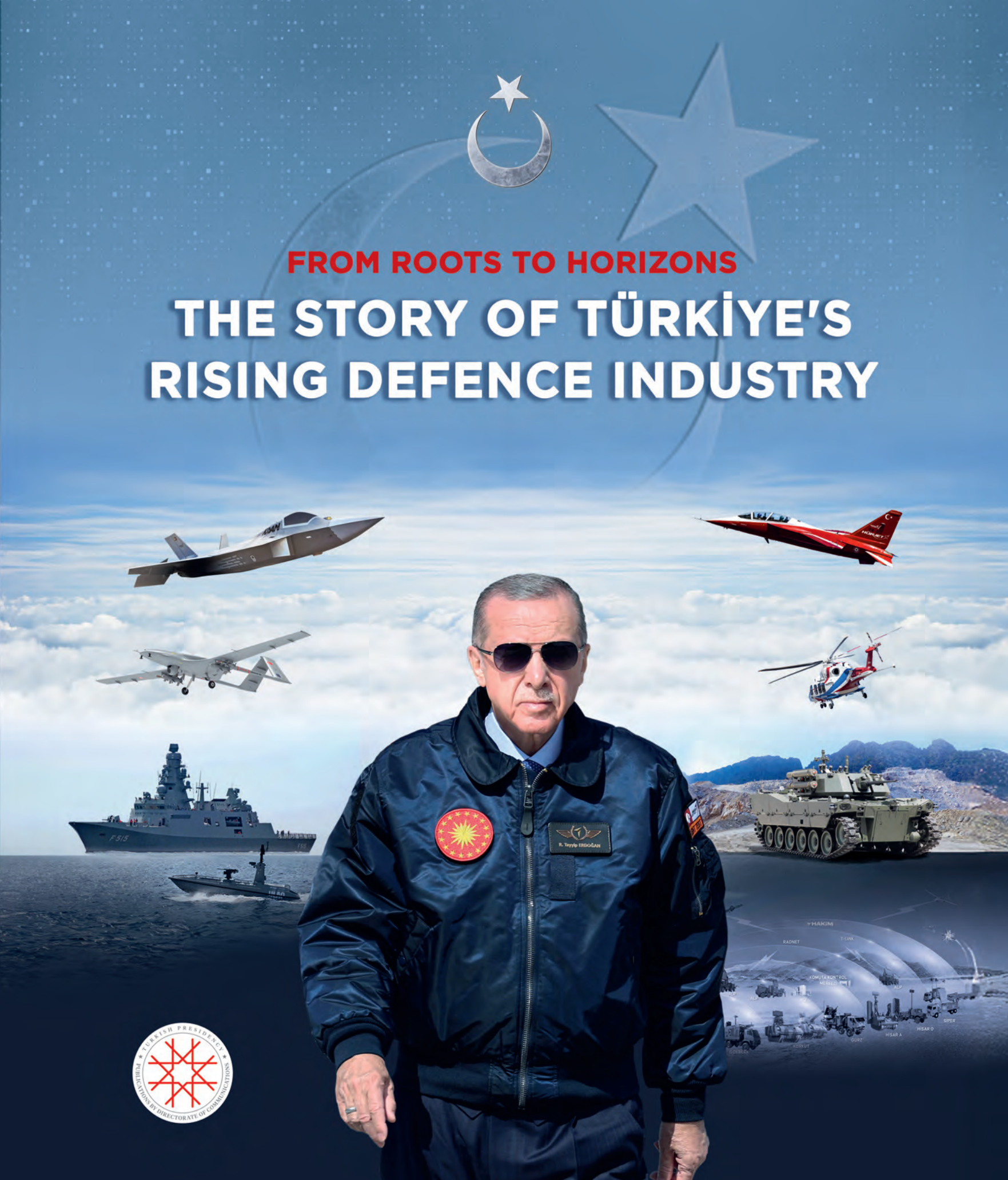
FROM ROOTS TO HORIZONS

THE STORY OF TÜRKİYE'S RISING DEFENCE INDUSTRY



TURKISH PRESIDENCY
PUBLICATIONS BY DIRECTORATE OF COMMUNICATIONS

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ISBN: 978-6-25628-163-9

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1st Edition, Ankara, February 2025

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Print

Greff Reklam Matb. Org. Tur. Dan. San. ve Tic. Ltd. Şti.
T +90 312 911 97 94, Ankara
Printing Certificate No: 76864

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FOREWORD

History is forged in instances where resistance transforms into revival, faith blends with perseverance, and patience intertwines with achievement. Every member of our nation knows that on these sacred lands, freedom is earned at a cost, independence through struggle, and security through sacrifice. Each stride we take today in our defence industry stands as a testament to this ancient understanding, embodied within the vision of the Century of Türkiye.

As Türkiye, we were left dependent for many years on the systems provided by others in the realm of the defence industry. In our quest to safeguard national security, we frequently found ourselves obliged to procure the defence products we needed either belatedly or in insufficient measure. At times, however, our dependence on foreign sources in the field of the defence industry was turned into an instrument of political leverage, wielded to our detriment. At that juncture, breaking the chains of foreign dependency stood before us as a historic responsibility. With this awareness, and with the strength and inspiration we draw from our nation, we have embarked on this journey.

We have set out with the dream of a Türkiye that casts its own cannon, builds its own ships, and develops its own UAVs, UCAVs, missiles, radar systems, satellites, software, and ammunition. This dream has now become a reality. The National Technology Initiative we launched years ago is not merely an industrial revolution but also a campaign for independence and the future, one that has uplifted our nation's self-confidence and is raising generations that look to the future with trust.

