

ECONOMIC ANALYSIS OF THE MEDICAL INDUSTRY IN TURKEY
TÜRKİYEDE MEDİKAL ENDÜSTRİNİN EKONOMİK ANALİZİ

Emine KILAVUZ¹
Hatice ERKEKOĞLU²

ABSTRACT

Healthcare industry is one of the fastest growing industries in the world and comprises hospitals, medical equipment and services, telemedicine, medical tourism and medical insurance. In this study, the medical industry in Turkey was analyzed using the industry's export and import data. The increase in Turkey's population and the number of hospital are increasing the demand for health industry in Turkey. But the medical device industry is mostly dependent on foreign and import-oriented structure. Trend analysis results show that the growth in imports is more than the growth in exports. On the other hand, Turkey is a country which has comparative advantages in medical tourism in the world. In order to increase the competitiveness and reduce the negative impact on foreign trade, Turkey should increase its investments in the medical industry.

Keywords: Medical Equipment, Export and Import, Healthcare Industry

ÖZET

Sağlık sektörü en hızlı büyüyen sektörlerden biridir ve hastaneler, tıbbi ekipman ve hizmetler, teletıp, sağlık turizmi ve sağlık sigortasını içermektedir. Bu çalışmada, Türkiye'de medikal sektör, alt sektörlerin ihracat ve ithalat verileri kullanarak analiz edilmiştir. Türkiye'nin nüfusunun ve hastane yatak sayısının artması Türkiye'de sağlık sektörüne olan talebi arttırmaktadır. Ancak tıbbi cihaz endüstrisi çoğunlukla yabancı ve ithalat odaklı yapıya dayanmaktadır. Trend analizi sonuçları, ithalattaki büyümenin ihracattaki büyümeden daha fazla olduğunu göstermektedir. Öte yandan, Türkiye, dünyadaki medikal turizm açısından karşılaştırmalı üstünlükleri olan bir ülkedir. Rekabet edebilirliği artırmak ve dış ticaret üzerindeki olumsuz etkilerini azaltmak için, Türkiye tıbbi sektördeki yatırımlarını arttırmalıdır.

Anahtar Kelimeler: Tıbbi Cihazlar, İhracat ve İthalat, Sağlık Sektörü

1.Introduction

It is possible for an industry to gain significant competitiveness if the products produced are better than other countries in terms of price and quality. The dependence of a competitive industry on imports in production may adversely affect its competitiveness in the long run. Turkey's tourism industry is economically important and rapidly growing. The total contribution of Travel&Tourism to GDP generated in 2017 was 359.1 bn Turkish Liras (USD98.4bn) i.e 11.6% of the nation's GDP calculated by The World Travel & Tourism Council, supporting 2 million jobs, 7.4% of its total employment. The tourism industry in Turkey has various tourism typologies, like historic cities, culture, sea&sun, religious, gastronomy and more recently health tourism. Medical tourism is becoming popular in the world and is considered to be holding immense potential. By following this process, Turkey gaining momentum in the medical industry and is willing to provide a significant increase in production.

In the first part of this study, the importance of medical tourism for economic growth and development will be revealed. Medical tourism is now popular in the world and has high value-added production and creates employment in many areas. In the following section, the structure of medical industry will be discussed. The analysis of the medical industry in Turkey will be discussed in the final section. In the conclusion, a general evaluation and policy recommendations will be given.

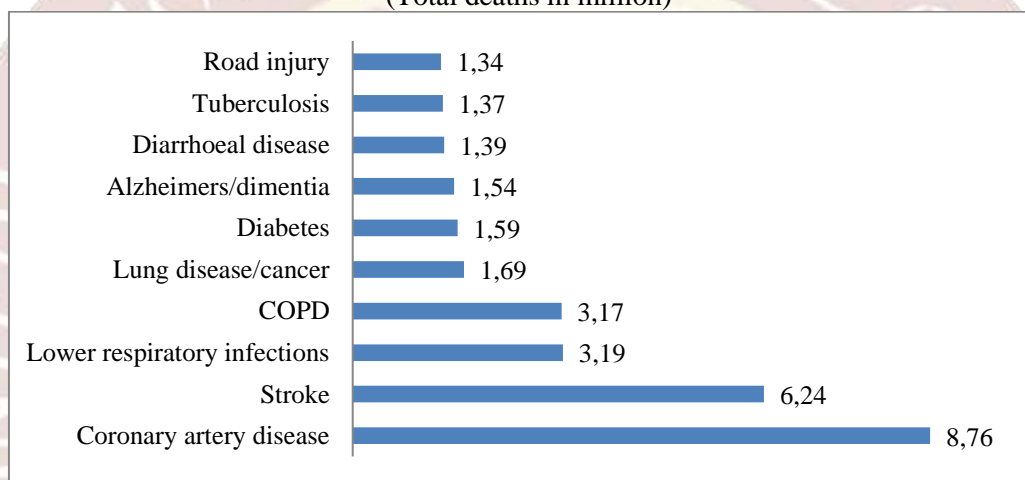
¹ Prof. Dr. Nuh Naci Yazgan University, Faculty of Economics and Administrative Sciences, Kayseri/Turkey, e-mail: ekilavuz@mny.edu.tr; <https://orcid.org/0000-0001-9639-2368>

