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AN ANALYTİCAL ASSESSMENT OF THE TURKİSH DEFENSE INDUSTRY AND ITS ECONOMİC IMPLİCATİONS

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Abstract: *The pursuit of strategic autonomy has been a key driver in shaping Türkiye's defense policy, with a focus on reducing dependence on others through the advancement of its domestic military capabilities. While benefiting from NATO membership and access to global technologies, Türkiye has emphasized the creation of a sovereign defense ecosystem. This article makes an overall evaluation of Türkiye's defense industry through an examination of its historical trajectory, strategic role, structural transformation, sectoral performance indicators, and economic role in a wider senseThe study aims to interpret the shifting pattern of the sector by analyzing export-import performance, labor trends, and its effects on technological and industrial development. A qualitative-descriptive approach was employed, founded on policy document analysis, scholarly literature, and statistics data analysis.The results emphasize Türkiye's improvements in integrating indigenous production, enhancing exportation capability, and aiding economic sustainability through its defense programs.*

Keywords: *Defense autonomy, national security industry, economic contribution, arms trade, industrial development*

1. INTRODUCTION

With the start of the Turkish defence industry in the 1960s, a twisted and circuitous, yet successful, path has been taken. Beginning with a mechanisation programme, amateur attempts at defence production slowly branched out to the fields of ammunition, land systems, ship and sub-unification, avionics, missiles and aircraft. Since the late 1990s, these efforts have been augmented further through the transfer of higher technology know-how, as the underlying weaknesses have been smoothed to some extent. Since the late 1990s, defence expenditure and investment levels have increased in a more compliant manner in relation to GDP levels.

Despite defence expenditure increasing tremendously, most of the investment and procurement still has to be made out of defence imports; aimed at meeting the postponed or unsatisfied needs due to the earlier weapon choice decisions of the military. In an attempt to facilitate an integrated defence procurement system that would create shorter substantive and procedural lead times, there must be an independent, non-partisan and high-level procurement authority. But governmental expansion projects have to be imposed over the procurement authority. There should be no other inter-agency co-ordination cost incurred as a result of an extended capability in policy and programme definition-decision making fields. The procurement authority that can become effective and qualify can be done only by utilizing

capable bureaucrats from the defence inner circles and not those promoted from the defence industry, trade and procurement circles.

In the context of currently existing, partially procedural procurement procedures,Türkiye will not be any more advantageous by just implementing such a procurement authority when comparable countries are being taken into consideration in her own perspective. While attempting to improve a procurement environment, respective alterations, reforms and fundamental modifications should/can be made on the aforementioned fronts.

In this context, although Türkiye's defense industry has made significant strides towards reducing dependence on foreign technologies and capabilities, the need for systemic reforms and a more integrated strategic approach remains. The restructuring of procurement processes, optimization of decision-making mechanisms, and enhancement of technological production capacity are essential for ensuring sustainable progress. The developments within the defense industry hold strategic importance not only from a security perspective but also in terms of economic growth, technological advancement, and the broader trade balance.

This study aims to provide a comprehensive description of the Turkish defense industry by its structural evolution, institutional framework, performance indicators, and economic contributions. The study refers to the contribution of the defense industry to industrialization, jobs, technological growth, and its effect on trade balances, both pre-2000 and post-2000.

Methodologically, qualitative-descriptive analysis is continued through the implementation of national and international statistical data, policy reports, and industry reports. Comparative analysis is applied to assess historical change in the industry, while economic indicators are quantitatively analyzed to observe the overall influence on industrial manufacturing, research, and technological innovation. Through this method, complete insight into the strategic and economic dimensions of Türkiye's defense industry is achieved.

2. Structural Overview and Historical Evolution of Türkiye's Defense Sector

The Turkish defence sector has made significant progress over the last 10–15 years, with an astounding yearly growth rate of 10 %. The "defence industry in Türkiye" defines the governmental organizational structure, laws, and the manufacturing sectors which produce defence systems and subsystems for the Turkish Armed Forces (TAF), law enforcing units, and relevant governmental agencies

Today, the Turkish defence industry extensively covers the design, development, production, and integration of air-, ground-, and sea-based defence systems and subsystems by an extensive range of national and international industries, companies, and manufacturers. The defence industrialisation initiatives and activities conducted by the defence and military authorities of Türkiye between the 1940s–1960s, establishment of the Turkish Armed Forces Foundation (TAFF), investments in weapons and munitions production facilities, the establishment of the Defence Industry Undersecretariat (DIU), defence industry development projects, and sanctions on defence export and co-production collaborations played crucial roles in the rapid growth of the Turkish defence sector. (Saygılı, 2022: 40)

Following the formation of the Defence Industry Executive Committee in 1989, major regulations were implemented to speed defense sector activities, and selected defense

enterprises were assisted with R&D activities. In this context, the regulations governing joint ventures and co-production agreements entered into with foreign defense manufacturers and suppliers were rewritten, and all prohibitions on technology and know-how transfers were removed.