This book, titled "From Roots to Horizons," serves as a reflection of this great awakening, this resolute march, and this faith-filled effort. Within these pages are not merely technological achievements, but also the story of our engineers, technicians, soldiers, and visionary entrepreneurs who have worked tirelessly—through sweat of the brow and mind, day and night. This volume is the written representation of the will of the Turkish nation—not to assert "we can do it too," but to declare that "we will do it best."

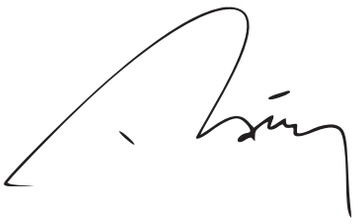
In this great march, I once again commemorate with mercy those who, from past to present, have contributed to our defence industry with their powerful vision, including Şakir Zümre, Nuri Demirağ, Vecihi Hürkuş, Nuri Killigil, Selahattin Reşit Alan, and Özdemir Bayraktar, one of the foremost supporters of our National Technology Initiative, as well as many other pioneers of our defence industry. It is the sacrifices and efforts of these heroes that are the very cornerstones of the strong position we have attained today. We have the responsibility to safeguard this sacred trust they left behind and to move toward the future with firmer and more resilient steps.

Today, the Turkish defence industry, with a project volume exceeding 100 billion dollars, more than 3,500 companies, and nearly 100,000 employees, has become a global power that meets not only the needs of Türkiye but also those of friendly and brotherly nations. In particular, our unmanned aerial vehicles, smart munitions, electronic warfare systems, and advanced software infrastructures are followed with admiration across the world. It is also worth underscoring that the domestic content rate in our defence industry has climbed from around twenty percent to eighty percent; as stated, we have attained a historic pinnacle in both the product diversity and technological competence. This achievement has been etched in memory as a tangible indicator on the path towards independence.

This invaluable work in your hands records the challenges, developments, and successes we have experienced in the defence industry from past to present, while it sheds light on the future in this blessed march towards our vision of the Century of Türkiye. On this occasion, I sincerely thank all those involved in the creation of this book. I am deeply convinced that every line will serve as a source of inspiration for the children of this nation and spark a flame in the hearts of young engineers and scientists.

May Allah grant ease and blessings to everyone walking on this blessed path. May our steps towards advancing our defence industry be fruitful. Those who seek to hinder Türkiye's rise should know that this nation never steps back when it comes to the homeland—nor will it ever.

With the determination of our nation and the unwavering resolve of our state, we are committed to shaping the second century of our Republic into the "Century of Türkiye."



PRESIDENT OF THE REPUBLIC OF TÜRKİYE
RECEP TAYYİP ERDOĞAN

INTRODUCTION

In the current context marked by an unfolding digital revolution, the balance of power within the international system is shaped not only by states' geopolitical, political, and economic capacities but also by their strategically advanced technological equipment. From the standpoint of international security, one of the key components of this technological depth for states is to maintain an independent, original, and innovative strategic capacity within the defence industry. In the context of conflict and tension that challenges global stability, it is certain that states equipped with a domestic, independent, and sophisticated defence capability are better positioned to safeguard their national security.

In today's conditions, where multidimensional risks, threats, and challenges in the field of security are escalating globally, it is of vital importance for Türkiye, due to its geopolitical position, close to many crises and conflict zones and therefore facing international terrorism, irregular migration waves, and humanitarian crises, to have an independent defence industry capacity. Beyond the security paradigm, it is acknowledged that enhancing technological and strategic capacity in the defence industry contributes to a country's overall development across a wide spectrum. In this respect, the story of Türkiye's rising defence industry is not only a journey towards reducing foreign dependency to ensure national security and establishing an independent defence system, but also about creating a thorough technological, economic, and industrial ecosystem.

Historically, Türkiye has faced a myriad of security risks and threats from past to present. Building a domestic and independent defence industry has thus become more of an imperative than a choice for Türkiye. This book aims to discuss Türkiye's rise in defence industry from a historical viewpoint, exploring its struggle for independence, technological innovations, and national and indigenous products through a multidimensional approach.

In this context, the first part of this book, which aims to convey the transformation story of the Turkish defence industry, chronologically addresses the historical development of the Turkish defence industry, starting from the pre-Islamic period, through the Ottoman Empire, and then the Republican era. This chapter addresses the origins of the Turkish defence industry, from the technical infrastructure of the Ottoman Empire

to the initial years of the Republic, and discusses the first domestic defence industry projects and institutional efforts in this field. In the chapter summarising the turning points in the development process of the Turkish defence industry, the reasons for dependency on foreign sources in the defence industry, the multiplier effect in the field of national security during the Cold War, and the difficulties created in Türkiye's defence industry sector by the embargoes imposed after the Cyprus Peace Operation are highlighted. Türkiye's efforts to enhance both its military and technological independence are detailed through the initial projects of domestic companies, primarily Turkish Aerospace Industries Inc. (TUSAŞ), Military Electronics Industry (ASELSAN), and Rocket Industry and Trade Inc. (ROKETSAN), along with the challenges these projects faced. The book also summarises the structural changes and reforms carried out in the 2000s, when the foundations of Turkish defence industry projects that attracted worldwide attention were laid and significant momentum was achieved in the industry, along with strategic investment policies.

