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MACHINE MANUFACTURING INDUSTRY

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EXECUTIVE SUMMARY

The Machine Manufacturing Industry is in nature of a sector boasting a strategic significance in the development process of countries and that **creates a multiplier effect in economic development by defining the manufacturing skills of other sectors through investment, intermediate goods and services** it offers**.** Economies equipped with a sound Machine Manufacturing Industry enjoy a critical competitive power over other countries in the manufacturing industry.

Capability of manufacturing a product at a more favourable price and quality demanded by the market relies upon the transformation to be driven by the machine manufacturing industry in the manufacturing technologies. In other words, the machine manufacturing industry should consistently explore innovation and upgrade the technologies for intermediate and investment goods it offers. Thus, the machine manufacturing industry gains a character somehow setting the efficiency in all sectors.

Like many of the sectors recently, the machine manufacturing industry is facing a migration. The breakthrough of Far Eastern countries, China, India and Brazil in the sector, the growing labour costs in developed countries like States and EU, and the environmental factor lead to the displacement of the origins of manufacturing. Developed countries progressively tend to lose competitive edge in low and medium technological arena and focus on advanced technologies. Like in all other sectors, China seizes a major slice out of the market as far as the products suitable for bulk manufacturing are concerned. **Many countries, now attended by Turkey, tussle to seize a share out of the market in low and medium technology field surrendered by developed countries.**

The Turkish Machine Manufacturing Industry's output is recently showing a faster expansion compared to that of the overall industry and to the manufacturing industry's output. The production indexes demonstrate the weight of the Machine Manufacturing Industry on the overall production industry. This finding clearly manifests that the sector steadily takes on a driving role in the economical advancement.

While the share of the Machine Manufacturing Industry in the overall production industry grows, the capacity utilization rates by years fall behind the average capacity utilization rates of the production industry. This data reveals the idle capacity issue and inadequate capital efficiency to some extent. **It is conspicuous that the sector should make a breakthrough in both domestic and foreign marketplaces to avail of this potential.**

The sector's share in the overall added value of the production industry is greater by around 20% than its share in production. The production industry's share in GDP has realized at the level of 24% recently. On the other hand, the machine manufacturing industry's share in the production industry along with factor prices is above 4%. **These data demonstrate that the machine manufacturing industry's share in GDP is around 1%.** And the Machine Manufacturing Industry's share in the Total Gross Fixed Capital Formation justifies the fact that the sector is the inevitable impetus for the economy. In the overall standing of sectoral shares in **Gross Fixed Capital Formation**, the construction sector is ranked first with 48,6% followed by **the Machine Manufacturing Industry with 18%.**

Whilst being ranked high in the production industry for the volume of employment created, the Machine Manufacturing Industry stands among those with high qualified

taskforce share. The slice of wage workers employed in the machine manufacturing industry out of the overall production industry is 4,5% in 2003. The production and added value indicators per wage workers in the machine manufacturing industry fall behind the average of the production industry, revealing that besides the low capacity utilization rate, the current composition of the Machine Manufacturing Industry is among labour-intensive sectors.

Group no 84 in which the Machine Manufacturing Industry predominantly is involved constitutes the group suffering the most foreign trade deficit after the "Mineral fuels, minerals oils etc" category no 27. The foreign trade deficit suffered by the Machine Manufacturing Industry realized at 11.8 billion USD in 2008, and 8.3 billion USD in 2009.

The export capacity scoring 2.2 billion USD in 2003 leaped to 7.6 billion USD in 2008 with a 3.6-fold increase. However, in 2009, due to the impact of the crisis, the sector's export dropped to around 5.9 billion USD. Turbines and turbojets (51%) and machine tools (40%) were named as the two subsectors seeing the worst decline in exports.

In the Machine Manufacturing Industry, the subgroups of "motors" and "machine tools" welcome the highest investment, followed in order by the groups of "industrial air-conditioners and cooling machines", "pumps and compressors" and "turbines and turbojets". In 2009, "machine tools" seeing a critical decline in export receded to the fourth rank whereas "industrial air-conditioners and cooling machines" suffering a rather less severe decline in export advanced to the second rank with "pumps and compressors" group defending its third rank.

According to the customs tariff number, the sector's export within the overall export is ranked the fifth after the woven garments and accessories group (ordinal no 61) in 2008, revealing the sector's substantial role in Turkey's export volume.

The share of the Turkey's export out of the Global Machine Manufacturing Industry export was 0,37% in 2003, mounting to 0,61% in 2008. The sectors where the Turkey's export share out of the global export capacity was the highest in 2008 are, in order, "reactors and boilers", "industrial air-conditioners and cooling machines", "leather processing and manufacturing machines", "rolling and casting machines-moulds" and "motors".

