PORTER'S DIAMOND MODEL AND THE COMPETITIVENESS OF THE TURKISH DEFENSE INDUSTRY

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Abstract: *Turkish Defense Industry is the locomotive of the national technology move. However, there is a need to develop strategies in line with the national strategic objectives to increase the contribution of the defense industry to national competitive edge. The ever-changing environmental and technological conditions and advances in the understanding of defense and security make it necessary to update vision for the defense industry. Porter's diamond model has become a generally accepted and frequently used model in terms of providing a more systematic and disciplined perspective in the context of competition strategies, promoting the creation of a value chain on a sectorial basis and supporting national competitiveness. Towards this end, the aim of this study is to analyze Turkey's defense industry's competitiveness by means of Porter's diamond model and present a future perspective. The reports of the Defense Industry Presidency and the Defense Industry Association have been systematically examined and analyzed.*

Key words: *Defense Industry, Defense Planning, Porter, Diamond Model*

1. INTRODUCTION

Lately, with the impact of the political and military pressure on Turkey, Turkish defense industry has gained momentum and experienced a similar dynamic like the mid-1980s. It has become increasingly critical to determine the strategies to make the contribution of the defense industry sustainable to the national competitiveness since it has been determined as the locomotive of the national technology move. Within the scope of the Vision 2023 studies, it has been determined on the basis of meeting the defense needs at the maximum level from the domestic market. Along with these, the concentration on the export of

defense products in the Eleventh Development Plan draws attention. Accordingly, analysis is needed to review the strategy and determine the strategy within the framework of the new vision.

One of the analysis methods that can be used in this context is Porter's diamond model. As a matter of fact, competitiveness can be handled at micro level on business or sector basis, as well as at macro level on a national or regional basis (Kuloğlu, 2016). It is seen that different models contribute to the determination of strategy road maps for the defense industry by different actors. The Defense Industry Presidency (SSB), which is officially responsible for the top policy, conducts current situation analysis within the scope of strategic planning, clusters such as OSSA (private sector cluster located in OSTIM organized industry zone), SAHA Istanbul (a nongovernmental organization representing private sector clusters) within the scope of developing international competition, professional organizations such as SASAD (a nongovernmental organization representing defense industry) within the scope of sectoral analyzes, and non-governmental organizations such as STM ThinkTech within the scope of foresight and insight studies. In addition, it is seen that analyzes are made with different methods within the scope of academic studies. For example; Bilgen (2013), Bilgen and Varoğlu (2016) examined the competitiveness of the defense industry by implementing competitive indices that determine the framework of the diamond pattern in the focus groups, Ozgen (2016) analyzed the Turkey's defense industry policy by using the process model method, Ocak et al (2016) examined the elements used in the vision and mission statements of Turkish defense industry companies and the compatibility of these elements with the national defense industry guidance documents, Bayrak, Bakırcı and Sarıkaya (2016) tested the limits of efficiency with data envelopment analysis, Kurç and Bitzinger (2018), Öksüz and Öztürk (2019) conducted a SWOT analysis for the defense industry, focusing on the internal functioning and examining which national or international factors had the greatest impact on defense industry and arms trade policies with case studies and comparative analyzes.

In particular, the rapidly changing environmental conditions, changes in technology, developments in defense and security understanding, and advances in the country's vision make it necessary to update and improve the analyzes. As a matter of fact, it is understood that

the analysis levels of the studies mentioned above are organizations or clusters, and the sectoral analyzes in the context of contributing to national competitiveness have not been sufficiently made. PESTLE and SWOT analyzes, which are used as a method in planning or indexing studies, are seen to be used predominantly. Turkey recently needs methods to analyze the competitiveness of the interests to the fore. It is necessary to carry out studies to determine the competitive power within the framework of the ecosystem understanding that will comprehensively handle the R&D, design, production, distribution, maintenance and disposal activities of the system, subsystem, component, weapon and equipment, as well as other service procurement.

Porter's diamond model, which deals with the competitive power of the industry with an ecosystem understanding, has been widely accepted and has been discussed in terms of different sectors. For example; Öz (2002) used this model in glass, construction, leather, automobile and steel industries, Gürpınar and Barca (2007) furniture industry, Olcay (2011) ceramic industry, Akdağ et al. (2014) textile and ready-to-wear industry, Bilir (2016) tourism industry, Kuloğlu (2016) benefited from the model in the context of furniture products, fabricated metal products and electrical equipment products manufacturing sectors, Köksoy (2018) dairy products, Öztürk (2018) accommodation sector, Erkahraman (2019) crane sector and Yolcu (2019) boron mining sector.

Porter's diamond model has generally been a preferred model for determining whether clusters can provide competitive advantage (Wickham, 2005; Ketels & Memedovic, 2008; Doegl et al., 2012; Jhamb, 2016). As a matter of fact, the starting point of the model is to reveal the reasons why a country is successful in one industry but fails in other industry clusters (Öz, 2002, p. 510). Because Porter (1998) pointed out the importance of pre-competitive cooperation of local actors in the formation of the factors in the diamond model, and included sectoral actors as well as institutions in the relevant public, university, private or non-governmental sectors to the ecosystem. Accordingly, it is seen that in aviation clusters analyzes are made using the model at micro level (e.g. Yalçınkaya & Adiloğlu, 2014; Leg, 2015; Köroğlu & Eceral, 2018). Based on this understanding; the analysis of the Turkish defense industry, whose exports are increasing, providing technology gains with original product designs,

and which constitutes the backbone of stable economic growth, was made by Porter's diamond model method. The study primarily focused on the concept of sustainable competitive advantage, then the diamond model of Porter was explained, the Turkish defense industry was analyzed in accordance with the model and the results were presented. The aim of this study was to analyze Turkey's defense industry's competitiveness and present a perspective. The reports of the Defense Industry Presidency and the Defense Industry Association, which is the regulatory body of the Defense Industry, have been systematically examined and analyzed. In addition, national and international literature has been used to compare competitiveness.

2. PORTER'S COMPETITIVE STRATEGIES AND DIAMOND MODEL

Businesses, sectors or countries that can produce more economic value than their competitors provide competitive advantage (Barney & Hesterly, 2015, p.45). Especially in sectors where competition is intense, businesses aim for competitive advantage in every strategic move they make or respond to the actions of their competitors (Hitt et al., 2011, p.130). The strategy preferred should be in a way to realize the mission, support the goals, make use of environmental factors with strengths, eliminate threats to weaknesses (Barney & Hesterly, 2015, p.59).

Competition strategy has become an important tool to achieve goals (Ehie & Muogboh, 2016; Kharub & Sharma, 2016, 2017; Olhager & Feldmann, 2018). According to Mintzberg (1967, p. 73), strategy is "the process of making important organizational decisions" and "the sum of all decisions". Strategies are formed in different contexts such as political, sociocultural, economic, technological, military, geographical and historical (Samaras & Hills, 2013). In the strategic management literature, Porter's competition theory has been a more preferred theory in terms of providing competitive advantage in the field with its holistic approach. The main reason for this is; While the previous theories only worked on one or two dimensions, this theory is the first multilevel theory that realistically connects companies, industries and nations (Peng, 2009, p. 125).

