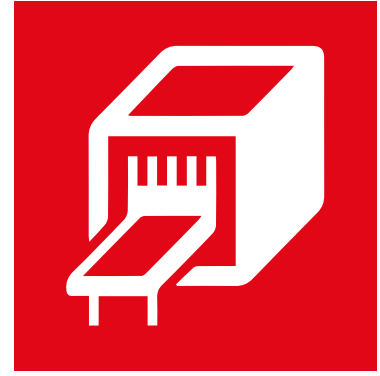




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Turkey Resilience Project in  
Response to the Syria Crisis (TRP)

## Sectoral Roadmaps: Machinery and Metals Sector in Turkey





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Turkey Resilience Project in Response to the Syria Crisis (TRP)

**JOB CREATION COMPONENT**

2020



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## Executive Summary

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Today, the machinery and metals sector in Turkey continues to be the leading sector in terms of the inputs it provides to other sectors, the contributions it makes to their development, the employment opportunities it creates for a qualified workforce, the value-added it generates and the wide industrial networks it builds. The importance of the sector increases every day in parallel with the synergies it creates. When it comes to the use of high technology, the machinery and metals sector creates production models which set an example to others. In general, its high-grade production structure is of vital importance for Turkey's future. The strategic importance of the machinery and metals sector for Turkey derives from the positive contribution it makes in increased efficiency and economic growth.

The cities examined for this study are facing socio-political challenges in terms of the labour market. The main problems of the sector in Gaziantep, Adana, Hatay, Mersin and Kilis include informal employment, limited numbers of qualified workers or the failure of the labour force to meet the needs of companies, and insufficient levels of cooperation among companies, government entities and educational institutions. With human resources becoming a critical factor in competition, sectoral solutions must be generated. On the other hand, the sector's exports consist mostly of low or medium technology products, with lingering deficiencies in market and product diversity.

Strengthening the Information Economy and innovation infrastructure is the key for SMEs to achieve long term competitiveness while offering substantial opportunities for private sector performance and economic growth.

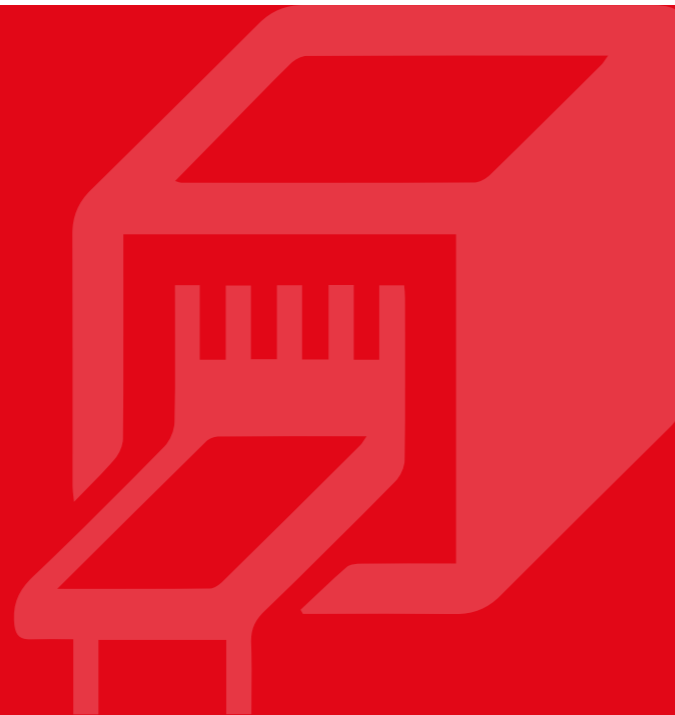
In this sense, it will be difficult for local industries to switch from low value-added production to high value-added production unless innovative strategies are developed. Encouragingly, companies in the study area share awareness of the need for change and require sectoral transformation. Sectoral development could be achieved through export-oriented production with the support of determined management and qualified employees. To this end, digital transformation must be managed and the transition to high value-added, technology-based production must be ensured.

This report aims to explain the existing challenges faced by companies based on the results of the meetings organised in the study provinces, surveys and desk-top studies. It also aims to view the sector from a strategic and operational perspective to develop recommendations, strategies and action plans by providing information about sectoral trends and changes. This version contains only a brief summary of the original report.



## Overview of the Machinery and Metals Sector

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### 2.1. Current Situation of the Sector in Turkey

Manufacturing industry is the most important branch of industry in Turkey, accounting for 84% of the total production. The largest sectors in manufacturing industry are as follows: food products (16% of total production); basic metals (11%); motor vehicles, trailers and semitrailers (9%); textiles (8%); other non-metallic mineral products (6%); rubber and plastic products (5%); chemicals and chemical products (5%); electrical equipment (5%); apparel (5%), and manufactured metal products (5%).<sup>1</sup>

**The machinery and metals sector** plays an important role in the Turkish economy through its contributions to R&D, the development of new products and its relatively high efficiency. The sector is also very important due to its innovative and technology-based structure, which is reflected in the utilisation of advanced technology in production processes as well as in the development of new models. The machinery and metals sector comprises the manufacturing of metal products and the production of machinery and mechanical equipment.

At present, nearly **150,000 people** are employed by some **31,000 workplaces** in the iron and steel sector. The metals sector is indispensable for many countries as it provides inputs for many sectors headed by the automotive, defence, construction and energy sectors. The metals sector in Turkey has successfully diversified its markets and is reducing its dependence on foreign countries for casting.

The sector has seen positive developments since 2011. In 2017, Turkey was ranked eighth in the world in iron and steel production with **37.5 million tonnes**.<sup>2</sup> There was a slight decrease in production in January-November 2018, when total production was 34.4 million tonnes. According to an analysis by the Turkish Steel Exporters' Association, production costs increased in 2019 due to high raw material prices while domestic demand declined.

Particularly due to the fall in steel consumption in the automotive, home appliances and construction sectors and the decrease in domestic market demand, Turkish iron and steel manufacturers have concentrated on exports. Turkey's exports increased by 40% in 2018 compared to 2017. The economic recovery experienced in Europe in recent years has had positive impacts on the metals sector since Europe constitutes the primary market for Turkish exports. Although they are not included in the top 20 export markets of Turkey, there has also been an increase in exports, particularly of construction materials, to Qatar and Iran. Turkish exports to the USA have been affected negatively in recent years by the protectionist policy measures adopted by the USA and thus there has been a significant decrease in metal industry exports to the USA. On the other hand, Turkey's exports to MENA countries and the EU have been stable.

The Exports Strategy for Turkey 2023 targets total exports of USD 500 billion, of which 11% (USD 55 billion) is expected to come from the steel industry.<sup>3</sup> However, Turkey's dependence on imports still continues, particularly for flat products and scrap products. Moreover, Turkey's existing factories are not

<sup>1</sup> Koç Erdem, Şenel Can Mahmut, Kaya Kadir, "Türkiye'de Sanayi Sektörünün Genel Durumu-Sanayi Ciro Endeksi" [General State of the Industrial Sector in Turkey - Industry Turnover Index], Makina Mühendisleri Odası, Compiled Article, vol 59, issue 692, .17-34, 2018

<sup>2</sup> "Sektörler İlgili 2018 Beklentileri"[2018 Expectations for Sectors], Department of Economic Research, İş Bankası Yayınları, 2018

<sup>3</sup> General Directorate of Exports, Department of Extraction, Metal and Forestry Products, "DEMİR-ÇELİK, DEMİR-ÇELİKTE EŞYA SEKTÖR RAPORU" [IRON AND STEEL, IRON AND STEEL PRODUCTS SECTOR REPORT], 2018

producing sufficient amounts of raw steel. Due to the depreciation in the value of the Turkish Lira, imported goods have become more expensive. Nonetheless, there is a clear need for Turkey to invest more in R&D for ore extraction and processing. Russia is Turkey's largest metal materials supplier, meeting 17.8% of Turkey's entire needs for iron and steel. Despite its strict policies, the USA is Turkey's second largest supplier of raw materials.

The Turkish steel industry has recorded stable growth since 2001. Manufacturers using raw steel appear to be clustered mainly in the Mediterranean, Aegean, Marmara and Black Sea regions. Stainless steel and steel are the most important strategic inputs for the machinery and equipment industry. The total cost of these strategic inputs constitutes approximately 44 per cent of the total raw material costs in the sector. Turkey has recently started to import even more scrap metal than China, which is the largest iron and steel manufacturer in the world. In 2017 Turkey purchased 21 million tonnes of scrap metals from abroad with an annual increase of 18.4%, equivalent to nearly 75% of the increase in demand for steel in the country. In fact, the 17% increase in scrap steel consumption in Turkey, to 30.3 million tonnes, was higher than the increase in domestic raw steel production, which rose by 13.1%. The main scrap metal suppliers of Turkey are the USA (3,798 million tonnes - 16.5% increase) and the United Kingdom (3.18 million tonnes - 22% increase).<sup>4</sup>

This dependence on scrap metal imports reflects the structure of the iron and steel sector. Only 22% of iron and steel production takes place in ore-based facilities. The remaining 78% of production is based on scrap iron and steel. In other words, 78% of the iron and steel produced in Turkey is produced in electric arc furnaces, where scrap iron and steel is melted down using high electrical energy. IoT is for this reason that scrap metals are the largest item in intermediate imports. The depreciation of the Turkish lira against the US dollar in recent years has resulted in an increase in the prices of raw materials, especially scrap metals, and hence increased costs for the steel industry. Solving this problem requires the involvement of all stakeholders of the sector. The

cost of the required transformation is estimated to be around USD 1 billion. Given that no company in the private sector can invest this amount, and that ore-based facilities such as Erdemir and İsdemir were initially founded by the state, such a transformation is only likely to be achieved, and import bills for ore-based production lowered, through state incentives and support.

While facilitating domestic scrap collection activities and establishing scrap metal collection centres could provide the sector with some support, a more comprehensive transformation seems possible through incentives and state support. Incentives could be used to improve the conditions for integrated facilities using ore. They could also be employed to enable Turkish iron and steel manufacturers to integrate vertically and produce raw materials for their own use, like the world's largest iron and steel manufacturers. Long term profitability and sustainability can only be achieved in this way. In its current state, the iron and steel sector is one of the sectors with the biggest external deficits. The resulting increase in steel prices also leads to cost pressures in sectors such as machinery and equipment. Since the machinery and metals sectors produce finished components and goods which feed into the supply chains for all areas of manufacturing industry, there is a close relationship between them.



Meanwhile, **machinery production** is one of the key factors behind the growth of the Turkish economy and a major driver of industrialisation. Turkey is the sixth largest machinery manufacturer in Europe and 80% of the sector is comprised of small and medium-scale enterprises (SMEs) with fewer than 20 employees. Turkey has increased its export/import ratio from 30% to 45% since 2003 and more than 60% of machinery exports are realized by small and medium enterprises. Turkey has doubled its production in the machinery sector in 10 years and is currently exporting to more than 200 countries, including free zones.

According to a study carried out by the Turkish Machinery Federation (MAKFED) in 2018, the machinery sector in Turkey increased its turnover by 28.3% in 2017 and was worth TRY 77.4 billion. Correspondingly, the workforce in the sector increased from 153,000 people in 2010 to 220,000 people in 2017. The machinery sector has a prominent place in the Turkish economy as it creates employment opportunities for 220,000 people, representing 5% of all employment in manufacturing industry. The number of people employed in the machinery sector increased by 44.7% between 2010 and 2017.

Capacity utilisation was more than 75% in the machinery sector in 2017, and increased to 80% in 2018. According to the MAKFED study, production increased by 27% in 2017 while there was an increase of 3.8% in value-added products and the value of production. On the other hand, as a result of the economic slowdown, production fell by 10.63% in 2018.

Turkey's machinery exports were worth USD 168 billion in 2018. The machinery sector accounted for 10.2% of total exports. The machinery and machinery parts sector ranks second in Turkey's exports after motorised land vehicles. The export to import ratio in the Turkish machinery sector increased from 27% in 2001 to 64.1% in 2018.<sup>5</sup>

According to data from the Machinery Exporters' Association and Trademap, the total exports of the machinery and equipment sector were worth USD 15.8 million in 2018, an increase of 14.5% compared to

2017. The increase in 2018 compared to 2017 appears to have covered all product groups. Turkey's main markets for machinery and equipment appear to be the USA, the UK and European countries. Germany is the largest single market for Turkish exports, worth USD 2.4 million. Reflecting their position in the global market for machinery and equipment, Germany and China are the countries with the highest exports to Turkey. China's competitiveness in exports comes from its employment of a low-cost labour force, while Germany and Italy supply Turkey mostly with R&D and information-based exports. There are more than 11,000 companies in the Turkish machinery sector which are capable of competing at the international level. As noted above, small and medium-scale enterprises account for more than 60% of machinery exports. With respect to R&D, the budgets and investments which companies allocate for R&D are increasing gradually. R&D expenditure rose from TRY 567 million in 2016 to TRY 735 million in 2017 – and increase of 30%.

