting but also supporting their products and services and so, progressing their brand image, achieve growth and success beyond expectations in the medium and long term. In today's world, the first condition of being an international company is to make maximum use of e-commerce, especially in the machinery sector, and this trend is growing very strongly and rapidly.

7. Customer Oriented Production

Currently, buyers can easily access prices and information for comparison of technical characteristics. Therefore, sellers or manufacturers have to listen to customer feedback and quickly implement solutions for customers' needs in order to be competitive in the market. As a result, the boutique manufacturing trend based on customer expectations has developed with the aim of differentiation.

Customer-oriented innovation has been the first condition of customer-oriented production. Innovation increases the loyalty of customers to the brand and opens the way for new orders. Customer-oriented innovation is one of the most important elements in the sector that increases the resilience of companies against crises.

8. Reducing New Product Launch Time

With increasing technology and high levels of communication through social media, attracting customers has become more difficult for large companies, while small companies have the opportunity to capture customers through social media and introduce new products they have just designed and produced. Even though this rapid and effective promotion through social media affects the textile industry, where the buyer and user are the same, it has also significantly affected the machinery and equipment industry, because customers have started to know much more about all the products in the market, especially through Youtube, than in the past.

This brings the market to a higher competitive environment, allowing it to attract more customer interest with better features than competitors. Thus, the trend of companies to invest in high technologies which are more preferred by customers is increasing. Companies focus on producing new products by applying digital transformation to their existing machines or products. In fact, the added value that will be offered to the customer by digital transformation of machines will be marginal or zero, except for the added value that remote control structures bring.

On the other hand, companies will have the advantage of updating a digitally transformed product in the form of versions, such as versions of a software, and will be able to launch a new product with a feature that can be added with every software update. In recent years, it is an increasing trend to launch new products to the market at short intervals with software releases and minor structural changes, especially in European machinery manufacturers.

9. Customer Financing

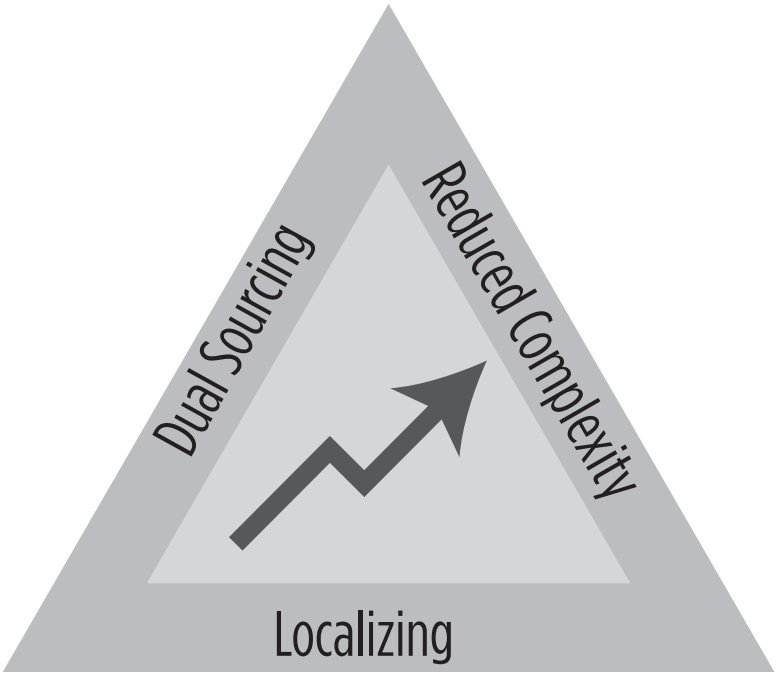
It is seen that especially European and Chinese machinery manufacturers in the world sell their products very comfortably with customer financing options such as 2-year grace period, low-interest 3-year maturity, 2 + 3 model. In fact, these sales can be realized at higher prices than the machines with higher added value. This shows how important customer financing is to create an export market and to retain customers.

10. Change in Environmental Regulations

Especially in countries such as Canada, USA and Mexico, it is predicted that the machines that comply with the 5th phase emission criteria by 2025 will have a large market. The EU, on the other hand, has started to implement the 4th phase within the framework of its own regulations and decreased its emission levels within the scope of the Paris Agreement signed in 2015.

11. Restructuring the Supply Chain

Among the three ideas proposed to increase resilience to the crisis, Localization, Dual Sourcing and Reduced Complexity are the ones that are recommended to be implemented with priority, and it is an increasing trend in Europe, which tends to give up supply from China (Figure 23). In this way, it is aimed to prevent the interruption of strategic product supply in case of any logistic setback, embargo, commercial restriction.



[AT Kearney, Building Resilience..., 2021]

Figure 23: *New Supply Chain Structuring*

5.2. Sectoral Trends in the Machinery Sector in Turkey

In addition to global trends, trade wars between America and China, trade restrictions imposed on North Korea, Iran, Syria, Libya, and Venezuela have been effective in almost all regions of the world. Economic and political sanctions imposed on countries have restricted the economic activities of both the country under sanctions and the countries which are trade partners of that country. In addition, geopolitical risks in Turkey directly affect the machinery sector as well as every sector of the manufacturing industry in our country.

The above-mentioned negative developments have led to a loss of momentum in the world economy, while investments in machinery and equipment and the machinery sector have also been negatively affected by this loss of momentum. But companies that evaluate sectoral trends well, especially in our country, continue to experience improvement in their business, rather than being affected by these risks.

1. Increasingly Rising International Competition

In addition to having the most qualified human resources, the machinery and equipment sector in our country is the sector consisting of the most innovative, fast-reacting and flexible companies. These are the most important elements in international competition that moves the sector forward compared to its competitors. The sector representatives of our country consist of companies that are export-oriented as well as the national market, attach importance to international marketing activities, and are managed with an export vision.

2. Implementation of Strategic Actions to Increase Competitiveness

In our country's machinery sector, new strategies are developed to increase the added value of product groups by providing technology and quality improvements in products and services. On-time Delivery, Modular Design, High Quality Assembly and After Sales Services in Standard Quality are effective values in the machinery sector of our country and are becoming noticeably widespread among sector representatives.

Especially with the Covid-19 crisis, high competition in standard machine production and difficulties in finding new customers have prompted industry representatives to seek new markets in the medium-high and high-tech machinery segments. The number of customers that sector representatives sold for the first time in 2020 with technology-enhanced products has gone far beyond 2018 and 2019.

The importance given to high-tech start-ups that are the driving force and dynamos of technology in the machinery sector is unfortunately low, as in other sectors. Almost all industry branches in our country are inadequate and weak in terms of supporting, purchasing and establishing partnerships with start-ups.

While the awareness of the demand for remote access and automation in the sector is increasing, there is a significant increase in the number of companies that add these features to their products. The Covid-19 crisis has had a compelling effect on companies to take quick steps to switch machines to remote access with a simple adaptation and to increase the level of automation.

There are industry representatives who create a significant competitive advantage by ensuring predictable maintenance. Increasing the share of after-sales revenues in total revenues, which are tried to be guaranteed by preventive maintenance, increases financial resilience by significantly contributing to cash flow during periods when the firm's sales decline or crises occur.

3. Industry 4.0 and Technological Developments

Information technology has also been integrated into various parts of companies (management, production, marketing, etc.) for a long time. Although this point is thought to be solved by making an ERP investment in our country's industry, this is a great illusion. A good evaluation of the value that ERP software adds to the product or the customer and the most accurate measurement of its effect will prevent companies from making unnecessary investments.

Although the industrial sector of our country is one step ahead in this regard, it is seen that Industry 4.0 is not fully understood in the machinery sector, and the added value that can be created with

its use has not yet been fully recognized. Although there are companies that have a tendency towards Industry 4.0 and started the transition period with restricted applications, it is important to take the necessary steps together with a strategic management plan. The technologies that should be worked on with the New Information Revolution and that should be used to create added value by developing company-specific strategies are as follows:

- Industrial Internet of Things
- Big Data
- Cloud Computing
- Additive Manufacturing
- Robotic Machines
- Augmented and Virtual Reality

4. Increasing Trend in Outsourcing

In the machinery sector of our country, it is common for suppliers to be used as outsources depending on the work for orders that cannot be made ready on time, and on a continuous basis for parts produced outside. As branding comes to the forefront, outsourcing of industry representatives, except for critical processes and parts, can reach quite high levels.

5. Tendency of Customers to Procure Service Instead of Machinery

In line with the demands of customers abroad, the demand for purchasing systems and facilities instead of purchasing machines and, beyond that, the demand for supplying services instead of purchasing systems and facilities has been a rising trend today.

In order for companies whose competence is not sufficient to supply facilities and systems instead of machines, they must take part in clusters and work according to the understanding of solidarity competitiveness. Examples of such cooperation are still in progress in our country and are improving rapidly day by day. The awareness of benefiting from start-ups that will adapt high technology to the industry in software and system automation issues and establishing partnerships if necessary, is becoming widespread just recently. It is hoped that the number of successful examples of service supply instead of machinery, systems and facilities in our country will increase day by day.

6. Internationalization and Branding

Sector representatives have made intensive efforts to find new customers and promote themselves at fairs and abroad for many years on both branding and internationalization using the phrase “Made in Turkey”.

However, to provide authorized service abroad and spare parts availability, which is an important step of internationalization for the machinery sector, are elements that can be realized with planned growth and cooperation beyond travel and fair participation. For this reason, this growth must be supported by planned and controllable growth, both in sales and after sales. Despite the increased awareness in recent years, the sector has still not reached the desired level in providing after-sales service abroad.

The percentage of e-commerce usage of the machinery sector is increasing day by day. It is a realistic prediction that the sector's presence in e-commerce will increase faster with the supports.

7. Customer Oriented Production

Customer orientation, which is the point where the sector representatives of our country are strongest and gain high competitiveness, ensures that both production and customer complaints are evaluated and the necessary modifications are made in the product quickly and problems are solved with customer-oriented innovation. Timely response to the customer, flexible production and quickly solving problems of customers, have been among the most important factors that increase the resilience of our companies in the sector to crises. These competencies are behind the rapid recovery of the industry and even gaining new customers during the Covid-19 crisis.

8. Reducing New Product Launch Time

Unlike European competitors, unfortunately, it is a trend open to improvement in our country. Sector representatives of our country tend to sell cheaper and easily, rather than raising the price by introducing new products. However, the proposition that the introduction of machines combined with a software or even software updates in these machines are launched as a new product which increases the added value as a competitive advantage that works in the market. With the application of the same method by the sector representatives of our country, new product and added value increase can be achieved more easily; so that, while increasing sales and profitability, customer loyalty can also be achieved.

Mergers and acquisitions in the Machinery and Equipment sector have increased in recent years, especially in the EU. One of the reasons for this development is that companies prefer to establish a structure that will gain an advantage by establishing production lines in the market instead of selling individual machines. Chinese companies in the sector tend to purchase branded and technologically advanced machinery manufacturers in the EU in order to gain competitive advantage.

Production in the world machinery sector is shifting towards large companies rather than SMEs. One of the main reasons for this is the requirement for an R&D budget, which is very important to be innovative and competitive in the market. Large companies with this competence have an important share in the machinery production market in countries such as Germany, USA, Japan and China.

9. Customer Financing

In addition to added value and competence; financing opportunities that attract customers have also become a major factor in increasing sales. So that machines with lower quality or higher maintenance costs are preferred to be imported by investors only because the provided financing solution is attractive.

10. Compliance with Environmental Regulations

In line with the European Union's directives 2012/46 / EU, 2011/88 / EU and 2010/26 / EU and 97/68 / EC directive; there are also practices in Turkey according to the procedures and principles determined within the framework of the regulation for the particle and gas pollutant emissions from the engine to be at certain limit values. In order to comply with the relevant regulations, technological development, certification and standardizing the respect shown to the environment also ensure that the companies have a rising brand image in the eyes of their customers.

11. Local Production

There has been a rising trend in National Production specifically in our country due to restrictions, sanctions and even embargoes on some special products that Turkey is subjected to, and it has been strengthened with the consequences of Covid-19 Crisis. This trend has the potential to positively affect the machinery sector, which is the first pillar of the investment. As can be seen in foreign sources (Figure 23 [AT Kearney, Building Resilience..., 2021]), among the ideas proposed to increase resilience against the crisis, Localization and Reduced Complexity are the efforts that should be implemented primarily in our country.

With the Technology-Based Industrial Action Program, there is a comprehensive and wide support for increasing localization in the machinery sector. The areas of support are wide if the sector plans to produce in the NACE codes included in the Program.

5.3. Sectoral Trends in the Machinery Sector in TR52 Region

1. Increasingly Rising International Competition

The representatives of the machinery sector in the TR52 Region state that they make quite an effort to retain this resource, even though they have a resource of qualified personnel above Turkey average. In times of crisis or when business slows down in the region, decreasing staff is one of the

last resort remedies. This approach ensures the capability to push the machinery industry forward every day in TR52 Region and supports the sector's continued growth. Sector representatives see HR policies as one of the most important criteria for the machinery industry to stay ahead of the automotive industry in the region and to maintain its progress, as well as maintaining its competitiveness in international markets [TR52 Focus Group, 2020].

2. Implementation of Strategic Actions to Increase Competitiveness

The machinery sector representatives of TR52 Region have a strategy to increase the competitiveness of the sector with high value-added products to be produced through partnerships with the medical, software and defense industry [TR52 Focus Group, 2020].

Companies in the region that have implemented strategic actions to reach unreachable customers more easily and to gain new customers by moving their products to the digital environment, managed to reach customers that they could not reach before with conventional promotion methods [TR52 Focus Group, 2020].

3. Industry 4.0 and Technological Developments

In TR52 Region, there are technology-oriented structures such as universities, techno-parks, model factories, lifelong education centers, especially in Konya. Extensive studies are carried out on the development of digital media within the sector. Serious progress has been made in virtual reality, operator orientation and assembly with virtual glasses, and sales of spare parts with virtual kiosk. Thanks to the technological advantage achieved in this way, new customers have been brought to the region. [TR52 Focus Group, 2020].

4. Increasing Trend in Outsourcing

Although there is outsourcing in the TR52 Region, especially in the Agricultural Machinery sector, the development of wider sectoral cooperation is expected in the region [TR52 Focus Group, 2020].

5. Tendency of Customers to Procure Service Instead of Machinery

As in all Turkey there are almost no examples of service procurement instead of machinery, systems and facilities in TR52 Region. Instead of purchasing machinery and investing, there is a tendency to purchase the work to be done with the machine or the complete facility installation as a service. This situation follows a different course in the agricultural machinery sector than other sub-sectors. With the increasing digitalization in agricultural machinery and software infrastructures provided by the combination of machine manufacturers; high-tech services such as maintenance, repair, customer service, product quantity and quality tracking, animal tracking, satellite tracking, humidity tracking, and autonomous driving are combined and turned into a model where manufacturers outsource each other in the service area. This situation strengthens the sectoral collaborations. Developing cooperation with the software industry as envisaged in TR52 Region may move the region out of competition with the development of very high value-added products. It is believed that progress will be achieved with the EU Project STEDEC, Smart Farming, which started its activities in the region in 2021.