According to Porter, competitiveness for a country is the share of a country's products in world markets. This competitiveness is like a zero-sum game, because the gain of one country means the loss of the others (Siudek & Zawojska, 2014, p.93). According to Porter (1998), the main competition takes place between industries. To explain why certain firms in a country can

successfully compete against foreign competitors in certain segments or industries, Porter (1990) developes an analytical framework and as a result of his study based on more than 100 case studies in 10 countries, he points out four factors that contributed to the competitive advantage of businesses. Based on this, Porter (1980) proposes a model called the "Diamond Model" to reveal how an economy gains competitive advantage through the interaction of various endogenous determinants in his study, in which he analyzes the reasons for the differences in the national competition level of countries. The four-factor model developed by Porter is a dynamic model that interacts with all elements supporting each other (Vlados, 2019, p.48). Elements of the model as shown in the figure below are; factor conditions, demand conditions, relevant and supporting industries and firm structure, strategy and competition. Adding chance and state factors to these four basic factors, Porter defines the role of the state as eterminant on four basic factors (Prestowitz 1998; Giap 2004; Budd and Hirmis 2004; Thompson 2004; Fendel and Frenkel 2005; Ezeala-Harrison 2005; Jhamb, 2016) Therefore, it will be useful to consider the role of the state from a supervisory and regulatory perspective.

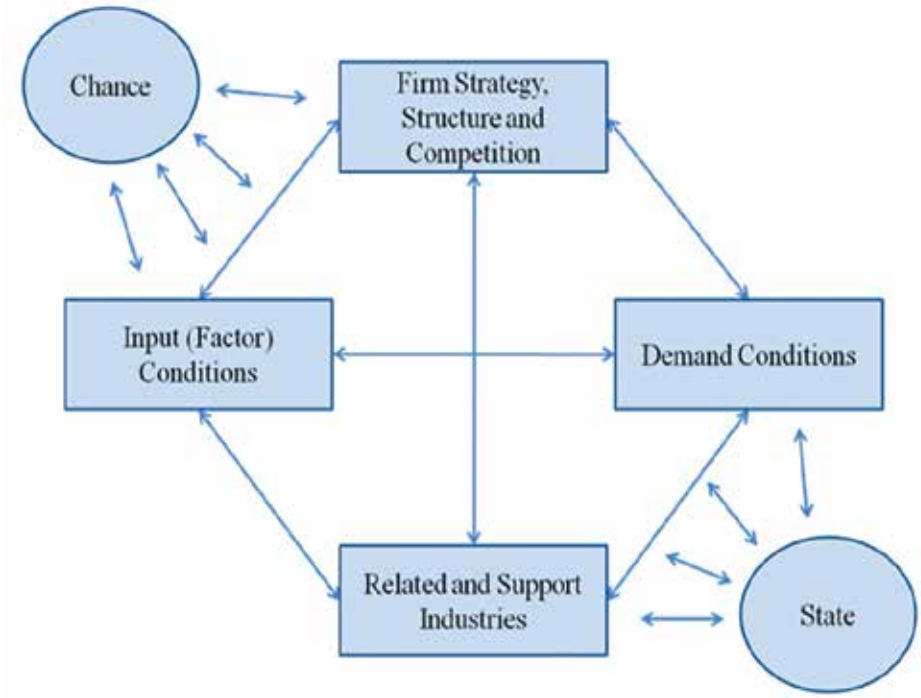

Fig. no. 1 *Porter's Diamond Model Source: Porter, 1990*

The necessary inputs that an organization needs to compete in the market form the factor conditions. Having sufficient factor conditions ensures the correct functioning of the ecosystem (Jhamb, 2016, p.142). Factor conditions, which are the preconditions for competing in a sector, are; human resources, physical resources, information resources, capital resources, and infrastructure resources (Porter, 1990). Among these, modern infrastructure and advanced qualified workforce are seen as developed factors (Öz, 2002, p. 515). According to Porter (1990, p. 211), the existence of developed factors is extremely important in increasing the competitiveness of the cluster.

Human resources include features such as professionalism, specialization and business ethics together with the quality and quantity of the workforce (Bilir, 2016). Within the scope of physical resources, location, geographical features, climate characteristics and water can be considered together with raw materials including energy (Vlados, 2019, p.35). Clustering of actors within the ecosystem in a specific geographic area increases competitiveness (Porter, 1990).

Business intelligence, market knowledge, academic knowledge and technical capacity constitute the sources of information. The presence of advanced enterprises that are aware of new technologies in an industry provides a competitive advantage around the world. Capital resources include financing expenses and the structure of capital markets as well as the size of investments. Although very general, there are transportation, communication, health and education opportunities, carrying capacity and sociocultural elements in infrastructure resources (Porter, 1990).

According to Porter, domestic demand determines the rate of improvement and innovation provided by a country's businesses. The composition of domestic demand shapes the way the business understands, interprets and responds to the needs of buyers. The competitiveness of the sector increases if local demand can provide a clear picture of businesses regarding the users' needs. If the composition of the demand includes international needs in addition to local needs, this is a factor that supports national competitive advantage. If the domestic demand for products is high, investments are made in new technologies to improve products and production capacity, which ultimately increases the competitive power (Karkkainen, 2008, p. 24). The sophistication of the domestic demand will help local companies to increase their production capacities. As a result, a developed market will force the industry to produce

products worldwide (Fainshmidt et al., 2016, p.84). In addition, the intensity and complexity of the demand will provide competitive advantage by producing higher value-added products (Munshi et al., 2019, p. 341).

Relevant and supporting industries are organizations that regulate and determine activities in the value chain while producing and competing with complementary products. The presence of supplier companies that can compete internationally in the industry also creates advantages for sub-industries. Such suppliers provide timely, fast and sometimes preferential access to the most cost-effective inputs (Munshi et al., 2019, p. 342). In addition, it can lead the technological developments in the sector.

The presence of strong suppliers in an industry is closely related to improved factor conditions and demand conditions (Porter, 1990, p. 162).

Developed, relevant and supporting industries accelerate the innovation process, while increasing the capacity of businesses in the supply chain or value chain. The presence of world-class businesses in the value chain contributes significantly to other businesses with information dissemination, operational efficiency and economies of scale (Furman, et al., 2002, p. 903). The existence of relevant industries increases the chances of other companies in the ecosystem to identify new opportunities, depending on information sharing (Jhamb, 2016, p. 142).

Business structure, strategies and competition determine the way businesses are established, organized and managed. The presence of competitors in the sector leads to innovation and continuous improvement (Porter, 1990, p. 76). The presence of a large number of competitors in the industry motivates all companies to be aware of the actions of others and to adopt the best strategy against competition (Davies & Ellis, 2000, p. 1192).

According to Porter, competition is a dynamic phenomenon and the competitive advantage of the enterprise is not only provided by responding to the environment, but also by shaping its environment in line with its own needs. it makes the surrounding conditions more suitable with its productive and innovative activities (Porter, 1990). The way for a country to gain competitive advantage is through development and innovation. The enterprises that can compete with the best companies in the international market are those that are exposed to intense competition at the local level (Karkkainen, 2008, p. 21). According to Porter, businesses that survive in sectors with intense local competition

show higher performance globally. Because businesses that can survive in an intense competitive environment can develop effective strategies to remain competitive and improve their production capabilities. Conversely, businesses operating under government protection and not exposed to competition perform below average in the global competitive environment (Fainshmidt et al., 2016, p. 84).