The evaluation of Türkiye's historical experiences repeatedly highlights the importance of an independent and national defence industry. The goal of independence in the defence industry, in its simplest definition, is to meet the needs of Türkiye's security forces to the maximum extent with domestic capacity and to create defence systems suitable for the latest technology and military structure with national resources to protect national security. In this context, the second part of the study conveys the strategic importance of the Turkish defence industry and the impact of the National Technology Initiative (MTH) in the field of defence. By reducing external dependency to the lowest level and creating a national and indigenous defence industry, as well as ensuring the modernisation of the Turkish Armed Forces (TSK) in accordance with the requirements of the age, the strategic steps taken in the field of the defence industry over the last 20 years have turned this sector into a global brand today. The deterrent effect of the progress achieved in the defence industry on ensuring national security is certain. Domestic and national production technology initiatives in Türkiye's defence industry have decreased external dependency in this sector from around 80% to 20% today. The achievements obtained with MTH in this advancement are of great importance.

The National Technology Initiative aims to boost Türkiye's technological competence by carrying out high-impact projects in informatics and advanced technology, improving cybersecurity and information security, creating and sharing national cybersecurity products, enhancing data centre and processing infrastructure, and building a strong cybersecurity ecosystem[1]. The National Technology Initiative, embarked upon with the vision of ensuring Türkiye's full independence in science and technology, aims not only to develop high technology but also to serve for the benefit of humanity.[2] This chapter of the book discusses in detail the emergence of MTH, the impact of this strategy on

[1] Directorate General of National Technology Duties and Authorities of the Directorate General of National Technology. T.C. Ministry of Industry and Technology. https://sanayi.gov.tr/merkez-birimi/c03f1f3bae27/hakkimizda. (Accessed: 29.11.2024).

[2] Bayraktar, S., (2022). Yediden *Yetmişe Toplumsal Seferberlik: Millî Teknoloji Hamlesi, Millî Teknoloji Hamlesi: Toplumsal Yansımaları ve Türkiye'nin Geleceği,* Türkiye Bilimler Akademisi Yayınları, 11-25.

Türkiye's achievements in domestic defence systems, and its international reflections. The National Technology Initiative, launched comprehensively in every field where technology is used, has increased interaction between universities, research centres, institutes, new companies, technoparks, and organised industrial zones; it has laid the groundwork for the development of the defence industry ecosystem with strong R&D incentives and support aimed at the specialisation of small businesses.

In the last 10 years, Türkiye has secured a position among the leading countries in the defence industry, thanks to global effectiveness and advanced technological achievements. This period of technological advancement actually refers to the process in which many projects initiated under the leadership of our President, Recep Tayyip Erdoğan, in the 2000s were completed and entered the inventory. For this reason, it is also possible to describe the last 10 years as "harvest time."[3] In recent years, thanks to these achievements, Türkiye has become one of the fastest-growing countries in the field of defence. The Turkish defence industry offers high-tech and cost-effective solutions according to NATO standards for various types of land, sea, and air vehicles needed by world armies, especially the Turkish Armed Forces. On the other hand, the Turkish defence industry has a wide product portfolio in the field of light- and heavy-class barrel weapons. In the third chapter of the book, Turkish defence industry strategic products and projects are detailed in four main areas of activity: land, sea, air defence systems, and space and cyber domains.

Thanks to these strategic products and projects, Türkiye has not only protected its national security in recent years but also gained a respected position globally as a strategic player. Domestic companies in the defence industry are attracting international attention, particularly due to their successes in unmanned aerial vehicle (UAV) technologies. Every year, the high-tech products of domestic defence industry companies, which are increasing in number at different scales, also contribute to sustainable economic growth.

The contribution of supporting countries' domestic defence industries in the areas of investment, employment, and technological infrastructure to the development of human capital cannot be denied. Growth in the defence industry supports economic growth by contributing to employment. In 2024, global[4] military expenditures reached 2.72 trillion dollars, showing an increase of 9.4 per cent compared to 2023. This has been recorded as the largest annual increase since the end of the Cold War. These statistics alone are meaningful in terms of showing the impact of the defence industry on a country's economy. The fourth chapter of the book addresses the economic contributions of the Turkish defence industry, the sector's export volume, employment, and socioeconomic impacts, as well as financial support and incentives for investments in the field of defence.

[3] Cumhuriyetin 100. Yılında T.C. Cumhurbaşkanlığı Savunma Sanayii Başkanlığı Yayınları.
[4] Ulusoy, E., Şahin, A. Tonra, B. (2017). "Türkiye'nin Savunma Sanayinde Millileşme Stratejisinin Ekonomik ve Politik Boyutları". Sosyal ve Beşerî Bilimler Araştırmaları Dergisi, 25(54), 33-59.

With over 3,500 companies and nearly 100,000 employees today, the Turkish defence industry is one of the sectors that have the highest contribution to the Turkish economy. Türkiye ranks 11th among the countries with the highest exports in the defence industry between 2019-2023, with a share of 1.6 percent. The number of defence projects has risen from 62 in 2002 to 1,380 today, with a localization rate of 80%, and its volume has exceeded 100 billion dollars. In 2024, Türkiye's defence industry recorded 7.154 billion dollars in exports to 185 countries, with significant contributions from unmanned combat aerial vehicles (UCAVs), missile systems, munitions, land vehicles, and civil aviation components. The sector's turnover increased from 1.1 billion dollars in 2002 to 20 billion dollars in the first half of 2025. The product diversity in the Turkish defence industry has reached 230 items today.[5]

Turkish defence industry companies have stood out in recent years with their strong brand values on a global level. Türkiye's domestic aircraft manufacturers TUSAŞ and Baykar made it to the world's top 50 aviation industry companies in 2023. In the compilation conducted by Counterpoint Market Intelligence on behalf of FlightGlobal, which publishes internationally for the aviation sector, TUSAŞ from Türkiye ranked 38th on the list of the top 100 companies in the sector according to 2023 activities, while Baykar, entering the list for the first time, ranked 49th. Thus, in 2023, TUSAŞ achieved the distinction of ranking among the world's top 50 companies in the aviation industry, with a sales figure reaching 2.674 billion dollars. Baykar, with a robust entry into the list with a sales figure of 1.805 billion dollars, holds the title of the company that manufactures the most widely exported unmanned combat aerial vehicle (UCAV), owing to Bayraktar TB2. The said company has also been[6] the export leader in Türkiye's defence and aviation industry in the years 2021, 2022, and 2023.