Meanwhile, the list of companies and manufacturers excluded from tenders, contracts and collaborations in the defence field in Türkiye was revised, with the exclusion of many national defence manufacturers and suppliers either acknowledged as a result of misconducts, or strong commercial competitors to the Türk Savunma Sanayi A.Ş (TARAS). Additionally, in 1995, the defence industry industrial development and R&D project manager and products supplier status was granted to TARAS by the Council of Ministers of Türkiye (Wiśniewski, 2015).

Despite a rapid growth in the capabilities of the Turkish defence industry, it still has several weaknesses which may pose obstacles to its further development. Firstly, production and procurement plans only cover a few years, are not publicised and lack transparency, making it difficult for the defence industry to adopt appropriate long-term strategies. Secondly, domestic companies are at a disadvantage in many cases, especially when trying to win foreign contracts from the licensed production of Turkish designs. The Turkish manufacturing costs are substantially higher than the costs of US centres due to wider wage, material and defence R&D cost differentials. (Uzun, 2007: 5) Despite many publicised successes, most Turkish designs either follow joint-venture solutions offered by US companies or are derived from other systems produced in co-production with the same companies. So far, there is no trace of originality or inventiveness in Turkish designs.

3. Conceptual Framework: Defense and Defense Industry

The beginning of 2022 marks a period of significant geopolitical turmoil. A conflict in Europe poses numerous basic questions regarding the continent's future, security, and the function of NATO, its current source of stability. Meanwhile, the Turkish Defense Industry, a significant part of the Turkish economy and a key factor in its long-term strategic growth, reaches a tipping point.

The current global and regional upheaval presents both chances and problems for a country that has undoubtedly become NATO's most talked-about and toughest fighter, and to which NATO allies must pay more attention. While full quantitative assessments of a country's military industry must incorporate a variety of elements, the current work takes a more simplified, static approach. Gaps in the hard-core topic of the Turkish defense industry will provide the earliest insight into how the Turkish defense industry may be seen by others.

Over-reliance on imported platforms has been a constant cautionary note against Türkiye since the late 1950s. As a result, technological limitations from the perspective of imports, bilateral in-platform co-productions, technology transfers, and multinational endeavors have always been a consideration when evaluating the Turkish defense industry. From this perspective, the current state of the Turkish Defense Industry can be readily assessed. A catalogue of the current Turkish defense industry landscape is compiled here for the first time, which includes current platforms from all known suppliers.

All well-known and publicly-seen platforms and systems such as vehicles, missiles, radars, helicopters and drones have been included. Outdated planning boards above the simple

level of detail in evaluating the Turkish defense industry have seldom been seen in the academic discourse on the Turkish defense industry. Gaps in the hard-core matter of the Turkish defense industry will provide the initial insight into how the Turkish defense industry might be perceived by others. (Tübitak, 2003: 9). A clearer assessment of the state of the affairs, and a better understanding of the concepts that are shaping it, may change the perception of the Turkish Defense Industry and its associated factors in the eyes of the interested parties.

4. Strategic Importance and Fundamental Characteristics of the Defense Sector

The defense sector is a strategic sector in Turkey's economy. It is regarded, alongside the military, as a key tool for preserving and strengthening sovereignty. The defense sector is vital to a country not only militarily, but also politically and economically. Today, numerous ISC (Intelligent Transportation Systems) industries, including automotive, shipbuilding, and aviation, are recognized as sensitive and strategic.

In addition to civil aviation opportunities, there are dual-use technologies that can be used for defense purposes.Türkiye is sovereign in many of the activities performed in the field of defense industry; however, major firms design and manufacture optimal solutions. Moreover, nonconflict in long-term agreements may require strategic co-production of segments in an international defense supply chain (Wiśniewski, 2015).