Another factor in the strategy determination of businesses is social culture. While determining their strategies, they determine the most appropriate strategy for their business model and culture (Mintzberg et al., 1998). Long-term strategies are determined in countries such as Germany, Japan and Sweden, where planning culture is developed (Porter, 1998). Oz (2002) in his review for Turkey's construction firms has revealed that cultural proximity will also be important in terms of international competition.

According to Porter, the role of the state in competition is to affect the other four factors. The existence of a sensitive, effective and organized public sector helps to create effective cooperation (Porter, 1990). According to Porter, national and local governments play an important role in promoting a pre-competitive cooperation. Because the state must interact with businesses in order to increase the industry's export revenues and innovation capacity and to create a sustainable international industry (Porter, 1990, p.127). In this direction, the state can support the industry by creating suitable conditions for competition and encouraging the entrepreneurial spirit (Porter, 1998). In evaluating the performance of exporting firms in Turkey Robust empirical study (2019) it has identified the role of state regulators.

The state is the main actor that determines and regulates the product and quality standards, which are the key for businesses to operate effectively in a competitive environment. To increase exports in the industry, innovative approaches are directly related to the government's perspective on the industry. For example, tax exemptions to be applied by the state to an industry will make a significant contribution to the development of the industry (Vlados, 2019, p. 36).

Porter defines events that develop outside the control of businesses and the state and cannot be intervened as "chance". These events can change the structure of the industry and offer opportunities to improve the competitive position of the business. Chance is the possibility that external events such as natural disasters and war may affect or benefit a country, an industry or a cluster. But these events are completely beyond the control of the

State and industry managers (Jhamb, 2016, p.143). Following events can be considered as an example of luck factor; major technological discontinuities, changes in global financial markets or exchange rates, increases in international or regional demand, political decisions of foreign governments (Porter, 1990, p. 192). There are also studies describing this factor as global developments instead of chance (Akdağ et al., 2014). Sağlam (2019) found that the luck factor plays a regulatory role in the effect of demand conditions and factor conditions on export performance.

3. EVALUATION OF TURKISH DEFENSE INDUSTRY WITH PORTER'S DIAMOND MODEL

One of the main elements of defense management is the armament planning of countries to support their political and military goals. In armament planning; determining the procurement strategy, developing the defense industry base and armament cooperation are of great importance (Öztürk, 2005). For this reason, the needs arising from the changes and developments in the operational concepts and the technological developments on a global basis should be transferred to weapon systems quickly, conveniently and with little cost (Meydan & Polat, 2017, p. 70). Accordingly, the importance of allocating national resources for defense planning becomes clearer. With the development of defense planning and defense resource management understanding, it is possible to increase the cooperation of stakeholders in the defense ecosystem and to prevent the waste of resources such as workforce, technology, infrastructure and information that will provide sustainable competitive advantage.

In this context, it is possible to come across studies showing that strategic management tools are used in defense planning. For example; Bilgen (2013) and Bilgen and Varoğlu (2016) tried to make the competitive structure more understandable by obtaining a composite competitiveness index using the diamond model. Yalçınkaya and Adiloğlu (2014) conducted an analysis specific to the Eskişehir aviation cluster and concluded that the cluster should increase cooperation with educational institutions in order to increase qualified workforce. Leg (2015) examined aviation clusters in the samples of Germany, France and Canada according to Porter's diamond model. Köroğlu and Eceral (2018) found that innovation ecosystem and social capital were effective in competitiveness as a result of the survey they conducted in Ankara clusters. Meydan and Polat (2017) discussed the applicability of the balanced scorecard in defense

planning. In addition, Demirtaş (2013) analyzed the aviation sector and Öksüz and Öztürk (2019) analyzed the development of the defense industry using SWOT analysis.

The strength of Porter's diamond model compared to other models is that, it gives more effective results in determining the sectors that contribute the most to the national competitiveness and high productivity (Akdağ et al., 2014, p. 330). Porter's model has been a generally accepted and frequently used model in terms of presenting a more systematic and disciplined perspective in the context of competitive strategies, encouraging the creation of value chain on a sectorial basis and supporting national competitiveness. It was used for the first time in this study in the context of the competitiveness of the defense industry. For this reason, the defense industry was briefly summarized in the study and analysis was carried out on the determinants of the model.

3.1. Overview of the Defense Industry in Turkey

Since the end of the cold war, the global defense industry has been in an important transformation and according to academics, this change takes place on two main axes as "globalization integration" or "self-sufficiency". On the axis of globalization; Mergers, acquisitions, partnerships and collaborations, export-based production, free markets, and integrative defense industry policies are included due to increasing R&D and system costs. On the axis of self-sufficiency, there are countries that are newly entering the market and whose main objectives are to reduce the influence of the supplier states on their foreign policies and to become independent, powerful and wealthy.

Global changes such as; the pressure on defense spending, difficulties in international cooperation, regional conflicts, humanitarian aid gaining importance and the doctrine of protection responsibility, increasing the effectiveness of regional formations, and global powers not approaching technology transfer, experienced after the 2000s have also been reflected in the defense planning approach and led the countries to use internal resources. In line with these developments in the defense industry, internationalization aimed at breaking the American sovereignty, catching the economy of scale while moving away from integration and increasing the participation of the industry in the supply chain have increased with the orientation to domestic markets (Hooke, 2005).

In this context, the need for an advanced defense industry for the

Republic of Turkey, which is adjacent to the world's most problematic regions, is of particular importance. The idea of domestic and national defense industry has always been on the agenda since the Ottoman Empire. The embargo on Turkey's Cyprus Peace Operation was a turning point for the defense industry. This process resulted in the emergence of domestic defense industry companies such as ASELSAN (1975), İŞBİR (1979), ASPİLSAN (1981), and HAVELSAN (1982). The "Turkish Defense Industry Policy and Strategy" published in 1998 with the establishment of the Undersecretariat for Defense Industry with Law No. 3238 in 1985 were the most important step in restructuring the defense industry. On the basis of these steps, there is always an effort to create a domestic and national defense industry.

International pressure Turkey faced after 2016 has created a new momentum in defense industry. With the policies determined at the end of the 1990s, a certain level was reached in the defense industry, the export orientation began to manifest itself in the Tenth Development Plan, and efforts to develop completely national and domestic systems with original designs have intensified. The number of projects carried out by SSB (2019) has reached 667 and a portfolio of 60 billion dollars. The turnover value reached 8.761 billion USD including 2.188 billion USD export. In addition, considering that the budget allocated for R&D is 1.448 billion USD, the value attributed to original design and technology gain becomes more meaningful. As a matter of fact, as a policy and measure in the Eleventh Development Plan; It is envisaged to focus on projects that will reduce external dependency, to strengthen the educational infrastructure to strengthen the defense ecosystem, to support SMEs, to increase and export cooperation, and to focus on multiple use by providing technology transformation. In this direction, it is aimed that the localization rate of defense industry products will be 75% in 2023, the turnover will reach 27 billion USD, the exports will exceed 10 billion USD and the employment will approach 80 thousand (Eleventh Development Plan, 2019).