² Prof. Dr. Kayseri University, Faculty of Applied Sciences, Kayseri/Turkey, e-mail: haticeer@kayseri.edu.tr; <https://orcid.org/0000-0002-9021-5843>

2. Increased Demand for Healthcare Industry

Life expectancy is the most important indicator of a community's health status. The average life expectancy increases especially in developed countries. In OECD countries, by the statistics in 2015, the average life expectancy for women is 83.1 years, while for men it is 77.9 years. Life expectancy is influenced by many factors besides the country's health systems. These include the effects of per capita health spending, smoking, obesity, education, air pollution, and many other socio-economic factors. As life expectancy increases, dementia and ischemic heart disease also increase in these countries (OECD, 2017). Aging populations and increasingly prevalent chronic diseases are the fundamental drivers creating demand for expansion of medical procedures and healthcare industry. Common chronic diseases are arthritis, cancer, stroke, heart attack, and obesity. Graph 1 shows the leading causes and amounts of death worldwide in 2015. Coronary artery disease and stroke are the most common. Early diagnosis is important and helpful in the treatment of chronic diseases. That is why it is thought that there will be great demand for medical technology products in the future (www.technofunc.com)

Graph 1: Leading Causes of Death Globally in 2015
(Total deaths in million)



Source: <https://blog.proclinical.com>

There are some cost-cutting technological developments in the treatment or prevention of chronic diseases. These technological developments include devices that constantly monitor health indicators and devices that auto-administer therapies. Consequently, individuals using high-speed internet and smart phones can manage their health needs with these devices. Mobile applications and devices are integrated with telemedicine and telehealth via the medical Internet of Things (mIoT). It is possible to access and analyze data through mIoT (Dimitrov, 2016). The increase in the demand for medical services in the world has led to an increase in health tourism.

Today, there is a tendency to medical tourism in the world. Several foreign tourists who want to get medical treatment along with tourism prefer medical treatment centers close to tourism destinations. It has been seen an increasing tourism demand for medical centers which have good infrastructure and are relatively inexpensive. Quality medical expertise and cost effectiveness have made some countries like India, Singapore, Thailand and Turkey one of the well-known places for medical tourism (Amiri and Safariolyaei, 2017; Kılavuz, 2018).

Medical tourism and health tourism are often used synonymously. However, health tourism is the tourism for spa and alternative treatments for healthy living. On the other hand, medical tourism encompasses primarily on medical procedures combined with travel and tourism (Whittaker, 2008). Health care and tourism industries are among the largest industries in the world. Medical tourism is becoming popular among world countries mainly for the following reasons. The high costs, lack of expertise and long waiting list at home, as well as new technology and skills in destination countries alongside reduced transport costs and internet marketing have all played a role. The rise of medical tourism emphasizes the privatization of health care, the growing dependence on technology, uneven access to health resources and the accelerated globalization of both health care and tourism. Many

countries such as India, Malaysia, Hungary, South Africa, Singapore and Turkey are among the countries that recognized in the medical tourism market. Therefore well-known health institutions are located close to the tourism regions of these countries.

Health tourism services are generally examined in three different categories (Republic of Turkey, Ministry of Health, 2012: 18):

- Services to improve health (spa, herbal therapy, massage, etc.),
- Services for treatment-medical tourism (cosmetic surgery, hearth surgery, eye surgery, cancer therapy, etc.),
- Rehabilitation services (dialysis, addiction programs, elderly care program).

According to the export-based growth hypothesis, international tourism increases the national income of the country both by increasing the competition between national firms and foreign tourism destinations and by increasing the competitiveness of national firms with economies of scale. As one of the world's largest economic sectors, tourism is shown to have accounted for 14.4% of global GDP and 313 million jobs, or 9.9% of total world employment in 2017 (wtcc.org, 2018). Tourism is an important source of income for the states as well as export-oriented growth in the world. Tourism-led growth occurs when tourism affects the overall economy with spillovers and other externalities (Oh, 2005). Consequently, it also reduces unemployment and poverty by increasing employment. The great advantage of tourism sector is that it tends to be labor intensive, so an increase in production is normally achieved by an increase in employment. The tourism sector which is a labor intensive sector is very important especially for the countries with unemployment problems (Akan et al., 2008). Because of its positive effects on foreign exchange earnings, income, employment and taxes, many governments support tourism sector (Chou, 2013). In short, the sector is a strategic sector due to its strong forward and backward links and has a positive impact on economic growth.