In summary, the machinery and metals sectors are among the main drivers of growth for the Turkish economy. The metals sector impacts the machinery and equipment sector, to which it provides inputs, via the changing prices of iron and steel. Both sectors are also important for the development of industry in general due to their capacity to provide inputs to important sectors such as food, automotive, construction, textiles, energy, agriculture and extractive industries.<sup>6</sup> An examination of the top 20 industrial enterprises in Turkey reveals that the majority of them operate in the automotive and machinery and metals sectors.

The efficiency of the machinery and equipment sector can be increased by investing in and developing machine tools/instruments which are likely to create a competitive advantage. The term "machine tools" refers to the various machines that are used to cut and work metals so as to produce the components which are then installed in engineering products. Put simply, machine tools are "machines producing machines". They therefore constitute the core of the industry and an important focus of efforts for the sector to perform better.

<sup>4</sup> World Steel Recycling in Figures Report 2013 – 2017

<sup>5</sup> Association of Turkish Machine Manufacturers, Machine Exporters' Association

<sup>6</sup> Koç Erdem, Şenel Can Mahmut, Kaya Kadir, "Türkiye'de Sanayi Sektörünün Genel Durumu-Sanayi Ciro Endeksi" [General State of the Industrial Sector in Turkey - Industry Turnover Index], Makina Mühendisleri Odası, Compiled Article, volume 59, issue 692, .17-34, 2018

The sectors which use machine tools/instruments are strategic sectors such as automotive, defence, agriculture, steel, machinery, energy and aerospace. These strategic sectors can only develop in conjunction with a strong machine tools/instruments industry. Turkey's exports of machine tools/instruments (excluding other equipment) increased from USD 491 million in 2017 to USD 584 million in 2018. Although Turkey has a significant position among the 27 manufacturing countries in the machine tools/instruments sector, there are no Turkish companies among the world's top 100 machinery equipment companies. The value of machinery equipment imports for 2018 was USD 995 million, creating a trade deficit of USD 411 million and directly impacting other sectors as well.

## 2.2 Outcomes of Discussions with the Sector Representatives in Turkey

The project experts used various techniques including face-to-face interviews, questionnaires, focus group meetings and analyses of existing reports and records to produce the data for this section.

The machinery and equipment sector accounts for 15% of manufacturing industry in Gaziantep, 17% in Adana, 16% in Hatay and 32% in the Mersin-Tarsus industrial zone. All of the representatives of the sector in all these provinces appear to be highly aware of the importance of moving towards innovative production with higher value-added.

The machinery and equipment sector is the industrial sector with the most advanced technology in the region. Sector representatives compete against leading global companies. The ability to compete at such a high level stems from the fact that the representatives of the machinery and equipment sector in the region are responsive to the demands and requests of their customers and do their utmost to make changes in their products and services accordingly. They are more customer-focused than their leading competitors in the world. By following this path, they have not only managed to manufacture products which are of the same quality as those of their competitors – if not better – and which take up less space and are more economical and environment-friendly; they have also achieved a level of flexibility

that enables them to process the requests and resolve the problems of customers around the world as quickly as possible through after-sale preventive maintenance and remote access facilities as well as an amenable product range.

Even though the machinery and metals sector is well developed, offering competitive prices and customer-focused products, a new range of products needs to be developed with a focus on branding, R&D and national and international awareness. A low degree of corporate institutionalisation was observed among the companies in the project provinces, whether or not they are family-owned. Although the companies are undergoing transition, they still definitely need support and direction to move forward.

It is a fact that the development of the machinery industry depends mostly on the development of other industries. However, although customers are now able to access all the necessary information about the products, most companies are aware that they are at a competitive disadvantage because they are not global players with unrivalled products or manufacturers of niche products.

Of the companies surveyed, 47% stated that they had the technological infrastructure required to compete on international markets. However, they are not capable of developing R&D projects and products which employ new technology, or brand-new systems, from zero. This indicates that the sector is currently not producing any new products and trails in this respect. Moreover, these companies struggle to achieve a strong brand image, with implications for their prices and competitiveness.

As many as 60% of the companies interviewed have started to implement Industry 4.0 practices. These practices generally involve the adaptation of technologies which ensure remote access to the machines they manufacture. There are no Industry 4.0 practices in place in these companies yet when it comes to their manufacturing processes. Concepts related to Industry 4.0 include efficiency, quality, safety, economic growth, manageability and employment. The advantages of Industry 4.0 practices include the ability to track the system from inputs to the final product, facilitating diagnosis, the self-awareness of the system and its components, the sustainability of the resource savings system, greater efficiency, increasing flexibility, reduced costs and the

development of new services and business models for companies. Companies aspiring to achieve these advantages are aware of this situation and would like to adapt faster. As mentioned below under “Future Scenarios”, it is vital for the competitiveness of the sector that it develops in terms of Industry 4.0 in the years ahead. Companies need new investment planning in the field of technology and guidance to identify the new technologies they need.

While the companies claim to have high levels of automation, none of them were found to be fully automated. As discussed above, this indicates that the infrastructure for Industry 4.0 is not ready, and that without new investment but there only exists sufficient infrastructure to allow the increased use of simple practices. In this context, companies must first understand and identify the technologies they really need, and invest in them only once they have acquired sufficient knowledge and competencies to make efficient use of them, rather than invest in fashionable technologies which will not create any value-added.

Companies have limited relations with other institutions in the region. Relationships with universities are particularly important since the Technology Transfer Offices established at university science parks in Gaziantep, Mersin, Adana and Hatay are the main suppliers of technology development and R&D activities. Companies may also benefit from collaboration with the University-Industry Cooperation Units of the universities.

As for human resources, most companies believe that their existing workforce is adequate to compete on the market, but they also express the need for a better qualified workforce if they are to develop further. It was also observed that efficiency-oriented and problem-solving employees could facilitate the process of increasing efficiency and cohesion. The problem of not being able to find qualified employees is not a problem to be resolved in the short term. However, the effects of this problem may be minimized at company level by implementing internal or external internship programmes and ensuring that human resources departments are established in Organised Industrial Zones (OIZs) or that the company itself monitors potential job candidates closely.

While companies did not display any prejudice against refugees, they pointed to a substantial need

for their social integration, since they often have difficulties adapting to the working environment due to barriers such as language, traditions and regulations. With Turkey facing tougher economic conditions in 2019, efforts to reduce costs have had an impact on employment decisions. Companies' state that qualified refugees could provide a good option for the sector to reduce costs and that companies will be more willing to employ refugees, provided their skills and qualifications correspond to their needs.

The machinery and equipment companies in the region are at a disadvantage in terms of quality/price ratios when compared to their competitors, which own leading global brands. They are expected to sell products of the same or better quality for lower prices. In practice, however, they are not even capable of selling products of higher quality or superior properties for the same price. The main reasons given for this are issues related to brand and country image. A secondary reason is the companies' inability to offer attractive sales financing alternatives like the competition does.

Although 80% of the SMEs in the region have sales and marketing departments and use marketing channels, marketing is done randomly, and few companies in the sector have developed marketing and sales strategies. Instead of understanding and implementing modern marketing techniques and product marketing strategies which highlight the properties of the product and the brand, companies compete only over product prices. It is clear that product costs, cost analyses and efficiency activities are very significant for the companies at present, but no comprehensive, detailed and/or systematic efforts to improve efficiency were observed at the companies either: only some companies were found to be engaged in discrete, non-systematic activities for increasing their efficiency. Some manufacturers complained that they fail in selling products of higher quality at lower prices. Since even investors located in the region often decide against local products, despite their low prices and high quality, it is obvious that the existing low-price strategy is being defeated by the strong competition. The sales financing and credits offered by competitors, mostly from abroad, are a major factor in decisions not to purchase locally. This is an area in which Turkish companies fail to compete. Turkish companies could become more competitive by offering sales financing alternatives to potential investors. These developed financial

products need to be defined in the financial system and made readily available to all SMEs.

In summary, all the companies interviewed aim to export and penetrate new markets in order to reduce commercial risks, increase their financial strength and overcome the recession in the domestic market. This is what will drive them to become more customer-oriented through more R&D investments and product development strategies. The main specific needs of the sector in the selected provinces are: access to financing in order to enter new markets, gain new customers and become more competitive; the adoption of new technologies; clear marketing and branding strategies, and the ability to bring together a qualified workforce. Other prominent needs appear to relate to favourable financial market regulations, financial options for potential customers/investors, suitable advanced incentive mechanisms, and cooperation in the sector.

### 2.3. Current Situation and Latest Trends in the Regional and International Markets

The machinery and metals industries are of vital importance for driving change in the Turkish economy. These sectors contribute greatly to employment and productivity, as has already been demonstrated statistically. In addition, there is a general tendency in the machinery and metals sectors towards achieving high quality production.

In Turkey, the machinery sector and R&D-based investments have been designated priority investments and companies are able to benefit from various incentives. Dependence on imports is one of the main problems of the machinery and metals industry. Machinery and equipment are among the six prioritised sectors in the New Economic Programme of Turkey. According to this programme, cooperation models will be developed which are based on domestic production and follow good practices around the world with the aim of reducing dependence on imports and increasing exports. In order to support exports, there are plans to increase the resources available to Eximbank and the number of its branches. Eximbank will also continue to provide support to contractors through

cash credits, export credit insurance and guarantee facilities.

The Roadmap for the Digital Transformation of Manufacturing Industry 2018 envisages identifying the digital technologies which will provide speed, efficiency, flexibility and improved quality in the production processes and business models of the manufacturing industry, and then supporting their adoption for the digital transformation needed to create increased value-added.

Nearly one third of the machine tools across the world are sold to the automotive sector and related sectors. Another one third is sold to companies operating in the machinery sector. Over the last decade, enterprises in Turkey have focused on specially developed and manufactured custom-made parts and tools. In such cases, which put the manufacturer and buyer in a close relationship, joint engineering work should be carried out to generate designs which meet the special needs in question.

While the R&D expenditure rate in the 2017 budgets of the universities in Turkey was set at 40%, which is a lot higher compared to other countries such as Sweden, South Korea and Japan where the R&D rate is a lot lower, the share of R&D in GNP is a lot higher in those countries compared to Turkey. This contrast supports the view that the studies undertaken at Turkish universities are too theoretical to be implemented in practice and such studies cannot be utilised in industry. Turkey should enhance cooperation between universities and industry to increase the effectiveness of R&D practices. Thereby, R&D activities undertaken by universities will not remain theoretical and will be more amenable to integration with industrial activities.

#### 2.3.1. Global Sector Trends

In World Investment Report 2018, UNCTAD, emphasises the themes of Technical Capabilities Development, Innovation in Production, the Learning Economy, the Sustainable Development Goals, Public-Private Knowledge/Technology Development Institutions, the Acquisition of Foreign Technology and Industrial Transformation as the latest trends in industrial policies.



In PWC's Industrial Manufacturing Trends Report for 2018, it is foreseen that a significant portion of new sales for industrial equipment manufacturers in the immediate future will come from connected equipment with sensors, actuators, and analytical insights that can exchange critical data with other machines and computer networks in real time via the cloud.

Moreover, additive manufacturing, which uses 3D printing, is rapidly catching on and transforming business models in the industrial world. This less wasteful and more efficient new production approach is rewriting the book for manufacturing and industry on minimum stock levels and warehousing, plant location and design, and spare parts and their maintenance.

The global trends in the sector can be categorised as follows:

#### *Gradually Increasing International Competition*

In recent years, especially due to the impact of developing countries, there has been a gradual increase in international competition in the sector. For instance, products such as fixing materials (screws, fasteners, clamps etc.) and valves have been particularly affected by the increase in international competition.