As mentioned above, the Turkish defence industry, especially with the breakthroughs it has achieved in recent years, has become one of the leading actors in the global and regional security architecture, beyond being the assurance of national security. Türkiye's rise in the defence industry has been shaped by the vision of developing specific products based on national technologies, and this progress has been crowned with export success and international cooperation strategies.

Within the framework of the Century of Türkiye vision put forward under the leadership of President Recep Tayyip Erdoğan, the position of the Turkish defence industry in global competition is solidifying with each passing day. Products developed with the primary mission of meeting the needs of the Turkish Armed Forces have also become products of choice for friendly and allied countries due to their high quality, originality,

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5 Cumhurbaşkanı Yardımcısı Cevdet Yılmaz: "Savunma Projelerinin Büyüklüğü 100 Milyar Doları Geçmiştir". (2024). *Anadolu Ajansı*. https://www.aa.com.tr/tr/politika/cumhurbaskani-yardimcisi-yilmaz-savunma-projelerinin-buyuklugu-100-milyar-dolari-gecmistir/3408288# (Accessed: 29.11.2024).

6 Yıldırım, G. "TUSAŞ ve Baykar İsimlerini Havacılık Devleri Arasına Yazdırdı". (2024). *Anadolu Ajansı*. https://www.aa.com.tr/tr/savunma-sanayisi/tusas-ve-baykar-isimlerini-havacilik-devleri-arasina-yazdirdi/3390380 (Accessed: 11.11.2024).

and reliability. Such products and projects, spanning a very wide range of air, land, sea, and even cyber defence systems, have not only augmented Türkiye's military power but also created a competitive brand value worldwide. In the fifth chapter of the book, within the framework of the Century of Türkiye vision, the transformation process of the Turkish defence industry into a dynamic structure aiming for sustainable growth through international partnerships is conveyed, along with the strategic partnerships realized in this sector. It is underlined that with its record-breaking export success in the recent years, it has become an original, innovative, and reliable solution partner that is welcomed in markets all around the world.

The past, the present and the future vision of the Turkish defence industry, which aims to contribute to regional and global peace, pass a stronger legacy on to the generations to come and consolidate its leading position in defence technologies in light of the Century of Türkiye, will be conveyed to the global public opinion.




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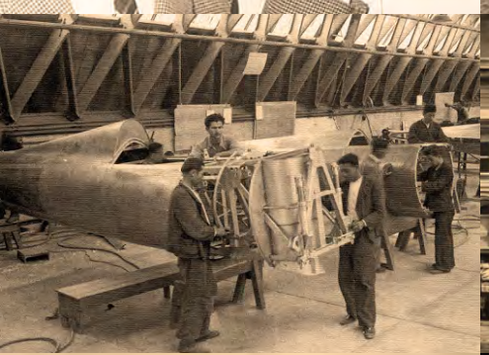


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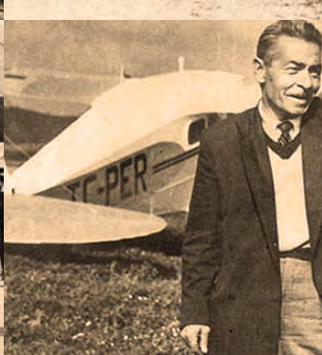
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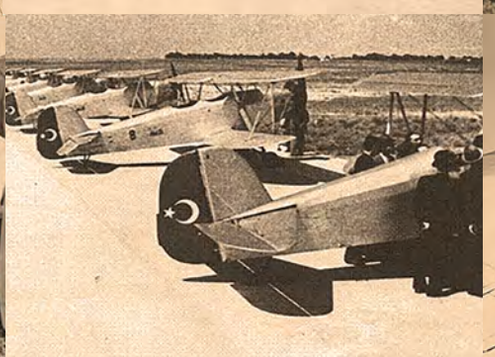

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I

Historical Development of the Turkish Defence Industry

HISTORICAL DEVELOPMENT OF THE TURKISH DEFENCE INDUSTRY

The defence industry has vital importance in ensuring the security and independence of a state. The historical foundations of the Turkish defence industry are a reflection of the struggle for independence and sovereignty pursued by the Turkish nation, known for its military achievements. Throughout history, Turkish states have stood out with their innovative approaches and their strategic distinctions in the art of war.

The defence industry ensures the design and production of defence and offence systems required by the armed forces, as well as the integration of such systems with other industrial sectors and economic activities. For this reason, it is not possible to evaluate the defence industry in a complete isolation from other industrial sectors, as it requires close cooperation and organization with all industrial branches during the production processes.[7] Throughout history, Turks have distinguished themselves with their military capabilities and war strategies. What sets the Turks apart in this field is not only their political and military achievements but also the complex warfare tactics and effective weapon technologies they have developed.[8] The elements they have developed have played an important role in attaining superiority over opponents on the battlefield.