As a result, it can be said that health tourism, which is an important type of tourism sector, has very significant positive effects on the economy. On the one hand, it provides employment to especially qualified workers and on the other hand, it receives input from many sectors because of its high level backward linkage. Therefore, the rise in medical tourism has a positive multiplier effect on the medical industry and the economy (Kılavuz, 2018).

3. Medical or Health Service Industry

In addition to the increasing importance of medical tourism, it has begun to be analyzed in the medical industry in terms of competitiveness. Health industry or medical industry is an industry that provides goods and services to treat patients with healing, preventive, rehabilitative or palliative care. The industry is comprised of different players including hospitals, doctors, nursing homes, diagnostic laboratories, pharmacies, medical device manufactures and companies involved in the research, development, production and marketing of pharmaceuticals and biotechnology products. The health care industry or medical industry is one of the largest industries in the world. As mentioned earlier, the health industry is as important to the people in the world as it is to the national economies, and is one of the fastest growing industries in the world (www.technofunc.com).

The health industry plays an important role as the largest employer in the world economy, if we increase the number of people working in every industry around the world, the healthcare industry in many countries will have the highest employment growth among the industries. The health industry is fragmented and divided between many different companies and different players. No single firm/company has a sufficiently large share of the market to affect the direction or price level of the industry.

The medical devices industry has a wide range of products. Generally they are grouped into advanced technology products and traditional products. The first group products are specially designed for treatment and diagnostic use and have high R&D activities, clinical trials, and regulatory procedures. The other one covers such products as syringe, gauze, etc. Products in this industry include a wide range of materials from bandages to nanotechnology products. More traditional product markets have low-profit but a high business volume (West Mediterranean Development Agency, 2012). Medical devices

are now increasingly used in the diagnosis and treatment of diseases. Being innovation-friendly, this industry is in contact with many different sectors, and is open to innovations. The medical devices industry and the pharmaceutical industry are the most important components of the health system (Ankara Chamber of Industry, 2017).

Profitability in the medical devices industry depends on the competitiveness of the firms in the market and the market demand. The producers of the advanced medical devices that are usually produced as a result of innovation charge higher price, earn high profits and have monopoly power. However, the more competitive firms which produce conventional devices such as surgical gloves and other routine surgical supplies compete heavily on price and often need high sales volume of medical devices to be profitable (Medpac, 2017).

Medical industry does not have universally agreed upon classification. For financing and management purposes, the industry is typically divided into several areas. According to the United Nations International Standard Industrial Classification (ISIC) categorizes the medical industry in as following:

- Hospital Activities
- Medical and Dental Practice Activities
- Other human health activities

On the other hand The Global Industry Classification Standard (GICS) Health Care Sector (35) distinguishes the industry as two main groups:

I-Health Care Equipment& Services (3510)

- a) Health Care Equipment &Supplies (351010)
- b) Health Care Providers & Services (351020)
- c) Health Care Technology (351030)

II-Pharmaceuticals & Biotechnology& Life Sciences (3520)

- a) Biotechnology (352010)
- b) Pharmaceuticals (352020)
- c) Life Sciences Tools & Services (352030)

Key sectors of the healthcare industry can be broadly divided into the following four sub-segments which are composed of many sub-sectors (www.technofunc.com):

i- Health care services and facilities: Hospitals, Ambulatory health care services, Medical Practitioners & Healthcare Professionals.

ii- Medical devices, equipment and hospital supplies manufacturers: Electro-medical and electro therapeutic apparatuses, Surgical Instrument & Medical Instrument Manufacturing, Surgical appliances and supplies, Medical Device Manufacturing, Medical Instrument & Supply Manufacturing, Hospital Bed Manufacturing and Hospital Furniture Manufacturing etc., Dental equipment and supplies,

iii- Medical insurance, medical services and managed care: Health maintenance organizations (HMOs), health maintenance organizations (HMOs), surgical apparel manufacturing, home medical equipment rentals and medical case management services etc.

iv- Pharmaceuticals & Related Segments: Over-the-counter (OTC) drugs & drug stores, prescription drugs, biopharmaceutical drugs, generic drugs, vitamin & supplement manufacturing, health stores and eye glasses & contact lens stores etc.