#### *Implementing Medium and Long Term Plans to Increase Competitiveness*

Increased international competition has led to countries putting plans to increase competitiveness into practice. Competitiveness through standard machinery production is on the decline. Therefore, countries are compelled to achieve technology and quality enhancements in their products and services and develop new strategies to increase the value-added of their product groups (for example, by shortening delivery schedules for their orders).

#### *Technological Advances*

Another factor in modern industrial policies is digital transformation, the improvement of internet connection infrastructure and the wider adoption of information and communication technologies (ICT) by companies. Information technology has provided opportunities for increasing efficiency in all sectors and creating new sectors. It has changed the field from one in which industrial policies were the only focus of manufacturing to one which incorporates neighbouring service industries. Moreover, technological advances have also resulted in an increase in the qualifications of professional profiles employed by these companies. Information technology has long been integrated into the various functions of companies (management, production, marketing etc.). Digital and computer-based controls and full automation in production systems are also on the rise along with a growing tendency towards Industry 4.0. More and more countries are adopting policies clearly connected to the New Information Revolution - such as implementing new digital technologies, advanced robotic systems, and 3D printing, and using big data and the Internet of Things in manufacturer supply chains<sup>7</sup>.

Technological advances are also affecting production processes in terms of quality, efficiency and increasing workplace safety. Innovation has affected the manufacturing of metal products by steering some traditional companies towards precision machining and made-to-order engineering work. As for machinery production, it has enabled smaller companies using lower level technology to approach the technological level of certain large companies by combining technologies such as mechanics, microelectronics, computers, optics and sensors. Product innovation is important for the development of businesses through the implementation of differentiation strategies. Companies may develop

<sup>7</sup> UNCTAD World Investment Report 2018



a vision that includes allocating a budget for the development of solutions for making the R&D departments of all companies in the sector stronger and more competitive and enabling them to access R&D more easily.

### *Increased Tendency Towards Outsourcing*

There is an increased tendency to direct some production activities towards suppliers with the aim of increasing flexibility. It is quite common in the machinery industry for workshop jobs involving the production and processing of casting and machining parts to be procured from suppliers.

### *Internationalisation*

In recent years, there has been an increase in the number of companies in the sector which are focused on foreign markets, either as exporters or by establishing production or sales units abroad. The advantage of high internationalisation for companies is that it puts them in a better position to recover well from the negative effects of any crisis. Exports constitute the most important dimension of internationalisation in the manufacture of machinery and mechanical equipment and metal products, and has provided companies with a safe haven during national and regional crises.

### *Customer-Oriented Production*

In the globalised world of today, buyers are able to access information on benchmark prices and technical specifications very easily. In order to be competitive, sellers or manufacturers must therefore listen to customer feedback and rapidly implement solutions based on the needs of the customers. As a result, there has been an increase in the tendency towards tailor-made manufacturing based on the expectations of customers with the goal of achieving differentiation.

Lately, there has been an increase in mergers and acquisitions, particularly in the machinery and equipment sector in the European Union. One reason for this is that companies are seeking to structure themselves in such a way as to achieve market dominance by being able to offer whole production lines rather than selling individual machines.

Chinese companies in the sector have sought to acquire machinery manufacturers located in the EU which own brands and advanced technology in order to achieve a competitive advantage.

### *New Production Forms*

Digital Production is the use of an integrated and computer-based system which involves the simultaneous utilisation of simulation, 3D visualisation and various analytical and cooperation tools to create product and production process definitions. Digital production has been developed through producibility design (PD), computer integrated manufacturing (CIM), flexible production, lean production and many other cooperative production initiatives which assist product and process design and are still in the process of being developed and shaped.

Production in the global machinery sector is currently shifting away from SMEs towards large companies. One of the main reasons for this is the need for an R&D budget, which is crucial for being innovative and competitive. Due to their competencies in this area, large companies hold a great share of the machinery production market in countries such as Germany, the USA, Japan and China.

The maintenance of machines is as an important area which all manufacturing companies need to address. Manufacturing companies generally plan their maintenance activities based on time periods or in line with criteria such as hours of operation or number of products processed. The use of systems which monitor the condition of machinery as it works, so as to avoid the need for unplanned maintenance, has become a significant factor affecting competitiveness. Infrastructure may also be established for predictive maintenance, which involves generating a large amount of data and monitoring the operations of machines via sensors.

### *2.3.2 Future Scenarios*

China, the USA, India and Japan are expected to maintain their leading positions in the sector until 2021, while Turkey is expected to register a slight increase in its standing, along with other developing countries.

Examining supply and demand, as well as developing global trends, there appears to be a comparative advantage in the machinery exports of developing countries. Therefore, the majority of growth between now and 2020 is expected to originate from developing countries.

Due to the increased use of new generation technologies and the spread of Industry 4.0, there will be an increase in demand for qualified human resources and professional profiles. Industrial engineers with specific experience in mechatronics and a knowledge of metal behaviours as well as competencies in electronics and IT are expected to be in high demand. Project management knowledge will become an essential requisite for managerial positions in fields such as manufacturing and R&D.

Companies will need to act together to become more competitive under the new economic conditions.

Digital transformation and the transition to Industry 4.0 are occurring in parallel with the transformation in the machinery industry. As a result of Industry 4.0, digital and smart machines, the Internet of Things, new materials and sustainability have all become parts of the transformation. During this process, the information and communication technologies of the machinery industry have become intertwined with the electronics and machinery disciplines and industries. The fourth industrial revolution will redefine all processes and business models including product development processes. The competitiveness of the machinery industry is no longer to be measured on the basis of the capabilities of the machinery industry alone. Moreover, the development of the machinery industry will only be possible through the development of other sectors with which it has increased mutual interaction.

The globalisation of jobs increasingly requires SMEs to join global value chains through various types of cross-border activities. It is important for SMEs to seize the opportunities

offered by this process to improve access to global markets. In return, access to global markets will potentially help SMEs grow quicker.

While the terms Industry 4.0 and smart factory are frequently used for new-generation manufacturing systems, the foundations for the such systems have been laid by the development of information technologies. It is essential for establishments wishing to maintain their competitiveness to make use of these technological advances to solve existing problems and to provide services to their customers in new ways.

Process integration is quite difficult due to the unique characteristics of each company, with their varying technologies, interfaces, standards and methods. Integrating customer feedback or customisation directly into the manufacturing process will help to improve products and raise customer satisfaction. Access to real-time data in production is crucial for ensuring the operational efficiency of machinery and the quality of processes and products. In the future, factories will benefit from the real-time exchange of data between enterprise resource planning (ERP) and production lines and achieve a level of integration which will make it possible to make decisions based on real-time data at the production level and vice versa. Data collected from machines and work processes will be filtered, analysed and submitted to decision makers in the necessary format to facilitate better process control and to optimise and reduce costs.

With respect to human resources, lean production techniques and increased automation will increase the qualifications required, both in terms of general skills and in terms of technical skills in all occupations.

It is important for companies in the sector to cooperate with institutions which generate information on technological innovations and R&D and which support international integration in order to become more competitive and to acquire the capacity to make strategic plans for the future.



## Strategies and Action Plan

3

### 3.1 How to Achieve the Required Transformation in the Sector

In the metals sector, the steps which need to be taken to accelerate the transition to products with high value-added and improve the existing capacity, as well as eliminating legislative barriers to better achieve the goals of the Eleventh Development Plan (2019-2023) of the Ministry of Development still apply. With the largest share in the global steel production, China's production is 14 times that of Turkey. Considering the dominance of China in recent years, Turkey needs to act to maintain and improve its current position in the steel industry. Non-competitive production costs and low value creation have caused a loss of competitiveness.

Inputs in the steel sector are generally provided by importers or traders who directly affect 50% of the price on the margin. The established strength of the steel sector is still not being utilised effectively in Turkey. Although Turkey produces 37 million tonnes of molten steel every year, only 5% of this amount is turned into solid steel which is then sold on the market by three or four large companies. Turkey imports half of its scrap metals from the USA and Russia and has become the largest buyer in the world. Moreover, the country has no impact

on prices in the scrap metal market, and has very limited powers as a buyer. There is no unity among the companies, and individual Turkish companies in the metals sector are incapable of making contracts for scrap through bulk purchases.

As for the machine and equipment industry, the creation of value-added in the industry is lower than the EU average. This indicates that companies must act to create additional value and increase productivity if they are to become more competitive. According to data from the Development Bank of Turkey, the dependence of machinery manufacturers on imported inputs is between 25% and 50%, depending on the technological level of the product. Moreover, the largest share of cost allocation management in the sector is devoted to human resources. Compared to machinery and equipment sector companies in rival countries, the companies in the project provinces, and companies in Turkey at large, struggle with greater deficiencies of key inputs. The high costs of key inputs such as energy, raw materials and intermediate products significantly affect their competitiveness.

At present, companies located in Asia and the Far East compete well in low-technology machine parts with relatively reasonable prices. However, when it comes to medium, medium-high and high technology machine parts that require new technologies,

innovation and R&D, Germany, Japan and the USA enjoy a certain superiority. Small companies with relatively low turnovers are usually unable to cover the costs to be allocated for this purpose. Large companies in the countries mentioned have adequate human resources to engage in R&D, innovation, design and technology development. In the European Union, except for Germany, and in the selected provinces in Turkey, the sector consists mostly of small or medium-scale enterprises. However, there are larger companies in Japan, China and the USA, which are more geared more towards mass production. On the other hand, manufacturers in Europe and Turkey have the advantage of producing machines which are specially designed and manufactured according to customer requirements. As for labour costs, Turkey has an advantage, but this advantage only applies over companies from China or the Far East and where the same product groups are produced. SMEs therefore need to engage in, locate or purchase R&D activities which will enable them to develop new products. SMEs in the project region, as well as the rest of the country, are unable to cover the costs of R&D activities since they do not have enough financial resources, and their human resources budgets are not large enough, to employ and finance competent and qualified engineers and technicians.

The interview results show that domestic demand is not constant enough to permit the companies to engage in mass production. Consequently, full automation will not be achieved. This situation encourages companies to manufacture machines which are customised for the market by implementing soft changes on existing machines. There is a need for internationalisation in the project provinces. There is also a need to build capacity among the industries in the region to determine potential exports and exporters. Companies need to follow the global trends in their sector – in products, technology, services etc. - in order to be able to compete internationally. Systems should be developed to predict market demand and shifts in demand should be monitored continuously.

Computers and computer technologies can make great contributions to efficiency in the sector. The use of Industrial Digital Technologies such as ERP, Big Data, Cloud Technologies, the Internet of Things (IoT), Artificial Intelligence, Cyber Security Technologies and vertical and horizontal integration technologies is limited in the project region. Some companies which are in the process of transforming

are utilising some Industrial Digital Technologies, but advanced manufacturing technologies such as Cyber and Physical Systems, Robotics, Smart and Flexible Automation Systems and Additive Manufacturing (3D Printing) are used less frequently.

The companies in the region generally use their internal resources and their own funds for financing and investment activities. Bank credit is used very rarely. Although awareness of grants and incentives in the region is high, they are not used as much as might be expected due to bureaucratic barriers.

Financing is important for all sectors but is particularly important for the machinery and equipment industry. In some countries, lack of capital constitutes a major limitation on access to new technologies, investments in technology, R&D investments and the ability to produce new technologies. Low levels of access to financing directly affect competition. In most cases, local machinery manufacturers require their customers to provide an advance payment before approving the order. By contrast, manufacturers in foreign countries are able to provide their customers with long non-payment periods and instalment options, which prevents local companies from competing with them. The credits provided by Eximbank have shorter terms and stricter conditions than those in rival countries.

The competitiveness of the sector in the region is also affected by the lack of a qualified workforce and intermediate personnel. In particular, there is a great need for qualified employees such as operators (millers, sieve operators etc.), welders and CNC operators. While some of the companies interviewed stated that there is a competitive workforce, even these companies said they had difficulty filling certain positions. The industry requires special foundational skills for technicians and engineers and some positions require skills and experience in mechanics, electricity, electronics and informatics/software technologies. The main concern expressed by the companies is that formal education is not designed to meet the workforce needs of the sector. Meanwhile, companies also face unfair competition from the informal economy, which operates without taxation and social security premiums.

Another factor which makes it difficult for small and medium-scale enterprises to complete is the one-person style of management in the region. While there appeared to be a trend towards corporate institutionalisation at some of the companies interviewed, decision-making in SMEs needs to be

devolved among department managers so that they are able to respond to changing market conditions. Personnel reinforcement is still a need for many companies. Establishing a working environment in which every person contributes in line with their own expertise has a positive effect on final decisions. Experience (older) and innovative (younger) thinking may make a great combination. This combination is also important for knowledge transfer, communication among generations, improving together, motivation and synergy.