1.1. The Turkish Defence Industry Prior to the Establishment of the Republic of Türkiye

Early Turkish states needed sophisticated warfare techniques and advanced technologies to establish dominance over vast geographies. The use of horses as riding animals provided speed and agility in operations, while expertise in iron casting made the production of durable and effective weapons possible. Iron, copper, tin, and bronze were among the major metals used in this period. The techniques applied in the processing of these metals have enhanced the Turks' superiority on the battlefield.[9]

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7 Sevgi, C. (1994). Sanayileşme Sürecinde Türkiye ve Sanayi Kuruluşlarının Alansal Dağılımı *Beta Basım Yayım Dağıtım.*

8 Göksu, E. (2004). *Türk Kültüründe Silah (En Eski Çağlardan Osmanlı Devletine Kadar)* (Yayımlanmamış Yüksek Lisans Tezi). Kırıkkale University, p. 53.

9 Bedirhan, Y., and Süder, N. (2022). "İslamiyet Öncesi Dönemde Türklerde Kullanılan Madenler ve Maden İşletmeciliği". *Academic Social Resources,* 7(35), p. 274.


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The period extending from the first Turkish states to the Seljuk era reflects a phase in which the Turkish defence industry evolved in terms of technological development. In the early periods, the Turks combined speed and endurance in wars through their expertise in ironworking and horse usage, while the Seljuks enriched this legacy with more advanced mechanical weapon systems.

Seljuk Empire Period

The Seljuk period is an era when the Turkish defence industry transitioned into a new phase. Mechanical weapons like catapults were also developed during this period, and the "stone-throwing catapult systems" used in the time of Alp Arslan became an effective defence tool.[10] It has been observed that heavy weapons started to appear in the inventories of armies during the Seljuk period. During the reign of Tuğrul Bey (1040–1063), catapults capable of hurling stones weighing up to 55 kilograms were employed, each operated by 400 men. Under Alp Arslan (1065–1072), even larger catapult systems were introduced, able to launch stones of 90 kilograms, directed by 1,200 soldiers using ropes[11]. The development of such heavy siege engines as catapults during the Seljuk

The bust of the first Turkish admiral Çaka Bey in Izmir.

[10] Göksu, E. (2004). Türk Kültüründe Silah (En Eski Çağlardan Osmanlı Devletine Kadar) (Unpublished Master's Thesis). Kırıkkale University, p. 107.

[11] Ibid., p. 6.

period reveals how the Turks combined military strategy with technology in order to establish a stronger defensive infrastructure. These advances represented a continuation of the technical and tactical transformations within the history of Turkish warfare.

The settlement of the Turks in Anatolia, a land surrounded by seas on three sides, made maritime activity an inevitable necessity. During the Seljuk period, Çaka Bey's establishment of the first shipyard in İzmir in 1081 and the formation of the Turkish navy became one of the cornerstones of Turkish maritime history. The Alaiyye Shipyard, constructed at Alanya in 1227, was among the most important shipyards of its age, given its strategic significance in securing dominance in the Mediterranean[12]. It is evident that maritime activities have been a strategic necessity for the Turks throughout history. Çaka Bey's pioneering initiatives, together with the role of the Alaiyye Shipyard, enhanced Turkish influence in the Mediterranean and shaped a defining period in the history of Turkish maritime power.

Ottoman Empire Period

The Ottoman Empire rose to prominence as one of the strongest states of its age, distinguished by its military technologies and capabilities, and continuously advanced its weapon systems to compete with Western powers. Military installations such as the tophane (cannon foundry), baruthane (powder works), tüfekhane (armoury), and tersane(shipyard) formed the foundations of the Ottoman and Turkish defence industry. Although it is not precisely known when the Ottomans first adopted firearms, it is clear that this technology, which developed in Europe in the 14th century, quickly reached the Ottoman realm via the Balkans. The close relationship that the Ottomans maintained with the Serbs played a decisive role in the transfer of this technology[13]. This early technological interaction proved a crucial factor in strengthening Ottoman military power. The firearm technologies acquired during the processes of war and peace brought about a revolutionary change in the military strategies of the Ottoman Empire.

In the Ottoman defence industry, ranged weapons — particularly artillery and casting techniques — held a place of great importance. Between 1450 and 1550, the Empire attained a leading position in the world in cannon-casting technology. The first documented use of artillery occurred during the reign of Murad I (r. 1362–1389), in the defence of Antalya Castle. Sources further record that at the Battle of Kosovo (1389), the Ottomans employed artillery against the Crusader army, with the pieces commanded by a gunner named Haydar. Although the earliest Ottoman cannons possessed limited destructive power, by 1439 they had developed sufficiently to demolish fortresses, and by 1444 to sink ships.[14] These developments demonstrated not only the increasing