The medical device industry producing inputs of the health industry is a sector with high added value. Besides, this industry is among the most dynamic sectors of economies since it is less affected by crises and employs qualified labor force.

Medical devices have an important role in the success of medical diagnosis and treatment services in hospitals and increase in overall efficiency (Ünal, 2016). Countries' efforts to reduce health spending and increasing competition in the medical device market have also changed the way medical device companies do business.

Key drivers and challenges for the general medical and surgical industry are given below:

- Technological Changes and Innovations
- Increased Household Income
- Aging Population
- Health Reforms
- Hospital Beds Per Capita
- Increased Labor Costs
- Inadequate Quality Staff and Medical Specialists
- Increased Capital Costs

Now the globalization of assistive healthcare industry, the latest technological developments and the standardization of various aspects of the industry facilitate the globalization of the health industry.

The medical device industry continues to grow every year thanks to medical technological advances. In order to combat diseases in the world and bring new health solutions, there are many medical device companies that continuously develop new medical technology. Here is a list of today’s biggest medical device companies based on their 2016 revenue is given in Table 1. The top medical device companies in the world are currently Johnson & Johnson, General Electric Co. (GE), Medtronic, Baxter International Inc. and Siemens Health. Medtronic Company was the first place with 2016 revenue. The company produces medical devices for diseases like “cardiovascular, diabetes, spinal and biologics, neuromodulation, surgery and cardiac rhythm disease.”

Table 1: Biggest Medical Device Companies Based on Their 2016 Revenue

Company name	Type of company (Country)	Medical devices	2016 revenue
1-Medtronic	Medical device company (USA)	Cardiovascular, diabetes, spinal and biologics, neuromodulation, surgery and cardiac rhythm disease	\$29.7bn
2-DePuy Synthes (Johnson&Johnson)	Biopharmaceutical, consumer goods and medical device giant (USA)	Orthopaedic, cardiovascular, diabetes, vision care and surgery	\$26.6bn
3-Fresenius (Medical Care)	Medical devices company (USA)	Key segments: Dialysis Services, Health Care products, Care Coordination	\$20.7bn
4-Philips (Healthcare)	Medical devices (USA)	Key segments: Diagnostic imaging segment, digital pathology sector	\$20.7bn
5-GE Healthcare	Medical device company (USA)	X-rays, ultrasound machines, incubators and CT image machines	\$19.1bn
6-Siemens (Healthineers)	Innovative healthcare provider (USA)	Medical imaging and diagnostics	\$16.5bn
7-Cardinal Health	Pharmaceutical and medical device products (USA)	Wound care, surgical, laboratory and home healthcare products	\$13.5bn
8-Stryker	Medical and surgical (MedSurg), and neurotechnology and spine (USA)	Orthopaedic devices such as mobile hospital beds and cast cutters	\$12.4bn
9-Becton Dickinson	Medical technology company (USA)	Medical devices, laboratory instruments and diagnostic products	\$12.1bn
10-Baxter International	Hemopatch, an advanced surgical patch and the generic vaccine Vancomycin (USA)	Renal diseases, haemophilia and immune disorders	\$10.6bn

Source: Ellis, May 30, 2018.

There are a lot of technological advances and innovation in medical devices industry. These developments cause the industry to grow and remain dynamic. As seen Table 1, in the United States, which is one of the leading countries in the medical device industry in the world, it is estimated that the revenue of this industry for the year 2017 will be 155 billion dollars. A number of medical device jobs exist specifically within the industry, mostly concern engineering and manufacturing areas. These are; Quality assurance (QA) and regulatory affairs, quality control (QC), R&D design, validation,

manufacturing, field engineering (Ellis, June 28, 2017). Jobs in the medical device industry are generally similar to pharmaceutical and biotechnology jobs. However, there are some differences depending on the type of medical device.

4. Medical Industry in Turkey

As in the world, healthcare is an important industry for Turkey both in terms of revenue and employment. For this purpose, medical industry should create a good medical industry infrastructure with qualified and high quality domestic medical products as well as qualified workforce. Turkish medical devices and supplies industry is a fast developing industry in Turkey, and the number of manufacturers in the industry has increased as well. At present, the industry manufactures a lot of medical equipment ranging from the simplest disposables to the most complicated medical equipments. They offer diverse products such as medical and surgical instruments and appliances, wadding, gauze, bandages, medical disposables, syringes, needle and catheters, ophthalmic instruments, dental instruments, laboratory diagnostics, wound closure equipments, etc. (Republic of Turkey, Ministry of Trade). On the other hand, the medical device industry is mostly dependent on foreign and import-oriented structure. Domestic companies, especially those producing with traditional technology, are in a weak position against international companies that have adopted technology and innovation. In the 10th Development Plan, it is stated that the domestic production and export capabilities will be increased in the medical device and medical equipment industry. In recent years, R & D, market entry, project-based sector-oriented incentives are among the strengths of the sector. The investment incentives of the Ministry of Economy, "Medical instruments, precision and optical instruments and clock manufacturing" are among the priority investment topics (Ünal, 2016).