Gaziantep and Adana in particular are among the important centres in Turkey in terms of manufacturing industry production and capacity. Nevertheless, product diversity and value-added must be enhanced to be able to compete on a global level. Although the machinery and equipment sector of the region produces many products with the potential to produce global brands, the capacity for branding is relatively low. Some companies are not proactive enough in their operations, and there is no serious planning for design and innovation investments. The sector focuses on exports but falls short in the areas of foreign market promotions, e-commerce, branding, servicing, distribution networks and country image. As mentioned during the seminar, companies export but the value created is not proportionate to their production. Branding constitutes one of the major barriers in the industry. The companies interviewed remarked that the country's low-profile image has a great impact on the branding process. Some companies nevertheless succeed in creating powerful brands for foreign markets, but most companies are not capable of using their post-production skills such as marketing and branding to make their products more desirable through marketing strategies.

The machine tools industry deserves particular attention because it has had a great impact on improvements in production efficiency and because it manufactures the machines needed in the sector. It is difficult for other industries to improve without a strong machine tools industry.

There is a need for greater cooperation in the sector. Companies need to act together and become more aware of the importance of relationships among companies, as well as relationships between companies and other institutions. They need to aim for the highest possible benefit through cooperation in order to gain a competitive advantage.

The fact that there are no logistics centres in Gaziantep and Adana, even though their logistics infrastructure is strong when compared to the other provinces, create additional costs for companies. Mersin Port is known as a main export outlet. The improvement of İskenderun Port and the construction of the Dörtyol-Hassa road and tunnel (expected to begin in 2021) will provide a solution.

There are relatively more business development support programmes in the selected provinces, especially in Gaziantep and Adana. Together with the existence of a developed infrastructure, a strong industrial manufacturing base, several Organised Industrial Zones and a number of innovation and design centres and facilities, the growing awareness of the need for R&D, innovation, design and product development is encouraging.

In the machinery and equipment industry, companies in underdeveloped and developing countries may be able to maintain their existence by copying and manufacturing parts for existing machinery and gradually accumulating knowledge about machinery manufacturing, but this does not guarantee that they will be able to protect themselves and secure their presence in competitive markets in the long term.

Due to economic conditions, declining demand, lower profit margins and lack of confidence, companies in the machinery and equipment sector in some provinces have begun to manufacture types of machines which fall outside their areas of expertise as a way of maintaining and managing their cash flow. Some companies initiate short sales for indefinite periods to local and foreign companies/investors in response to the decline in their sales volumes.

Throughout the value chain, there are differences and similarities among companies. Some of the common properties shared by many companies are listed below. These highlight the need for the relevant strategic decisions:

- E** Companies are production-oriented; they prioritise production over other areas of work such as marketing, innovation or digitalisation.
- E** Companies usually prefer to use their own resources for new investments.
- E** The owners are usually involved in almost all processes. As a result, they are focused on

solving day-to-day challenges and postpone medium and long-term planning.

**E** Almost all companies are struggling with workforce problems. All companies complain about the lack of a qualified workforce. Similarly, employees do not find their companies reliable or trust in their performance in the long term. This is not only an issue for the existing companies; it is also a barrier to attracting new local and foreign investors. There is a lack of vision and planning in management. A strategic approach is a must.

**E** Technology-based products are limited and the comparative advantage of the products produced by the machinery and equipment industry is low.

**E** The growth of the machinery and equipment industry depends on the development of other sectors.

**E** Companies focus mainly on costs, and so not see product innovation, market innovation or process innovation as priorities. Products from the project provinces are already being offered in the market with various degrees of success. An innovative approach and innovative products are needed.

**E** Companies neglect important functions of marketing such as business development, vision formation and value creation, and concentrate only on generating sales and a new customer base.

**E** Companies do not pay attention to brand identification and the qualities of a brand which separate it from its competitors.

### 3.2. Recommendations

For the metals industry, production costs should be lowered to the same levels as those pertaining in countries such as Russia, Ukraine and China. Input costs should also be reduced. The sector should be restructured in such a way as to manufacture products with high value-added. R&D should be undertaken to increase the efficiency of these products. For the steel sector, the recovery of local scrap metal needs

to be improved. Bulk purchases would provide a competitive advantage in terms of prices, but this requires cooperation and unity among companies, sectoral bodies and NGOs. While facilitating domestic scrap collection activities and establishing scrap collection centres may help to support the sector, a more comprehensive transformation only seems possible through incentives and state support. Such incentives could be used to improve the conditions for integrated facilities using iron ore. They could also be provided to enable Turkish iron and steel manufacturers to engage in vertical integration and produce their own raw materials, just like large iron and steel manufacturers in other parts of the world. Only by taking this route can long-term profitability and sustainability be achieved.

The metals sector is a sector in which imported inputs are used intensively, raising production costs. Imported semi-processed and processed goods are used in the main metal industry and other manufacturing industries. While it may be cheaper for companies to import such inputs in the short term, it would be possible through a certain investment plan to switch to local manufacturing based on technologies and materials in already existing in Turkey. The investment plans for the local production of processed petrochemical products constitute the first example for such a practice. In the same way, it would also be possible to switch to local production for certain inputs used in the automotive and machinery and equipment sectors. Production costs constitute the most critical problem with respect to this transformation, with energy the most prominent factor.

High quality steel is a strategic product for all countries and an important indicator of a country's economy, industry and level of development. It is an indispensable raw material for automobiles, aeroplanes, submarines, ships, railways, machinery, defence industry products and the energy and healthcare industries. The most valuable property of high quality steel is its high resistance in the engineering process. High quality steel manufacturing is a field which has high value-added and requires advanced engineering knowledge, technology and investment. While Japan, China and India are the top three global steel producers, France, Austria and Japan are the leading countries in high quality steel production, followed by Sweden, the USA and Germany. It would be better for Turkey to focus on producing alloyed flat, stainless, lined and

special steels with high value-added rather than on producing high volumes of iron and steel with lower value-added.

In the iron and steel industry, capacity utilisation is low and profit margins are between 10% and 15%. Solving the raw metal terms of trade issue will require an effort from all parts of the value chain. An infrastructure is needed, supported by energy investments, for extracting ore and enriching it for the needs of the industry. Companies which manage to provide turn-key solutions for their customers, work on a project basis and manage the whole process from feasibility to assembly are less affected by competition but than others, this is not the case for most SMEs.

In the machinery and equipment industry, factors affecting inputs such as the quality of local products, the number and quality of suppliers and dependence on external resources constrain the competitiveness of the sector on international markets.

In order to enhance product quality, lower costs, improve production and distribution, and – most importantly – increase customer satisfaction, strategies involving clustering practices, joint procurement, joint sales and joint production should be considered. There are two ways for companies to increase their value-added. One is to lower the total product cost without changing the product price; the other one is to differentiate the product and increase its brand value. Long-term branding of products can only be achieved through intensive R&D work supported by marketing activities. In conclusion, commercial R&D activities must be increased to achieve a sustainable increase in value-added. In the machinery and equipment industry in particular, it is important to emphasize that lasting branding can only be achieved through technological advances and R&D efforts.

Companies have a great need for cooperation with other companies, public entities, financial institutions, universities and NGOs for digital transformation, value creation and the development of R&D-based innovative products and technologies. The existence of a supportive ecosystem can play a significant role in the success and sustainability of the development process. It is therefore quite important to pursue the possibility of Technology Platforms or sector-specific Advisory Boards as well as Design, R&D or Technology centres.

Nowadays, managers are rarely involved at any state of design work from hand drawings to CAD applications in machinery manufacturing. Work that used to be done on conventional turret lathes and milling machines can also be done on computer-controlled CNC machines with better control and less waste. The machinery manufacturing sector, in particular, is trying to keep up with the digital age by using various kinds of software (ERP, MRP, MRPII etc.) for the purposes of design, manufacturing, production planning and control, and stock management. This demonstrates just how important process improvement is for companies in the sector. Some companies are also using condition monitoring technology on the production line. Condition monitoring technology is widely recognised to be very useful, and does not require a large investment. It consists of sensors that are easily mounted on machines, making it possible to create a database and monitor parameters automatically. The level of machinery malfunctions is indicated on various scales. Condition monitoring does not require any expert personnel and can easily be integrated into the automation system. However, from the point of view of Industry 4.0 practices, if the industry is to achieve digital transformation, condition monitoring should be coupled with lean production techniques and automatic production processes at the company level. As mentioned before, the majority of companies interviewed use enterprise resource planning software and production management systems. In addition, lean production practices should be developed, automation levels should be increased and the level of technology utilised for digital transformation should be improved.

Transforming data to information by using analytical tools is key for the future transformation of the sector. It is important to be able to collect data, to combine them with other relevant data and to analyse them in order to evaluate any problems and defects that need to be addressed. It is even more important to make sure that decisions taken by the company are based on the data and analysis.

In order to increase value-added and enhance competitiveness, companies need to be informed about the benefits of digital practices which increase speed, efficiency and quality. These include integration technologies, Big Data, Cloud Technologies, the Internet of Things (IoT), Artificial Intelligence, Cyber Security Technologies, Cyber and Physical Systems, Robotics, Smart and Flexible Automation

Systems and Additive Manufacturing (3D Printing). With regard to digital technologies, companies may engage in demand prediction and procurement and production planning practices. Companies will also find digital applications for supply management and systematic stock tracking very useful. The use of machinery and workforce performance monitoring systems is relatively common, but the integration of robots into the production system is low and digital technologies for automation and data analytics are not widespread. Only one of the companies issued was making use of CRM. Cross-functional and customer-oriented business strategies would help companies create customer-oriented products and services, and this is very important for their sustainability and competitiveness. For an efficient digital transformation process, the technologies adopted for production processes should be supported by professional management approaches and organisational structures, and new business models should be developed. Rapid changes in production technologies may become critical in terms of competitiveness and therefore companies should invest in new technologies and R&D as a main strategy while at the same time prioritising design and adapting to changes in customer demand in order to differentiate themselves from their competitors. In general, combining software in machine parts, electric-electronics design and technology-based products with enhanced automation and adopting a mechatronics approach may lead to differentiation. An innovative approach is essential, and inevitably needs to be combined with a deep understanding of existing and future markets and customer needs.

R&D efforts create better technologies for providing customers and/or users with greater value-added, convenience and economy to customers – in short, improving the real customer/end user experience. However, in terms of productivity, the key consideration is production performance and the volumes that can be produced with existing inputs. In this respect, technology is not always the main factor. There are other very important variables in the equation which can make it possible for a company with average technology to succeed against the highest technology available.

Among the companies in the machinery sector in the project region, those that possess the most advanced technology are not necessarily the ones which stand to benefit the most from the opportunities provided by productivity enhancement work. Even

if a company were to launch R&D activities today, these would only result in incremental steps towards technological advancement. This characteristic of R&D applies to the sector as a whole. However, in the case of productivity enhancement efforts, positive results may be observed the very next day.

In the light of the above, in order to save time and start to increase productivity immediately, efforts should first be made to enhance the efficiency of SMEs in the region. These efforts should focus on production methodologies, increased efficiency, lower stock levels, enhanced product quality and minimising rejects. These efforts usually fall into the realms of lean production techniques, but they do not include sales and financial coordination, which is a vital issue when examining the life cycles of SMEs. Systems for making SME management more effective, such as Throughput Management and the integration of production, sales and finance parameters, are likely to become more popular in the next few years, since competition is usually stronger on the financing and management sides, except in the case of companies that make special breakthroughs.

Secondly, the region – and the whole of Turkey – needs research centres working on applied R&D, rather than universities. The training and perspectives of academics and industrialists are different, and these differences can prevent them from creating an environment for putting new goods on the market or increasing efficiency. There is a great need for a leap in results-oriented studies. This need can be met by clusters, including implementation-oriented R&D institutions and R&D companies. In this way, even the smallest SMEs would be able to offer constantly developing products and to increase the number of markets where they can offer completely new products, as well as improving their production skills, and discovering new customers and markets from which to procure inputs. This would also automatically increase the larger companies' chances of finding qualified suppliers for larger companies in case of orders requiring high capacity.