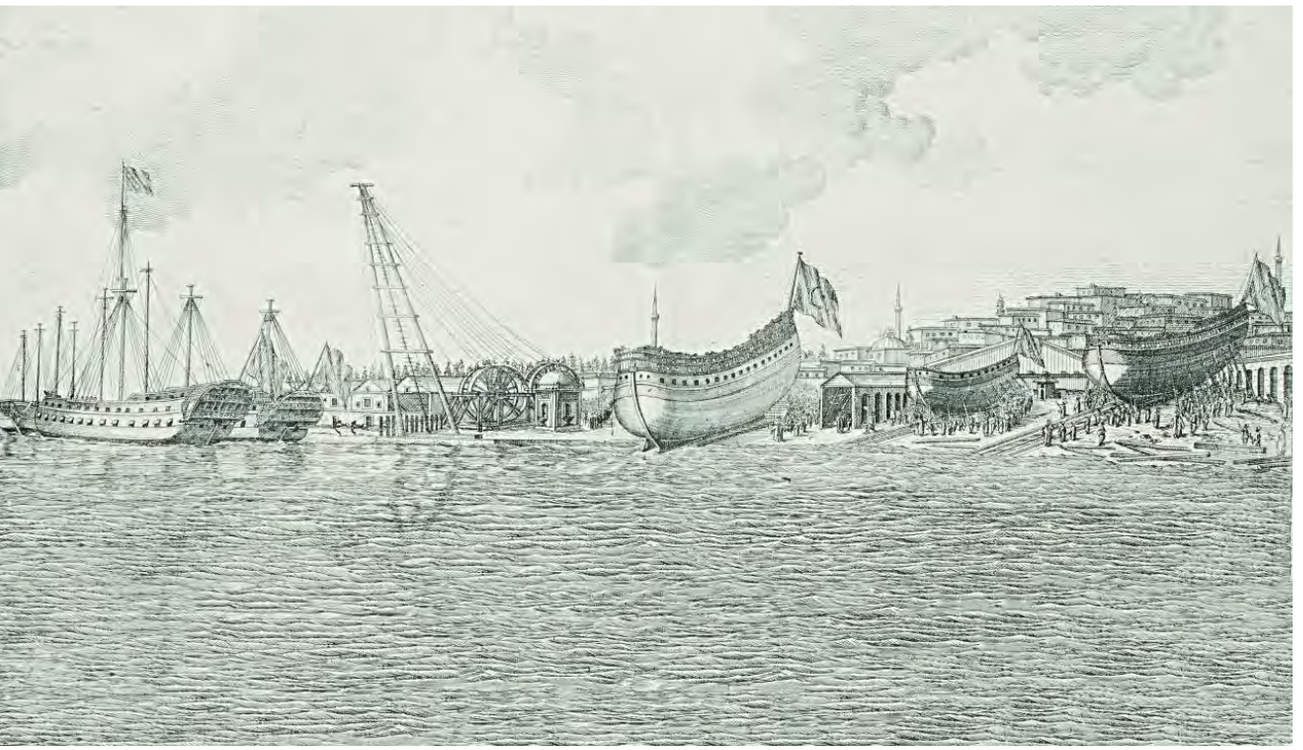
[12] Tersaneler ve Gemi Geri Dönüşüm Tarihçesi. (2024). *T.C. Ulaştırma ve Altyapı Bakanlığı* https://tkygm.uab.gov.tr/tersaneler-ve-gemi-geri-donusum-tarihcesi (Accessed: 12.11.2024).

[13] Keleş, A. (2013). "3 Numaralı Mühimme Defterine Göre Osmanlı Devletinde Tüfenk". Gelecek Geçmişi Tartışıyor Ulusal Tarih Öğrenci Sempozyumu Bildirileri, 2-4 May 2013, Isparta.

[14] Bayraklı, E. (2024). Presidency of the Republic of Türkiye Presidency of Defence Industries in the 100th Year of the Republic. *Türkiye Araştırmaları Vakfı Yayınları*.

military might of the Ottomans but also the degree to which they had advanced in integrating technology into their war strategy. The rapid progress of artillery technology enabled the Ottomans to become increasingly effective in siege warfare and open battle alike, and artillery emerged as a decisive factor in their military victories.

To overcome the difficulties of transporting heavy artillery across rugged terrain, the Ottomans surpassed European defence industries by casting cannon directly on site before fortress walls. . During the reign of Murad II (1438), fixed and portable artillery workshops were established during the siege of Germehisar, and the large cannons of the period were produced here. For example, the siege cannon at Shkodër Castle, which could fire a stone ball weighing 702 kilograms, is considered one of the most impressive weapons of the period. The success of the Ottoman Empire in this field is associated with the policy of bringing together a large number of master founders and engineers. It [is] stated that during the reign of Sultan Mehmed the Conqueror, 532 master cannon founders were employed within the Ottoman Empire and that large-calibre cannons were included in the inventory from the 1430s[15]. The cannon foundry establishment efforts initiated by Sultan Mehmet the Conqueror before the conquest of İstanbul strengthened the military power of the Ottoman Empire and laid the foundation for engineering achievements in this field.



Imperial Shipyard.

[15] Ibid.

The conquest of İstanbul (1453) also marked the beginning of a more institutional organisation of cannon casting in the Ottoman Empire. Sultan Mehmet the Conqueror expanded the foundry network by organising the necessary teams and military units to accelerate cannon production processes, and significantly increased the number of foundries after the conquest. In this regard, alongside centres such as Bursa and Edirne, new foundries were established in Belgrade, Buda, Shkodër, and Egypt, further strengthening the Ottoman defence industry.[16] Sultan Mehmet the Conqueror's focus on cannon-casting not only consolidated Ottoman military power but also enabled the development of a lasting institutional infrastructure in the defence sector. These strategic steps increased the military effectiveness of the Ottoman Empire and, with the growing network of foundries, laid the cornerstones of its defence industry.