Unfortunately, almost 85% of the medical devices and supplies that are used in the health field are imported products. These are used in diagnostic and therapeutic applications and consumables constitute all the inputs of a hospital other than drugs and fixtures. In other words, Turkey is a net importer in medical devices and equipment market. In the field of health, that expensive and new technologies are used day by day, this dependency will continue and to be transferred billions of dollars to foreign countries every year. This situation will delay the development of medical industry which can be able to get important foreign exchange earnings (Republic of Turkey, Ministry of Development, Nov 2014). Medical equipment industry in Turkey (technology of medicine) has not reached a sufficient level of production and research. Traditional products are mostly produced in the industry, and advanced technology products are also produced at a limited level. However, it is seen that domestic production is mainly composed of R & D oriented products and low technological content (Ankara Chamber of Industry, 2017). The inadequacy of local producers' work in the R & D field causes market demands to be met with imports. The number of firms in Turkey and the market share in this industry in terms of new production capacity are increasing. The following products are produced. Operating tables and lamps - anesthesia devices - gynecological tables - surgical aspirators, oxygen delivery devices, X-ray devices, syringes, needles, elastic bandages, gauze and cotton steam and dry air sterilizers, blood-retrieving seats, cushions, patient beds -dental units, dental repair materials, surgical instruments, drainage, stents, catheters and sondoles, medical gas systems, stone crushing devices, blood and blood products, removal kits, orthopedic prostheses, orthopedic repair devices, medical masks, surgical gloves, blood storage cabinets, bio carriers, defibrillator, serum sets, stainless steel products. Turkey, as can be seen from Table 2 gives the foreign trade deficit in the medical industry. Production is still far behind the total need.

Table 2: Turkey Medical Sector Production and Trade (USD millions)

	2016	2017	2018 (est.)	2019 (est.)
Total Local Production	838	768	836	955
Total Exports	445	429	494	550
Total Imports	2,222	1,945	1,933	1,950
Imports from the USA	445	398	386	351
Total Market Size*	2,620	2,284	2,275	2,355

*total market size = (total local production + imports) - exports

Source: export.gov.

There are about 1000 manufacturers, 2000 importing company and 45000 dealers in the medical device and disposables market in Turkey. Local manufacturers primarily manufacture disposables, surgical tools, stents, prosthetics and hospital furniture. In general, all major categories of medical equipment are present in the market both in private and public hospitals. At this point, they seek state-of-the-art and innovative medical equipment and solutions.

The sub-industries where the firms are concentrated can be classified in three groups (Economist Online, Jan 9, 2019):

- Orthopedic devices, prosthetic teeth, dental fittings and artificial nec.
- Syringe, needle catheter, cannula and so on.
- Surgical, dental or veterinary furniture.

The competitiveness of domestic producers with imported products is often at risk due to general production problems. Domestic companies, especially those producing with traditional technology are in a weak position against technologically, international companies that have adopted innovation. There is an oligopoly structure in the high value-added advanced technological activity world-wide. The competition structure of the medical industry is not high because of financial constraints, import pressures, oligopolistic structure in the industry, and inadequacy of the credit companies. Having an import-dependent structure of the industry has a negative effect on the current account deficit in Turkish economy. Despite the increasing incentives for the industry in recent years, it is seen that innovation-oriented activities such as patents and utility models remain low. Also, the level of benefiting from investment incentives is not at the desired level. The frequent changes in legislation, the late payments in tenders are among the weaknesses of the industry (Republic of Turkey, Official Newspaper, Jun 7, 2011).

The industry targets in Turkey (Ankara Chamber of Industry, 21-22):

- \$ 2 billion in exports in 2018, \$ 5 billion in exports in 2023,
- To reduce its consumption of medical equipment, which is 85% outsourced, to 20% in 2018.
- To reach the capacity to meet domestic production by 30% in 2023,
- Elimination of structural defects in the health industry and improvement of information communication infrastructure,
- Focusing on supplying single-use consumables with domestic production and preparing software programs for advanced technology devices,
- Opening, encouraging and supporting centers for biotechnology subtitles,
- The country becomes a regional power and reference center for the production of medical consumables, software programs and biotechnological studies,
- Detection and suggestions should be made.