Current policy and strategy documents now mention the competitive power in the international arena with the localization and nationalization of defense products. For this reason, it has become more important to strengthen all actors in the value chain with a more integrated approach. For this reason, the correct description of the defense ecosystem is critical in assessing the competitiveness of the Turkish defense industry. Because it also determines the level of analysis and the context of the analysis. The figure below shows the ecosystem of the Turkish defense industry.

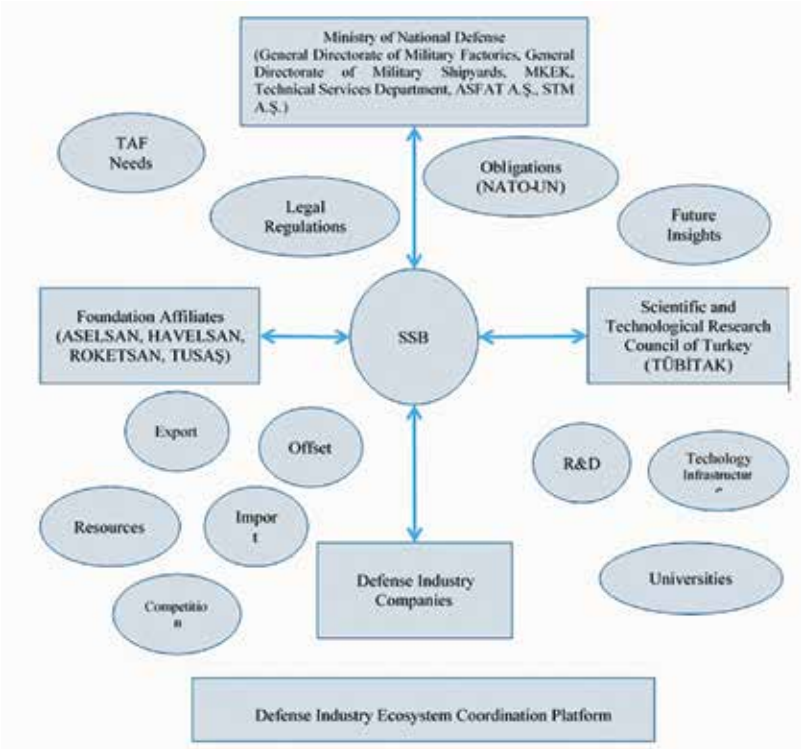

Fig. no. 2 *Turkish Defense Industry Ecosystem*
Source: SSB 201-2023 Strategic Plan

Located at the center of the ecosystem, SSB reveals the vision of the sector, guides the sector and ensures coordination between the actors in the system. Turkish Armed Forces and other security forces are customers of the sector within the framework of their duties, future predictions and international obligations. Foundation companies and other businesses in the current competitive conditions; They are the actors that continue their activities within the framework of resources, export, import, offset variables. The association and clustering efforts of businesses strengthen the ecosystem. TÜBİTAK, on the other hand, is the science and technology-focused actor of this system, which provides science and technology coordination and while doing so, it is in contact with universities and related organizations.

3.2. Evaluation of Turkish Defense Industry with porter's diamond model

Although the effort to create a domestic and national defense industry is a desirable situation

in terms of national security, the globalizing world economy and increasing system costs make it necessary for defense industries to be strong enough to compete in order to survive. It is possible for companies to preserve their production lines and maintain their competitive power by selling their products outside their own state though the only buyer of many systems produced is the state. In other words, competing in the international market is very important to sustain production line. Defense industry enterprises that want to compete in the market have to develop strategies accordingly. However, as Porter states in the diamond model, this will be possible with the collective effort and government support of the defense industry altogether rather than the effort of a company independently (Porter, 1990). Therefore, in this study; by using Porter's diamond model, the current status of the resources providing competitive advantage to the Turkish defense industry has been determined and presented to the attention of field experts, academics, researchers and policy makers.

3.2.1. Evaluation of the Factor Conditions of the Turkish Defense Industry

3.2.1.1. Assessment of Human Resources of the Turkish Defense Industry

One of the strongest elements of the Turkish defense industry is the well-trained young labor force. The number of employees in the defense industry is 73,771 as of 2019 (SASAD, 2019). Compared to the previous year, the number of employees has increased by 10%. Table-1 below contains data on employment in the defense industry since 2015. 24% of the employees are engineers, 48% technicians/ operators, 18% administrative personnel, and approximately 64% of these personnel work in departments directly related to production (SASAD, 2018, p.18).

Table 1. Defense Industry Employment Figures

Year	Engineer Rate	Technical Staff Rate	Total Employment	Change Rate	Per Capita Turnover	Change Rate
2015	34%	40%	31.375	- 0,4%	156.403 $	- 4,4%
2016	30%	30%	35.502	13%	168.103 $	7,5%
2017	31%	37%	44.740	26%	149.600 $	- 11%
2018	24%	48%	67.239	50%	130.304 $	- 13%
2019	-	-	73.771	10%	147.539 $	13.23%

Source: SASAD 2014-2019 Reports

When the table above is examined, the fact that around 70% of the personnel are engineers and technical personnel is interpreted as a sign of the intensity of technological production, design and development activities. However, the turnover rate per capita, which was 130-170 thousand $ in the last five years, remains at a very low level compared to the world average of 350 thousand dollars (Deloitte, 2018, p.6). Although the rate of personnel working in the production area is high, the turnover per personnel is less than half of the sector average. turnover per capita, an indicator of labor productivity and sectors remain at very low levels of average pitch is a significant problem in terms of Turkey's defense industry.

The number of personnel employed in the sector has been increasing over the years and the most important increase was experienced in 2018 with 50%. It is expected that the effect of this increase on the sector's turnover will be felt better in the coming years. In particular, the fact that the wages of technical personnel are well below the international companies cause the skilled workforce gaining experience in the sector to move abroad (SASAD, 2018, p.22). At the end of 2018, 272 people, mostly senior engineers, left the country to work in defense companies abroad. A survey of these people by the SSB have shown that the most important causes of brain drain were; limited professional development and career opportunities, lack of equal opportunities in the promotion system, low salaries, discrimination and mobbing in the workplace (Defense News, 2019).

The Turkish defense industry is currently working on a wide range of systems, from intelligence satellites to guided missiles, from unmanned vehicles to helicopters. Such a complex system and product range requires the vertical and horizontal integration of technical knowledge, technology and experience infrastructure supported by a strong academic infrastructure. Employment in the sector is critically low compared to the number and content of many development and production projects, most of which are controlled by SSB (Mevlütoğlu, 2017, p.11). The number of personnel working in the defense industry is 850 thousand in the USA and 2 million in Russia in 2014 (Toydemir, 2017).

3.2.1.2. Assessment of Physical Resources of the Turkish Defense Industry

60-70% of the defense industry companies in Turkey is located in Ankara clustered. In addition, 6 out of 11 companies (MKEK, ASELSAN, HAVELSAN, TUSAŞ-

TAİ, ROKETSAN and FNSS), which are the main contractors in many projects in the defense industry, and the headquarters of many companies operating as subcontractors of these companies are located in Ankara (Köroğlu & Eceral, 2018 , p. 141).