Thirdly, the research centres and R&D companies in the clusters may could join forces and cooperate with universities and work on completely new technologies and innovations with a view to greater breakthroughs. Even though the clusters are likely to be formed of small but effective and flexible companies, larger companies with similar previous activity records should be motivated and encouraged

to become a part of them, together with R&D and technology companies, not only for the sake of improvement and innovation based on customer feedback but also to benefit from opportunities for the development of completely new products which may become available as a result of a breakthrough. Clustering will generate different competitive advantages for the different types of companies in the sector, such as medium size exporting companies, competent small companies able to fill gaps in the production capacities of larger companies, R&D companies, small workshops which offer high flexibility and have a high capacity for specialist production, and technology companies. As stated at the seminar, forming clusters on the basis of a vertical hierarchy model is tedious and non-functional. A horizontal, or even circular, hierarchy is called for. In a vertical hierarchy, large companies have the largest share while smaller companies have smaller shares. More universities must join these clusters. An ideal cluster is one that includes different institutional set-ups with different structures, rather than leaving all the work to companies. It is important to remain local and to conduct analysis at the micro level instead of focusing on the macro level. Clustering may fulfil this need.

In order to overcome the problems of low brand and country image, companies in the project region may rely on traditional channels such as participating in the most influential sectoral fairs, visiting companies – an important marketing tool that gives direct access to the target audience – and preparing written materials such as brochures. However, in today's world, websites, portals, blogs and indices provide online advertising opportunities as well as e-mail marketing promotions. The increased use of the Internet and social media in recent years, including e-commerce sites, listing sites, Facebook, Instagram, YouTube, LinkedIn, Twitter etc., has created a new and modern way of communicating. Therefore, in modern awareness strategies, commercial listing sites and social media channels are often chosen as the main tools. Companies should consider marketing activities as an integral part of their business operations and improve their abilities to identify target markets, develop customer-oriented marketing strategies and promote their products through an effective communications strategy. On the other hand, the creation of a better country image cannot be achieved by the efforts of companies alone. Creating and developing the image of Made in Turkey products requires a national policy rather

than individual action. State and public entities should be involved in promoting the image and raising awareness and interest by generating news and identifying publicity channels. It would be the task of these institutions to ensure a regular flow of information by creating strong communication channels and supporting and strengthening selected marketing messages through press bulletins, press kits, press reports, press meetings and media briefings. Meanwhile, companies need to be better informed about brand identity formation and branding, and how these may be combined with effective marketing and communication strategies. As for the internationalisation of companies, there are a number of ways to be involved in international markets. Exporting is the easiest and most flexible method. Licensing is an alternative to direct investment, which may depend on political and economic conditions. When foreign resources are needed and there are state limitations on foreign ownership, or when changes in global markets encourage competitive consolidation, joint ventures, mergers and acquisitions are appropriate, but they require major, game-changing decisions. Direct ownership of foreign branches or subsidiaries is the strongest type of dependency in international businesses and contains the highest risk. On the other hand, strategic alliances are often made to maximise the advantages and opportunities available to more than one company. A strategic alliance is a legal agreement between two or more companies envisaging shared access to their technology, trademark or other assets. A strategic alliance comes into force when two or more companies engage in a relationship by signing a contract to combine their gains and skills. A strategic alliance does not create a new company.

These arrangements allow companies to grow without expanding their companies or incurring higher costs. For the companies in the project area, the most important strategies will be to seek to become exporters in the case of micro- and small-scale companies, and to engage in strategic alliances in the case of medium-scale enterprises.

In general, companies are expected to develop long-term strategies to integrate their organisational activities and to use and allocate resources to reach the goals they have identified. While planning a strategy, it is important to take into account the way in which those affected – competitors, customers, employees and suppliers – may react to the decisions

made by the company. Companies in the region will also need to consider social and economic factors and to undertake risk evaluations as a complementary part of their strategy development. Strategic risk evaluation should be done at the managerial level and the outputs should be treated as a key factor for the development of a suitable business strategy.

In the survey, companies in the machinery industry were asked the reasons why they preferred to use imported inputs. Among the reasons given, 96% of the companies mentioned “the lack of local production”, 72% “quality and continuous supply”, and 45% “lower costs”. Over all sectors, 65% of companies specified “the lack of local production” as the most substantial reason for importing machinery while 19% stated “quality and continuous supply” and 8% stated “lower costs”. The interviews produced the same results. Most machinery manufacturers stated that even local companies preferred to import machines rather than buying them from local companies. Quality concerns and the availability of sales financing were the most prominent reasons. The sector would benefit from capacity building programmes for input manufacturers, analyses of existing input suppliers and the establishment of matching mechanisms.

With respect to financing, machinery manufacturers struggle due to the conditions preventing them from competing. Better cash credits, export credits and collaterals could be arranged for the sector. Relatively larger European competitors offer their buyers two-year non-payment periods and options to pay in instalments over 3- 10 years. In such a market, manufacturers in the region, who are obliged to demand cash payments, will fail to sell any products to investors even for half the price. There is a need to develop financial alternatives to solve this problem. In addition, in order to replace imported machines with local goods, the percentage of state support for local products should be increased and local products should be supported in public procurements.

In addition to competition from imported machines, the companies in the region suffer from unfair competition created by local machine manufacturers who do not comply with technical regulations and Turkish standards. The sector is in need of an audit and control mechanism to check whether the machines produced are compliant with the relevant directives. Considering that competition in the domestic market is so dependent on prices, it is

important to eliminate these barriers to achieve fair market competition.

It will only be possible to take the steps mentioned here and to achieve the intended goals if a qualified workforce is available. When it comes to human resources, companies complain mainly about two challenges: the difficulty of finding qualified employees for certain positions, and the difficulty of retaining them for long periods of time. As the participants at the seminar pointed out, “Employees must earn the wage they deserve.” This statement is very important because there are two sides to the issue. This approach mobilizes both sides. It requires the employer to invest in the employee while also requiring the employee to contribute to the company. The points raised by the companies interviewed can be summed up as follows: To begin with, technical education in Turkey fails to meet the needs of the sectors and needs to be restructured technologically and physically. To this end, a needs assessment should be carried out for technical schools in the region. In this sense, vocational training appears to be the most important way of familiarising candidate employees with production processes, machines and parts. Strengthening the cooperation among companies, universities and vocational schools is another priority. Nevertheless, companies themselves should take an active role in developing human capital. Companies have benefited from the establishment of vocational schools in Organized Industrial Zones in Gaziantep and Tarsus – something that was clearly stated at the seminar. This model should be developed by the authorities as a way of developing human resources to serve the sector better. The sector is unsatisfied with the levels attained by graduates of universities in the region. At the seminar, representatives of the sector strongly recommended reducing student numbers and enhancing the quality.

Since human capital has become a critical factor for competitiveness, labour development programmes will be of key importance for the sector. Educational institutions need to be aware of the requirements of industry, while industries should be more aware of what it takes to motivate their employees and keep them productive. Departments teaching the required subjects could be opened in technical schools, or new technical schools could be established in close coordination with sector representatives. In addition to the development of human resources, considering the sizes of the SMEs in the region, it is important to

emphasize that company owners would also benefit from certain types of development programmes, particularly with respect to strategic planning and visions for the future.

The differentiation strategy mentioned earlier is most suitable for medium and large-scale companies which are better at research and development activities, quality assurance and standardisation. For the small-scale companies, a focus strategy is an option, and customised production may be possible, in some categories. SMEs could cooperate with other companies and institutions for technology adoption and development activities. Technologies can be adopted in several ways – through R&D activities within the company, through cooperation with universities, through R&D cooperation with techno parks, technology transfer offices of other companies, and through company acquisitions. In most cases, it requires strong cooperation among public entities, universities, industry bodies and companies.

While the Government of Turkey already provides incentives and support programmes, the machinery and equipment sector deserves specific attention due to its organic connections with other sectors. Encouraging unlimited sectoral investments in R&D, technology, new product development, human resources and marketing activities would make additional contributions not only to this particular industry but also to the whole Turkish economy.

Public institutions can play a very important role in industrial development if they are willing to take into account the potential of industry and the contribution which it can make to the national economy and to the economy of the provinces where it is located. In conclusion:

**E** The development of the sector in the selected provinces needs to be supported through the provision of services aimed at enhancing competitiveness in national and international markets. Once the precise areas for development have been identified, companies should be provided with capacity building programmes, training and counselling services.

**E** The business services available in the region should be diversified and the technical capacities of companies in areas like e-commerce, exports/imports, management,

human resources, market research, customer relations management, procurement, marketing and sales, digital marketing intellectual property, design and language should be strengthened.

**E** Companies should be encouraged to engage in joint procurement, joint production and joint sales to increase their competitive advantage. The connections among universities, research institutions and the business world should be intensified and they should all be encouraged to create networks and cooperate.

**E** A pioneering role should be assumed, together with other stakeholders, to identify opportunities to improve levels of mechanisation and develop technology.

**E** The state should play an intermediary role in R&D activities, encourage new product development activities and reach out to business networks and similar entities to explore potential opportunities for collaboration.

**E** Companies should be assisted in accessing financial instruments.

**E** The state should assume a pioneering or intermediary role in conducting market research to determine the potential and depth of penetration in each targeted region.

**E** The state should play an active role in developing human capital.

**E** Companies should be assisted in using modern marketing management techniques and establishing brands.

### 3.3 Recommendations for the Sector on Labour Absorption Strategies

Low-income and middle-income countries currently host 65% of all the world’s refugees. The most significant barrier to the integration of the refugees in these countries into the workforce is the shortage of formal employment opportunities for the local population and refugees alike. In most middle-

income countries which host refugees, the lack of a policy framework to provide work permits to refugees creates a barrier to formal employment. In host countries where no such problem exists, there is a visible lack of interest from the private sector in employing refugees formally, due to the difficult economic conditions which prevail. Moreover, without additional job creation, the employment of refugees combined with the lack of any formal or informal policy framework may result in them replacing the local workforce.

Integration into the labour market may be achieved either through policy design or through human interaction. The responses of host countries such as Turkey to the Syria crisis, which is the source of the largest wave of forced migration in the world at present, are gradually evolving away from humanitarian aid towards flexibility-based development. Syrians' participation to the socio-economic life is important not only for the economy but also for social cohesion.

The informal employment of Syrians is very common in all the provinces visited, and particularly in Gaziantep, Kilis and Hatay. It causes wages to fall and results in lower workforce participation in local communities, especially on the part of women and young people. A key analysis on Turkey carried out by the World Bank in 2015 indicates that local people mostly relocate in the informal sector, that formal employment is increasing for unskilled men, and that women and less-educated people are clearly eliminated from the workforce (World Bank, 2015). Regionally, there is a large gender gap in employment rates in the sector. Women also certainly face gender-specific barriers in accessing the labour market. Those currently working in the sector are mostly concentrated in low-skilled and low-paid jobs. At the seminar held in Gaziantep, representatives of the sector stated clearly that woman employees are preferred for their discipline and self-motivation. This shows that women's participation can be increased provided their skills are aligned with market demand.

There are some negative attitudes towards Syrian refugees in the project provinces. This is due to economic factors such as the increase in housing rents in urban areas and the decline in wages at a time of economic stagnation. As the best way of

defusing the tension, the government, national and international NGOs and the international community should seek to involve refugees in formal economic activities. The majority of the Syrian population is working in low-skilled jobs in the fields of seasonal agriculture, textiles, construction and manufacturing. As of January 31st 2019, there were 3.6 million Syrian citizens and approximately 400,000 registered refugees and asylum seekers from other countries in Turkey. There are approximately 788,000 Syrian refugees in the 15-24 age group. While Gaziantep hosts 450,000 refugees, equivalent to 21.76% of the local population, there are 105,000 refugees in Kilis, which is equal to 74% of the local population. There are 252,000 refugees in Adana, 434,000 in Hatay and 222,000 in Mersin.

As of 13<sup>th</sup> January 2021, 58,687 Syrians are living in Temporary Accommodation Centers (camps). The remainder of the refugees live in the cities where they struggle with difficult living conditions and work in the informal economy for very low pay. The work permit regulation has had a very limited impact on the access of Syrian refugees to the labour market: a total of 132,497 work permits have been issued to Syrian nationals between 2016 and 2019. On the bright side, Syrian refugees are not only seeing jobs; many of them are contributing to the local economy by establishing their own private enterprises in the same provinces. There are 15,000 companies in Turkey which have at least one Syrian shareholder. According to UNHCR Turkey, the Syrians in Turkey can be categorised into five groups: entrepreneurs, micro entrepreneurs, professionals, farmers and the unemployed (UNHCR, 2016).