A country must independently and consistently make sure that it has the strategic and essential component design and production capabilities of the products it produces and uses within its borders. Domestic relevance and background are generally required by the major firms, as they must effectively keep their profits in their countries in an enduring context. (Ziylan, 2004: 91)

Therefore, a country which wants to be in contention must ensure that it possesses a sufficient amount of stocks within its borders. On the other hand, even if the indigenous production capability becomes unnecessary, the price impacts of war or crisis on imported end products would result from an indigenous production strategy, which is a capability for a country’s defense industry. A country which can produce a warplane may also be able to produce a bus for logistics. The offset financing with the indigenous production joined with a co-production agreement may cost much less than direct subsidies.

The cohesion and uniqueness of the government’s and defense companies’ strategies must be regarded for the success of the ISDs (Integrated Supply Chains). Anomic and instant trade may not satisfy a country’s defense needs as well as long-term investment. On the other hand, defense procurement contracts, which are dominated by a firm which is mainly a service firm, may necessitate the long-term investment of a country.

The source of procurement contracts must be aware regarding what information, which brings dependency, are to be given. Furthermore, the technological offsets of the military contracts generally have a higher premium and requirement than dual-use technologies. The incorporation of defense firms in long-term global supply chains, later on, changing to defense industries, is also possible. The assurance of a local supply chain in a long-term context is central to defense needs and a defense industry.

5. Sectoral Statistics and Performance Indicators in Türkiye's Defense Industry

Manufacturers of defence products are companies, state-owned or private, whose main area of activity is production or services for military purposes. Companies which were privatized in the 1990s, and are now private joint-stock ones and which used to be joint state-private stock companies are also included in the defence industry. (Donaldson, 2013, p. 21).

Effective in the 1996 fiscal year, defence procurement budget is no longer included in the general budget. In addition to this, except military vehicle projects, an alarming amount of the past problems with exceeding the defence procurement budget have been solved. In addition to these regulations, some international agreements were signed with countries or companies in order to facilitate both exports and joint work on the assignment and adaptation projects. These agreements which are classified as Close Cooperation in Defence Industry (CCDI) and Under Joint Cooperation in Defence Production (UJC-DP) are expected to increase the share of the defence industry in export revenues and local production (Wiśniewski, 2015).

In this context, beginning with the 1990s, a serious transformation process has been started in the defence industries of both developed and developing countries. (Sidhu,2024) This transformation has three main aspects: reorganization of state-owned defence industries, privatization of state-owned companies or establishing private joint-stock companies as substitutes, and relaxation on the state control of private companies which are producing former defence weapons. The defence industry must be viewed as an important sector of the national economy.

Companies in this sector generate significant profits, invest heavily in advanced technologies and employ large numbers of skilled workers. These contributions benefit economic growth, industrial and technological development, as well as social welfare. For states that do not face an imminent military threat, the economic role of the defence industry is as important, or perhaps even more important than the military one. The Turkish Defence and Aerospace Industry Manufacturers Association compiles data on the performance of the sector annually.

The turnover breakdown of Turkish defence and aerospace companies by year shows that companies operating in the defence electronics subsector had first place in most of the years examined in terms of turnover generation. The turnover distribution by subject shows that most of the turnover is coming from the procurement of goods and services for the military, while a small, yet considerable part comes from the civilian domains. The highest turnover per employee has been recorded in the defence aerospace subsector.

6. Trade Dynamics: Export-Import Revenues, Orders, and Employment

Türkiye's defense industry has witnessed a remarkable rise over the past decade, in which the value of defense projects and manufacturing has surpassed $1 billion. In 2006-08, the defense industry grew by 35% a year on average, while its exports amounted to $128.1 million in 2006, $166.6 million in 2007, and $226 million in 2008. (Wiśniewski, 2015)

In spite of a booming industrialization effort accompanied by an impressive export performance,Türkiye's defense industry is not yet strong enough to meet fully the demand of the armed forces and is still subject to restrictions imposed by foreign partners. The country imported about $4 billion worth of military hardware in 2007 alone, much of it from the U.S. and the European nations.

Türkiye has long been in search of more self-sufficiency in the military sector and alternative markets for defense purposes. The recent takeover of foreign interests in the Turkish defense industry is therefore not a healthy sign forTürkiye's strategy of establishing a sustainable military-industrial complex. The Turkish defense industry is currently focusing on export markets for avionics parts of F-16 fighter planes, sundry parts and systems for C130 Hercules transport aircraft, and Shikra unmanned aerial vehicles.