6. Internationalization and Branding

In order to create a Product Conformity Brand for the machinery sector, the "TURQUM" product conformity brand was launched in order to meet the need to strengthen the image of "QUALITY TURKISH MACHINE" in international markets. In the current situation, although the project does not have a structure focused on agricultural machinery, agricultural machinery manufacturers within the region may also make progress towards increasing brand value by participating in this branding movement [TR52 Focus Group, 2020], [TURQUM, 2021]. Sector representatives will have the opportunity to document the standardization in the following details with the brand "TURQUM":

- Company and production system competence
- Production in accordance with the Quality Management System
- Product Safety
- Product Quality

- Service and after sales services
- Constant surveillance

Although the region is progressing in the field of internationalization day by day, there is a lack of abroad after-sales service and assembly team. During the Covid-19 crisis, there were incomplete sales due to the fact that the existing assembly teams of the companies in TR52 Region did not want to go abroad.

7. Customer Oriented Production

Customer orientation, which is the point where the sector representatives of our country are strongest and gain high competitiveness, ensures that both production and customer complaints are evaluated and the necessary modifications are made in the product quickly and problems are solved with customer-oriented innovation. Timely response to the customer, flexible production and fast solving have been among the most important factors that increase the resilience of our companies in the sector to crises. These competencies are behind the rapid recovery of the industry and even gaining new customers during the Covid-19 crisis.

Apart from customer visits, fairs and sales relations, sector representatives of TR52 Region have a solution-oriented approach especially towards customer complaints and demands they collect. They make maximum effort to use the feedback from the customers in production and new product development. This is an important factor in increasing the competitiveness of the sector in the region and improving itself.

8. Reducing New Product Launch Time

Although it is a common strategy to produce new products and try to increase market share in the region, there is no strategy to reduce the time to launch new products to the market. This strategy prevents business and income loss, with an increase in the loyalty of customers who make purchases over time.

9. Customer Financing

TR52 Region Machinery Sector representatives are using Eximbank Buyer loan. However, extending the existing interest and maturity range of the Eximbank buyer loan to compete with foreign competitors will provide the opportunity to achieve a significant increase in exports [KTO, 2020].

10. Compliance with Environmental Regulations

For the machinery sector, it is important to comply with the changes in the EU legislation and to produce products that comply with Environment criteria for the coming years. Knowing that all sub-sectors will be affected by these regulation changes, necessary adaptation efforts should be started.

TR52 Region Sector representatives stated that with the European Green Deal and the rise of green economy, machine parks will be seriously renewed or modified both in Turkey and in the world [TR52 Focus Group, 2020].

11. Local Production

The difficulties experienced in the supply of raw materials in the Agricultural Machinery sub-sector in the region, especially during the Covid-19 crisis, once again clearly demonstrated how important domestic production is in terms of the continuity and durability of industrial production.

6. Current Status of the Machinery Sector

6.1. Primary Research Results

6.1.1. Surveys

The number of survey responses in the survey conducted within the project for the machinery sector in TR52 Region including Konya and Karaman Provinces is shown in Table 11 below.

Table 11: *Number of Answers by Sub-Sectors in TR52 Region*

Sub-Sector Fragmentation	Konya	Karaman
NACE 281 Engines and turbines, pumps and compressors, taps and valves, bearings, gears etc.	1	
NACE 282 Furnaces, burners, lifting, bailing, cooling and ventilation equipment, general purpose machinery etc.	4	
NACE 283 Agriculture and forestry machinery like tractors, planters, trailers, semi-trailers and combine harvesters, seed graders, animal feed preparation etc	1	1
NACE 284 Machine tools, cutters, hydraulic presses, forged iron etc. metal processing machinery		1
NACE 289 Construction Machinery, other tools for wood, stone and rubber. Special machinery for other purposes such as food, textile, apparel and leather production, paper and paperboard, plastic and rubber.		1
Total	**6**	**3**

[FSR Machinery Sector Survey Results, 2021]

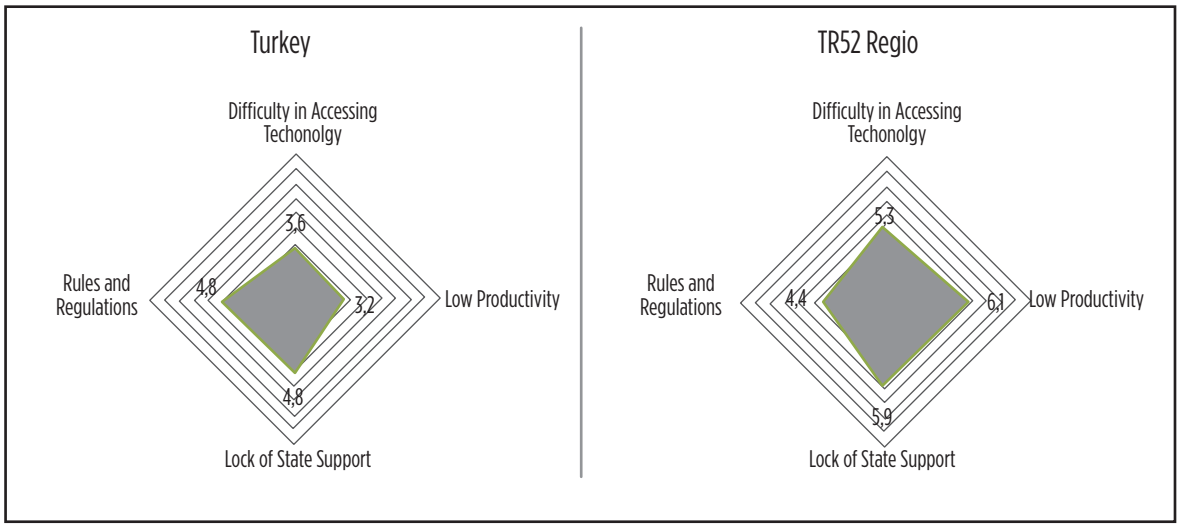
When looking at the number of survey responses, it is clear that the current number of answers is not sufficient to obtain regionally significant statistical results. The survey study aiming to obtain information about the Agricultural Machinery sub-sector, which is especially important for the region, is far from the targeted sample numbers and therefore it is not sufficient to represent the Agricultural Machinery subsector. However, it is also possible to make a comparison based on the responses of the 158 participants participating in the survey across the whole Turkey and the responses from TR52 Region. The comparisons, whose details you can see below, are selected among the criteria that are thought to give an idea about the status of the region, with the risk of differences in perception [FSR Machinery Sector Survey Results, 2021].

The results obtained from the answers to the questions about the difficulties experienced by the companies in the field of Competitiveness are shared in Figure 24 for Turkey and TR52 Region. Looking at the figures, the sector representatives of TR52 Region stated that they perceive a higher rate of difficulty in Difficulty in Accessing Technology, Low Efficiency, Lack of State Support under the title competitiveness.

In terms of the region, TR52 Region Machinery Sector has 8 R&D centers and 1 design center. In this case, sector representatives can develop technology through R&D by attracting qualified manpower and can access new technology through start-ups that are developed in the Incubation Centers existing within Konya Innopark and Karaman Techno-park or in different provinces or technology import channels. The increasing importance of R&D investments in the Machinery Sector in the Region is a very positive development. But, the lack of R&D solutions that can be implemented more quickly and widely in the region supports the evaluations of the sector representatives participating in the survey.

In terms of productivity, the fact that the adaptation of Lean Manufacturing to operational processes within the company culture has not been completed yet, is an indication that the efforts in this area have not reached sufficient maturity in the Region in general and is consistent with the survey results. It is thought that productivity-enhancing activities and productivity-themed studies carried out by Chambers and Commodity Exchanges, Universities in the region have raised awareness seriously [TR52 Focus Group, 2020]. In addition to the works within the Konya Model Factory established in the region, it is very important not only for the Machinery Sector, but also for the entire Regional Industry, to start alternative productivity-enhancing activities in the fastest way.

Although there is no discrepancy between Country and Region in the survey results, it should be kept in mind that the perception level of the problems may differ.



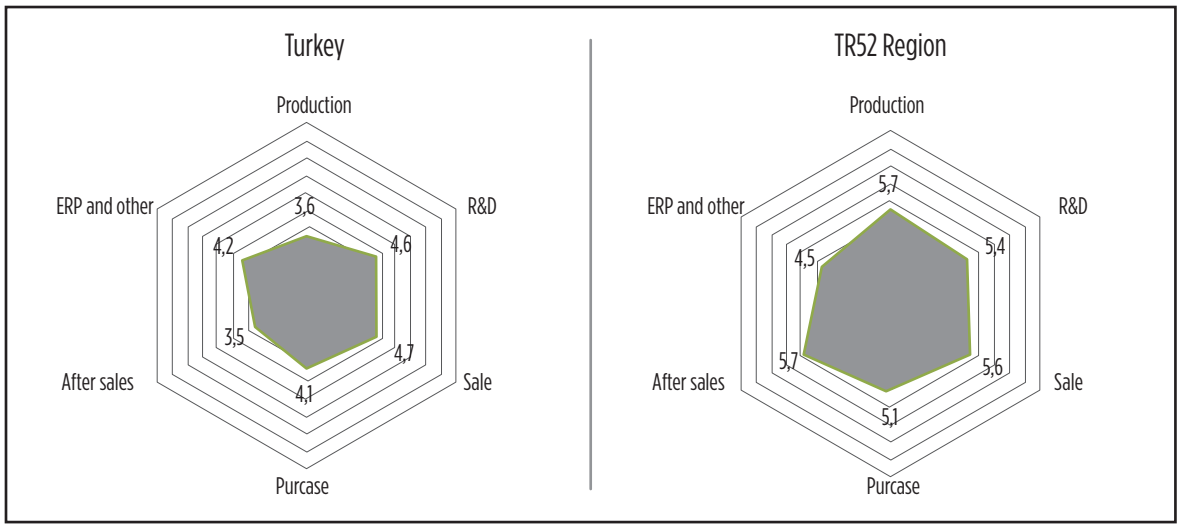
[FSR Machinery Sector Survey Results, 2021]

Figure 24: *Comparison of Competitiveness Infrastructure from the Perspective of Entrepreneurs*

Ankette Dijital Dönüşümün Uygulandığı Operasyonel Alanların sorgulandığı sorulardan elde edilen sonuçlar, Türkiye ve TR52 Bölgesi için Figure 25'te paylaşılmıştır. Figurelere bakıldığında; TR52 Bölgesi sektör temsilcileri, Dijital Dönüşümde Üretim, Ar-Ge, Satın Alma, Satış, ERP vb. ile özellikle Satış Sonrası alanlarında Türkiye ortalamasının üzerinde bir adaptasyon süreci yaşandığını ifade etmektedirler.

Elde edilen sonuçlar, bölgenin Türkiye ortalamasına göre daha yüksek bir gelişim gösterdiğini ifade etse de TR52 Bölgesinin Dijital Dönüşümün Operasyonel Alanlarda Uygulanmasının Türkiye genelinin üzerinde bir yoğunlukta olduğu düşünülmemektedir. Dijital Dönüşüm konusunda Bölge Makine Sektörü de Türkiye geneli İmalat Sanayi gibi net bir Figurede Dijital dönüşüm konusunda hem yatırım ve destek hem de danışmanlık ve vizyon geliştirme ihtiyacına sahiptir.

Dijital dönüşüm ile elde edilebilecek katma değerin konvansiyonel üretim ve yönetim teknikleri ile elde edilenlere ilaveten önümüzdeki 10 yılda 100 Trilyon ABD doları büyüklüğünde olacağı ifade edilmektedir [WEF, 2021].

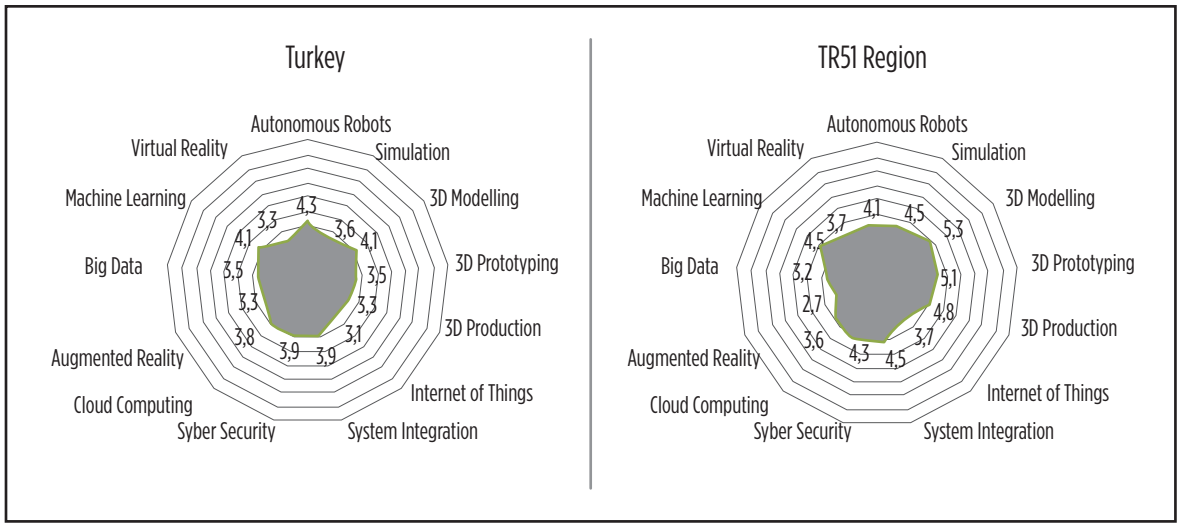


[FSR Makine Sek. Anket Sonuçları, 2021]

Figure 25: *Dijital Dönüşümün Uygulandığı Operasyonların Karşılaştırılması*

Ankette Endüstri 4.0'ın Uygulama Yoğunluğunun sorgulandığı soruların cevaplarından elde edilen sonuçlar, Türkiye ve TR52 Bölgesi için Figure 26'da paylaşılmıştır. Figurelere bakıldığında; TR52 Bölgesi sektör temsilcileri, Endüstri 4.0'ın uygulanması konusunda, her konuda Türkiye ortalamasının üzerinde veya yakın bir uygulama yoğunluğu ifade etmişlerdir. TR52 Bölgesi, sektör temsilcileri, çoğunlukla, Endüstri 4.0 alanlarında henüz gelişmekte olan bilince sahip ve dönüşüm sürecine başlama aşamasında firmalardan oluşmaktadırlar. Bu sebeple anket sonuçlarının, 10 üzerinden en yüksek 5 puan alabilmiş konu başlıkları özelinde değil, bütün olarak Türkiye İmalat Sanayi geneli gibi Endüstri 4.0'a uyumlanma konusunda gelişim potansiyeli yüksektir.