As for employment, according to Article 29 (2) of the Temporary Protection Regulation (TPR); "Persons, who hold a Temporary Protection Identification Document may apply to the Ministry of Labour and Social Security for receiving work permits to work in the sectors, professions and geographical areas (provinces, districts or villages) to be determined by the Council of Ministers." The Regulation on Work Permits of Foreigners under Temporary Protection was published by the Ministry of Labour and Social Security in January 2016 to further clarify and facilitate the access of Syrians to the labour market under certain conditions. According to UNHCR Turkey, this is the first time such a large groups of refugees has been

given the right to access to the labour market. In July 2016, the International Labour Force Law (No: 6735), a new law that concerns all foreigners in Turkey, was adopted. According to this law, foreigners with long-term residence permits or with 8-year work permits are entitled to unlimited work permits. According to the work permit regulation, the employer must apply for the work permit on behalf of the employee. Conditions related to residency, registration and health must be met. The employment quota stipulates that the number of Syrians employed may not exceed 10% of the number of Turkish citizens working in the same workplace.

Language, socio-cultural differences, poor working conditions and unequal wage policies are the other main barriers to Syrians finding work. Moreover, even when refugees are qualified for a certain position, they often do not have the documents to prove their levels of education or occupational qualifications. Most of the refugees are educated and have professional experience but there is no database by which their experience can be verified. Lacking work permits, Syrian refugees are obliged to work informally for long hours in unhealthy conditions in return for low wages, and payments are often late. In spite of this, many company representatives stated that most Syrians prefer to work informally so that they and their families can continue to benefit from humanitarian aid (ESSN) while earning extra money. They are also easier to employ, since they accept low paid jobs without any social security. Informal markets are still very attractive for most Syrians and employers because under formal employment, employers are obliged to pay the monthly minimum wage as well as social security premiums and taxes.

Based on the interviews and desk research, the following recommendations can be made for the faster integration of refugees into the labour market:

**E** There is a large gap between the skills which are in demand in the sector and those which are available on the labour market. Refugees are good candidates for filling essential positions in the companies. Unfortunately, however, there is no system for verifying the skills or experience of refugees. Therefore, the Government, ISKUR, other public institutions

and NGOs could usefully work together to analyse the current status of refugees vis-à-vis the demand for human resources in the sector.

**E** Vocational competency and re-certification courses provided by the state could be the most effective approach to the problem. Refugees could also be provided with training certificates/accreditation from a recognised institution such as ISKUR or the Vocational Qualifications Authority.

**E** Increasing the participation of women in the workforce in the region will depend on education policies as well as labour market policies. Work needs to be done within the entire educational system from secondary or even primary level onwards to increase the number of women entering technical fields. Support and incentives still need to be made available for companies for each woman they employ. The need also persists for a systematic and comprehensive gender responsive employment policy that includes the implementation of gender-oriented educational practices. Effective job counselling for women in the region would also be useful. In addition, refugee women in the region can benefit from joint projects with large industrial companies.

**E** The oversight mechanism is clearly not working properly, since all companies think that they need to employ Syrian refugees informally in view of the cost factor. This creates unfair competition. Companies complain about the lack of any incentives for formal employment. It should be noted that there are available incentives for formal employment of Syrians provided by UN Agencies, NGOs and also government.

**E** Companies emphasise that refugees are not aware of the cultural values and culture of the host community. This is one of the most significant barriers to their employment and integration. They need to be provided with information about social norms and to develop an understanding of Turkish business culture.

- E** Training and counselling programmes are needed to support refugees in developing their language skills and abilities to communicate professionally within the host community and more generally to increase their acceptability to local communities.
- E** Refugees' professional and education qualifications tend not to be taken into consideration by employers because they cannot be verified . Arrangements need to be made to have available documents translated. Where possible, refugees should be assisted in obtaining national recognition or accreditation for their qualifications.
- E** None of the companies interviewed were currently employing refugee women. The main reason for this is that refugee women are usually still the most important caregivers in their families. They therefore they have special needs in terms of employment assistance and specific employment programmes.
- E** Language is one of the most significant barriers to the employment of refugees. Refugees should be provided with every opportunity to teach the Turkish they need for their daily needs and for participating in the workforce and employment. The language training provided needs to take account of the fact that the needs of individuals will vary significantly depending on their educational and occupational backgrounds.





### 3.4. Action Plan

Action	Importance	Purpose	Possible Person / Institution in Charge	Potential Challenges	Comments
<p><b>What needs to be done?</b></p> <p>Establish innovation centres / excellence centre</p>	<p><b>Level of Importance A, B or C</b></p> <p><b>A</b></p>	<p><b>What is the purpose?</b></p> <ul style="list-style-type: none"> <li>● Increase innovation and entrepreneurship, build a bridge between universities and the industry (in the digital transformation process)</li> <li>● Design</li> <li>● Leadership, best practices, research, support and/or training</li> <li>● Industry 4.0,</li> <li>● Lean Production Technologies</li> <li>● 3D Manufacturing Easy prototyping</li> </ul>	<p><b>Who should act to undertake this step?</b></p> <p>Ministry of Industry and Technology</p> <p>Development Agencies</p> <p>Universities</p>	<p><b>Potential challenges which may prevent completion</b></p> <p>Financial resources</p> <p>Lack of cooperation among regional partners</p> <p>Required feasibility study</p> <p>Bureaucratic barriers</p>	<p><b>Comments</b></p> <p>May be subject to grant programmes / funding programmes / development programmes.</p>
<p><b>What needs to be done?</b></p> <p>Establish Fab-Labs (Digital fabrication workshops)</p>	<p><b>Level of Importance A, B or C</b></p> <p><b>B</b></p>	<p><b>What is the purpose?</b></p> <ul style="list-style-type: none"> <li>● Apply digital production and digital applications.</li> <li>● Prototype</li> <li>● Technology to invest in pilot projects, benefits analysis / implementation analysis of companies</li> <li>● Cooperation with Digital Transformation Centres to be established in the region</li> </ul>	<p><b>Who should act to undertake this step?</b></p> <p>Ministry of Industry and Technology</p> <p>Development Agencies</p> <p>Universities</p>	<p><b>Potential challenges which may prevent completion</b></p> <p>Financial resources</p> <p>Lack of cooperation among regional partners</p> <p>Lack of interest of companies</p>	<p><b>Comments</b></p> <p>May be subject to grant programmes / funding programmes / development programmes.</p> <p>Collaboration with GETHAM (Gaziantep Industrial Design and Modelling Centre)</p>

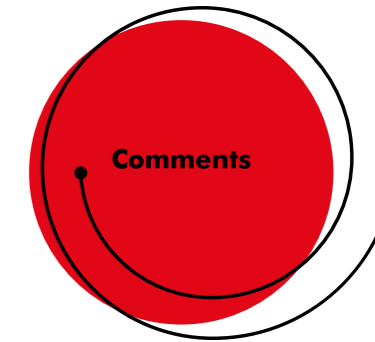
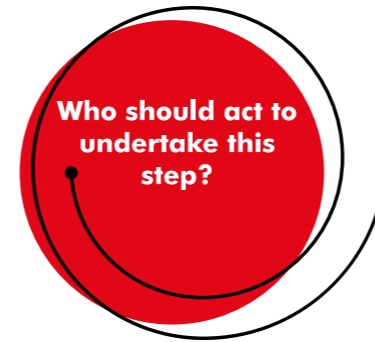
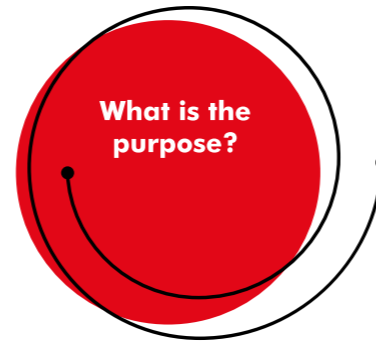
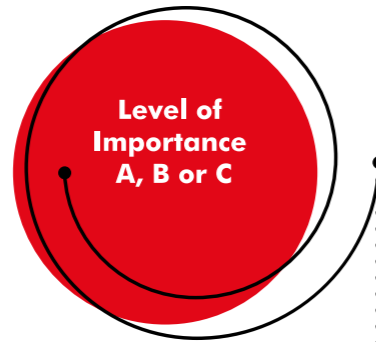
**Action**

**Importance**

**Purpose**

**Possible Person / Institution in Charge**

**Potential Challenges**



**Sectoral identification study and digitalisation needs assessment**

**A**

- Define existing technologies
- Company skills
- Exporting potential
- Infrastructure
- Capacity

TOBB (Union of Chambers and Commodity Exchanges of Turkey)

Chambers of commerce and industry

Sectoral associations

OIZ

TMMOB (Union of Chambers of Turkish Engineers and Architects)

Lack of interest of companies

Establishment of fair selection criteria

A strategic selection process should be followed, companies which are not selected should be informed about requirements.

**Establish an incubator for sub-sectors of the machinery and metals sectors**

**B**

- Strengthen sub-sectors
- Form companies
- Meet demand better

TOBB

Chambers of commerce and industry

Sectoral associations

OIZ

TMMOB

Different actors in the value chain

May be subject to grant programmes / funding programmes / development programmes.

**Action**

**Importance**

**Purpose**

**Possible Person / Institution in Charge**

**Potential Challenges**

**Comments**

What needs to be done?

Level of Importance A, B or C

What is the purpose?

Who should act to undertake this step?

Potential challenges which may prevent completion

Develop a new strategy for digitalisation for each selected company

**A**

- Guidance and mentoring
- Determine the future direction of the company (Exports)
- Cooperation with Digital Transformation Centres established in the region
- Identify areas for the incentive and support programmes in the region
- Identify the need for investment

Chambers of commerce and industry  
 OIZ  
 TMMOB  
 Sectoral associations, NGOs

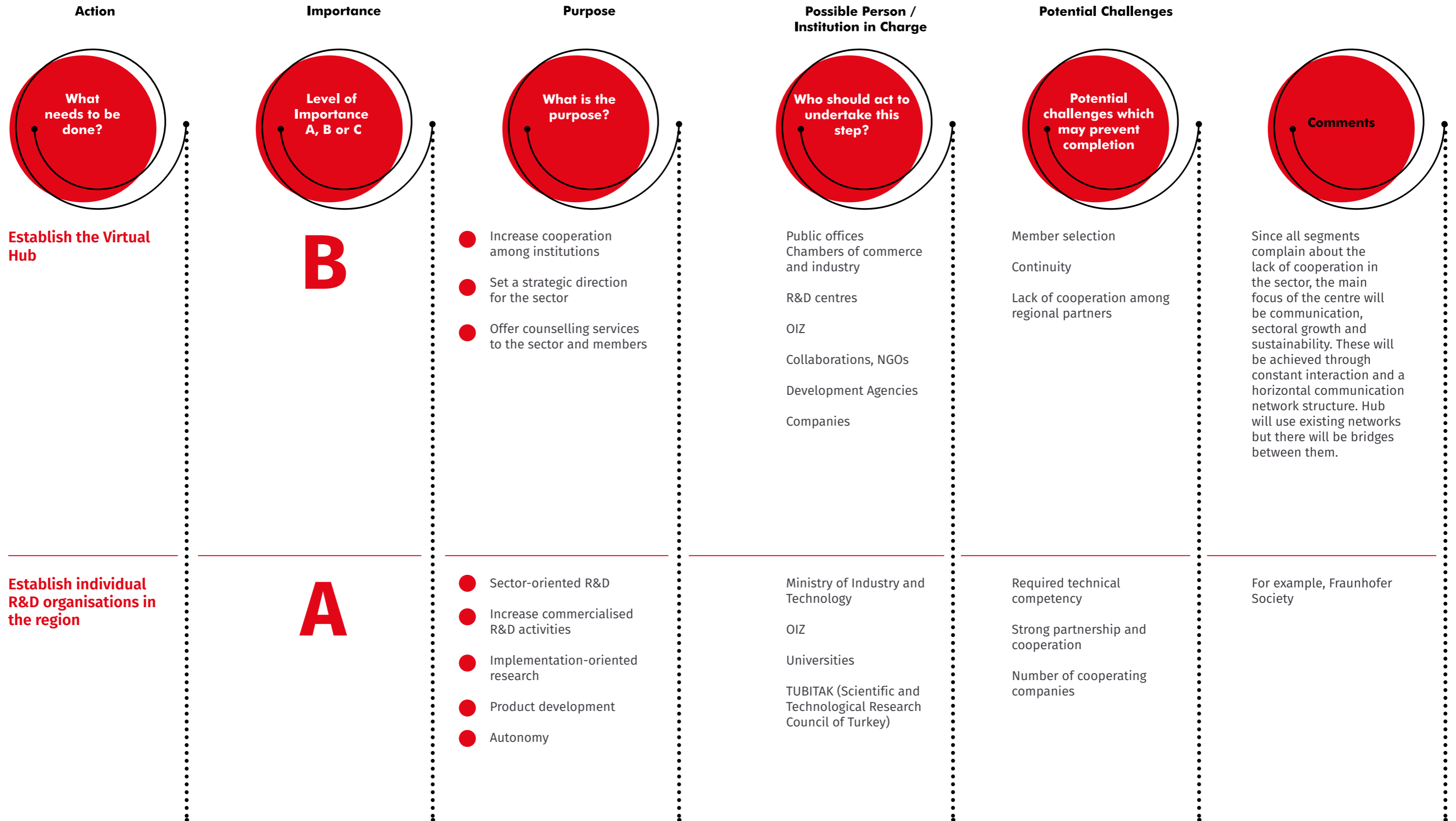
Different actors in the value chain  
 Lack of interest of companies  
 Mandatory comprehensive work

Studies on efficiency per company

**A**

- Guidance and mentoring
- Determine the needs for investment
- Improvements in manufacturing methodology
- Enhancement in efficiency
- Enhancement in quality

TOBB  
 Chambers of commerce and industry  
 Sectoral associations, NGOs  
 OIZ  
 TMMOB



**Action**

**Importance**

**Purpose**

**Possible Person / Institution in Charge**

**Potential Challenges**

**Comments**

What needs to be done?