It remains vide to conduct a detailed assessment of the structural, functional, and operational characteristics ofTürkiye's relatively young defense industry, while considering restrictions dampening the sector's growth, prospects of emerging non-Western markets, public support and contribution to technological development and modernization, shadow military firms, revisions in the national military policy, etc.Türkiye's newly found economic power and growing defense expenditure are further conducive to an industrial growth spurt. The Turkish economy can support the defense industry with scientific and technical manpower, while the military has a vital requirement for systems incorporate possessing indigenous technology (Wiśniewski, 2015).

7. Comparative Evaluation: Pre- and Post-2000 Phases of the Turkish Defense Industry

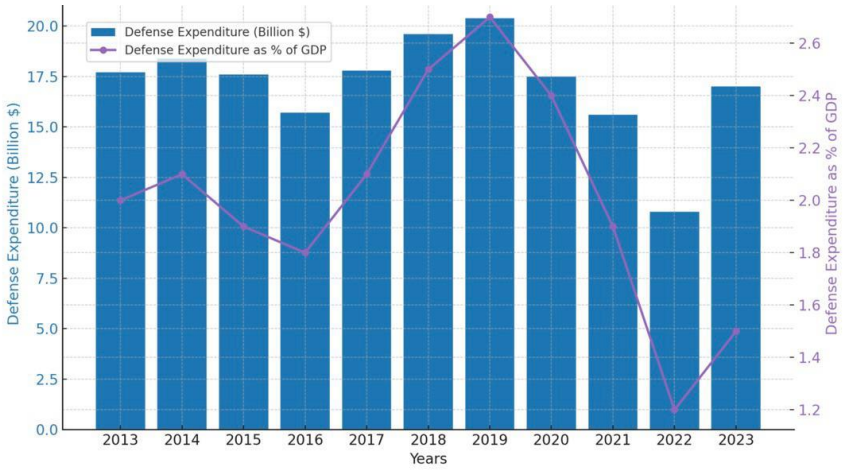
The Turkish defense industry is analyzed through two different perspectives: On one hand, it is evaluated in the international arena through comparative macroeconomic indicators; on the other hand, its domestic and industrial development is solved on a more detailed and microscopic level. Numerous indicators and statistics have been included to interpret the comparative pre-and post-2000 phases of the Turkish defense industry in both international and domestic perspectives.

Since World War II, the rapid growth of the defense industry has been addressed with detailed analyses on broad macroeconomic parameters and comparative evaluations of the pre- and post-2000 industrial and comprehensive defense systems. The rising capability and efficiency of the Turkish defense industry that is shaping the contemporary interpretation and notion of a nation-state, particularly after the events of 11 September has been discussed in detail in various aspects, perspectives, and domains (Wiśniewski, 2015).

With this extensive academic interest regarding the defense industry, a relatively unstudied and unexplained area has been tried to be filled. The hitherto-created indicators and framework of evaluation have been adopted on the Turkish defense industry with the aim of delivering an analytical evaluation of Türkiye's performance in the broad defense industry throughout the years up to now. The Turkish defense industry has witnessed tremendous and rapid developments in various aspects, dynamics, dimensions, and domains since its early establishment even though its comprehensive development level is still below the expected level compared to its ambitions and objectives.

Since 2000, a more intensive, affluently funded, and better articulated perspective of defense and defense industry development has been introduced and prevalently applied in order to fill the existent gaps in the Turkish defense industry's capability and efficiency structure. These efforts led to tremendous outcomes and yielded rising trends and advancements in all of the aspects, performances, capabilities, and efficiency levels which are the subject of this study.

Graphic 1- Türkiye's Defense Expenditure and GDP Share (2013-2023)