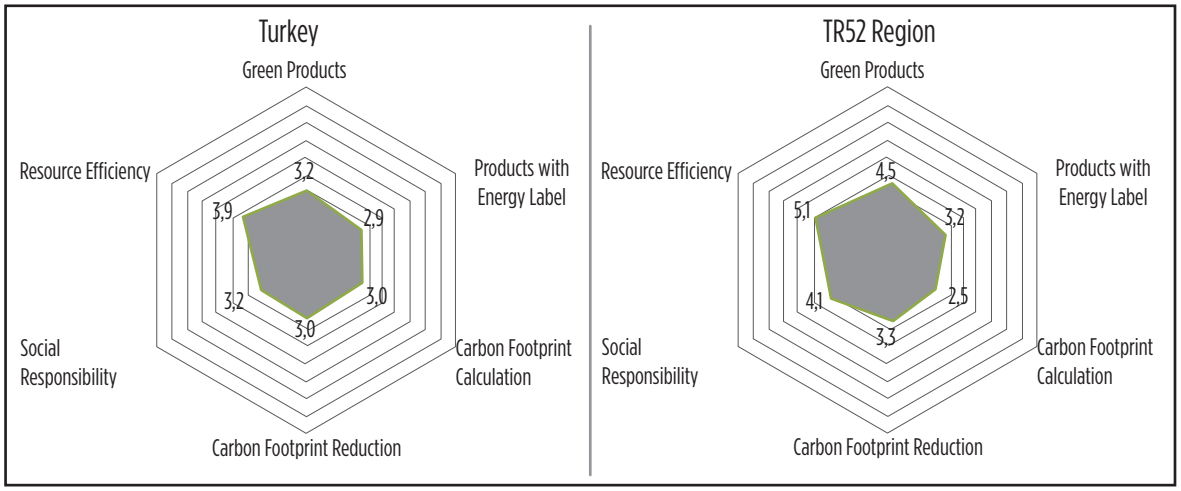
Endüstri 4.0 Uygulamaları konusunda, bölgede geniş çaplı bir ilerleme sağlanması için Innopark bünyesinde 1 adet Prototipleme Atölyesi mevcut olup STEDEC Projesi kapsamında ikinci bir prototipleme atölyesi kurulacak olsa da altyapı çalışmaları artırılmalı ve farkındalık artırma çalışmaları ile desteklenmelidir.



[FSR Machinery Sector Survey Results, 2021]

Figure 26: *Endüstri 4.0'ın Uygulama Yoğunluğu Karşılaştırması*

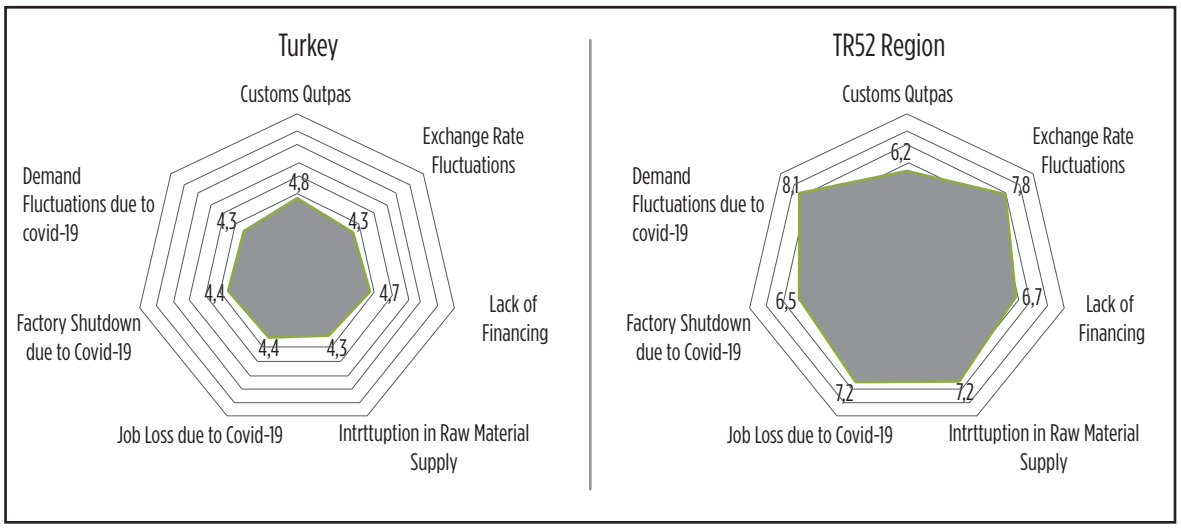
Approach and Production subjects only in the calculation of the Carbon Footprint. However, considering the effects of the effects of climate change even in our country today, it is obvious that this issue will be the most important issue of the next 10 years. For this reason, it is very important to comply with the decisions to be taken on Environmental Production in target markets in terms of both commercial growth and respect for the environment. Progress should be made with decisive actions on the development potential present in both Turkey and TR52 Regions with regard to environmentally friendly production.



[FSR Machinery Sector Survey Results, 2021]

Figure 27: *Comparison of Environmental Awareness and Environmentally-Friendly Production*

The results obtained from the answers about Sustainability are shared in Figure 28 for Turkey and TR52 Region. Looking at the figures; TR52 Region sector representatives stated that they experienced sensitivity far above the Turkey average in every issue, especially in the topics "Exchange Rate Fluctuation", "Interruptions in Raw Material Supply" and "Demand Fluctuation Due to Covid-19", which are present in the survey under the topic of Sustainability. Exchange Rate Fluctuation, Business Loss and Raw Material Supply Constraints in the Region have affected SMEs considerably [TR52 Focus Group, 2020].

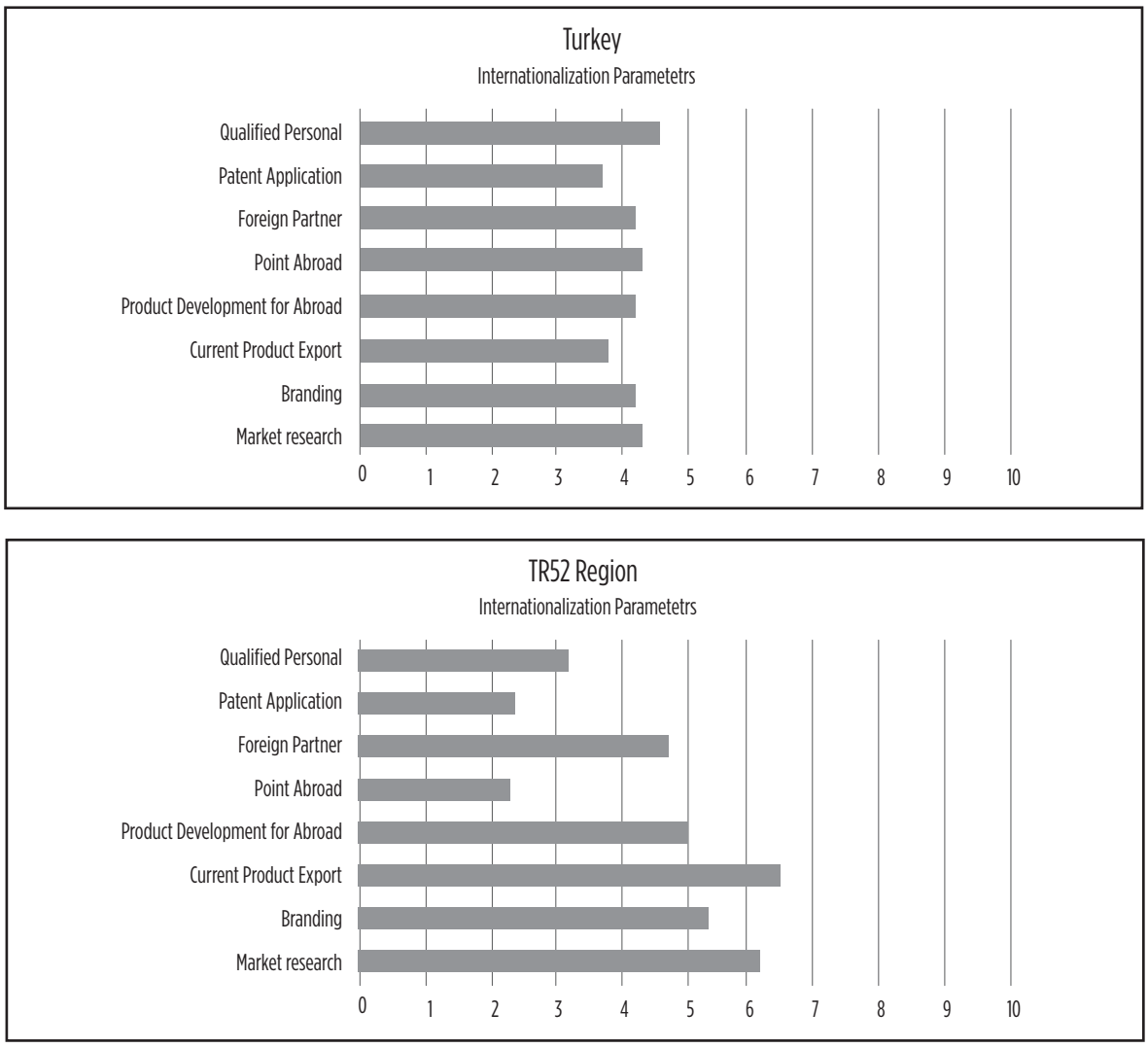


[FSR Machinery Sector Survey Results, 2021]

Figure 28: *Comparison of Sustainability*

The results obtained from the answers about “internationalization” are shared in Figure 29 for Turkey and TR52 Region. Looking at the figures; The results obtained from the answers about “internationalization” are shared in Figure 29 for Turkey and TR52 Region. Looking at the figures; while the sector representatives of TR52 Region have a position below Turkey average in “Qualified Personnel, Patent Application and Abroad Structuring”, it is seen that they are above Turkey average in Exports of Existing Products, Market Research, Branding and Product Development for Abroad. Although there is a deficiency in the Machinery Sector in terms of patent applications and abroad structuring, this deficiency is felt more in the Agricultural Machinery sub-sector, which is the dominant sector in the TR52 Region. However, the Agricultural Machinery Manufacturers of TR52 Region have been developing with very successful practices in the fields of Remote Management of Machines and active use of new technologies after sales. Cooperation of sector representatives on the spread of applications such as Virtual Reality, Virtual Glasses and Virtual Kiosk is a priority development area in terms of minimizing the need for abroad structuring [TR52 Focus Group, 2020].

It is understood that there is a development potential in internationalization both throughout the country and regionally, from the fact that the scores of the questioned criteria could only approach 5 points out of 10. Export is absolutely essential for sector representatives with capacities above the national market demand to develop, make profit, and invest in product development and innovative technologies with these profits. It is indispensable to meet the internationalization criteria for export.

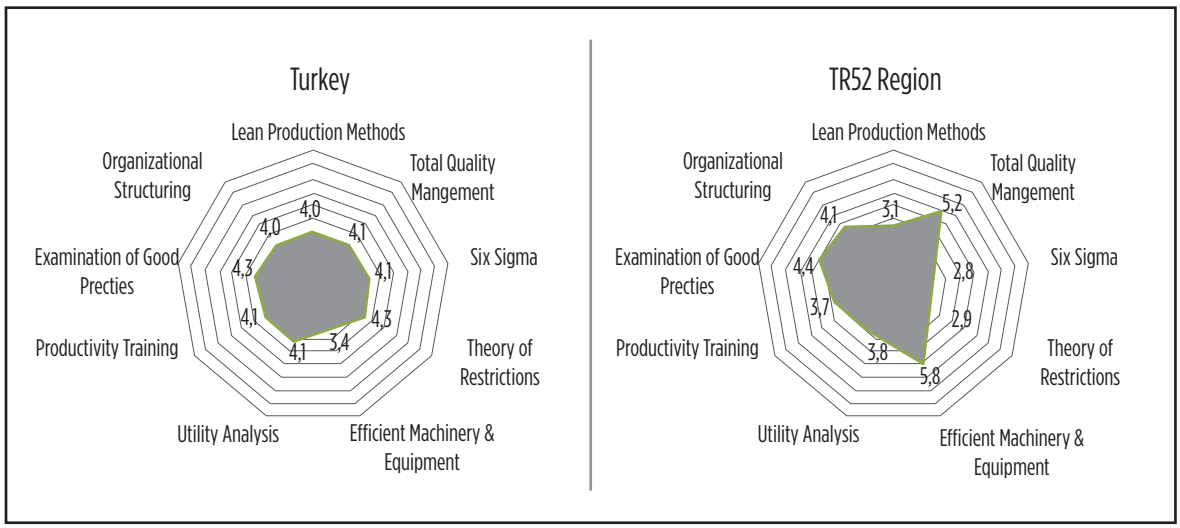


[FSR Machinery Sector Survey Results, 2021]

Figure 29: *Comparison of Internationalization Criteria*

The results obtained from the answers about Productivity Focus are shared in Figure 30 for Turkey and TR52 Region. Looking at the figures; sector representatives of TR52 Region have a position above the Turkey average in Total Quality Management and Efficient Machinery & Equipment under the title of "Productivity", while they are below the average of Turkey in Six Sigma, Theory of Constraints, Productivity Utility Analysis and Productivity Training. When this situation is evaluated, it is seen that the knowledge and application competence of TR52 Region on Total Quality Management is already quite sufficient, while a development potential is seen in focusing on productivity-enhancing studies including different management and systematics.

Also across the country; the necessity of a more intensive implementation of productivity studies that will provide both increase in quality and added value and decrease in costs with productivity-oriented work, embedding productivity culture in production and continuous improvement clearly manifests itself in the region.



[FSR Machinery Sector Survey Results, 2021]

Figure 30: Comparison of Productivity Criteria

6.1.2. Odak Grupları

Participants included the representatives of Chambers of Industry, Chambers of Commerce, University and Sector in TR52 Region.

In the Machinery Sector Focus Group, the opinions and suggestions of the sector representatives and stakeholders were listened to in 4 groups in the Region and ideas on related issues were exchanged mutually. Within the report, the outputs of the Focus Group work were utilized to the maximum extent specific to the region.

The following questions were sent to the Focus Group participants in advance as the meeting agenda and they were expected to make preparations. During the meeting, each question group was asked one by one to the participants, and the answers, ideas and suggestions of the whole group were received. The question groups shared as the meeting agenda are as follows:

1st Group of Questions

What was the situation in the sector before Covid-19?