Level of Importance A, B or C

What is the purpose?

Who should act to undertake this step?

Potential challenges which may prevent completion

Design technical trainings and certification

**A**

- Develop intermediate workforce
- Increase levels of institutionalisation of companies
- Increase HR competitiveness

Chambers of commerce and industry  
 TOBB  
 OIZ  
 ISKUR  
 Vocational Qualifications Authority

Identifying the needs of the sector  
 Certification

Offer business services to companies and company owners (trainings, counselling, mentoring etc.) - Camp for Company Owners

**A**

- Capacity building  
Increase levels of institutionalisation of companies
- Increase HR competitiveness
- Vision

Chambers of commerce and industry  
 TOBB

Identifying who will receive services and how  
 Time dedication

Development programmes; E-commerce, exports/imports, management, human resources, market research, customer relationship management, procurement, marketing and sales, digital marketing, intellectual property, design, language etc.  
 Camps may be organised for company owners to raise awareness about the development of the sector by focusing on foreign trade.

**Action**

**Importance**

**Purpose**

**Possible Person / Institution in Charge**

**Potential Challenges**

**Comments**

What needs to be done?

Level of Importance A, B or C

What is the purpose?

Who should act to undertake this step?

Potential challenges which may prevent completion

Develop new market strategies

**A**

- Define target markets for the sector
- Design actions for selected markets
- Design, collect, interpret and report information to help companies benefit from marketing opportunities
- Information on the properties, needs and requests of target markets

Chambers of commerce and industry  
NGOs  
Associations

This may be achieved by establishing the Regional Machinery Promotion Group. This action should be developed by the sectoral actors in the region.

Establish foreign trade units for exports within relevant institutions

**B**

- Increase foreign market penetration
- Recognise opportunities
- Increase marketing activities of companies

Chambers of commerce and industry  
NGOs  
Associations

Bureaucratic barriers

**Action**

**Importance**

**Purpose**

**Possible Person / Institution in Charge**

**Potential Challenges**

**Comments**

What needs to be done?

Level of Importance A, B or C

What is the purpose?

Who should act to undertake this step?

Potential challenges which may prevent completion

Provide metals sector incentives for integrated facilities, facilitate scrap collection activities and establish scrap collection centres

**A**

- Improve scrap use in metals and eliminate dependence on scraps
- Sustainability
- Increase competitiveness
- Cost

All actors in the value chain

High costs  
Technical knowledge  
Joint work

Increase incentives and support in marketing and exports

**A**

- Increase foreign market penetration
- Increase marketing activities of companies
- Branding

Ministry of Industry and Technology  
KOSGEB  
Development Agencies

Bureaucratic barriers  
Required effective implementation and evaluation

**Action**

**Importance**

**Purpose**

**Possible Person / Institution in Charge**

**Potential Challenges**

**Comments**

What needs to be done?

Level of Importance A, B or C

What is the purpose?

Who should act to undertake this step?

Potential challenges which may prevent completion

**New incentives and support for sector specific R&D**

**A**

- Prefer Turkish-made products
- Special support mechanisms, provide incentives without regional discrimination
- Simple, smooth, accessible, common, trust- and expression-oriented access to R&D incentives

Ministry of Industry and Technology  
 KOSGEB  
 Development Agencies  
 TUBITAK

Bureaucratic barriers  
 Required effective implementation and evaluation

**Offer clustering support and develop clustering strategies**

**B**

- Create opportunities for exports and expansion
- Reduce costs, increase the attractiveness of the sector
- Joint Procurement, Joint Sales, Joint R&D, Joint Marketing

Ministry of Trade and Ministry of Industry and Technology  
 Chambers of commerce and industry  
 All institutions and associations relevant to the sector

Lack of cooperation among regional partners

It may be supported by clustering projects – a horizontal approach.



**Action**

**Importance**

**Purpose**

**Possible Person / Institution in Charge**

**Potential Challenges**

**Comments**

What needs to be done?

Level of Importance A, B or C

What is the purpose?

Who should act to undertake this step?

Potential challenges which may prevent completion

Better access to financing and better provision of buyer financing

**A**

- Increasing the grace period
- Increase in number of instalments
- Cash credits with better conditions, create exports, collaterals etc.
- Increase in competitiveness

Eximbank  
CRF  
State banks

Economic recession

Becoming a solution partner for exporters

Prepare a list of sector-based imported goods and search for compliance in Turkey

**B**

- Define sector-based imported goods to encourage the production of substitutes for imported products

Chambers of commerce and industry

Work on machinery parts tolerances should be prioritised.

**Action**

**Importance**

**Purpose**

**Possible Person / Institution in Charge**

**Potential Challenges**

**Comments**

What needs to be done?

Level of Importance A, B or C

What is the purpose?

Who should act to undertake this step?

Potential challenges which may prevent completion

Prepare a doctoral dissertation on a topic given selected by industrialists

C

● Increase industry - university cooperation

Chambers of commerce and industry

Universities and companies

OIZ

Increase supervision and governance in the market

A

● Decrease the impact of the informal economy

● Minimise informal employment

Ministry of Industry and Technology

Chambers of commerce and industry

**Action**

**Importance**

**Purpose**

**Possible Person / Institution in Charge**

**Potential Challenges**

**Comments**

What needs to be done?

Level of Importance A, B or C

What is the purpose?

Who should act to undertake this step?

Potential challenges which may prevent completion

Increase awareness of patents, brands and design

**A**

● Increase in the number of acquired patents, small patents, brands and design

Turkish Patent and Trademark Office

Process

For example, the Hazarfen Project

Policy change: Set criteria for procurement from companies

**B**

● Prevent unfair competition  
● Strengthen the infrastructure of companies

Public entities  
Sector representatives

Mandatory changes in the law

Companies should first seek accreditation to make offers.

**Action**

**Importance**

**Purpose**

**Possible Person / Institution in Charge**

**Potential Challenges**

**Comments**

What needs to be done?

Level of Importance A, B or C

What is the purpose?

Who should act to undertake this step?

Potential challenges which may prevent completion

**Policy change: VAT exemptions for purchasing machinery and equipment**

**B**

- Increase in sales
- Increase in competitiveness in terms of prices

Public entities  
Sector representatives

Mandatory changes in the law

May be subject to grant programmes / funding programmes / development programmes.