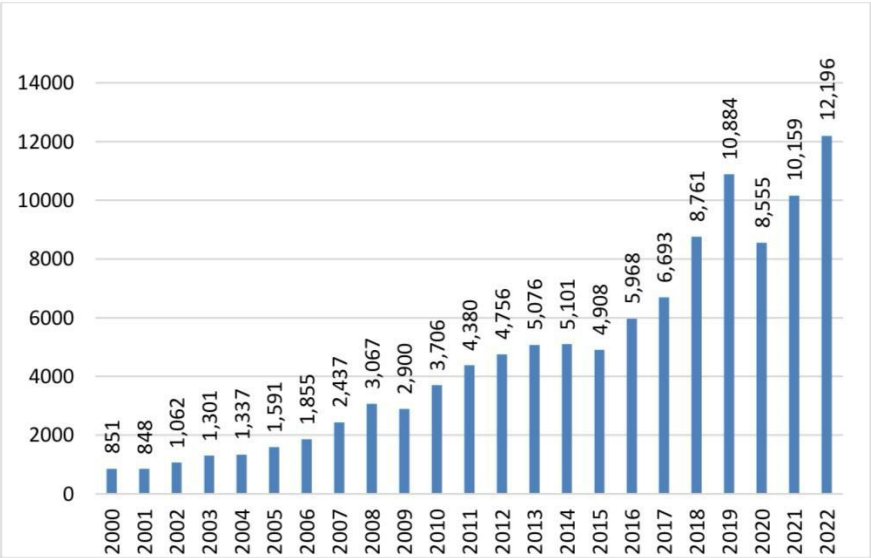


Source: SIPRI

In 2001, Türkiye's defense spending was approximately $7.2 billion, constituting 3.6% of its GDP, largely due to a significant dependence on imported military equipment. By 2002, this proportion increased to 3.8%. However, in the subsequent years, the government reported a shift as domestic production capabilities expanded. By 2023, defense expenditures had risen to $17 billion, yet their share of GDP decreased to 1.5%, attributed to the widespread adoption of domestically developed military technologies

As a result, the Turkish defense industry has shifted from a lower to higher competitive and capability levels in the aforementioned aspect.These extensive advancements in the Turkish defense industry both enabled and financed a more comprehensive and extensive approach to defense and security.

Graphic 2 - Total Defense Industry Turnover Figures between 2000-2022 (Million $)



Source : (SASAD,2022)

Based on the data from Defense and Aerospace Industry Manufacturers Association Performance Report 2022presented in SASAD's 2022 report, the Turkish defence industry experienced a significant increase in turnover between 2000 and 2022. Specifically, in 2022, the sector's total sales revenue rose by 20.05% compared to the previous year. In addition to the growth in domestic sales revenues, there was also a 36.32% increase in foreign sales revenues, indicating substantial progress of the Turkish defence industry in international markets. (Yılmaztürk,2023: 143-150)

In order to meet the newly awakened and emerging demands of the complex multilateral operating environment, the Turkish defense and security policies have redefined the context and the content of defense and security. The classical notion of a nation-state has been redefined and shaped through the original development of national defense capabilities and capacities. The Turkish defense and security policies started to focus on the development and procurement of sophisticated defense systems and weaponry in order to design and be capable of conducting a more extensive and comprehensive engagement strategy.

However, In 2023, Türkiye was 22nd globally in defense spending, allocating $15.8 billion for the military budget. It increased by 37% from the previous year and a 59% increase over the past ten years, according to the Stockholm International Peace Research Institute (SIPRI). Even expanding in absolute terms, military spending represented 1.5% of the GDP of Türkiye and 0.6% of global military spending. (Kenez, 2024)

8. Economic Implications of the Turkish Defense Sector

Economic efficient spending might contribute to good influence on advanced defense technology, security, level of exports, new employment opportunities, and army being a force to deter. Non-productive defense spending might, however, result in adverse influence on imports, foreign dependency, higher taxation and borrowing, loss of skilled personnel, and cost of opportunities (Deger, 1986).

Following an unfortunate series of sovereign debt crises throughout the 2000's – the outbursts of which were duly accompanied by widespread societal unrest – the Turkish economy has since climbed its way back to relative respectability through a combination of ambitious reform and protectionist policies. The US crisis is not only a factor of defence expenditure comfort but also an important aspect of the competition amongst firms in the Turkish Defence Sector (Wiśniewski, 2015).

With defence expenditure hovering around a satisfactory 2.2% of GDP there is little doubt that Türkiye's position in the international arms market is set to rise and with this rise will come economic growth and important sectoral reforms across the Turkish economy. It has indeed been indicated elsewhere thatTürkiye's growing involvement in the international arms market will warrant a pocket of exports. Coupled with strong performing strategic firms this is sure to accelerate economic growth in tandem with deft industrial policy reform.

Additionally, it remains to be seen how the BRICs correspond toTürkiye's current development strategy. Should, on the one hand, the Turkish Defence Sector be able to wrestle in one of these nations then its defence aspirations will be aligned with the rest of its aspirations. Alternatively, if these powers oppose greater Turkish involvement in the arms market then it may find itself entrapped in a new defence dependency, albeit a different one.

Thus the future for the Turkish economy is one awash with opportunity and peril, necessitating a deft comprehension of the current world in which it operates.