How is the current situation after Covid-19, are there new trends emerging?

What are the 2021 forecasts for the sector?

How will the sector be affected if the Covid-19 pandemic ends in the medium-long term (1-3+ years)? What are the scenarios they foresee?

2nd Group of Questions

What are the national trends in the sector and what are the regional repercussions of these trends?

What are the sectoral trends specific to the region?

Which province stands out in the region in which sub-sector, why?

What are the needs and demands of sector representatives in the region?

What are the strengths and weaknesses of the sector in the region?

What are the opportunities and threats faced by the sector in the region?

What are the aspects open to development in terms of competitiveness in the region?

3rd Group of Questions

What are their thoughts on the following horizontal issues specific to the sector?

(Managing the pandemic crisis, Energy Efficiency, Climate Change, Gender Equality)

4th Group of Questions

What are the national and regional short, medium and long-term strategy proposals?

What are the sectoral actions that can be taken in the region, how much can the estimated budgets of these actions be?

What are the governmental policy recommendations?

Below is a summary of the responses to the above questions during the Focus Group Meetings:

TR52 Region Machinery Sector Focus Group Meeting Summary

Among the participants were mainly representatives of the machinery sector, as well as participants from Konya Chamber of Industry and Commerce, Karaman Chamber of Commerce and Necmettin Erbakan University.

It was stated that before Covid-19, rather than the effect of global fluctuations, the course of the sector in the region contracted with the effect of exchange rate fluctuations at the Turkish economy in 2018, the wounds began to heal as the exchange rate movements ceased in 2019, and a good introduction was welcomed for 2020. It is predicted that there will be a 20% increase in turnover in Turkish liras in 2020. Considering the effect of the increase in exchange rates, this increase at least indicates that the sector has not shrunk in the region.

Although there were concerns about contraction in the sector along with Covid-19, there were no problems in the first months of the outbreak due to order-based machine production, but in May, problems began to be felt, but there was no reduction in personnel in the machinery industry in the entire region due to both new orders and stock production.

Covid-19 has caused a serious catalyst effect in terms of approach to business and realization of future plans in the region. It has been stated that the Industry 4.0 applications, which are planned to be implemented in the medium term, have enabled rapid progress in product development studies for the defense industry, the introduction of digitalization into business life in both customer communication and increasing the added value of the products. In addition, with the emergence of the sector differentiation effect, additional sales from additional sectors have been made, and with the help of digital media, 40% of the 2020 turnover came from new customers.

In the Machinery and Automotive sectors that make up 50% of the production in Konya, the importance of logistics has been better understood, and an increase in the awareness of digitalization and lean production and productivity enhancement activities has been observed.

The biggest problems encountered were in Cash Flow, Personnel Health, Customer Loss and Order Loss, respectively, and the sector was protected from the effects of the crisis by using the opportunities provided by technology with rapid response, adaptation and flexibility. However, serious delays were experienced in the assembly stages of foreign sales due to both infections and travel restrictions, and the effects of this immediately manifested itself in cash flow. At this stage, it was stated that there were serious problems arising from the existing deficiencies in Institutionalization in Family Companies and especially the lack of financial literacy, and some of the divided companies were left weak and closed.

There were difficulties in the supply of other materials, especially in the supply of steel and intermediate products. Although the problems in cash flow have been alleviated with loans, it is stated that the bank limit problems still continue.

Sector representatives have suggested that all the data collected from the sector in the region should be entered into a single system and these data should be shared with the industrialists of the region to a certain extent. With the Company List to be obtained with this proposal, it is aimed to be in constant communication with all companies doing business in the region, to be able to order goods and to develop cooperation.

In the upcoming period, sector representatives of the Region, who want to focus on both the health and defense industry by combining machinery and software, expressed the following recommendations:

issuing a new business loan, implementation of customized MBA programs for the 3rd generation in the region which will accelerate institutionalization in family businesses and application of training modules to increase in-house practices for lean production in industry.

TR52 Region Focus Group Participant List is in ANNEX.1

6.2. Sectoral Analysis

6.2.1. TR52 Region Machinery Sector Value Chain Analysis

Value chain is essentially a systematic method to examine the development of competitive advantage. In this respect, the model is used as a useful analysis tool in identifying the main competence areas of an organization and determining the operations that are effective in gaining competitive advantage. It is not possible to understand the competitive advantage by looking at an organization in general. The competitive advantage arises from the different operations that the organization performs, such as design, production, marketing, delivery and product support services.

In order to better understand the operations that attracts competitive advantage, it is necessary to start from the value chain with its general scope and then to identify the appropriate operations specific to that organization or structure. The competitive advantage of an organization stems from its ability to outperform its competitors in key operations in the value chain. Competitive advantage depends on whether the organization performs its value-creating functions at a cheaper cost than its competitors or offers its products to the market at a high price by differentiating their quality and functions. Therefore, differences from competitors provide competitive advantage to the organization.

In other words, value chain is a method of dividing the firm's operations into strategically important operations and understanding the effects of these operations on cost and value. Value chain is essentially a systematic method to examine the development of competitive advantage. In this respect, the model is used as an analysis tool to identify the main competence areas of a company or the whole sector and to determine the operations that are effective in gaining competitive advantage.

While preparing the simplified value chain belonging to the machinery sector in Figure 31, machinery sub-sectors in our country are listed according to the added value they create and the size of the added value they produce has been rated with box sizes. (The added value of Agriculture and Forestry Machinery is US $ 2.316 million according to 2019 data) [MAKFED, 2021]

The added value produced by sub-sectors increases from left to right and from top to bottom. After the sub-sectors, operations that create added value are listed considering the current structure of the machinery sector in our country. These operations are also the ones that create higher added value from left to right from top to bottom. The added value creation potential of these operations is also proportional to the box sizes.

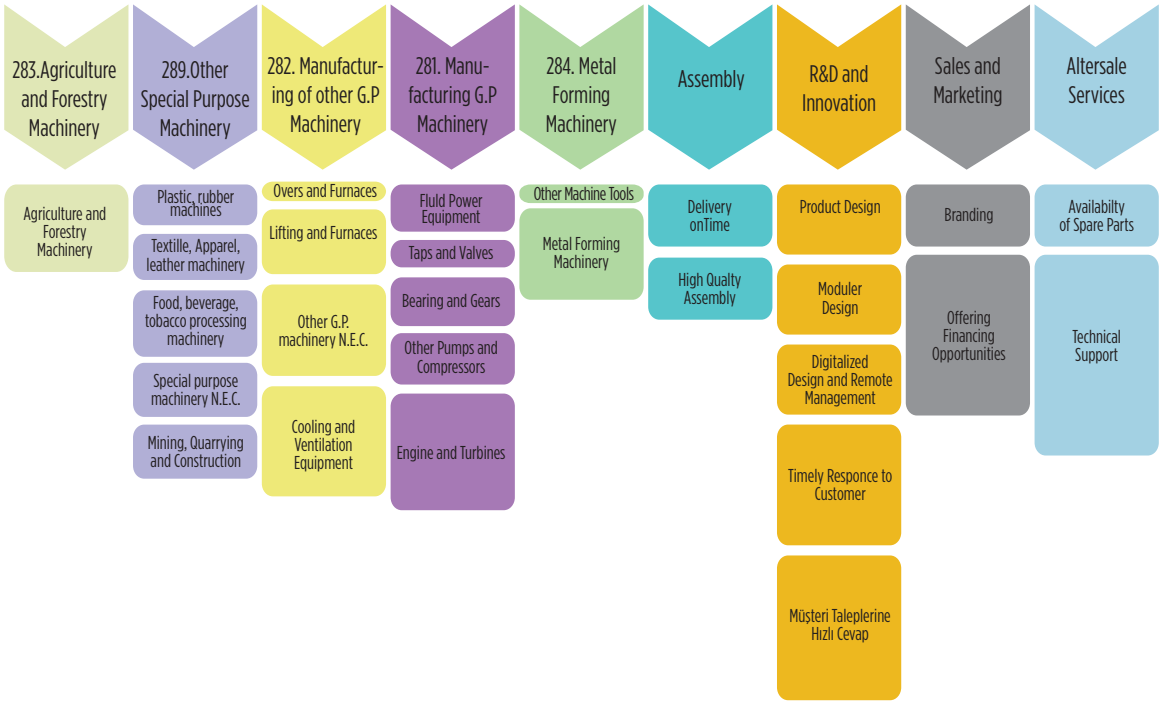


Figure 31: *Simplified Value Chain for the Machinery Sector*

Figure 32 shows the simplified value chain of the Agricultural Machinery Sector, the largest sub-sector of the Region. Analysis of the value chain will be covered in the Sector Gap Analysis.

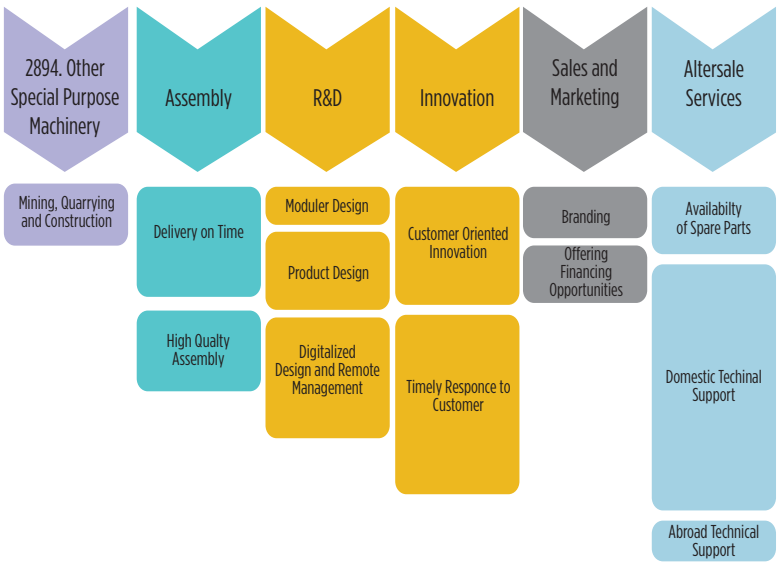


Figure 32: *Simplified Value Chain Analysis for Agricultural Machinery*

6.2.2. TR52 Bölgesi Makine Sektörü PESTLE Analizi

İşletmelerin uzak çevresinde politik, ekonomik, sosyokültürel, teknolojik, yasal ve çevresel ölçekte meydana gelen makro gelişmelerin TR52 Bölgesi özelinde makine sektörüne etkisi değerlendirilerek, oluşturulacak kısa, orta ve uzun vadeli stratejilere yönelik fırsat ve tehditlerin belirlenmesinde girdi teşkil etmek üzere yapılan PESTLE analizi aşağıdaki Tableda paylaşılmıştır.

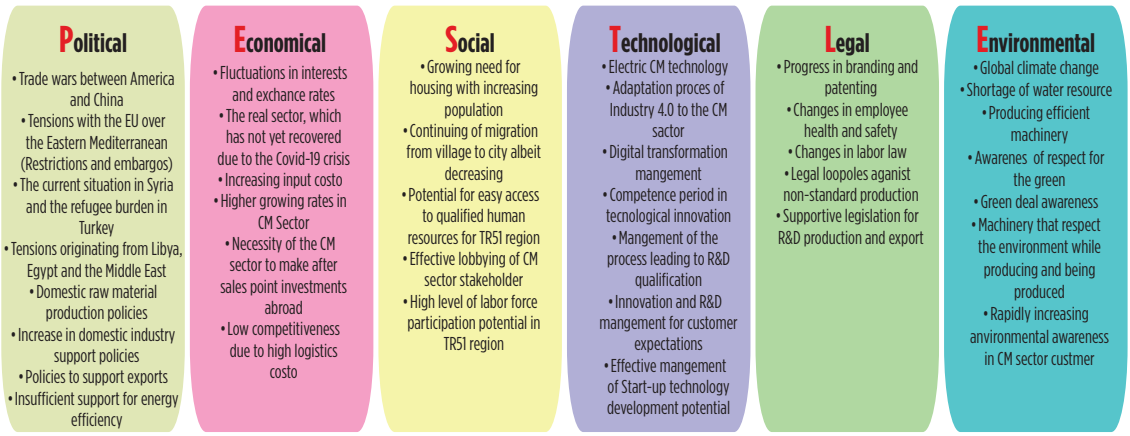


Figure 33: *PESTLE Analysis for the Machinery Sector in TR52 Region*

6.2.3. TR52 Region Machinery Sector SWOT Analysis

The strengths and weaknesses of TR52 Region and the main issues creating Opportunities and Threats for the region in line with the data obtained from secondary sources and the information obtained from the focus group meetings are presented in the table below.

STRENGTHS	WEAKNESSES
• Strong organization in the agricultural machinery sector • Companies with high export competence, focused on the foreign market • Product development competence with a collaborative approach in design and production of new parts • Flexible production ability • Order-based work instead of stock • Quick response to customer demands, strong adaptability • Value given to qualified HR and its positive effect • Sector representatives have an entrepreneurial spirit • Open to innovation • After-sales service • Strong cooperation with the university • High Quality engineer resource • Qualified manpower	• Lack of specialization • Lack of risk management • Splitting of family businesses • Lack of institutionalization in family businesses • Insufficient financial literacy level • Insufficient attention to design development and R&D, insufficient resources • Lack of market diversity and inability to reach markets with growth potential • Lack of qualified education and insufficient vocational schools • Lack of high value-added original strategic products • High logistics cost in maritime transport • Not sharing technology among industry representatives • Lack of using digital opportunities in internationalization • Lack of clustering • Lack of foreign structuring

OPPORTUNITIES	THREATS
• Collaborations between industry representatives • Collaborations with medical, software and defense industries • Gaining new customers from Europe with the changing supplier network structures • Increasing demand for machinery and intermediate goods in nearby geographies • Presence of products with the potential to create a brand in the region • Qualified manpower potential • Young and dynamic population structure to work in the coming years • The existence of a significant number of companies in the market that will produce in accordance with international standards • "European Turkey" image in the Far East • Increasing national production trend with restrictions and sanctions • Growth potential with the adaptation of new technologies in the Packaging and Air Conditioning sectors	• Financial literacy in company owners not reaching a sufficient level in the short term • Foreign dependency in important parts in the production of agricultural machinery • Risks taken in management, planning and investment stages due to lack of institutionalization in family businesses • Being out of defense industry collaborations due to lack of institutionalization • "Made in China" strategy and tendency to sell cheap products in Far East countries • Covid-19 crisis repeating with attacks or pandemic process not ending within 2021 • Slow tendency in transition to Industry 4.0 • High input (energy, raw material) costs • Inability to manage risks arising from lack of institutionalization in new investments

6.2.4. TR52 Region Machinery Sector Five Forces Analysis

This analysis is based on the data obtained from the surveys and the information obtained from the remarks of the sector stakeholders in the Focus Group meetings.