The Şahi Cannon used during the conquest of İstanbul[18]

Historical sources indicate that the Ottoman Empire devised innovative solutions for the use of artillery in rugged terrain, thereby securing a place at the forefront of European defence industries. Murad II's casting of large cannons in fixed and mobile foundries during the 1438 siege of Germehisar showcases the superior engineering knowledge of the Ottomans. The 702-kilogram siege cannon in front of the Shkodër Castle was also recorded as the largest cannon of the period. This success was the direct result of Ottoman policies to support and employ skilled gunners and engineers.[17] The success of the Ottoman Empire in military engineering enabled them not only to cast cannons but also to achieve strategic superiority. This has been an important innovation that reinforced the military power of this period.

16 Ibid.

17 Bayraklı, E. (2024). *Presidency of the Republic of Türkiye Presidency of Defence Industries in the 100th Year of the Republic. Türkiye Araştırmaları Vakfı Yayınları.*

18 Fatih'in Şahi Topları. (2023). https://www.millîyet.com.tr/gundem/fatihin-sahi-toplari-7026098 (Erişim Tarihi: 11.11.2024).

The conquest of İstanbul in 1453 was a decisive turning point in both the history of heavy artillery and the evolution of the Turkish defence industry. Guided by his engineering knowledge and scientific outlook, Sultan Mehmed the Conqueror personally designed the "Şahi" cannon used in the siege of İstanbul. As one of the most powerful weapons of its age, this cannon was capable of hurling cannonballs weighing between 200 and 500 kilograms, marking an era in which artillery pieces of 15 to 17 tonnes were produced. Developed with the contributions of Ottoman engineers, the Şahi cannon was designed specifically to shatter the Byzantine walls, while the mortar guns employed in the siege also played a major role.[19]

Ceremony of launching a galleon into the sea at the Imperial Shipyard.

In addition, shipyards of critical importance were built in İzmit, Karamürsel, Gelibolu, İstanbul, Sinop and Suez during the Ottoman Empire period. While a shipyard was being established in Izmit, which had been captured from the Byzantines, the Ottoman Empire's first large, organised shipyard was the Gelibolu Shipyard, built in 1390 during the reign of Yıldırım Bayezid. This shipyard served as the Ottoman Empire's most strategic naval base until the establishment of Ottoman Imperial Arsenal (Tersâne-i Âmire). The Golden Horn Shipyard, founded by Fatih Sultan Mehmet in 1455, became one of the largest shipyards in the world in the 16th century and reached a capacity of 249 ships per year. The Imperial Arsenal remained the main base of the navy until the collapse of the Ottoman Empire.[20]

The shipyards of the Ottoman period were significant infrastructure projects that reflected the naval power of the era. The establishment of shipyards in strategic locations and their large production capacities played a critical role in boosting the power of the

[19] Ibid.

[20] Tersaneler ve gemi geri dönüşüm tarihçesi (2024). T.C. Ministry of Transport and Infrastructure. https://tkygm.uab. gov.tr/history-of-shipyards-and-ship-recycling (Accessed: 11/12/2024).

Ottoman navy. The Taşkızak Shipyard played a key role in the modernisation of the Ottoman navy. It built the first armoured ship in 1828, a frigate in 1884 and the first submarine in 1886. After The shipyard, which ceased operations during World War I, resumed operations during the Republican era.[21]

The dry dock built in the 19th century at the Golden Horn Shipyard, considered to be the oldest shipyard still in operation.

During the 16th century, the Ottoman Empire increased its political influence in the Islamic world through military technology, but the wealth gained by colonial powers from the New World disrupted the country's economic balance and slowed down technology transfer.[22] This situation has slowed down developments in the defence industry, but it has also created a need to reorganise the internal dynamics of the state. During this period, the Ottoman Empire implemented significant defence projects by utilising its resources in the most efficient manner.

Lagari Hasan Çelebi and Hezarfen Ahmed Çelebi, who stood out with their early work in the field of aviation during the 17th century, are noteworthy in this context. Lagari Hasan Çelebi went down in history as one of the pioneers of modern missile technology with his vertical flight experiment using a multi-stage rocket system powered by gunpowder. During the same period, Hezarfen Ahmed Çelebi made a significant contribution to aviation history with his glider-type flight from Galata Tower to Üsküdar. The Table of the Defence Industry during the Ottoman Empire examines these significant developments in the Ottoman Empire's defence industry from a historical perspective, summarising the strategic priorities of the period and how these priorities changed.

[21] Sezgin, Ş., & Sezgin, S. (2018). "Defence Industry in the World and Türkiye: An Overview". *Avrasya Sosyal ve Ekonomi Araştırmaları Dergisi*.5(12), 13.

[22] Bayraklı, E. (2024). Cumhuriyetin 100. Yılında T.C. in the 100th Year of the Republic. *Türkiye Araştırmaları Vakfı Yayınları*.

Defence Industry during the Ottoman Empire

1444
The Ottomans adopted the battalion battle formation (Tabur Cengi) for the first time at the Battle of Varna.

1453
Fatih Sultan Mehmet, had the famous Şahi cannon cast.

1455
Imperial Shipyard was founded.

1464
Ali Usta's famous two-piece cannon was cast.

1702
The Baruthâne-i Âmire (gunpowder factory) was founded in Bakırköy.

1736
Hendesehâne (engineering school) was founded.

1773
Mühendishâne-i Bahrî-i Hümâyûn (Imperial Naval Engineering School) was founded.

1774
The Mobile Artillery Corps was founded.

1837
The construction of Eser-i Hayr, the first steam warship, was completed, and it was launched.

1841
Cannon casting transitioned from the French method to the Prussian method.

1842
Zeytinburnu Iron and Steel Factory was founded.

1847
The production of percussion cap rifles began at the Dolmabahçe Rifle Factory.

1885
The first domestically produced torpedo was manufactured by Navy Staff Major Davut Bey.

1886
Abdülhamid, the world's first submarine capable of firing a torpedo at a target, was assembled and launched.

1887
The Abdülmecid submarine was completed and launched.

1890
The first torpedo boats, Peleng-i Derya and Nimet, were launched.

1488
"Ten gunboats were added to the Ottoman navy.