**Policy change: VAT refunds on exports**

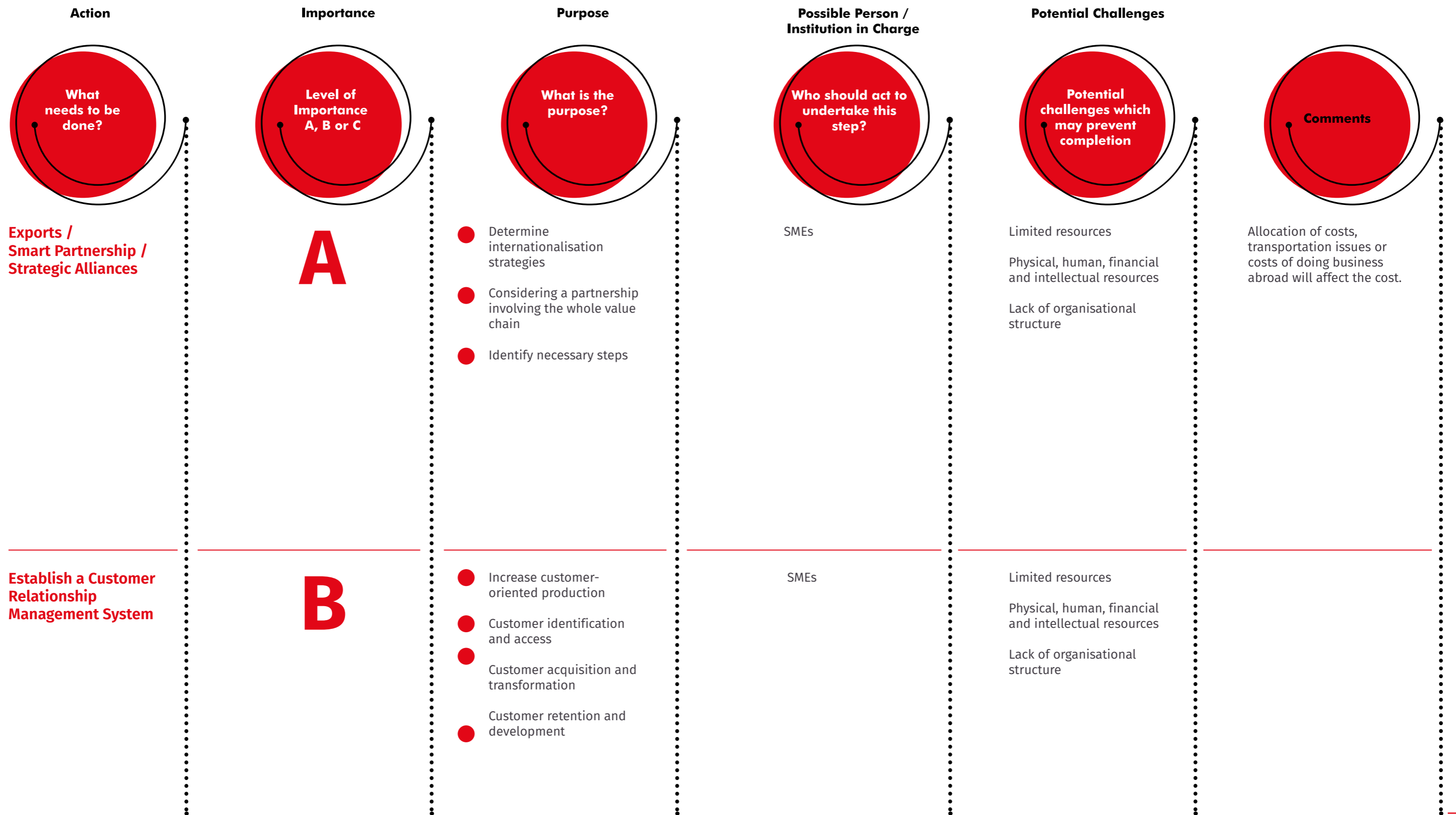
**B**

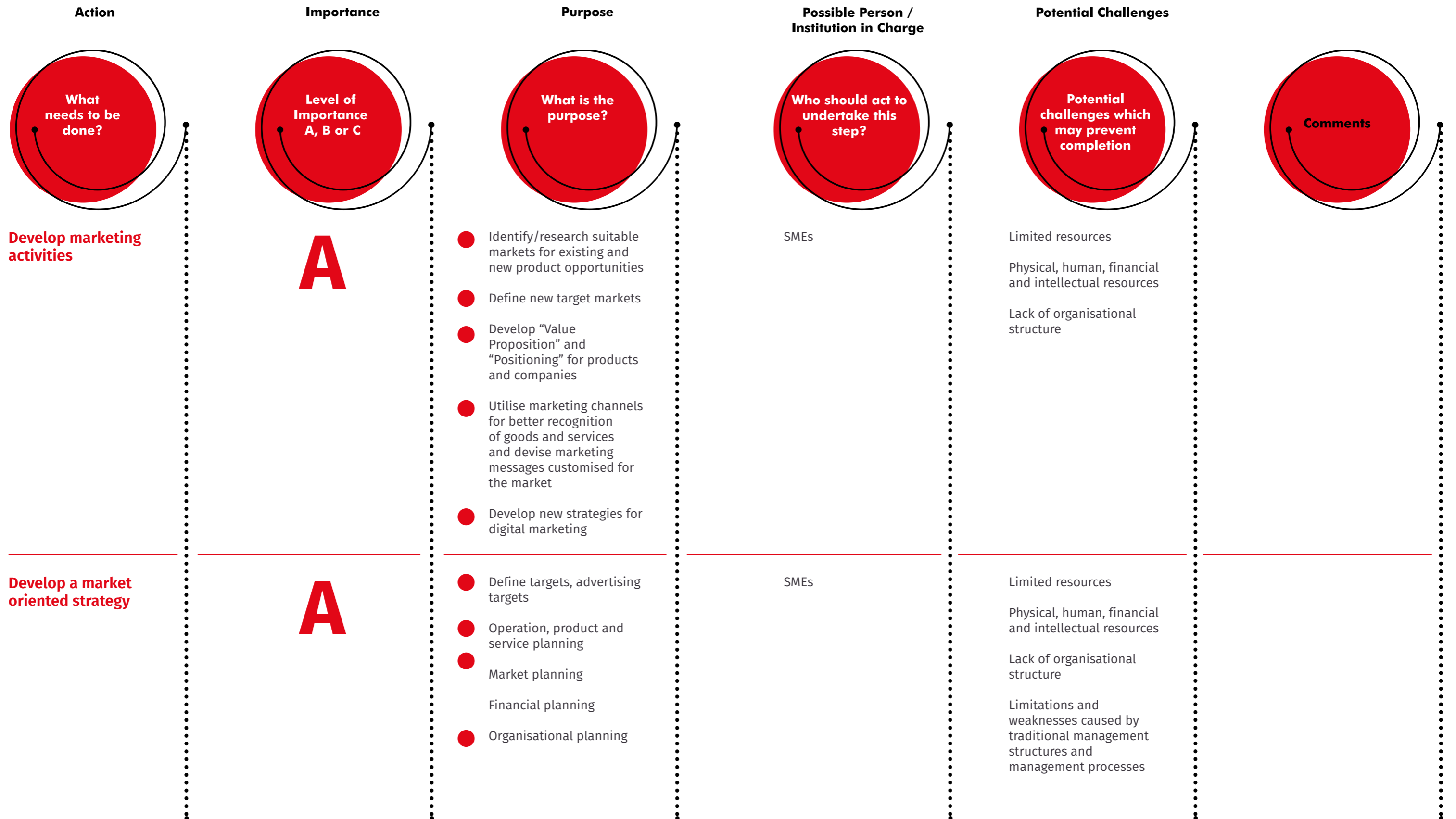
- Decrease costs
- Encourage investments

Public entities  
Sector representatives

Mandatory changes in the law

Since it takes longer than in other sectors.





**Action**

**Importance**

**Purpose**

**Possible Person / Institution in Charge**

**Potential Challenges**

**Comments**

What needs to be done?

Level of Importance A, B or C

What is the purpose?

Who should act to undertake this step?

Potential challenges which may prevent completion

Develop risk management

**B**

- Risk evaluation / definition
- Implementation / risk analysis
- Risk management integration

SMEs

Limited resources

Physical, human, financial and intellectual resources

Lack of organisational structure

Devise programmes and develop strategies + Review and analyse production methods in terms of efficiency

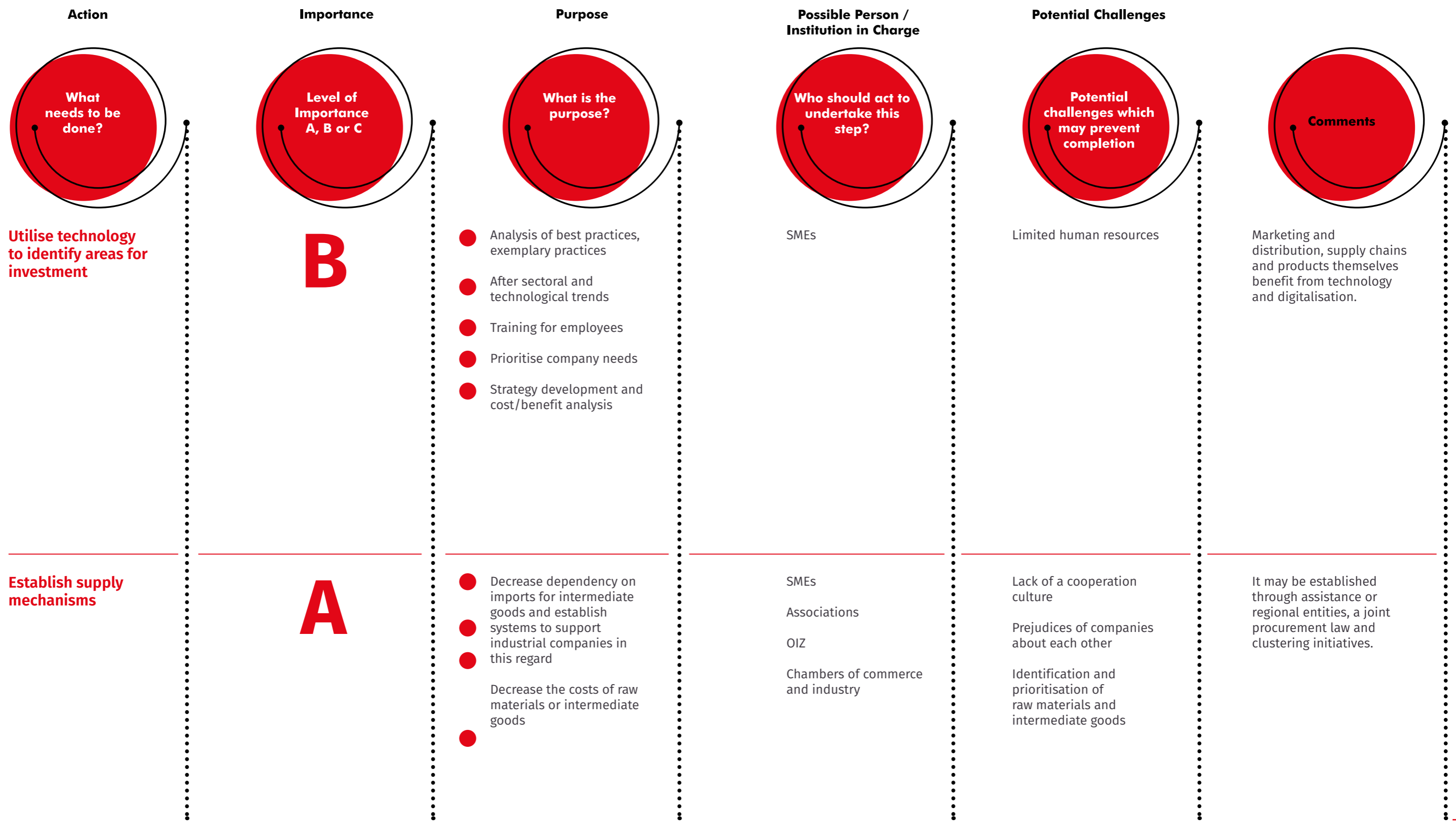
**B**

- Analyse existing workflow, benchmarking with competitors -Human-Process-Technology-Machinery and Equipment
- Training for employees
- If necessary, outsourcing consulting
- Design future steps based on strategies

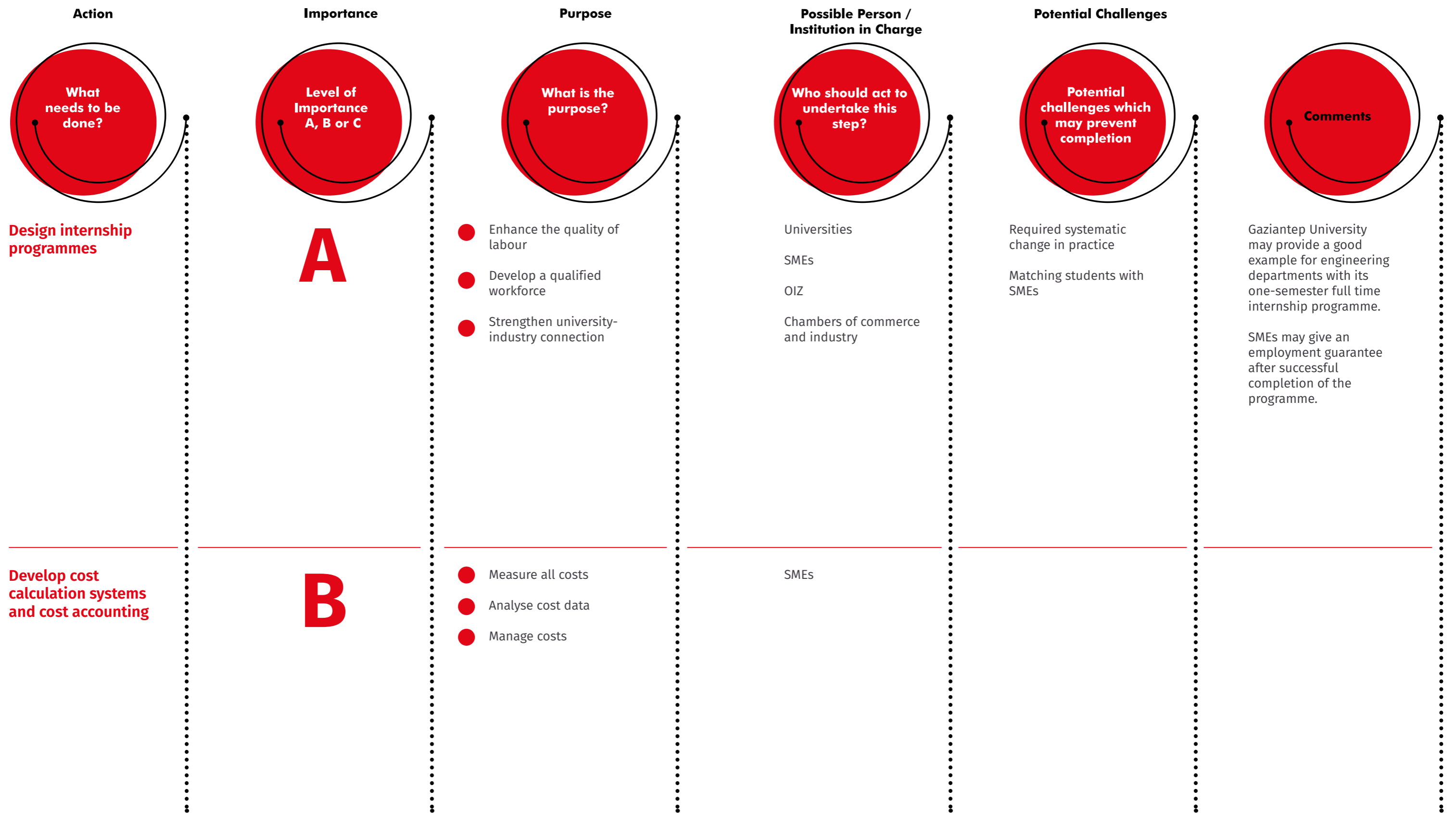
SMEs

Limited human resources

Companies should determine the reason for the scarcity in competition and develop strategies based on the results.





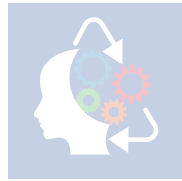
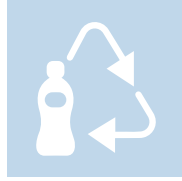




Turkey Resilience Project in Response to the Syria Crisis (TRP)

**JOB CREATION COMPONENT**

2020



Sectoral Roadmaps: **Machinery and Metals Sector in Turkey**