Porter points out that competition in industry is influenced by five competitive power factors that shape the industry. According to Porter, the industry structure consists of the threat from new companies entering the sector, the threat from substitute products, the market dominance of the suppliers, the power of the buyers and the intensity of the current competition. These factors affect the strategies that businesses will determine according to each other and their understanding of competitive advantage.

Understanding the forces that shape sector competition is the starting point of strategy development. Each company needs to know the average profitability of its sector and the change it has undergone over time. Five Forces reveal why sector profitability is in its current state. Only then a company can incorporate sector conditions into its strategy. Five Forces reveal the most important aspects of the competitive environment. They also provide the basis for measuring a company's strengths and weaknesses. Porter Five Force Analysis is a framework for measuring the level of sectoral competition and developing strategies based on it. Firms can build their core competencies, business models or networks to achieve a profit above the industry average. But we can say that an "unattractive" sector for investment is one where the combination of these five forces acts to reduce overall profitability.

In the analysis, there are 4 competitiveness together with "Competition in the sector" to see the process; “Threats from New Companies”, “Market Dominance of Suppliers”, “Threats from Substitute Products” and “Power of Buyers”.

The scoring specified according to the results of the survey was made according to the following principles. The answers between "Very Low" and "Very High" in the survey were scored between 1 and 10. Accordingly;

- Yeni Giriş Tehdidi: Threats from New Companies: What is the rate of convenience for a new company to enter your market?

(1: Very Low 10: Very High)

The score in the analysis is 5.1, representing that the threat from new companies is not "high".

- Power of Suppliers: What is your dependency on a limited number of suppliers?

(1: Very Low 10: Very High)

The score in the analysis is 4.3, which represents the strength of the suppliers is not "high".

- Power of Buyers/Suppliers: What is your dependency on a limited number of buyers?

(1: Very Low 10: Very High)

The score in the analysis is 4.6, representing that the strength of the customers is moderate.

- Threats from Substitute Products: What is the danger of having equivalent / substitute products in the market?

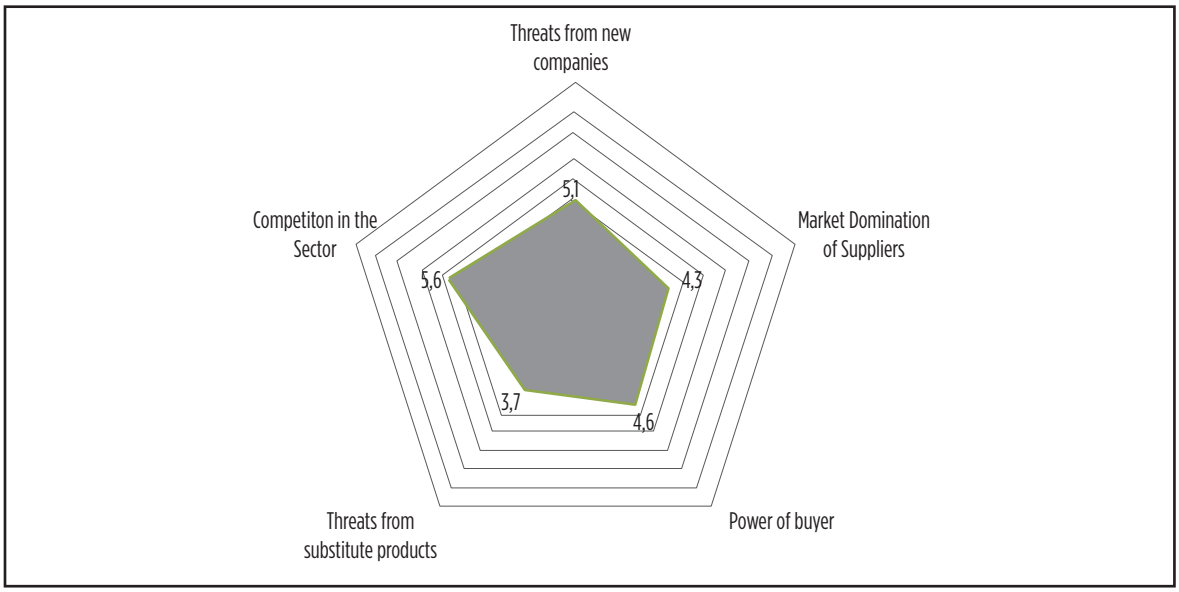
(1: Very Low 10: Very High)

The score in the analysis is 3.7 representing a relatively low level of substitution threat.

- Competition: What is the Level / Intensity of Competition in the Sector?

(1: Very Low 10: Very High)

The score in the analysis is 5.6, which represents a relatively low level of competition in the industry.



[FSR Machinery Sector Survey Results, 2021]

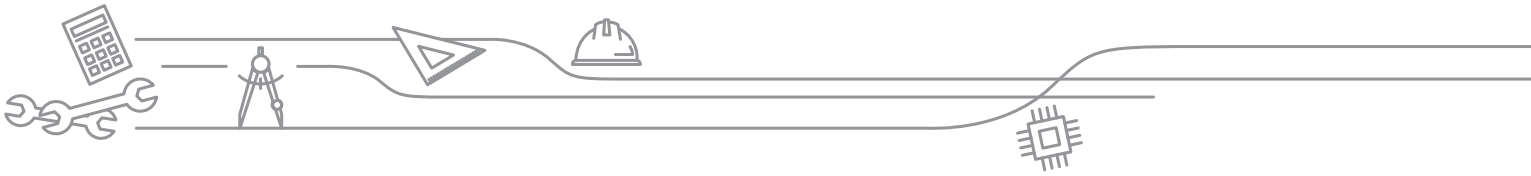
Figure 34: *Survey Answers for 5 Forces Analysis of TR52 Region's Machinery Sector*

Threats from New Companies

Newcomers to an industry have the desire to gain market share that suppresses the price, cost and rate of investment required to compete in the market. Therefore, the threat of entry has an impact on an industry's profit and growth potential. When the threat is high, existing companies in the market may move towards making a new investment to lower their prices or compete with new companies. Threats from new companies in Konya and Karaman has been designated as "Medium" considering the high investment cost, high requirements for profitable operations, and the size of the new investment in the sector.

Market Dominance of Suppliers

Strong suppliers can capture more value by demanding higher prices, limiting quality or services.



It is considered that the Supplier Power in the region is low due to low supplier density, low replacement cost and low differentiation. In this sense, it should be considered that import dependence is mainly low in the main inputs of the sector.

Power of Buyers

Strong Customers can capture more value by driving prices down, demanding better quality or more service (thus increasing costs) and often at the cost of destroying industry profitability. According to the sector participants, the buyer power did not appear to be threatening due to the medium bargaining power of the customers, medium exchange cost, existence of illegal practices and product differentiation.

Threats from Substitute Products

Companies in the region do not complain about the substitute product threat in the market. Industry profitability suffers when the threat of substitution is high. Substitute products or services limit the sectoral profit potential by suppressing prices. This situation, which is valid mainly due to international competitors and their products, is not only related to the competitiveness of the products produced in their target markets, but also to the narrow profit margin of the product portfolio.

Competition in the Sector

Competition between companies is in the form of quality, price, new product promotions, advertising campaigns and service improvements. The nature of competition takes a different form today, with joint action and cooperation that offer new ways to compete in the sector. Also, technology is reshaping the competition. As a result, it was found in the analysis that the sectors in the region have a "medium" level of competition. Capacity, product differentiation level, number of companies and the continuation of growth in the sector are the main drivers of competition.

Figure 35: *TR52 Region Machinery Sector 5 Forces Analysis*

6.3. TR52 Region Machinery Sector Gap Analysis

The sectoral GAP analysis is shown in Figure 36, which has been prepared by showing the potential progress area that should be filled for the sector in each field through the simplified value chain.

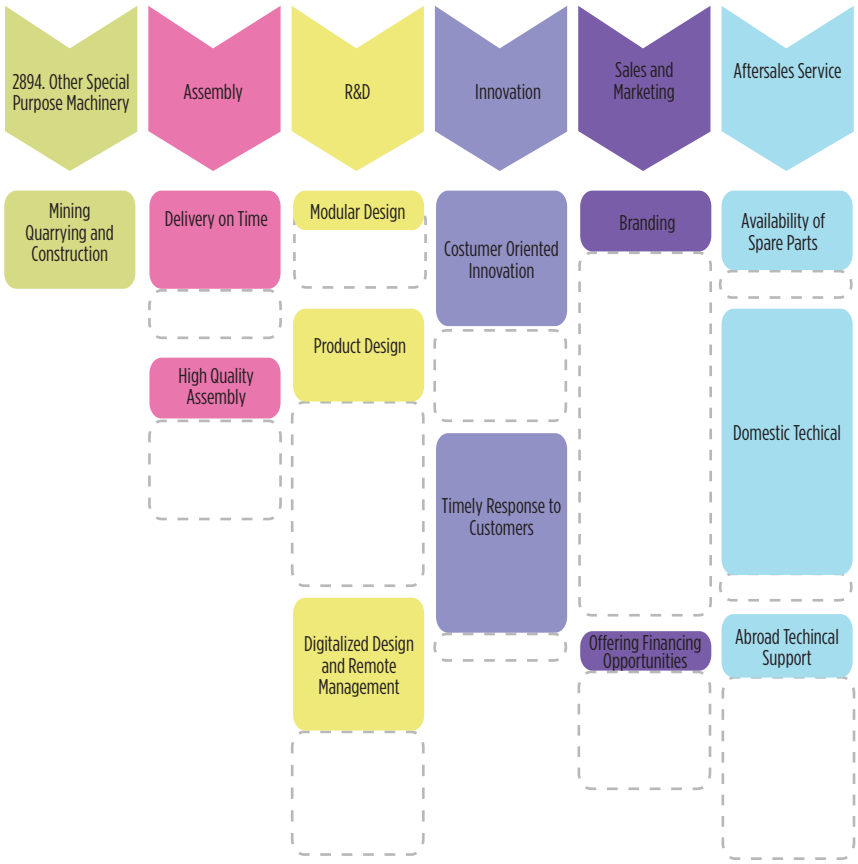


Figure 36: *TR52 Region Construction Machinery Sector Gap Analysis*

Zamanında Teslimat: MOn-Time Delivery: It is very important in the eyes of customers and if there is nothing to reduce customer satisfaction within the product, is the strongest competitive feature. The value given to the customer, the promise of the enterprise and loyalty to job have the power to increase the image and brand value in the eyes of the customer.

The sector has sufficient power in this title, but the necessity to resolve the disruptions in the supply chain due to the logistical difficulties caused by Covid-19, enlarged the gap at this point.

High Quality Assembly: In Agricultural Machinery sector, for the products that are not ready-to-use but require assembly, high quality assembly has a positive effect on the added value that the machine will provide to the customer. Especially in foreign sales, there may be cases where ongoing orders from the same customer are lost only due to problems in assembly quality. The problems experienced due to travel restrictions caused by Covid-19 enlarged the gap at this point [TR52 Focus Group, 2020]. Augmented reality and virtual reality technologies and the technologies developed in the field of assembly will help to fill the gap here.

Product Design: With the Ministry of Industry's and Technology "R&D Center" application, 174 sector representatives across Turkey established R&D centers. There are 8 R&D centers in Konya and 1 in Karaman in the Machinery sector. 365 Design centers have been established in Turkey and there are 3 Design Centers in Konya in Agricultural Machinery sector. The sector has the potential to create added value that will reach much more targets than its current position if it focuses on

developing original new product designs with its own R&D studies.

Modular Design: It is a method that must be applied in order to reduce the logistics costs that doubled during the Covid-19 crisis and to achieve better competitiveness and increase value added. The manufacturers which diagnosed the gap here and transformed their products into modular products, have differentiated themselves from their competitors by reducing the storage of end products, logistics, installation of the product at the customer site and all related costs. The gap at this point is open to development for the sector, in general.

Digital Design and Remote Management: When sector representatives collect and evaluate customer complaints with a goal of customer satisfaction, it creates a serious development motivation in companies. With this motivation, improvements have been made in the field of services, as well as improvements in operations and logistics. Most companies have installed remote control systems on their machines in order to instantly intervene in the troublesome situations that customers experience in machine use. In this way, they had the opportunity to solve the instant problems of the customers. At this point, the gap in the sector has been determined beforehand and started to be filled before the planned dates with the effect of Covid-19 crisis. However, there is still a gap across the sector and in order to close this gap, it is critical to recruit strategically important engineers and technicians who will bring this technology to the company.

Customer Oriented Innovation: Customer complaints from after-sales activities are accepted as important feedbacks to increase customer satisfaction by the machinery sector representatives. These feedbacks triggered the process of generating solutions by developing technology or changing operations to solve problems, and ultimately led to increased competitiveness in the company. These capabilities have enabled the product to be continuously improved in line with customer expectations and to gain competitive advantage in the short and medium term over competitors who do not have the same value but try to develop products directly through R&D. Because, although the same raw materials and production technology are used like the competitor, the changes and innovations made in operations without losing time in order to gain space, volume and process efficiency lead to the production of machines that produce higher added value or meet different customer demands. This process has an ongoing continuous improvement cycle.

The sector has a high added value in this area. However, it can be said that there is always a gap in terms of adapting to the recently developing technology and changing customer demands.

Timely Response to Customer Demands: Timely response and flexibility are vital for the firm to easily navigate from the crisis environment to the non-competitive zone, especially in times of crisis. During the Covid-19 crisis, construction machinery sector representatives reacted quickly using these capabilities and were less affected by the effects of the crisis. There is still a gap to be filled in terms of the principle of continuous improvement by adapting to the developing technology.

Branding: Although the exports of the regional sector representatives are high, it is obvious that they lag behind their European competitors in brand awareness and brand image creation. For these reasons, establishing a sales and marketing company in countries with high brand image and trying to sell the products produced in Turkey with different country origins is expressed as a solution applied by many regional representatives.

With the TURQUM brand, in which sector representatives are included, a sectoral alternative has been created in terms of branding.

The TURQUM Brand is a certification system that certifies the following standards for the Turkish machinery sector,

- Company and production system competence
- Production in accordance with the Quality Management System
- Product Safety
- Product quality
- Service and after sales services
- Constant surveillance

Offering Finance Opportunities: Sector representatives cannot compete with the financial alternatives offered by their European competitors in sales financing. It is difficult to compete as competitors, can offer alternative financing or grace periods. The difficulty, sector representatives encounter to sell their higher quality products in national market even at lower prices, indicates the development potential of this value.

There are many customer financing alternatives such as 5-6-7 years of low interest loans, leasing financing, buyer financing that can compete with Hermes and Coface which are open to development and form the gap in this value.