- 8.1. Contribution to Industrialization

Turkish defence policy explicitly highlights the requirement for extensive industrial cooperation to accompany foreign acquisition of weapon systems. It is also noted that, at least officially, "making as much of a system, where design installations and integration work is concerned, inTürkiye, and producing the components to a greatest extent through local defence industry, followed by assembling the system with local capabilities" are requirements for weapons technology acquisitions inTürkiye (Wiśniewski, 2015).

However, the Turkish defence policy, until recently, could not provide a viable strategy to advance the indigenous defence industry. The reasons for the insufficiently developed indigenous defence industry inTürkiye have been highlighted in the earlier sections. At present, alongside the threats, new opportunities are appearing with respect to the main forces affecting the advancement of the Turkish defence industry. (Demir, 2020)

Table 1. Selected Turkish defence exports to European countries, 2019–present

Turkiye: selected defence exports to European countries, 2019–present							
Contract date	**Recipient**	**Equipment**	**Type**	**Quantity**	**Value (USD millions)**	**Contractor**	**Deliveries**
January 2019*	Ukraine	*Bayraktar* TB2	CISR Medium UAV	6	69	Baykar	2019
December 2019	Hungary	*Ejder Yalcin* 4×4	PPV	10	n.k.	Nurol Makina	2020–21
December 2020	Hungary	*Ejder Yalcin* 4×4	PPV	40	n.k.	Nurol Makina	2022–23
December 2020	Ukraine	*Ada*-class (MILGEM)	Corvette	2	n.k.	STM	Likely 2025–26
2021	Kosovo	*Vuran* with *Alkar*	120mm SP mortar	3+	n.k.	ASELSAN BMC	2023–24
May 2021	Poland	*Bayraktar* TB2	CISR Medium UAV	24	268	Baykar	2022–24
c. 2022	Kosovo	OMTAS	Man-portable anti-tank missile	n.k.	n.k.	Roketsan	2023
November 2022	Kosovo	*Bayraktar* TB2	CISR Medium UAV	est. 5	n.k.	Baykar	2023
December 2022	Albania	*Bayraktar* TB2	CISR Medium UAV	3	n.k.	Baykar	2024
2023	North Macedonia	*Boran*	105mm towed artillery	18	n.k.	MKE	2025–31
April 2023	Romania	*Bayraktar* TB2	CISR Medium UAV	18	321	Baykar	n.k.
October 2023	Estonia	NMS 4×4	AUV	230	75.71	Nurol Makina	From 2025
October 2023	Estonia	*Arma* 6×6	Wheeled APC		140.61	Otokar	From 2025
July 2024	Bosnia-Herzegovina	*Kirpi* II	PPV	4	n.k.	BMC	2025
November 2024	Romania	*Cobra* II	AUV	1,059	929.6	Otokar	2025–30
November 2024	Croatia	*Bayraktar* TB2	CISR Medium UAV	6	73.91	Baykar	n.k.
December 2024	Portugal	Auxiliary Oiler Replenisher and Logistics Ship (AOR+)	Fleet replenishment vessel	2	134.03	STM	2028

Source: Military Balance+, milbalplus.iss.org

*First of several contracts. APC = Armoured Personnel Carrier; AUV = Armoured Utility Vehicle; CISR = Combat, Intelligence, Surveillance and Reconnaissance; SP = Self-Propelled; PPV = Protected Patrol Vehicle; UAV = Uninhabited Aerial Vehicle

Table 1 highlights Türkiye's selected defence exports to a number of countries in Europe since 2019, marking the growing country presence within the regional defence market. The data demonstrate a wide diversification of the type of defence equipment exported, ranging from unmanned aerial vehicles (UAVs) such as the Bayraktar TB2 to armoured vehicles (e.g., Ejder Yalçın, Cobra II), artillery systems (e.g., the Boran howitzer), and naval ships such as corvettes and replenishment ships.

Of these, the Bayraktar TB2 UAV has been a flagship export, acquired by various European nations like Poland, Romania, Albania, and Kosovo. This indicates increasing worldwide interest in Turkish-produced drone technology. In addition, the inclusion of advanced land and naval systems in export orders shows a shift towards a broader and more advanced range of defence products.