The positioning of defense industry companies in locations close to each other constitutes an important competitive power. However, one of the most important problems of the sector in terms of physical resources is that domestic prime contractors carry out their activities with higher operational costs compared to international examples. It is inevitable that the high operational costs will force companies that want to compete in international markets in price competition (SSM, 2017, p.3).

3.2.1.3. Evaluation of Turkish Defense Industry's Information Sources

"Technology Roadmaps" are used to quickly access the information needed by the defense sector, to get rid of foreign dependency and to develop the necessary technologies. In this roadmap, with a systematic approach, operational needs are evaluated and prioritized according to competence level and Technology Readiness Level within the scope of national capabilities, and the acquisition of relevant technologies is tied to a schedule. However, the transformation of technology in production with traditional methods still cannot occur at the expected pace (SSB, 2019). In addition, Defense Industry Technologies (SSTEK A.Ş.), which was established to support companies operating in the sector and 100% owned by SSB, has a strong legal infrastructure to develop and support the fields of defense, aviation, space and homeland security (SSM, 2017).

The success criterion in the development of defense industry products is the ability to reflect user feedback on designs by using field experience. The know-how formed in this respect in the Turkish defense industry is a positive development for the sector (SSB, 2019). Armed and unarmed unmanned aerial vehicles, which are one of the most important information sources of the defense industry, have become the most important systems of the sector with the successes achieved in recent years. These systems are seen as the most important architects of the tactical achievements in counter-terrorism and cross-border operations. However, some authorities state that these systems are not a panacea and strategic game changers, and that the biggest threat to them is the developments in anti-hydrone technologies (The Arab Weekly, 2020). In the upcoming period, the developments in the antidrone systems should be closely followed and the success of the sector

should be made sustainable.

The key to independence in the defense industry is to produce high-tech and value-added original products. An indicator of the ability to produce original products is the number of patents received in the sector. In 2017 Turkey was ranked in 22nd in the world rankings patents. At the end of 2018, it ranked 13th in the world in the domestic patent application ranking. The number of international patents, which was 1403 in 2018, increased to 2058 in 2019. The ten-fold increase in the number of patents in the defense industry in the last ten years is one of the most important reasons for the rise in this ranking (ITO, 2020). While the upward trend is promising, it may be misleading to say that university-industry cooperation is sufficient, which is the most important root cause of the increase in patents (SSB, 2019).

3.2.1.4. Assessment of Turkish Defense Industry's Capital Resources

Turkish defense industry consists of public and private sector organizations. Public-owned organizations consist of the SSB and the Turkish Armed Forces Foundation affiliates. The capital structure of private sector organizations consists of domestic or international partnerships. When the total asset sizes and sales volumes of the companies are compared between 2012 and 2016, it is observed that the main contractor companies in the sector have achieved a sales volume that is half of their total assets on average. This low rate is due to project-based production, inefficient use of resources and long stock cycle periods (SSM, 2017, p.17).

In the defense sector, 70% of the assets are generally financed by external resources and 30% by companies' own resources (SSM, 2017, p.3). Especially in the shipbuilding sector and land vehicles sector, the lack of equity is noteworthy. These sectors meet their financing needs by short-term borrowing. Electricity, Electronics and Software, Aviation and Space and Weapon Systems sectors borrow predominantly with long-term advances. Subcontractors meet their business financing needs mostly with advances or short-term bank loans. Sector capital resources create financial difficulties for companies (SSM, 2017, p.3).

3.2.1.5. Evaluation of Turkish Defense Industry's Infrastructure Resources

Since the defense industry is a sector that needs manufacturing infrastructure and investment to a large extent, its fixed costs are very high. Therefore, it needs significant

financial support. When the fixed assets and sales volumes of the enterprises in the sector are compared; It is observed that the infrastructure investments made are not sufficiently reflected in sales, especially in sub-contractors, idle capacity is created and this has a negative impact on costs (SSM, 2017, p.4).

One of the most effective mechanisms to strengthen the defense industry infrastructure is incentive mechanisms. Following incentives can be listed as the incentives given for defense industry infrastructure; Support provided for qualified product loans, tax exemptions, interest support, investment location allocation, promotion of strategic investments and promotion of priority investments and large-scale investments (SSM, 2017, p. 10-31).

With the "Turkey's Strategic Vision 2023" project, the development of the defense industry is seen as one of the leading sectors in the country. It is aimed to make use of the existing industrial infrastructure, to cooperate with foreigners on technology development issues when necessary investments to produce high-tech products, and to meet all the required systems from within the country as much as possible. As a matter of fact, with the infrastructure investments made within the framework of this vision, an important infrastructure has been established especially in subsystems such as system integration, command control, communication, electronic warfare and firepower. Turkey's strategy followed by the creation of this infrastructure has been cooperating with the countries in the leading position in the sector. In this way, many projects such as MİLGEM, ALTAY, ATAK and UAV projects have been realized (GBR, 2016, p.3).

A country's military operations can only be supported by a strong industrial infrastructure. The most important issue in terms of defense industry infrastructure is to ensure sustainability. This can only be possible by transferring the skills gained in the defense industry to the civil sector. As being the leading power for many years in defense industry, USA made radical changes in the defense procurement strategy in 2017, it started to support the production of defense industry enterprises for both military and civilian uses. However, it is seen that double-use opportunities are not evaluated for the Turkish defense industry, which continues to be foreign-dependent in some critical technologies (SSB, 2019). Although the needs of the Turkish Armed Forces are mostly met, private sector organizations produce more goods and services for civilian use than public affiliates (SSM, 2017, p.17).

3.2.2. Assessment of the Turkish Defense Industry's Demand Conditions

The state is the sole purchaser of many products in industries such as the defense industry. The state, which is the most important customer in terms of the defense industry, is also the main determinant of the demand conditions for modernization activities of the armed forces (Domingo, 2015). In Turkey, the last five years, has been the most requested land platform, in second place came the aerial platforms. The demand for informatics has remained well below expectations (SASAD, 2019: 5). Considering that the IT segment has the largest share in the world defense market, it is obvious that the competitive advantage in this industry depends primarily on producing value-added products that will create demand in the domestic market. The sector sales and composition for the last five years are given below.

When the defense industry demand in the last five years is analyzed, it is seen that the demand composition is largely domestically sourced. The ratio of foreign sales in total sales varies between 30% and 40%. It is seen that total sector sales are increasing every year. In 2019, the highest number and the highest increase in international sales was achieved. The most exported countries in 2018 are the USA, Oman and the European Union, respectively. However, it is one of the most important problems of the sector that exports to the USA and the EU are mostly realized within the framework of meeting offset obligations. Another point to be taken into account at this point is the comparison of the defense industry imports and the foreign sales revenues of the sector. The table below contains this comparison for the last five years.