Availability of Spare Parts: Although largely seen as a fulfilled value, this problem manifested itself during Covid-19 crisis within the difficulties experienced in the supply of parts which is dependent on foreign suppliers. Spare parts availability for products sold abroad is a value that can be fulfilled more successfully with effective international after-sales organizations.

Domestic Technical Support: Domestic technical support is an important added value, and it is the first requirement to work in the field, especially for Machinery. Filling the gaps of adaptation to new technological developments will increase its value.

Foreign Technical Support: Foreign technical support has a gap where Agricultural Machinery industry is open to development in terms of added value and is difficult to fulfill with individual efforts of companies. Progressing by individual efforts with new technologies and remote management will be beneficial in this regard, but these are solutions with a partial added value. Taking into consideration of the fact that a machine is under constant maintenance and monitoring, concrete and customer-satisfying actions should be taken with fast and rigid steps to fill the gap in this value with sectoral merger and government support for constantly reliable and growing export figures.

7. Horizontal Issues

7.1. Crisis Management

The Covid-19 pandemic caused a significant contraction in the world economy and trade in 2020. The assumptions that the pandemic will take place in a single wave, that it will be taken under global control at the end of the summer months and the vaccine will be found and implemented in 2021 are the basis of optimism in predictions regarding the world economy and trade.

During this period, as in all sectors, the representatives of the machinery sector in the region were directly exposed to the effects of the crisis. Some companies have been able to show high resistance to the crisis. This endurance has been achieved thanks to their ability to quickly implement the solutions they developed with innovation to customer demands with their flexibility in production. Synchronized operation of these three is the definition of resilience in a crisis period [AT Kearney, How to Rebound, 2021].

Resilience Against Crisis = Timely Response to Customers + Innovation + Flexible Production

Crisis management has also been implemented in terms of occupational and worker health and to minimize the effect of the virus on production and the Sector has taken hygiene and social distance measures in the workshop and business services in general to minimize the impact of the virus on production and employees with chronic illnesses and / or those over 55 years old were given the opportunity to take leave. The number of workers has been reduced by carrying out weekend works and it has been stated that the leaves for weekend work were managed very successfully [TR52 Focus Group, 2020].

In crisis management, additional precautions were taken in order to prevent strategic personnel with high added value from being out of work due to illness, and difficulties in operational processes.

With the Covid-19 crisis, both a Crisis Desk and a Corona Support Line were established in TR52 Region. Communication was established with industrial companies via electronic messaging, e-mail and telephone. Each company in the region was contacted individually. The problems experienced by the companies from Konya and Karaman were conveyed to the relevant authorities and support was provided to resolve them within the region as much as possible [TR52 Focus Group, 2020].

7.2. Resource Efficiency

Resource efficiency is defined by the United Nations Environment Program (UNEP) as the sustainable production, processing and consumption of natural resources, as well as the reduction of negative environmental impacts during the production and consumption of products throughout their entire life cycle.

Energy Efficiency

When it comes to resource efficiency, the first thing that comes to mind is energy, water and raw material efficiency. In reducing greenhouse gas emissions in the industry, especially energy efficiency comes to the fore. Energy efficiency can be defined as the conversion of each unit of energy consumed into more service or products [TMMOB, 2008]. Although the concept of energy efficiency is perceived as intangible for businesses in our country, it is a concept that can have serious financial, environmental and economic benefits.

Unfortunately, the machinery sector is far from successful positions it has at other subject matters in terms of energy efficiency. It is estimated that there are not many companies that have energy efficiency analysis and/or implementations of energy efficiency increasing measures according to efficiency analysis. Unfortunately, the reason for this is lack of awareness and the projects, practices that will increase this awareness in our country should be increased in quantity and diversity.

In TR52 Region, studies are carried out by KTO Karatay University Department of Energy Efficiency and MEVKA to reduce the energy density. The Energy Efficiency center is in the installation phase.

KTO Karatay University has Energy Efficiency Department and supports these studies [TR52 Focus Group, 2020].

Significant progress has been made in the transition to LED lighting in companies in the TR52 Region. There is a lack of awareness and information about the energy classes of electric motors operating coupled on machine tools. On the other hand, electric motors working coupled on the machines produced are preferred according to cost advantage instead of efficiency class if the customer does not have any preference [TR52 Focus Group, 2020].

Raw Material Efficiency

The most commonly used raw materials in the sector are steel and steel products. Steel is successful in terms of raw material efficiency, as it is recycled at a high rate. However, the production trend from recyclable materials, which are very effective in raw materials used in equipment other than steel, is recently being adopted by the sector representatives.

7.3. Climate Change

The Machinery Sector, where carbon footprint measurements started with the regulations and changes that emerged in line with the EU's "Zero Emission" target in 2050, needs to adapt much faster in terms of both respect to the environment and compliance with environmental processes with the current high level of internationalization in TR52 Region.

47.2% of net electricity consumption in Turkey is consumed by the industrial sector and more than 70% of the electricity used in industry is consumed by electric motors. In other words, approximately 35% of the total net electricity consumption of our country is consumed by the electric motors in manufacturing industry activities. However, 88% of the electric motors used in industry are in the low efficiency class [MOIT, Electric Motor Inventory Study, 2017]. It is observed that the sensitivity of the machinery sector customers in terms of both reducing their carbon footprint and saving electricity has increased and the tendency to use IE3 class motors and variable speed drive instead of IE2 class motors has also increased. The machinery sector is of key importance in terms of reducing the amount of electricity used in the industry and thus the carbon footprint of industrial production.

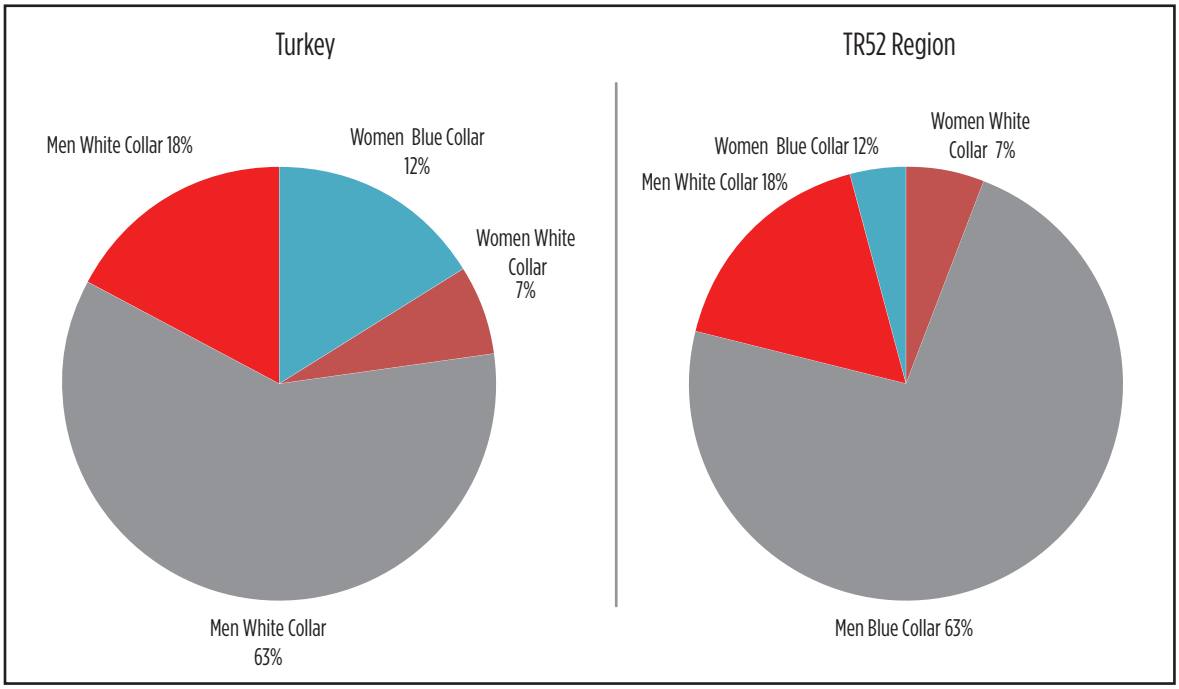
Sector representatives state that the motors accoupled to their machines, are selected according to the demand of customers. But, the establishment of green economies and the energy consumption classes of the supplied products are of greater importance in the developing world. So, that will encourage the sector both to protect nature by increasing the use of more energy-efficient motors and to strengthen their position in the supplier lists of European customers with the help of the importance they hold for nature.

In TR52 Region, the Konya Chamber of Commerce has planned to organize information activities on Climate Change for its 2300 members. Carrying out such awareness-raising activities on climate change will support the approach and level of knowledge of the industry in the Region.

7.4. Gender Equality

Currently, women working in the sector focus predominantly on low-skilled and low-paid jobs. Sector representatives generally prefer female employees because of their discipline and self-motivation. As their skills adapt to market demands, women have a chance to find a job in the machinery sector.

According to the results of the survey conducted within the scope of the project, the rate of female employees in the region, as seen in Figure 21, has employment rates far below Turkey average. While white-collar and executive positions are close to Turkey average, the region's blue-collar female employment rate in the sector is very low, one third of Turkey average. It is observed that female employment in the sector is viewed more favorably in the white-collar group, but more cautious in blue-collar employment.



[FSR Machinery Sector Survey Results, 2021]

Figure 37: Gender Distribution of Machinery Sector Employees

Established to support Women Entrepreneurship in the region, the 43-member Kimya Hatun Women's Cooperative sells the products they produce in internet markets such as Hepsiburada and Trendyol.

8. Policy, Strategy and Action Plan Recommendations

8.1 Policy Recommendations

Encouraging Purchase of Domestic Machinery

1. Effective implementation of supervisory and regulatory practices in the sector while insisting on the choice of domestic products in government purchases
2. When government specifications are incompatible, allowing the development of domestic products in accordance with the specifications and not directly approving the import.
3. Cancelling income tax on scrap value of old machines in domestic machine purchases
4. VAT discount for domestic machine purchases

2. Increasing Exports

1. Performing efforts to improve the image of Turkey and Turkish goods
2. Support for strengthening the image of Turkish machine brands
3. Providing logistic support in maritime and rail transportation of exports
4. Eximbank's allocation of more resources for buyers' loans and receivables insurances and increasing the loan term over 1 year
5. Applying competitive interest rates for the machinery sector on buyer credit by Eximbank compared to rival banks
6. Supplying low-interest loans from Turkish banks or leasing institutions abroad to foreign customers who will purchase Turkish machinery

3. Decreasing Raw Material Prices

1. Promoting high quality steel production in the iron and steel sector. Focusing on producing alloy flat, stainless, coated and more special steels that the sector needs, investing in products with high added value with advanced engineering knowledge, technology and government support

4. Increasing R&D Structure

1. Establishment of institutes developing R&D for SMEs
2. Employing graduate and doctorate engineers, getting support from universities, establishing institutions that develop applied technology R&D to contribute to the industry (Example: Fraunhofer Institute - Germany)
3. Continuing to encourage R&D and design centers

5. Directing SMEs to efficiency increasing activities

1. Model factories giving practical lean production training in the workshops of SMEs
2. With the Mobile Model Factory, making the model factory concept more accessible, expanding it and focusing more on in-plant applications
3. Promoting result-oriented lean practices and consultancy services on the production line

6. Promoting Environmental Regulations

1. Activating energy efficiency incentives for SMEs
2. Preparing policies for harmonization with the European Green Deal

7. Developing Human Resources

1. Conducting comprehensive training organizations to increase the technical capacity of companies on e-commerce, Export / Import, Management, Human Resources, Market Research, Customer Relationship Management, Purchasing, Marketing and Sales, Digital

Marketing, Intellectual Property, Design, Language.

2. Regional differentiation of the coordination between vocational, technical high schools and industry, based on the sub-sector
3. Developing the concept of a "Producing University" and budgeting universities according to their production in areas such as Social, Economic, Cultural, Artistic, Industry, allocating staff and benchmarking the production potential of universities

8. Developing of export-oriented transportation

1. Having the opportunity to compete with China based on product price, via government support in exports, especially in maritime shipping

8.2 Short, Medium and Long-Term Strategy Recommendations

Sub Strategy 1.

Making a Move Towards Branding

Without understanding and applying modern marketing techniques and product marketing strategies that highlight product characteristics and brand, achieving success and competitiveness with product pricing is still used.

Branding is one of the biggest hurdles of the industry. Although some companies in our country manage to create a strong brand for foreign markets, in general, most industry representatives cannot effectively use their post-production capabilities, such as marketing and branding.

Success can be achieved with the development of TURQUM, which is an alternative sectoral solution for branding, forming similar structures and increasing the participation in TURQUALITY program.

Sub Strategy 2.

Fast completion of the transition to operational efficiency and lean production

Establishment and dissemination of smart factories covering multi-functional production processes including lean production applications and production bands are among the expected developments.

In the sector, all production operations should be reviewed with lean production techniques and a systematic and general approach should be carried out for continuous development, increase in value addition, total efficiency improvement, cost reduction and processes of localization.

Sub Strategy 3.

Training strategic human resources

The need for qualified human resources that can carry out applications and processes for adapting to R&D and innovation-enhancing studies and digitalization processes is deepening. Individuals who follow innovations in technology, make an effort to adapt to them and effects of innovation can be observed in their lives, are individuals that demand and direct innovation and development. Therefore, companies that internalize the R&D culture and select their new employees from these technology-compatible individuals and invest in the necessary processes to train their human resources will be competitive in the sector.

Sub Strategy 4.

Ensuring localization

The importance of reducing the external dependency in the supply chain of the industry have once again demonstrated itself with the Covid-19 Crisis. Continuity and sustainability of sales, logistics cost advantage, being aware of product changes, reducing imports and increasing exports are issues that need to be studied at every opportunity for our country to close its current account deficit.

The insufficiency of domestic production diversity, deeply felt with the Covid-19 Crisis makes it difficult or impossible to complete the production process of the final product not only in times of crisis, but also in any logistic setback, policy changes, exchange rate fluctuations, supplier strike and embargo. For these reasons, the prerequisite for increasing the resilience of the sectors against crises and setbacks is to increase the proportion of domestic goods in manufactured products.

Sub Strategy 5.

Focusing on alternative markets

The sector should focus on the China-Pakistan economic corridor connecting China and Central Asia, or the modern Silk Road Corridor, RCEP, Russia, South America and Africa markets. In Asian markets, the sector should benefit from the fact that Turkish goods have the image of "Made in Europe".

Sub Strategy 6.

Developing intra and inter-sectoral cooperation

In addition to manufacturing within the industry's own internal structures, inter-sectoral cooperation is also becoming more important every day. In this sense, technology transfer, product development and joint business opportunities from both inside and outside the sector should be investigated. The machinery sector should enter into close cooperation with defense, energy and automotive industries.

Sub Strategy 7.