While the total export revenue per kilogram of Turkey is around 1.5 dollars, the export price of medical products reaches to thousand dollars per kilogram and even higher in some products. Therefore, value-added of this sector is very high. The medical device market in Turkey is 3 billion dollars (Üslü, Dec 4, 2017). There are approximately 1000 producers, 2300 importers and up to 700 manufacturers operating mainly in İstanbul, Ankara, İzmir, Samsun, Adana and Konya. Turkey imports advanced medical equipment and devices which include pre-screening and diagnostic devices, advanced point-of-care devices, surgical devices, cancer treatment devices, surgical devices using robotics technologies, implants, etc. (Republic of Turkey, Ministry of Health, Nov, 2015).

The 2017-2021 Action Plans (Republic of Turkey, Ministry of Health, May 2017) includes the following recommendations for the development and competitiveness of the medical device industry:

- Product safety measures for imported medical devices should be increased.
- After-sales service responsibilities should be increased.
- By removing inventory of domestic medical devices and materials, dependence should be reduced.
- Organized industrial zones for medical devices should be established.
- "Medical Device Exporters' Association" should be established on medical devices.
- Increased international cooperation and transition to high technology medical devices in domestic production should be accelerated.
- Support for the establishment of accredited testing laboratories.

Table 3: Trade Performance HS: Exports and Imports of Turkey-90 Optical, Photo, Technical, Medical, etc. Apparatus (2016, in USD Thousands)

Industry	Exports in value	Imports in value	Net trade in value	Growth of exports in value (% p.a.)	Growth of imports net trade in value (% p.a.)	Net Trade (X-M) / (X+M)*100
9000 All industries in sector 90	709395	4632030	-3922635	0.5	2.33	-73.4
9012 Microscopes other than optical microscopes; diffraction apparatus	759	5686	-4927	0	0	-76.5
9018 Electro-medical apparatus (electro-cardiographs, infra-red ray app, syringes, dental)	175823	946491	-770668	0.12	0.48	-68.7
9019 Mechano-therapy appliance (artif resp, massage app, ozone/oxygen)	13608	87853	-74245	0.01	0.04	-73.2
9020 Other breathing appliance & gas masks	2536	12178	-9642	0	0.01	-65.5
9021 Orthopaedic appliance (crutch/surgical belts & truss)	82071	442954	-360883	0.06	0.22	-68.7
9022 Apparatus based on the use of X-rays/of alpha, beta/gamma radiations	10977	248577	-237600	0.01	0.13	-91.5

Source: <https://tradecompetitivenessmap.intracen.org/TPIC.aspx>

Turkish medical devices manufacturers comply with international procedures, quality and safety standards such as the GMP (Good Manufacturing Practices), GHP (Good Health Practices), ISO standards and CE mark of the European Union. Table 3 shows the exports and imports of Turkish medical devices and supplies industry (HS. 9018, 9019, 9020, 9021, 9022). These industries fulfill domestic demand for some products and also export. In 2016, approximately \$ 285 million of exports have been made and a significant portion of this export has been realized by the sub-sector, “Medical, Surgical, Dental or Veterinary Instruments and Instruments” worth \$ 175.8 million. “Orthopedic appliances, splints and other fracture appliances and hearing aids” industry exported \$ 82 million and while “mechano-therapy appliances” sub-sector exported \$ 13.6 million in the same year. But the value of net exports which is simply obtained by subtracting imports from exports, was -3.9 billion dollar for all industries in industry 90. As seen in Table 3, the net trade has a negative value in all sub-sectors. The growth of imports in the sector 90 is greater than export and the import of Electro-medical apparatus (electro-cardiographs, infra-red ray app, syringes, dental) sector has the highest growth rate with 0.48%.

Turkey exports various medical devices and disposables to alot of countries throughout the world. Turkish major export markets are China, Germany, Holland, France, Syria, Azerbaijan, Turkish Republic of Northern Cyprus, Georgia, USA, Iraq, UK, Italy, Iran, Spain, S. Arabia, Egypt, Ukraine, Belgium, Hong Kong and India. Turkey's production and export of medical devices continues to increase. In addition, it is also expected to increase the proportion of more technologically sophisticated products (Republic of Turkey, Ministry of Trade). Table 4 depicts the exports and imports of Turkey-90 “Optical, photo, technical, medical, etc. apparatus” for leading partners in 2016. Germany’s share in total imports of this sector is 18.17% and net trade is -85.7%. Turkey gave the net trade deficit against trading partners except Azerbaijan in 2016 and the total trade deficit for this industry is \$ -3.9 billion.