These steps reinforce Türkiye's growing role as a competitive European defence industry supplier, supported by its focus on building domestic output capabilities and technology development. Furthermore, the rising number of European beneficiaries also further signal upgraded defence collaboration between Türkiye and some of the NATO and EU member countries. (Waldwyn, 2025)

In recent years, a significantly more favourable domestic environment for the defence industry has gradually emerged. There has been a significant expansion in the size of the armed forces and the number of frames within its responsibility. Turkish firms have qualified the industry to undertake larger system responsibilities.

With respect to exports, within a relatively short period of time, the Turkish defence industry succeeded in substantially increasing arms exports from a couple of hundred million dollars annually to a level where the exports exceed one billion dollars. The development of the Turkish defence industry and the prospects in this regard are at least very rare in the contemporary arms industry context.

At least for the time being, or until 2030, the Turkish defence industry possesses a subjective opportunity to expand into defence production, which is relatively easily sellable, through a development strategy aiming at the export of the smaller systems and subsystems, provided that the internal constraints and eventual threats do not block this opportunity.Türkiye’s possession of these opportunities, in terms of their timing and specification, is rare in the contemporary international arms industry context.

- 8.2. Strengths and Limitations

Türkiye’s defence policy strongly relies on the military-industrial sector. This defence policy forges far-reaching linkages between foreign policy and the defence industry. Defensive policy appears on the one hand as ensuring external security and on other hand as the development of defence sector.Türkiye’s geopolitical position has affected its perception of external threats. The establishment of a well-developed military industrial enterprise is being perceived as a very important component of strategic independence.

In evaluating threats to security, special attention is put on internal threats to stability. A prediction is made that in the current decade the prevention of internal threats to security will be paramount in national defence policy. The defence industry has long been at the centre of-Türkiye’s security. The achievement of full autonomy in the procurement of large-scale armaments and the establishment of a well-developed military-industrial enterprise appear to be the most important components of strategic independence. However, the arms embargo imposed onTürkiye has exposed limitations in producing advanced weapons systems independently. Domestic production options were virtually exhausted, andTürkiye was left with only one alternative: foreign suppliers.

Anti-Americanism in Turkish political circles was cyclical, and the defence industry faced a formidable task to mitigate damage caused by hostile perceptions. Problematization of dependence on external sources for security ledTürkiye to attempt to maximize the national capability of self-reliance. A period of extensive military cooperation began in 1950. The main purpose of NATO membership and military co-operation was to deter aggression. The requirement for extensive industrial cooperation to accompany foreign acquisition of weapon systems is an important feature of official Turkish policy.

Turkish defense industry is looking to establish regional arms industry co-operation within the region, as a part of the current export drive strategy. The future development of the Turkish defense industry perhaps has two major threats, which are associated with its two main drivers of growth - export demand and domestic demand. The outlook for the Turkish economy over the next few years seems to be uncertain. A critical assessment of the internal drivers proves that the Turkish economic trends could significantly affect the defence sector in the next five years. The defence industry has to deal with the economic status which is unfavorable regarding local demand.

- 8.3. Impact on Research, Development, and Technological Advancement

Military Science and Technology Research, Development and Technological Advancement. The defence sector has also accomplished successful designs in the field of harnessing defence industry tools with an open system approach, achieving substantial technological know-how and capability transfer in partnership with defence industry companies and institutions. Academic institutions working on defence matters have made breakthroughs in projects on modelling and simulating advanced avionics, radar, simulation of missiles, helicopter flight dynamics, civilian aviation aspects and fire control systems. In all of these, the defence industries and their institutional partners with extensive experience in relevant fields had substantial support to accelerate indigenous capabilities before realistic engagements with national security concerns. (Yenturk, 2014, p. 4)

Design and development work is carried out with professional competence for defence system representation and simulation. Defence industries focused centre design contractors for modelling and simulation are supporting the adaptation of these tools according to the requirements of the recent projects. (Tübitak Sage) Besides the defence industries, some government agencies also engage in designing and developing diverse training and mission rehearsal simulation products in hardware and software. Aboriginal academic organizations have been able to deliver projects. Design and development of an integrated flight simulator for a modern trainer aircraft have been achieved.

Air combat simulation capabilities' aircraft model and mission locations have been enhanced. There has been some advancement in the software and content areas of 3D scene generation and management. The simulator is now integrated fully with the aircraft model created at one of the original software companies leading to a homogeneous scene management and model compatibility. Both companies have similar successful histories in training the customers with reliable information and with much experience of continuously running develop-and-fix scenario for training.