Providing financial support for export

Sales financing and loans that competitors obtain from abroad are the most effective reasons in sales where our companies cannot be competitive. Sector representatives will be more competitive by expanding the Sales Finance alternatives and opportunities to be provided to potential investors at a competitive level compared to foreign examples such as Hermes and Coface. The financial product alternatives should be defined in the financial system and then offered to all SMEs in an easily accessible manner.

Sub Strategy 8.

Supporting Export Shipment

Reducing shipping costs, which is an important source of cost when exporting from provinces far from the port and increasing competitiveness is an important condition for the increase and development of the export potential of Anatolian provinces.

Identifying intermodal transportation alternatives and supporting transportation costs for exporters will be an important milestone for regional development.

Sub Strategy 9.

Adapting to innovative technologies

Industry 4.0 Applications started to be implemented in the sector. Computer and Information Technologies make a great contribution to the efficiency of the sector. However, vertical and horizontal integration technologies such as ERP, Big Data, Cloud Technologies, Internet of Things (IoT), Artificial Intelligence and Cyber Security Technologies, and the level of use of Industrial Digital Technologies contain great development potential.

What is desired to be achieved with Industry 4.0 is productivity, quality, security, economic growth, easy manageability and improvement in employment. The advantages of Industry 4.0 applications can be listed as follows: tracking the system from input to end product and thus making diagnosis easier, self-awareness of systems and components, sustainability of resource-saving systematics, ensuring high efficiency, increasing flexibility in production, reducing costs and developing new service and business models.

Sub Strategy 10.

Developing innovative production models in accordance with environmental policies

Production capacity in accordance with current and renewed domestic and international

regulations regarding environmental policies should be developed. This requirement will prevent a decrease in machinery exports, especially to developed markets, and has the potential to contribute significantly to paving the way for export growth.

Innovative technologies should be used to protect nature and support sustainable living, respecting both domestic and international environmental standards. The sector should reduce the environmental impact of both its factories and products day by day. Besides this requirement, compliance with the new environmental standards that will be demanded in the future markets of developed countries, especially the European Green Deal, will be a proof of both the infrastructure and competence of the sector in compliance with these standards and it will make an unaffordable contribution to the rise of the brand image.

Sub Strategy 11.

Optimizing operational processes with new technologies

Supply chains and inventory management should be optimized, risk and safety management and project planning processes should be improved by using new technologies. Examples include implementing digital purchasing, adapting to digital logistics channels, and adapting ERP systems to operations management in a value-added way.

Sub Strategy 12.

Technology transfer from start-ups

Major players in the sector should improve their existing technologies by recruiting technology-developing start-ups. The implementation of this strategy, which is very common in the world, will save a lot of time in terms of gaining the ability to catch up with high technology and develop new products.

Sub Strategy 13.

Leaving the follower status in technology and producing more innovative products

In most of the sector representatives, the motivation to develop a brand new product that works with different systematics in different technologies instead of existing products is weak or does not work. One of the reasons for this deficiency is that industrialists focus on short-term solutions rather than producing long-term R&D strategies. This understanding will only allow a progress towards working with a similar technology and imitating a new product when released by competitors. Currently, product prices are also much lower than European competitors due to lack of branding and the earnings will not allow the companies to endure long-term R&D studies.

For these reasons, the goal of companies should be to move from the "follower" status in technology to the "leader" position by turning to more innovative products, together with branding and sales-increasing strategies. It is also important to start production of critical components such as engine and powertrain in terms of reducing dependency on suppliers.

Sub Strategy 14.

Establishing a joint after-sales organization abroad

This structure should be supported by creating a new model in public-private sector cooperation for international after-sales service. In the focus group meetings held with the sector representatives, it was determined that the companies had difficulties in fulfilling their after-sales services due to the high costs. Each company tries to create its own after-sales service model. Some of the leading exporter companies of the sector create after-sales support offices abroad, and some assign technical personnel. Both the establishment of an office and the assignment of personnel do not constitute a sustainable structure for companies. An abroad organizational structuring should be established that will provide after-sales service for the products of companies which want to participate, keep spare parts inventory, and support assembly works.

8.3 Sectoral Action Plan

The Estimated Budget of the Actions of the Plan prepared below include the budget figures envisaged for the relevant study to be carried out for 1.107 Machinery Sector Firms in TR52 Region. Actions within the sub-strategies have been increased or decreased in TR52 Region, depending on the industrial structure and requirements of the region.

Strategy and sub-strategies are colored as follows, according to their status as National, Regional and Global Vision Developers: **National**/**Regional**/**Global Vision Developer.**

Main Strategy	Sub Strategy	Action	Explanation	Term	Estimated Budget [TL]
Strategy 1: **NATIONAL AND REGIONAL STRATEGIES**	Strategy 1.1. **Making a Move Towards Branding**	Action 1.1.1. **Conducting research to raise awareness about patents, trademarks and design**	• Increasing the number of patents, utility models, brands and designs • Ensuring production of high technology product alternatives, encouraging R&D, increasing competitiveness	3-10 Years (Long Term)	Micro Investment (<100 Million TL)
		Action 1.1.2. **Promoting the TURQUM brand and supporting participation**	• Sectoral branding with quality standards certificate	1-3 Year (Medium Term)	Micro Investment (<100 Million TL)
		Action 1.1.3 **Increasing awareness and diversity of consulting services for international brand identity development**	• Increasing international image and awareness • Increasing the capacity to export • Raising awareness of the need for coaching, mentoring and consultancy	1-3 Year (Medium Term)	Micro Investment (<100 Million TL)
		Action 1.1.4. **Increasing the participation to Turquality program**	• Increasing international image and awareness • On company base, developing branding in the market, organization and brand management issues, strategically and export-focused	3-10 Years (Long Term)	Meso Investment (>100 Million & <1 Billion TL)
		Action 1.1.5. **Developing software with common user interface for Agricultural Machinery**	• Developing the brand identity of the companies in the region • Increasing customer communication and brand loyalty	3-10 Years (Long Term)	Meso Investment (>100 Million & <1 Billion TL)
		Action 1.1.6. **Developing the capacity to export with E-commerce**	• Developing international brand identity • Providing companies with the ability to export via e-commerce	3-10 Years (Long Term)	Meso Investment (>100 Million & <1 Billion TL)
		Action 1.1.7. **Raising awareness of the need for development-oriented HR in companies**	• Employing HR with the ability to develop international brand identity • Employing or training HR capable of exporting with e-commerce	3-10 Years (Long Term)	Meso Investment (>100 Million & <1 Billion TL)

Main Strategy	Sub Strategy	Action	Explanation	Term	Estimated Budget [TL]
Strategy 1: **NATIONAL AND REGIONAL STRATEGIES**	Strategy 1.2. **Fast completion of the transition to operational efficiency and lean production**	Action 1.2.1. **Awareness Raising Activities on Productivity**	• Understanding the operational efficiency potential • Understanding operational efficiency alternatives • Understanding alternatives of quality improvement studies	0-1 Years (Short Term)	Meso Investment (>100 Million & <1 Billion TL)
		Action 1.2.2. **Ensuring Company-Specific Operational Efficiency Analysis**	• Understanding the production methodology and creating development potential • Understanding cost-effective alternatives • Seeing the potential for improvement in productivity	1-3 Year (Medium Term)	Meso Investment (>100 Million & <1 Billion TL)
		Action 1.2.3. **Ensuring that the Company-Specific Operational Efficiency Studies are Made in the Production Lines**	• Improvement in Production Methodology • Cost reduction (Labor, Consumables and Natural Resources) • Productivity improvement • Guidance, mentoring and practical lean trainings in the factory, especially Kaizen training	1-3 Year (Medium Term)	Meso Investment (>100 Million & <1 Billion TL)
		Action 1.2.4. **Performing Company-Specific Energy Efficiency Analysis**	• Increasing awareness of energy costs in production • Cost reduction in energy, providing understanding of alternatives • Raising environmental awareness • Supporting the analysis of EVD companies, increasing participation in free analysis support	1-3 Year (Medium Term)	Meso Investment (>100 Million & <1 Billion TL)
		Action 1.2.5. **Supporting Energy Efficiency Efforts**	• Reducing the energy cost share in production • Cost reduction (Labor, Consumables and Natural Resources) • Reducing the carbon footprint	3-10 Years (Long Term)	Mega Investment (>5 Billion TL)

Main Strategy	Sub Strategy	Action	Explanation	Term	Estimated Budget [TL]
Strategy 1: NATIONAL AND REGIONAL STRATEGIES	Strategy 1.3. **Training Strategic Human Resources**	Action 1.3.1. **Training Intermediate Staff, Putting Special Workshops for the Machinery Sub-Sector and Lessons Determined by the Industrialist in Vocational High Schools, Applying Internship Programs**	• Tracking qualified intermediate workforce from the first stage of education, training and monitoring in school and industry, and ensuring adequate and competent development, • Increasing the institutionalization levels of companies • Increasing HR competitiveness • Training operators who can use the machines produced in the region • Opportunity to anticipate labor deficits and take measures	3-10 Years (Long Term)	Meso Investment (>100 Million & <1 Billion TL)
	Strategy 1.4. **Focusing on alternative markets**	Action 1.4.1. **Helping Companies Take Advantage of Marketing Opportunities Designing, Collecting, Interpreting and Reporting Market Information**	• Awareness of Asia, Silk Road, RCEP (Regional Comprehensive Economic Partnership), Russia, South America and Africa Markets • Marketing awareness • Enabling companies to understand their position in international markets • Raising awareness of preparing a marketing plan and designing a roadmap	0-1 Years (Short Term)	Micro Investment (<100 Million TL)
	Strategy 1.5. **Developing intra and inter-sectoral cooperation**	Action 1.5.1. **Clustering Support and Developing Clustering Strategies for Existing and New Companies**	• Creating export and expansion opportunities • Determination of cluster location and organization • Setting up the necessary infrastructure • Cost reduction, increasing the attractiveness of the industry • Joint supply, sales, R&D and marketing training	1-3 Year (Medium Term)	Meso Investment (>100 Million & <1 Billion TL))
	Strategy 1.6: **Providing financial support for export**	Action 1.6.1. **Ensuring that companies get the maximum benefit from Incentives and Supports in Marketing and Exports**	• Increasing entry to new markets abroad • Increasing the foreign marketing activities of companies • Increasing the brand image	3-10 Years (Long Term)	Mega Investment (>5 Billion TL)
		Action 1.6.2. **Regulating Buyer Financing Terms According to Competitors and Providing More Convenient Access to Financing**	• Defining a competitive grace period in buyer's credit • Long Maturities in buyer's credit • Cash loans, export creation, guarantees etc. under more favorable conditions • Increasing competitiveness	1-3 Year (Medium Term)	Mega Investment (>5 Billion TL)

Main Strategy	Sub Strategy	Action	Explanation	Term	Estimated Budget [TL]
Strategy 1: **NATIONAL AND REGIONAL STRATEGIES**	Strategy 1.7. **Increasing of Localization**	Action 1.7.1. **Preparing the List of Imported Products on Provincial Basis for the Sector**	• Identification of sector-based imported products to encourage the production of substitutes	0-1 Years (Short Term)	Micro Investment (<100 Million TL)
		Action 1.7.2. **Ensuring the Understanding that Imported Products for the Sector Can Be Produced Locally**	• Increasing the use of imported substitute products	0-1 Years (Short Term)	Micro Investment (<100 Million TL)
		Action 1.7.3. **Ensuring the Understanding that Imported Products for the Sector Can Be Available Locally**	• Ensuring the production of imported substitutes	1-3 Year (Medium Term)	Micro Investment (<100 Million TL)
		Action 1.7.4. **Localization by Simplifying Imported Products**	• Reducing the rate of imported products	1-3 Year (Medium Term)	Meso Investment (>100 Million & <1 Billion TL)
		Action 1.7.5. **Establishing a Company-Specific Localization Mechanism**	• Accelerating the use of substitute products	1-3 Year (Medium Term)	Meso Investment (>100 Million & <1 Billion TL)
		Action 1.7.6. **Establishing Internal Supply Mechanisms**	• Reducing import dependency on intermediate goods and facilitating the access of industry to alternative domestic producers	1-3 Year (Medium Term)	Meso Investment (>100 Million & <1 Billion TL)
	Strategy 1.8. **Development and Supporting of Export Transport**	Action 1.8.1. **Developing Intermodal Transportation Alternatives from Konya and Relieving Costs**	• Reducing export transportation costs from cities far from ports	1-3 Year (Medium Term)	Mega Investment (>5 Billion TL)

Main Strategy	Sub Strategy	Action	Explanation	Term	Estimated Budget [TL]
Strategy 2: **GLOBAL VISION DEVELOPING STRATEGIES**	Strategy 2.1: **Adapting to innovative technologies**	Action 2.1.1. **Engaging in Industry 4.0 Awareness Raising Activities**	• Ensuring that the details of Industry 4.0 are understood • Internalizing the Industry 4.0 specific to each company a nd implementing alternatives specific to the company • Ensuring that the added value to be produced by the company with Industry 4.0 is recognized	1-3 Year (Medium Term)	Meso Investment (>100 Million & <1 Billion TL)
		Action 2.1.2. **Making Sectoral Diagnostics Study and Industry 4.0 Needs Analysis**	• Ensuring that the details of Industry 4.0 are understood per company • Ensuring that Industry 4.0 is internalized and implemented on a company-specific basis. • Ensuring that the value-increasing effect of Industry 4.0 can be calculated.	1-3 Year (Medium Term)	Meso Investment (>100 Million & <1 Billion TL)
		Action 2.1.3. **Increasing Value with Industry 4.0, Reducing Costs, Increasing Productivity (IoT, Autonomous Robots, Additive Manufacturing, Artificial Intelligence, AR, VR, Big Data, Machine Learning, etc.)**	• Increasing the added value • Developing competitive technologies • Responding to technology-based requests from customers • Providing customers with ease of use • Reducing costs, increasing productivity • Reducing the carbon footprint • Increasing the resilience of companies to crises	1-3 Year (Medium Term)	Mega Investment (>5 Billion TL)
	Strategy 2.2: **Developing innovative production models in accordance with environmental policies**	Action 2.2.1. **Making Environmentally-Friendly R&D, Production and Establishing Organization, Transforming Production Processes**	• European Green Deal • Energy efficient production • Energy efficient product • Reuse of waste • Zero waste factory	3-10 Years (Long Term)	Mega Investment (>5 Billion TL)