Table 2. Defense Industry Sales

	Total Sales (Mil $)	Change (Yearly %)	Domestic Sales (Mil $)	Change (Yearly %)	Foreign Sales (Mil $)	Change (Yearly %)	Domestic to Foreign (%)
2015	4.908	3,78	2.979	- 8,22	1.929	3,99	60/40
2016	5.968	21,60	4.015	34,77	1.953	1,24	67/33
2017	6.693	12,14	4.869	21,27	1.824	-6,62	72/28
2018	8.761	30,90	5.706	17,19	2.188	20,02	65/35
2019	10.884	24,23	7.816	36,98	3.068	40	71/29

Source: Compiled from SASAD Reports

Table 3. Defense Industry Import and Foreign Sales Rate

Years	International Sales Revenues (Millon $)	Imports (Million $)	Sales to Imports
2015	1.929	1.067	1,8
2016	1.953	1.289	1,5
2017	1.824	1.544	1,2
2018	2.188	2.449	0,9
2019	3.068	3.088	0,99

Source: Compiled from SASAD Reports

The development of the sector requires a force multiplier in the form of technology, and this is only possible with the local knowledge stock. Import is a factor that may prevent the formation of this stock (Bruton, 1998). When the foreign sales and import figures of the sector are examined, it is seen that the balance has deteriorated in favor of imports every year, and although there is an increase in foreign sales every year, the rate of increase in imports is higher than that of foreign sales. This is an important sign that the defense industry has imported a significant amount of raw materials and intermediate products from abroad. The most important expenditure items of enterprises operating in the sector are materials and labor. When import expenditures are analyzed, it is seen that enterprises are dependent on raw materials mainly import (SSM, 2017, p.3).

One of the problems caused by high import-based production is being exposed to embargoes and restrictions. For example, during Idlib operation European countries has stopped selling some of the products they sell to Turkey. These situations, which make the defense industry stronger, cause the development to be connected to the urgent need for action. Meeting operational needs results in a delay in allocating resources to strategic investments.

Especially not having critical technologies such as engine and software may prevent export to third countries, by remaining under the control of the country from which the intermediate product is purchased. For example, not being able to obtain the license from the USA, prevented helicopter exports to Pakistan (Defense News, 2019). Another problem has been experienced

regarding the Storm Howitzer to be made to Azerbaijan. Germany's refusal to allow the engine export license prevented this export from happening (İsmailov, 2015). For this reason, technologies or intermediate goods that are critical in terms of the final product should be guaranteed with domestic production, if this is not possible, the export potential should be guaranteed with long-term contracts.

Demand conditions constitute the weakest factor of the defense industry; therefore, it carries important risks for the future. Excessive dependence on public institutions domestically, the share of exports in the revenues of defense industry companies and the low level of revenues outside the defense field are important problems of the sector (Vakıfbank, 2018, p.13). It is extremely important for the future of the sector that it develops high-tech systems with dual use, that is, both military and civilian use, and decreases its dependence on the public by increasing the share of exports in sales. One way to increase the share of exports in sales is to use political and political relations effectively. Especially, it is extremely important to develop relations with countries that have good relations that will ensure defense industry exports.

Another problem in Turkey's defense industry is, customer diversity in terms of exports cannot be created. When the countries that have been exported since 2010 are analyzed, it is seen that all of them consist of Muslim countries with good relations and it is seen that there is no significant export to NATO countries other than offset. The expansion of the export base and the development of the range of countries to which the export is made are important for the sustainability of the sector, as well as the ability to export main system exports to NATO countries in terms of competitiveness. Exporting systems to NATO countries will contribute to the competitiveness of the defense industry. System exports to NATO countries will also determine the development and competitiveness of the defense industry.

Another problem area in terms of demand conditions of the defense industry is the lack of coordination between industry representatives and demand authorities. While the agency of need sets forth the Strategic Target Plan (SHP), which is the plan for the next twenty years, it does not get the sufficient support of the industry and carries out the process of determining the needs within itself in a tactical-based manner. However, shaping the force structure and modernization are processes that have technical, sociological, economic and cultural aspects. This approach neglects these and makes the operational doctrine the main determinant of the needs analysis (Mevlütoğlu, 2017). In addition, the vision of the needs authority in the coming period is

not known by the industrialists and this may cause them to be unable to predict the future.

3.2.3. Assessment of Turkish Defense Industry Related and Supporting Industries

One of the most important deficiencies of Turkey's defense industry is not having sufficient number of suppliers competing in the international market that may help meeting the critical needs and having access to raw materials. As a matter of fact, one of the main reasons for the 60% increase in import figures in 2018 is the effort for creating stocks due to hidden embargoes affecting the sector (SASAD, 2018, p. 14). Lack of strong suppliers that can support domestic production at a sufficient level led the sector to make stocks in the accessible amount.

Defense industry companies operating in Ankara procure 19.1% of their raw material, intermediate and electronic component needs from abroad and 23.7% from another city (Köroğlu & Eceral, 2018, p.144). As a result of the increase in awareness towards the defense industry, there is an increasing trend in entering the sector. However, it is a fact that SMEs in the defense industry cannot be adequately specialized (SSM, 2019). Industrialization and self-sufficiency in sub-systems and critical systems require long-term technology management strategies. Technology management is the key to sustainability in the defense industry. The dependence of the Turkish defense industry on foreign suppliers in terms of subsystem, technology and material creates an important sensitivity for the sector.

In addition, the proximity of the locations has also accelerated the clustering efforts, there are two clusters each in Ankara and Istanbul, one in Bursa, Eskisehir and Izmir. Resource sharing, diffusion of innovation, career and talent management of qualified workforce, university-industry, public-industry, industry-industry collaborations strengthen the ecosystem by increasing social capital. Deployment of authorized institutions in the same province, the existence of non-governmental organizations for advocacy activities, and the excess of universities and educational institutions to cooperate to increase the quality of human capital are among the factors that strengthen the sector.

3.2.4. Evaluation of the Turkish Defense Industry's Business Strategy, Structure and Competitiveness

The defense industry consists of companies mostly supported by the Turkish Armed Forces Strengthening Foundation or public subsidiaries focused on specific areas of expertise rather than businesses operating

in the same fields that compete intensely with each other. Foundation firms represent approximately 50% of the defense sector on a turnover basis. Considering the turnover distribution according to the defense industry sector report; It is seen that the main contractors have a share of 72%, subcontractors 19% and the sub-industry 9% (SSM, 2017, p.3). The fact that the main contractors are mostly TAFF companies is a product of the defense industry policy. Although this structure of the sector creates an important advantage for an industry that is in the establishment and initial stages, it may create significant problems in terms of competitive advantage in the international environment in the long term.

In addition, in sectors other than shipbuilding and vehicle production, there is almost no competition between enterprises and most contracts are given to TAFF companies, which can be made in advance, which significantly reduces the motivation for innovation in the sector (Mevlütoğlu, 2017, p.291). Although Turkey develope systems that can compete in the international arena, the countries having established customer bases will perceive it as a threat and they may use export licenses as a tool to prevent the powerful actor in Turkey's defense industry (Mevlütoğl 2017, p. 12)

One of the most objective evaluations in terms of international competition is the evaluation of defense industry companies. In 2007, ASELSAN was the only Turkish company to be on the list of "The Largest Defense Industry Company in the World" and it was in the 97th place in the list. Four Turkish companies entered the list in 2018. ASELSAN ranked 52nd, TUSAŞ 69th, STM Defense Technologies Engineering and BMC 85th, and ROKETSAN 89th (SSM, 2017, p.21). Increase in the number of companies entering the world ranking is an important indicator of the increase in the international competitiveness of the defense industry companies in Turkey. However, considering the sector data and the dependence of the sector on foreign suppliers in terms of subsystems, equipment and technology, it is evaluated that this increase is due to the growth based on imports.