Table 4: Trade Performance HS: Exports and Imports of Turkey - 90 Optical, Photo, Technical, Medical, etc Apparatus (2016, in USD Thousands)

Rank	Leading partners	Exports in value	Imports in value	Net trade in value	Exports as a share of total exports (%)	Imports as a share of total imports (%)	Exports as a share of world exports (%)	Imports as a share of world imports (%)	Growth of exports in value (% p.a.)	Growth of imports in value (% p.a.)	Net Trade (X-M) / (X+M) *100
	World	709 395	4 632 030	-3 922 635	0.50	2.330	0.13	0.87	6	3	-73.4
1	Germany	64 714	841 659	-776 945	9.12	18.170	0.01	0.16	5	4	-85.7
2	Azerbaijan	49 477	28	49 449	6.97		0.01		4	5	99.9
3	China	46 085	597 911	-551 826	6.50	12.910	0.01	0.11	34	7	-85.7
4	Free Zones	32 882	36 488	-3 606	4.64	0.790	0.01	0.01	24	0	-5.2
5	France	32 026	232 178	-200 152	4.51	5.010	0.01	0.04	-3	-6	-75.8

Source: <https://tradecompetitivenessmap.intracen.org/TPIC.aspx>

Table 5 depicts the exports and imports of Turkey-30 “Pharmaceutical products” for selected sectors in 2016. The value of the industry’s net exports is \$ -3.4 billion and shows that Turkey is net importer. The industry’s share in national imports is 2.12% which is very high. Only net trade for sub-sector 3005 “Dressings packaged for medical use” is positive. Sub-sector 3002 has negative net trade value but on the other hand, the growth of the sector’s exports is 50%. The net trade of “Pharmaceutical goods, specified sterile products sutures, laminaria, blood-grouping industry” is -71.2 percent.

Table 5: Trade Performance HS: Exports and Imports of Turkey-30 Pharmaceutical Products (2016, in USD Thousands)

Industry	Exports in value	Imports in value	Net trade in value	Exports as a share of total exports (%)	Imports as a share of total imports (%)	Exports as a share of world exports (%)	Imports as a share of world imports (%)	Growth of exports in value (% p.a.)	Growth of imports in value (% p.a.)	Net Trade (X-M) / (X+M) * 100
3000 All industries in sector 30	827,087	4,217,106	-3,390,019	0.580	2.12	0.170	0.79	6	1	-67.2
3004 Medicament mixtures (not 3002, 3005, 3006), put in dosage	588,334	2,610,766	-2,022,432	0.410	1.31	0.180	0.74	0	-1	-63.2
3002 Human & animal blood; antisera, vaccines, toxins, micro-organism culture	185,107	1,320,183	-1,135,076	0.130	0.66	0.130	0.92	50	8	-75.4
3005 Dressings packaged for medical use	23,863	19,649	4,214	0.020	0.01	0.330	0.26	-3	-6	9.7
3006 Pharmaceutical goods, specified sterile products sutures, laminaria,	21,600	128,311	-106,711	0.020	0.06	0.150	0.88	21	0	-71.2
3003 Medicament mixtures (not 3002, 3005, 3006) not in dosage	8,111	108,698	-100,587	0.010	0.05	0.060	0.8	5	0	-86.1
3001 Glands & extracts, secretions for organotherapeutic uses; heparin & its salts	72	29,499	-29,427	0.000	0.01	0.000	0.96	-43	12	-99.5

Source: <https://tradecompetitivenessmap.intracen.org/TPIC.aspx>

Table 6 shows the leading trade partners of Turkey for the sub-sector 30. In terms of export, the most important country is Republic of Korea. Switzerland, Iraq, and Slovenia are the other important importer countries which can not be ignored for Turkey's pharmaceutical products. On the other hand, Switzerland is net exporter for Turkey at pharmaceutical products.

Table 6: Trade Performance HS: Exports and Imports of Turkey - 30 Pharmaceutical Products (2016, in USD Thousands)

Rank	Leading partners	Exports in value	Imports in value	Net trade in value	Exports as a share of total exports (%)	Imports as a share of total imports (%)	Exports as a share of world exports (%)	Imports as a share of world imports (%)	Growth of exports in value (% p.a.)	Growth of imports in value (% p.a.)	Net Trade (X-M)/(X+M) * 100
	World	827 087	4 217 106	-3 390 019	0.580	2.120	0.1700	0.7900	6	1	-67.2
1	Republic of Korea	164 798	210 305	-45 507	19.930	4.990	0.0300	0.0400	36	43	-12.1
2	Switzerland	59 742	363 118	-303 376	7.220	8.610	0.0100	0.0700	9	-3	-71.7
3	Iraq	48 602	102	48 500	5.880		0.0100		-3	20	99.6
4	Free Zones	47 610	3 309	44 301	5.760	0.080	0.0100		31	2	87.0
5	Slovenia	28 791	4 725	24 066	3.480	0.110	0.0100		10	26	71.8

Source: <https://tradecompetitivenessmap.intracen.org>

Medical industry exports reached \$ 507.9 million in 2016 while it was \$ 108.7 million in 2006. The top 10 countries that Turkey exported the most medical exports in the past years are Germany, China, Iraq, the Netherlands, France, Azerbaijan, Syria, Italy, TRNC and USA (Medikal Akademi, Sep 25, 2017).