Scoring 8.9 billion USD in 2003, import volume reached 15.8 billion USD in 2006 and 19.4 billion USD in 2008 with a growth of 2,2 folds. As in export, import suffered a decline in 2009 as well, and the sector's import realized at around 14.2 billion USD. In import, the categories "motors", "pumps and compressors" and "machine tools" seize the highest slice. In terms of its share in Turkey's overall import figure in 2008, the sector is ranked the third after mineral fuels etc (ordinal no 27) and iron-steel (ordinal no 72) sectors. Realizing at 24,1% in 2003, the export-import ratio escalated to 39,3% in 2008 and 40,4% in 2009.

DEVELOPMENTS IN TECHNOLOGY AND R&D WITHIN THE SECTOR

The Machine Manufacturing Industry is a sector that, in company with machine, electronics, software and service sectors, accounts for the efficiency of good and service production systems. **The sector sets the functions of all recipient sectors' products through the technologies it boasts and develops, and ensures the implementation of these functions.** For this reason, the sector should focus on R&D efforts to boost the competitive power of both itself and the recipient sectors.

The share of the machine manufacturing industry within total R&D investments of the overall production industry is 11,9% in 2007, placing the sector to the third rank. It is noteworthy that the sector's share in the overall R&D investments of the production industry is much less than that in production or added value. However, the rate of Turkey's R&D investments to GDP much lags behind compared to developed countries such as EU, Japan and USA.

Like in overall R&D investments, Turkey is on the back row again in terms of the rate of R&D investments of the machine manufacturing industry to GDP. While this rate was 0,02% for Turkey in 2006, Korea was enjoying a 0,1%, Japan 0,21% and Germany 0,2%.

DEVELOPMENTS IN THE GLOBAL MACHINE MANUFACTURING INDUSTRY

Turkey exhibits a poor standing in terms of export specialization index compared to countries that are or potentially will be its competitors in the machine manufacturing industry. However, the export specialization index constantly evolves. For instance, while Turkey's index rate was much behind Taiwan in 2001, it outdistanced Taiwan in 2006 with 0,73,. **In case this favourable wind keeps blowing, the Turkish machine manufacturing industry may turn out to be a significant actor in the international arena.** In this period, India leads the pack of countries swiftly improving its export specialization index. In 2006, India outdistanced China in terms of the index rate and rose to the second rank with 1,23 after Italy among countries that we picked for this study for comparison purposes. **Another noteworthy fact is that the export specialization indexes on the machine manufacturing industries of recently distinguished BRIC group comprising Brazil, Russia, India and China are high.**

In terms of the export specialization index rates for 2006, agricultural tractors group is ranked the first with 2,72 among sub sectors followed by the "food, beverage and tobacco processing machine industry" scoring 2,31. Comparing to Turkey, this sector is ranked second after Netherlands. The "leather, textile and garment industry machines" subsector is ranked the third, and the "metallurgy machines" subsector is the fourth.

COMPETITIVE POWER OF THE MACHINE MANUFACTURING INDUSTRY

Compared to rival countries, the sector suffers major shortcomings in basic inputs. Costs of basic inputs such as energy, raw materials and semi-finished products adversely impact the competitive edge. The supportive and protectionist policies of rivals predominantly lie behind this adverse condition. Factors on inputs such as quality of domestic products, number and quality of suppliers and foreign dependency of sources hinder the sector's competitive edge in international marketplaces, making it necessary to build a working and business culture and clear shortcomings off efficiency and institutionalization. **Undercapitalization and enterprise sizes far from the scale economy are among factors that weaken the competitive power.** Due to undercapitalization, factors such as access to new technologies, investment in technology, R&D investments and capability of producing new technologies suffer major shortcomings.

Among major factors that adversely impact the sector's competitive power, shortcomings in legal infrastructure and regulatory mechanisms play a key role. **Unfair competition brought about by the underground economy, taxation and social security contributions upon employment, defects in professional standards, taxes, duties and imposts on the import of intermediate goods, practical defects in intellectual property rights, bureaucracy and**

poor entrepreneurial environment represent some of these factors. It is an inevitable requirement that the sector should also boost its competitive edge in the marketing field.