3.2.5. Evaluation of the Turkish Defense Industry in the Context of the Chance Factor

Since chance is an external factor for the defense industry, it is very difficult to control. Turkish foreign policy and defense industry are directly linked to each other, so the sensitivities of the defense industry should be taken into

account in foreign policy decisions. For example, the variation in international relations can affect the exports of defense products faster and more than expected. Military activities carried out in Syria and Libya have caused some countries to apply embargoes and this has caused significant problems in both raw material/intermediate product and system procurement processes. The recent problems experienced in the JSF 35 strike aircraft project have created uncertainty in both supply and subcontractor companies. In terms of large companies operating abroad, such as ASELSAN, deterioration in political relations with the countries operating abroad will bring significant risks. On the other hand, the increase in restrictions stemming from international relations creates an opportunity for the defense industry to turn to domestic resources.

Another factor affecting operational costs is that the depreciation of the Turkish lira against foreign currencies due to production based on raw material and intermediate product imports increases the costs of raw materials and intermediate products. If the sector supplies the raw material or intermediate product domestically, the loss of value of the TL may turn into an advantage in terms of exports, since the system costs will be cheaper than international market prices.

3.2.6. Evaluation of the Role of the State in the Turkish Defense Industry

The State is the most important power affecting the defense industry with its policies, incentives or obstacles, and political approaches. The evaluation of the defense industry in a political context can be considered from two perspectives, namely the consistency and stability of the policy (Domingo, 2015, p.163). The fact that the defense industry is included in the development plans and has been declared as a priority sector in recent years is very valuable in terms of these criteria.

The state has a key position in the sector both in meeting the high R&D costs and as the customer purchasing the final products (Köroğlu & Eceral, 2018, p. 148). Defense industry companies, whose capital financing structure is quite fragile, stand by state supports and legal regulations. Currently, incentives given to the defense industry are not given to any sector in the country.

One of the most important indicators of government support to the sector is product and technology development expenditures. The share of project incentive expenditures, which reveal the state's contribution to product development expenditures, in total has gradually increased in recent years and reached the level of 80%. The state supports the defense

industry product development activities intensively. Despite the increase in the state's share, there was no significant increase in the expenditures of the sector representatives, and a significant decrease was observed compared to 2016. It is extremely important for enterprises operating in the sector to increase their product development expenditures in terms of developing value-added original products.

as directly reduce the economic activities by creating uncertainty and pessimism among the public and thus, may affect the sector negatively. Political instability carries significant risks, especially in terms of long-term contract provisions (Pelletier and Bligh, 2006). In such turbulent times, the state should encourage economic development with persuasive and plausible commitments. When politically instabilities are possible,

Table 4. Product Development Expenses

Years	Equity (Million $)	Project Incentive	Total (Million $)	Project Incentive Share
2015	287	616	904	68%
2016	513	741	1.254	60%
2017	295	942	1.237	76%
2018	288	1.160	1.448	80%
2019	331	1.340	1.671	80%

Source: Compiled from SASAD Reports.

The state can positively affect the defense industry with its regulations or international relations, as well as negatively affect it with the political environment or tension it creates. As a result of military operations conducted by Turkey, some countries have increased their embargo it affected import figures in 2018. The policies implemented by the government can encourage economic activities by increasing the uncertainty and confidence environment in the country, as well

the market actors make allocation of resources in this direction (Huang et al., 2015). In Countries open to political and economic turmoil such as Turkey the political conjuncture may affect the defense industry and it should be considered as part of it. It should be used as a positive leverage. As a matter of fact, when we look at the examples of the USA and France, it is seen that very important agreements regarding the defense industry were signed as a result of the visits made at the level of heads of state (BBC, 2017; AA, 2020).

Another important effect of the state on the defense industry is in the protection of property rights. A strong protection system based on the rule of law will reduce transaction costs and encourage investment. Property rights are the driver of competitive advantage in technologically developed countries (Williamson, 2000). Turkey is a country situated in relatively backward in terms of copyright (Pepper, 2017, p. 75). It is important for the Turkish defense industry to support technology investments by taking the necessary steps to protect intellectual property rights in order to produce more unique products with higher added value.

4. CONCLUSIONS

Recently, with the impact on Turkey's political and military incursions, the defense industry has gained momentum experienced a similar dynamic in the mid-1980s. It has become increasingly critical to determine the strategies to make the contribution of the defense industry sustainable to the national competitiveness, which started in the Tenth Development Plan period and reinforced its importance by taking it among the priority sectors in the current period and determined as the locomotive of the national technology move. With the decisions taken at the end of the 1990s, the principle of meeting the defense needs domestically to the maximum extent within the scope of Vision 2023 studies in the defense industry increased the efforts for localization. In addition to these, the concentration on the export of defense products in the Eleventh Development Plan draws attention.

Defense industry is one of the priority sectors that requires top-down planning approach. The appropriate policy and strategy can be determined by the interactive and shared participation of all elements of the state in the decision-making process. The Philippines 'modernization move failed due to policymakers' desire to reduce defense spending, inconsistency in resource allocations, the devaluation of the Philippine currency, and the priority of action against dissidents in the strategy, resulting in greater attachment to foreign powers rather than modernization (Domingo, 2015). Kurç (2017) argues that the fundamental errors of Turkey's defense industry strategy are; errors in planning, prioritization, external dependence to technology transfer and American pressure. He sees them as an obstacle to Turkey's goal. Similarly, Mevlütoğlu (2017) emphasizes that the import substitution strategy reduces efficiency in the defense industry, and mentions the lack of skilled labor.

Different models contribute to the determination of strategy road maps for the defense industry. In particular, the rapidly changing environmental conditions, changes in technology, developments in defense and security understanding, and advances in the country's vision make it necessary to update and improve the analyzes. As a matter of fact, it is understood that the current analysis levels are organizations or clusters, and the sectoral analyzes are not sufficiently made in the context of contribution to national competitiveness. PESTLE and SWOT analyzes, which are used as a method within the scope of planning or indexing studies, are seen to be used predominantly. Turkey's export oriented approach to the defense industry needs the methods of competitive analysis. For this reason, in this study, analyzes are made with Porter's diamond model, which is a method for determining competitiveness within the framework of ecosystem understanding.

Porter's four factor model created on the basis of strategy and competition is a dynamic model and the factors support each other. Adding the chance and state factors to these four basic factors, Porter defines the role of the state as a determinant on four basic factors. These factors, which are the key to sustainability of competitiveness; is created and developed through innovation and re-investments. The absence or lack of any factor leads businesses to make innovation (Smith, 2010). In cases such as shortage of raw materials, lack of workforce and lack of infrastructure, businesses either start to use their resources effectively or begin to develop new designs, new methods and new products. Each country has strengths and weaknesses in terms of factor conditions, but competitiveness can be achieved through effective use of factors (Jhamb, 2016, p.142).