The development of an open systems architecture avitors training environment is achieved. It is foreseen that this environment shall become modelling and simulation capabilities' centre with reliable and controllable engine for dynamic mission rehearsals and robust system training for civil aviation ground handling systems. To sustain effectiveness in the field of operation, advanced simulation and modelling tools are being evaluated. The system will provide high-fidelity representations of the operating environment for both the physical and text simulation domains.

- 8.4. Effects on Economic Stability

The Turkish defence industry that has begun to be shaped with the Turkish importation of Armoured Amphibious Assault Vehicles from the US in 1975, has gone through a tremendous development process from the assemblage based period on foreign sub-systems at the beginning, to the manufacture and generation of an independent defence technology true to the national assets. Since the late 1980's, the Turkish defence industry has been on its way to defence self-sufficiency, with the full understanding of the economic and strategic needs of the new millennium.

Defence technology has begun to be regarded essential for achieving the technological level required for the independence of the nation's technological infrastructures, as well as for improving the economic efficiency of the concentration of resources on the national priorities. In this regard, the defence technology transfer policy coupled with the establishment of a defence technology oriented infrastructure was paved the way for the defence sector to flourish through both fostering defence expenditure and lengthy offset contracts on production and technology transfer of a wide variety of defence sub-systems.

The establishment of a technology oriented defence industry has been considered crucial in the sense that it would enable indigenous high-technology manufacture, as well as the much needed technology generation capability (Wiśniewski, 2015).Türkiye's defence industry has been one of the rare sectors to have continuously expanded in production and capability since the late 1990s. Built on shaky ground through decades of assembly contracts and technology transfer agreements, during the late 1970s and early 1980s, the self sufficiency rate has improved with exports acquisitions having risen to USD 1 billion in this period. (Kopits, 1987)

However, as the geopolitics surroundingTürkiye rapidly change, and economic pressures increase, the country's defence procurement landscape is forced to be reshaped. The requirement for extensive industrial cooperation to accompany foreign acquisition of weapon systems is an important feature of official Turkish policy.

The Turkish defence industries are still state-owned (although in accordance with the majority of other sectors, some companies such as TAI or Aselsan have been listed among publicly-traded Turkish companies). Defence equipment manufacturing is the most technology-intensive type of production inTürkiye after automotive, with the highly qualified workforce, which can engage in the international supply chain of most types of aerospace and military electronics projects. There are three processes by which defence industries are created: (1) indigenous design and manufacture of simple systems only, (2) importation of capital

systems and equipment for licensed manufacture of same, and (3) transfer of advisory licences for production techniques, upgrades, modular and refurbishment services.

Nevertheless, defence industrialisation could be counted as successful only if it is accompanied by efforts at the establishment of a national defence technology base. In this regard, Turkish experience differed markedly from the typical pattern of military-industrial evolution among other newly industrialising countries. The record of defence industrialisation in Türkiye evolved through a much less gradual process.

9. Conclusion

Internationally, Turkish defence industry will have stringent competition in gaining access to third-country markets. However, the potential is extremely high for Turkey to develop an efficient export development strategy. The defence market is becoming multipolar with a shifting interest from the North to the South with high dynamism. Emerging new defence expenditure patterns are seen, and sophisticated defence products and defence systems with roots in complex technologies are being purchased, particularly by countries with rapidly growing economies.

Even though Türkiyes top defence industry manufacturers make not perhaps produce a great number of excellent international products annually, the success in the development of the defence industry will indeed give positive contributions to national security and defence. The Turkish defence industry is thoroughly integrated into the democratisation and normalisation process of social and economic life, national unity has finally been achieved, and an independent foreign policy formation. But what will be needed in the longer term is a transition from a narrowly defined, state-centered defence effort to competition on the home and foreign market, which is tied to the promotion of entrepreneurial behavior, the growth of civilian control, and a change of style towards defence policy. Without this transition, there is an increasing risk that the ability to establish a base of producers of advanced defence products will be lost and economic and societal costs associated with huge imports of weapons and equipment will be incurred instead.

If defence exports and foreign participation by indigenous companies in defence programs abroad are made mandatory to the defence industry sector as some political goal, then this may lead to greater insularity of the defence sector and along with it ultimately to the limitation of its growth over the long run. The destiny of the defence sector and military-technical cooperation significantly relies on the geopolitics and geoeconomics situation under which the Turkish Republic has developed its defence and military policy. The strength of the Turkish defence industry relative to other "emerging" ones stems from the acquisition by national enterprises of major licences for the manufacturing of advanced armament systems.

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