5.Trend Analysis Results

The number of private and state hospitals and also the bed capacity in Turkey has been increasing in recent years. This means that the expansion of Turkey's medical equipment market. As mentioned above, the medical device industry has a wide range of products. Turkey is poised to become one of the leading countries in the world in the field of medical tourism. Therefore, in order to increase the price competition in the medical industry, it is necessary to make cheap production in this industry and to reduce its dependence on imports. This means that the medical industry needs the cooperation of state, private industry and universities. The competitiveness of the industry will increase with the support of the state, the projects of the universities and the private industry investments. The following table shows that the import of medical industries has increased rapidly over time. The external dependence in the medical sector is not good in terms of competitiveness.

Table 7: Trend Analysis Results of Medical Sub Industries

Industry Codes	Export			Import		
	Trend Coefficient	P values	R ²	Trend Coefficient	P values	R ²
3005	0.042	0.000	0.846	0.159	0.000	0.925
3006	0.066	0.000	0.534	0.101	0.000	0.885
3407	0.098	0.000	0.788	0.154	0.000	0.896
401511	0.108	0.000	0.839	0.068	0.001	0.356
7017	0.101	0.000	0.880	0.297	0.000	0.907
370210	0.102	0.004	0.544	0.082	0.000	0.841
841920	0.098	0.000	0.745	0.086	0.000	0.728
9012	0.098	0.008	0.460	0.124	0.000	0.671
9018	0.065	0.000	0.946	0.094	0.000	0.923
9019	0.109	0.000	0.907	0.122	0.000	0.887
9020	0.124	0.000	0.799	0.113	0.000	0.844
9402	0.100	0.000	0.839	0.108	0.000	0.797

Note: The period of export and import are from 1989 to 2016 mostly. But the export periods of 401511, 370210, 9012 are from 1993, 2004 and 2003 to 2016 respectively.

Table 7 presents the trend analysis results for exports and imports of the above mentioned medical sectors. Accordingly, the results for the medical sector with the code 3005 show that exports increased by 4.2% and imports increased by 15.9%. Exports of the sector 7017 increased by 10.1% while imports increased by 29.7%. As seen from the Table, the percentage changes in imports are usually greater than the percentage change in export of medical sub-sectors discussed in Turkey. This shows an opportunity

for foreign investors in medical industry but on the other hand it represents the dependence on imports and foreign exchange outflow for Turkey.

6. Conclusion

Medical industry has become one of the world's largest industries both in terms of revenue and employment. Because the aging and growing populations, the increase in chronic diseases, advances in technology and other developments lead to increase in health care demand in the world. Medical tools and devices has been one of the leading sectors in terms of both production and foreign trade potential in recent years. In parallel with the development of the medical industry in the world, it is also one of the fastest growing industries in Turkey. There is also an increase in the number of firms operating in this industry. At present, the industry manufactures a lot of medical equipment ranging from the simplest disposables to the most complicated medical equipments. But, having an import-dependent structure of the industry has a negative effect on the current account deficit in Turkish economy.

Turkey has big domestic market in medical materials. Demand for medical products and health services are increasing due to reasons such as the population of 82 million, the increase in the number of state and private hospitals. Unfortunately the majority of increasing demand in this industry is met by imports. It means that the medical industry which is strategic industry in terms of development for Turkey is dependent on imports. That is why Turkey supports the investments for medical devices, the biomedical engineering which is closely related industry and research and development activities in medical products. It is aimed to increase international cooperation and accelerate the transition to advanced technology medical devices in domestic production. The government gives several incentives to develop the medical device industry and to increase competitiveness. Therefore, this industry is attractive for both domestic and foreign investors. On the other hand, the medical tourism in Turkey shows a significant development. The competitiveness of this sector is possible by reducing input costs. The competitiveness in medical sector will also have a positive impact on medical tourism. In terms of tourism, employment, economic growth, and external deficit, the medical industry in Turkey has a very important place, so the government should increase its support to this sector.

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