According to Porter, the factors that are vital for the growth and productivity of developed economies required to achieve competitive advantage in many industries are not inherited or bestowed on the past, but are created within the nation over time. In order for Porter's model to be functional, the industry must have sufficient resources, sectoral know-how, the actors in the ecosystem, including the employees, must be conscious and environment must be created in which innovations are encouraged with investments (Timuçin, 2010). Porter (1990) argues that the development of competitive advantage occurs in four steps. These are; factor, investment, innovation and welfare-oriented stages, respectively. Porter's model expresses a systematic that goes through certain stages in an evolutionary way rather than the

developed industries that emerged suddenly. In this respect, it is possible to state that the Turkish defense industry displays an outlook that shifts from investment to innovation.

The results of the analysis made using Porter's diamond model are compiled in Table-5 below.

According to the Cognitive School approach, one of the strategic management schools, strategies are facts learned through direct experiences. These learned facts determine what to do, and new results are learned with the applied strategy. According to the Learning School, another school, the strategy formulation process is learned over time. Organizations, like individuals, learn how to solve the problems they encounter over time. According to the planning school, strategy is the result of a conscious and controlled formal planning process, divided into certain stages and detailed. When we look at the basics of Turkey's defense industry strategy, it has received its roots from learning school and cognitive school. Planning approach shapes his current strategy with its past experiences. However, according to the power school, it is the power and politics that shape the strategy formation. The strategy formulation is not the product of a single architect. The strategy is shaped to reflect the interests of the strongest structure in the environment rather than the opinions of everyone. According to the power school, the concepts of "coalition", "political games", "collective strategy" are extremely important for an effective strategy, and policy is very important in achieving strategic change (Mintzberg et al., 1998, p. 176). The sanctions that Turkey faces in every strategic step it takes, such as the Cyprus peace operation, the southeastern operations, and the Idlib operation, reveal that the power school's approaches should also be given importance in the defense industry strategy. Turkey should use defense strategies as a powerful leverage when determining the friends and relationships with allied countries and should increase the diversity of customers. It should always be kept in mind that the key to independence in the defense industry is to be able to produce high-tech value-added original products. Turkey should take the necessary measures in advance by foreseeing the negative effects that foreign policy moves may create in the defense industry.

The common point of the strategies determined for the defense industry is to have a "domestic and national" defense industry. The system in which all stakeholders operating in the defense industry take part is called the ecosystem, and in order to achieve this goal, synergy should be created with all stakeholders in the defense ecosystem towards the same goal.

Table 5. Evaluation of the Turkish Defense Industry within the Framework of Porter's Diamond Model

Factor	Sub Factor	Advantages	Open to Development
Factor Conditions	Human Resources	-Increase in the number of employees -Engineering and technical staff ratio -Inverse brain drain study	-Turnover rate per employee -Professional development, promotion and career opportunities -Discrimination and mobbing at work -Total number of people working
	Physical Resources	- The proximity of businesses - Knowledge and experience sharing	-Intensity of intermediate product supply from abroad -High operational costs
	Sources of Information	- Technology road maps - Establishment of SSTEK A.Ş. - The knowledge and experience on the UAV - Experiences from field applications	-Advances in Antidrone technologies -High-tech and value added product manufacturing - Number of patents
	Sources of Capital	- Capital support provided to businesses in need	- Lack of equity of the companies in the sector - Need for financial support and access - Long stock cycles and inefficient use of resources
	Infrastructure Resources	- Supports provided for infrastructure creation - Reaching the infrastructure to realize important projects	- Infrastructure investments not being reflected in sales sufficiently - Dual use (military and civilian) possibilities are not evaluated.
Demand Conditions		- Total sales increase every year - High demand in land and air platforms	- Low demand for information - Demand composition is predominantly domestic - The rate of increase in imports is higher than the rate of increase in exports - Being subject to sanctions and import quotas - Export-barrier license agreements - Excessive dependence on public procurement - Offset-dependent export - Lack of customer diversity - Using International relations as a leverage for export - Not enough export to NATO countries - Lack of coordination between industry and demand authority

Factor	Sub Factor	Advantages	Open to Development
Related and Supporting industries		- Know-how related to reengineering	- Lack of suppliers in raw materials and intermediate products - Scale of economies production
Business Strategy, Structure and Competition		- Companies operating in certain areas of expertise - Foundation firms constitute 50% of the sector - Four companies ranked among the world's largest defense industry companies	- No competition other than shipbuilding and vehicle manufacturing -The use of dependency in terms of subsystem, technology and materials by countries with a customer potential to prevent competition
Chance		- International restrictions increase awareness of the national ecosystem	- Negative effect of international relations on the defense industry - Considering defense industry sensitivities in foreign policy moves - Due to the dependence of raw materials and intermediate products, the depreciation of TL increases the system costs
State		- R&D costs are largely covered by the state - Legal regulations reduces the fragility of the sector - Incentive mechanisms support new product development	- The tense political environment created by the state causes instability in the sector and an increase in system costs. - Inadequate protection of intellectual property rights

In addition, by improving the understanding of defense planning and defense resource management, it is possible to increase the cooperation of stakeholders in the defense ecosystem and to prevent the waste of resources such as workforce, technology, infrastructure and information that will provide sustainable competitive advantage. However, the defense industry has recently started to deal with the ecosystem as a whole. In the 2019-2023 Strategic Plan prepared by the SSB, the defense ecosystem approach was adopted, planning was made within the framework of more holistic and comprehensive concepts such as program management, innovation management and cooperation management, and sectoral depth was expressed. In this direction, it becomes important to analyze the defense industry infrastructure first and urgently and to determine the strategies in this context. The planning

approach should now change and a risk-oriented perspective should be adopted. The risk-focused approach is an important approach that can both improve the factors in the diamond model and ensure rapid development in line with the vision and turn the luck factor in favor of the industry. The risk management approach is a powerful tool to prevent the sector from being unprepared for the risks it may encounter. Sectors that cannot manage their risks with a proactive approach will have to manage their crises reactively.

In order to become the owner and the producer of critical technologies with unique designs and to come to the position that exports them, Turkey should; increase its technology ownership, by increasing the firms' R & D and innovation management capacities in this direction, should manage and improve the competition and the development of skills and work-based learning approach, should reconsider university-industry cooperation. Especially the presence of main contractors may restrict entry to the market and reduce the innovation motivation of SMEs and other contractor companies. On the other hand, prime contractors determine the number and density of ties within the ecosystem. For this reason, there is a need for mechanisms that increase cooperation between industrial companies. It is considered that the state and the industrialists should work more effectively in order to increase the cooperation between the security forces in the position of customers and the industry, to ensure the product variety in line with the demand conditions and to increase the advanced qualified workforce.

In our opinion the main problem of Turkey's defense industry is heavily dependent on imports of raw materials. Most of the aspects open to improvement mentioned above are due to this addiction. Even if defense infrastructure can compete in the world with systems such as ATAK, FIRTINA and UAV's, the intense need for intermediates that are needed in the production of these systems and that can be obtained from abroad and under the control of international actors is an important handicap for the defense industry. In addition, althoug Turkey develops advanced systems that can compete international markets, the developed countries may see this as a threat to their customer base, and they may use export licenses as a means prevent international competition. The actors that direct the defense industry should create suppliers that can meet the critical needs of the sector and compete in the international market. These suppliers may provide advantages in accessing raw materials and intermediate products to defense industry and support them in terms of international competition.

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