Main Strategy	Sub Strategy	Action	Explanation	Term	Estimated Budget [TL]
Strategy 2: **GLOBAL VISION DEVELOPING STRATEGIES**	Strategy 2.3. **Optimizing operational processes with new technologies**	Action 2.3.1. **Increasing Awareness of the Digitalization of Processes with New Technologies**	• Ensuring that the details of Industry 4.0 are understood • Internalizing the Industry 4.0 specific to each company and implementing alternatives specific to the company • Ensuring that the added value to be produced by the company with Industry 4.0 is recognized	1-3 Year (Medium Term)	Micro Investment (<100 Million TL)
		Action 2.3.2. **Analyzing Digital Transformation Opportunities in Processes**	• Ensuring that the details of Industry 4.0 are understood per company • Ensuring that Industry 4.0 is internalized and implemented on a company-specific basis. • Ensuring that the value-increasing effect of Industry 4.0 can be calculated.	1-3 Year (Medium Term)	Micro Investment (<100 Million TL)
		Action 2.3.3. **Digitalizing Processes with New Technologies (Cloud Systems, Digital Twins, Digital Call Center, Digital Logistics, Virtual Fair etc.)**	• Increasing the added value • Reducing costs (Labor, Consumables and Natural Resources) • Increasing productivity • Reducing the carbon footprint	1-3 Year (Medium Term)	Mega Investment (>5 Billion TL)

Main Strategy	Sub Strategy	Action	Explanation	Term	Estimated Budget [TL]
Strategy 2: **GLOBAL VISION DEVELOPING STRATEGIES**	Strategy 2.4. **Leaving the Follower Status in Technology and Producing More Innovative Products**	Action 2.4.1. **Establishing R&D organizations for SMEs to develop applications in the region Example: Fraunhofer Institute**	• Providing ready, applied R&D support to SMEs through an autonomous R&D Development Institute • Ensuring an R&D structure for the sector • Increasing commercial R&D activities • Performing practice-oriented research • Shortening product development processes	3-10 Years (Long Term)	Mega Investment (>5 Billion TL)
	Strategy 2.5. **Technology Transfer from Start-Ups**	Action 2.5.1. **Establishing a Special Incubation Center for the Agricultural Machinery Sub-Sector**	• Strengthening the Agricultural Machinery Sector • Creating a company for needs • Better fulfillment of supply • Technological product and process supply	1-3 Year (Medium Term)	Meso Investment (>100 Million & <1 Billion TL)
	Strategy 2.6. **Establishing a joint after-sales organization abroad**	Action 2.6.1 **Reducing the Need for abroad Sales and Aftersales Structuring by Using New Technologies Specific to the Agricultural Machinery Sector**	• Increasing exports • Increasing customer satisfaction • Increasing the brand image • Reducing after sales costs	1-3 Year (Medium Term)	Meso Investment (>100 Million & <1 Billion TL)
	Strategy 2.7. **Increasing the Number of R&D Centers in the Sector**	Action 2.7.1. **Increasing the Number of R&D Centers in the Sector in the Region**	• Creating the R&D infrastructure for the company by taking advantage of the existing state support • Accelerating sectoral technology development • Creating R&D infrastructure	3-10 Years (Long Term)	Mega Investment (>5 Billion TL)
	Strategy 2.8 **Increasing the Number of Design Centers in the Sector**	Action 2.8.1. **Increasing the Number of Design Centers in the Sector in the Region**	• Creating the R&D infrastructure for the company by taking advantage of the existing state support • Accelerating sectoral technology development • Creating R&D infrastructure	3-10 Years (Long Term)	Meso Investment (>100 Million & <1 Billion TL)

Main Strategy	Sub Strategy	Action	Explanation	Term	Estimated Budget [TL]
Strategy 2: **GLOBAL VISION DEVELOPING STRATEGIES**	Strategy 3.1. **Training Strategic Human Resources**	Action 3.1.1. **Provision of On-the-Job Training Services to Senior Company Employees and Company Owners** (Especially Family Constitution, Institutionalization and Financial Literacy Trainings)	• Capacity building • Increasing financial literacy • Creating a family constitution • Increasing the institutionalization levels of companies • Increasing HR competitiveness • Vision and values	1-3 Year (Medium Term)	Micro Investment (<100 Million TL)
	Strategy 3.2. **Focusing on alternative markets**	Action 3.2.1 **Designing the Necessary Actions for the Selected Markets and Segments for the Agricultural Machinery Sector and Sharing them with the Companies in the Sector**	• Marketing according to company and market dynamics • Determination of target positions for companies in national and international markets • Draft marketing plan and roadmap design	0-1 Years (Short Term)	Micro Investment (<100 Million TL)
		Action 3.2.2. **Determining Empty Segments in Agricultural Machinery Market, if any, and Making Product Definition according to These Segments**	• Increasing market share with current technology and production competence • Filling the segments where there are no competitors • Increase profitability	1-3 Year (Medium Term)	Micro Investment (<100 Million TL)
	Strategy 3.3. **Developing intra and inter-sectoral cooperation**	Action 3.3.1. **Establishing a Private Virtual Hub for the Agricultural Machinery Industry**	• Increasing cooperation between institutions • Determining Strategic Direction for the Sector • Providing consultancy services to the sector and members	1-3 Year (Medium Term)	Micro Investment (<100 Million TL)
		Action 3.3.2. **Cooperating with Defense, Automotive and Medical Sectors**	• Developing hybrid technologies and products with primarily Defense, Automotive and Medical sectors • Accelerating technological adaptation and staying up-to-date through collaborations to be established with the software industry	1-3 Year (Medium Term)	Mega Investment (>5 Billion TL)
	Strategy 3.4. **Increasing Localization**	Action 3.4.1. **Ensuring the Production of Replacements for Imported CM Sector Engines and Powertrains**	• Reducing dependence on foreign suppliers • Increasing the resilience of the industry against crises	3-10 Years (Long Term)	Mega Investment (>5 Billion TL)

9. TR52 Region Machinery Sector Analysis Summary

TR52 Region Machinery Sector Analysis Summary
THE MOST IMPORTANT STRENGTHS OF TR52 REGION
Strong structuring and export competence in the Agricultural Machinery sector
Companies focused on foreign market, with high export competence
Product development competence with a collaborative approach to design and new parts production
Companies with flexible production capability
Order based production instead of stock keeping
The value given to qualified human resources and its positive effect
Quick response to customer demands, strong adaptability
MAIN STRATEGIES FOR INCREASING INTERNATIONAL COMPETITIVENESS FOR TR52 REGION
Branding and enhancing the country image
Structuring R&D organizations in the region to increase R&D capability of SMEs in developing applications for the industry
Product development in line with the Smart Farming concept
Focusing on competitive products with high added value and high return with Industry 4.0
Providing foreign language, financial literacy and foreign trade training to company owners
Ensuring that customer-oriented innovation is embedded in the company culture
MAIN STRATEGIES FOR INCREASING INTERNATIONAL COMPETITIVENESS FOR TR51 REGION
Increasing the effectiveness and awareness of TURQUM
Increasing participation in the Turquality program, in which CM sector pioneers are included
Providing R&D support to SMEs in the region within a R&D center using the knowledge and HR of regional universities, developing applied R&D studies specific to the sector
Increasing the added value and competitiveness level of the current product portfolio with low competitiveness by focusing on the production of smart agricultural machinery
Implementing technology transfer and training activities to increase added value in products and production with Industry 4.0 and Digitalization
Developing a common software and user interface that will enable the communication of agricultural machinery produced in the region with other suppliers of customers and with each other.
Following up customer demands regularly in a responsibility distributed organization. Reporting and standardizing innovative solutions based on these demands.

10. Conclusion and Evaluation

As the first shock was experienced due the Covid-19 Crisis, the cash flows of companies were disrupted and the policies and practices aimed at solving this problem enabled companies to survive financially. However, the crisis has shown that companies that can react to the crisis and change operationally, much more than surviving, have found new customers and increased their sales during the crisis period. These companies are the ones that respond quickly to customers, realize customer demands with innovation, and easily adapt these innovations to their production and meet customer expectations with new products, these are, companies that are resilient against crisis.

Certain strategies have been developed and policy recommendations have been made in order, for all companies in the sector to gain these characteristics. Moreover, although these strategy and policy suggestions were methods foreseen before the Covid-19 Crisis, the crisis clearly revealed the necessity of these methods in order to catch up with the new industrial revolution.

In the Machinery Sector in the TR52 Region, the projects at hand continued due to previous orders and this enabled the effects of the Covid-19 crisis to be felt after a certain period and has given the region a very valuable extra time. The Covid-19 crisis, which manifested itself in the form of exchange rate fluctuations, logistics problems caused by a slowdown in customs, travel restrictions, problems in the supply of raw materials, caused companies to experience a shortage of cash flow as a result. Although the region has experienced bank limit difficulties and trouble reaching CGF loans, the opportunity to reach a safer point from the crisis has been created with the use of government supports such as “continue to work credit” and short time work allowance. After this initial recovery move, the sector focused on new customers in digital environments to overcome the effects of travel restrictions, and sales to new customers during the crisis period in regional companies reached 40% of their turnover. In short, the project-based works, the presence of stocks at hand, the result-oriented management style and flexibility in production and the rapid and adequate response to new customer demands have been the formula in the TR52 region to ensure resilience to the crisis.

Strategies developed in conjunction with the Covid-19 Crisis and will be developed afterwards should include both innovative and self-renewable solutions and enable local industries to switch from low-medium value-added to high-value-added and efficient production, and make it sustainable.

The machinery sector companies in TR52 Region have a common awareness that supports continuous development and innovation regarding the need for change and the necessary sectoral transformation, as is the case with all Turkish Machinery sector stakeholders. This awareness is the most important reason for the development of the Machinery Sector, which is a strategic sector for our country, to look at the future with hope. Sectoral development, which must be completed and then constantly renewed in acyclic manner, should be supported by professional management and qualified employees via going forward in exports. In order to start or progress in this transformation cycle, it is necessary to manage digital transformation, and ensure the transition to technology-based production with high value addition.

The proposed policies to achieve these goals, short, medium and long-term strategies, sub-strategies and actions under sub-strategies are shared in the relevant sections. Actions within the sub-strategies are arranged in accordance with the industrial structure and requirements of the region specific to TR52 Region.

As a result, in order to complete this transition as soon as possible, the most important Policies and related Strategies proposed for TR52 Region are summarized below. Strategic actions may vary by region and are shared in detail in the relevant section.

Policy Recommendations

1. Increasing Exports

1. Performing efforts to improve the image of Turkey and Turkish goods
2. Support for strengthening the image of Turkish machine brands
3. Supplying low-interest loans from Turkish banks or leasing institutions abroad to foreign customers who will purchase Turkish machinery

2. Decreasing Raw Material Prices

1. Investing in metal sector with products of high added value with advanced engineering knowledge, technology and government support

3. Increasing R&D Structure

1. Continuing to encourage R&D and design centers

4. Directing SMEs to efficiency increasing activities

1. Model factories giving practical lean production training in the workshops of SMEs
2. Promoting result-oriented lean practices and consultancy services on the production line

5. Promoting Environmental Regulations

1. Activating energy efficiency incentives for SMEs
2. Preparing policies for harmonization with the European Green Deal

6. Developing Human Resources

1. Conducting comprehensive training organizations to increase the technical capacity of companies on e-commerce, Export / Import, Management, Human Resources, Market Research, Customer Relationship Management, Purchasing, Marketing and Sales, Digital Marketing, Intellectual Property, Design, Language.
2. Regional differentiation of the coordination between vocational, technical high schools and industry, based on the sub-sector
3. Developing the concept of a "Producing University" and budgeting universities according to their production in areas such as Social, Economic, Cultural, Artistic, Industry, allocating staff and benchmarking the production potential of universities
4. Supporting the training initiatives implemented by the Chamber of Industry and OIZs in the region

Suggested Strategies for TR52 Region

1. Making a Move Towards Branding
2. Fast completion of the transition to operational efficiency and lean production
3. Optimizing operational processes with new technologies
4. Focusing on alternative markets
5. Developing intra and inter-sectoral cooperation
6. Leaving the follower status in technology and producing more innovative products
7. Technology transfer from start-ups
8. Adapting to innovative technologies
9. Establishing a joint after-sales organization abroad
10. Providing financial support for export
11. Development and supporting of export transport
12. Developing innovative production models in accordance with the new regulations

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Annexes

Annex.1 TR52 Machinery Sector Focus Group Participant List

Name/Surname	Organization
Sevda KAYHAN	Kayahan Machinery
Muciz ÖZCAN	Erbakan University
Ahmet ÇELİK	Konya Chamber of Commerce
Cüneyt KOÇER	Konya Chamber of Commerce
Mustafa GÖKAN	Karaman Chamber of Industry and Commerce
Zehra PEKERGİN	Mevlana Development Agency
Halide RASİM	Ministry of Industry and Technology
Onur KARAKURT	UNDP
Arzu KARAASLAN	FSR Project Team Leader
Tamer ÖZTİN	FSR Machinery Sector Specialist
Gürol AK	FSR Makine Sektör Uzmanı

Annex.2 TR52 Machinery Sector Working Group Participant List

Name/Surname	Organization
Ahmet Alıcı	Coordinator / Expert, T.C. Ministry of Industry and Technology
Onur Karakurt	Coordinator / Expert, T.C. Ministry of Industry and Technology
Z. Tuğba Şavli	Investment Support Expert - Ankara Development Agency
Halil İbrahim Ünlü	Expert – İKA
Zehra Betül Pekergin	Expert – MEVKA
Tuğba Purtul	Investment Support Expert – OKA
Arzu Karaarslan Azizoğlu	Inclusive and Sustainable Growth Portfolio Local Socio-Economic Development Specialist, UNDP Turkey
Aslı Aygün	Inclusive and Sustainable Growth Portfolio Project Assistant, UNDP Turkey
Cemre Arcak	Inclusive and Sustainable Growth Portfolio Project Intern, UNDP Turkey
Tamer Öztin	Fragile Sector Analysis Team Leader, UNDP Turkey
Cihat Gök	Fragile Sector Analysis Sector Analyst, UNDP Turkey
Gürol AK	Fragile Sector Analysis Machinery Sector Expert, UNDP

Annex.3 TR52 Machinery Sector Working Group Meeting Schedule

Sector	Date, Meeting Hour
Meeting 1	
Machinery (4 regions)	3 December 2020, 14:00 - 15:30
Meeting2	
Machinery (4 regions)	17 December 2020, 14:00 - 15:30
Meeting 3 (Changed due to New Year)	
Machinery (4 regions)	4 OJanuary 2021, 14:00 - 15:30
Meeting4	
Machinery (4 regions)	14 January2021, 14:00 - 15:30
Meeting 5 (Draft Report)	
Machinery (4 regions)	28 January 2021, 14:00 - 15:30
Meeting 6 (Draft Report)	
Machinery (4 regions)	4 February2021, 14:00 - 15:30
Verification Meeting	
Machinery (4 regions)	18 February 2021, 14:00 - 15:30

COVID-19 Crisis Response
and Resilience Project

MACHINERY SECTOR ANALYSIS REPORT and GUIDELINES

TR52 REGION
(Konya, Karaman)