Though the sector has the competence in export, it is still in the back compared to its rivals in terms of foreign market promotions, e-business, branding, service, distribution network and country image. Finance is another major factor that hits the sector's competitive edge. **Access to financial sources, lack of medium and long-term export credits (supplier's credit), undercapitalization and high credit costs though showing a decrease recently, curb the sector's leap forward.**

Number of enterprises and installed capacity are one of the strengths of the sector. The sector **has major strengths in product and service standards in terms of diversified production, loyalty to deadlines, aftersales service and support and compliance with international standards.** On the other hand, there is more the sector should cover for reliability and certification issues. The ability to build cooperation, the competence in comprehending and implementing new technologies across experience and knowledge background are other factors that boost the competitive edge.

Though the sector is in a more advantageous situation compared to other developed countries, mainly EU, in terms of labour costs, this advantage is clearly lost to China and similar countries as far as the same product groups are concerned. **Availability of qualified taskforce and quality of labour is another factor that adds to the competitive power of the Turkish Machine Manufacturing Industry. Considering the demographical structure of the country, we can talk about an extra distinguished superiority on the part of the sector boosting the competitive edge against EU and other developed countries once formal education is properly tailored to meet labour demands in the sector.**

STRATEGIES IN THE MACHINE MANUFACTURING INDUSTRY

In the period of economic development, the major goal should be **to bring the machine manufacturing industry, which is of strategic significance for the inputs it provides to all sectors, to a structure promising high competitive power in international scale through products based on medium and high technology.**

Manufacturing specific, high-quality **machines and equipment with high added value that are highly renown and sought in international marketplaces**, contributing to the creation of **employment opportunities** in the country, hosting or **developing** rapidly-**evolving technologies to build a R&D level at international scale,** being a sound and reliable machine and equipment manufacturer keeping up with **the economical scale** constitute the targets across the key objective.

Many of the fields require arrangements and improvements for the machine manufacturing industry to attain its defined targets.

Human resources responsive to sector's needs: Reviewing and improving the technologic and physical structure of technical education for the human resource, bringing education to a level encouraging entrepreneurship in the sector, taking actions towards the need to accredited technical consultancy, identifying professional competences, fostering collaboration between industrial and secondary-high educational institutions.

Competitive financial facilities: Extension of project credits by Turkish Eximbank at conditions prevailing in competitor countries as a minimum to develop facilities, input machines and equipment, encouraging practices such as partnerships with foreign investors, collaborations and mergers that would facilitate to meeting the capital need and keeping up with the economic scale, creating credit facilities for the Turkish machine manufacturing industry equivalent to credits made available by rival countries to entrepreneurs in the Turkish market in their project, investment good, machine and equipment purchases, supporting the import of input installations, machines and equipment towards existing and new marketplaces to be addressed through favourable credit conditions.

Sector-specific support policies: Implementing incentives without regional discrimination, bringing R&D incentives to a simple, smooth, accessible, common, fiduciary and statement-based structure, encouraging foreign capital in intermediate goods of critical importance that are not locally produced but highly employed as input by the sector, launching incentives favouring Turkish-origin products in private and public procurements in the country, building up specific support mechanisms.

Effective marketing and communication strategies: Addressing target products and markets, ensuring the switch from product-based strategy to a customer-oriented strategy, promoting the machine manufacturing industry's products in target countries as well as building and improving the image of Turkish-made product, expanding the market share and reinforcing the standing towards products and marketplaces where rival countries, primarily EU have relinquished.

High quality, customized and innovated products: Building the ability to produce customized products, developing the sales and aftersales service network, issuing and submitting fully all documentation for products such as warranty certificates, maintenance manuals, instruction manuals etc, attaching specific important to and developing industrial design and innovation.

Fostering cooperation between institutions: Fostering collaboration between universities and industry on R&D, P&D and similar processes, supporting research projects, fostering cooperation with bureaucracy in developing regulatory mechanisms, developing pre-competition R&D and similar collaborations between enterprises, building the culture of collective action and achievement, ensuring the involvement of machine sector exports in harmony negotiations with EU, fostering cooperation with suppliers, primarily engaged primarily in the electronics and software sector that provide input to the sector, cooperation in marketing, partnership in distribution channels, sales and aftersales service network, acting collectively in the field of promotion, project development and implementation.

Boosting the productivity of enterprises engaged in the sector: Focussing on efforts for institutionalization, availing of the possibilities of merger, procurement and cooperation, focussing on building foreign partnerships and cooperation, bringing the current equipment pool of the sector to a level combined with sensitive technology and more stringent tolerances, encouraging foreign capital to invest in the sector.

Fair and competitive business and entrepreneurial environment: Preventing underground economy that gives rise to unfair competition in the sector, preventing unfair competition in the sector caused by poor-quality products in import, focussing on efforts for resolving the

accreditation and certification issues in the sector, launching initiatives for improving accessibility to information and reclaiming the sectoral database, improving the machine manufacturing industry’s inventory.