1495
The sailing ship GÖKE, with oars and three holds, was built by Kemal Reis.

1518
Removable iron mortars were cast for the navy.

1682
The ship platform was changed from a galley type to a galleon type sailing platform.

1796
The Azadlu Baruthanesi (Azadlu Gunpowder factory) industrial facilities, powered by water, was founded.

1797
The Selimiye Galleon, measuring 51 metres in length, with a capacity of 1,200 personnel and equipped with 122 cannons, was launched.

1825
The empire's second dry dock was built by local architects at the Imperial Shipyard.

1828
The Mahmudiye Galleon, 76 metres in length and equipped with 128 cannons, was launched.

1848
Eser-i Hadid, the first domestically built iron steamship, was constructed at the Küçük Demir Factory of the Istanbul Gunpowder Plant and launched.

1863
The Meriç and Utarid, which were part of the Ottoman navy, were converted into steam corvettes using national resources.

1869
The world's first rapid-fire field gun was cast by Ahmed Süreyya Emin Bey at the Zeytinburnu Imperial Factory.

1875
The Mukaddeme-i Hayr, the first armoured corvette built at the Imperial Shipyard, has been launched.

1892
The first autoclave machine (tebhir) was manufactured at the Imperial Shipyard (Tersâne-i Âmire).

1894
The Hamidiye, the first armoured frigate with a central battery built at the Imperial Shipyard, entered service.

1911
With the initiative of Mahmut Şevket Pasha, the Aviation Commission (Tayyare Komisyonu), the first official aviation organisation of the Ottoman Empire, was established.

1912
The first educational institution offering aviation training in the Ottoman Empire, Aviation School (Tayyare Mektebi), was opened.

Source: (SBB: Savunma Sanayii Başkanlığı 2022, p. 29)

1.2. Turkish Defence Industry in the Republican Era

The defence industry of the Republic of Türkiye began to take shape with the steps taken during the War of Independence. With the closure of the Ottoman Empire's military factories after the Armistice of Mudros, Istanbul came under the control of the Allied Powers. However, Turkish resistance organisations such as the "Karakol Cemiyeti" and the "Mim Mim group" attempted to meet the military needs of the national struggle by smuggling machinery, engineers and craftsmen from closed factories to Anatolia.[23] The newly established Republic of Türkiye placed great importance on the defence industry while recovering from the Balkan Wars and the continuous wars that lasted from 1912 to 1923. The emphasis placed on this stems from the lessons learnt through the past experiences of the Republic's founding cadres, who came from military backgrounds.[24]

These strategic moves by resistance organisations from Türkiye after the Armistice of Mudros show that the defence industry played a critical role in the struggle for liberation. The engineering expertise and equipment brought to Anatolia enabled the military capacity to be increased during the War of Independence and formed the cornerstone of the defence industry infrastructure of the Republic of Türkiye. In the early years of the Republic, the leadership and wartime experience of military-origin cadres contributed to the rapid development of the defence industry and led to its prioritisation in state policies. The investments made during this time period served Türkiye's long-term goals not only in the military field, but also in economic and technological development.

With the proclamation of the Republic, Türkiye placed great importance on the defence industry in order to overcome the military challenges posed by the War of Independence and establish a strong defence infrastructure. Following the closure of military factories following the Armistice of Mudros, the newly established Republic began efforts to rebuild the defence industry. Under the leadership of Gazi Mustafa Kemal Atatürk, the foundations of the Turkish defence industry began to be laid, and numerous domestic production activities were carried out during the years of the national struggle. The early Republican period is a critical turning point for the institutionalisation of the modern defence industry in accordance with the needs of the new state. The military factories and defence industry infrastructure established during this period were part of a strategy aimed at ensuring Türkiye's independence and security.

[23] Özlü, H. (2006). İkinci Dünya Savaşı'ndan Günümüze Türkiye'de Savunma Sanayinin Gelişimi (1939-1990) (Unpublished Master's Thesis). Dokuz Eylül University. Principles of Atatürk and Revolution History Institute. Department of Principles of Atatürk and Revolution History. p. 2.

[24] Ermiş, U. (2023). 1919-1947 ve 1985-2004 Dönemlerinde Türk Savunma Sanayii Kurma Girişimlerinin Karşılaştırmalı Analizi. *Kafkas Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 14(27), p. 441.

Some of the aircraft used by the Turkish Aeronautical Association from past to present are exhibited in the Turkish Air Force Museum.

With the proclamation of the Republic, Türkiye gained not only political independence but also sought ways to stand on its own in the fields of economy, industry, and technology. The limited resources left in the hands of a people exhausted by wars and years of external dependency necessitated prioritising industrialisation and domestic production efforts during the early years of the Republic. In this context, the defence industry was considered a critical field for Türkiye's resurgence. Because a nation's defence capability has been a fundamental factor in shaping not only its military power, but also its economic independence and technological progress.

1.2.1. Türkiye's First Domestic Defence Industry Investments and Projects

Domestic defence industry projects, which began in the 1920s, aimed not only to meet military requirements but also to raise the industrial awareness of the public and support Türkiye's modernisation efforts. Under Atatürk's leadership, these efforts aimed to meet the young Republic's defence needs with domestic resources, laying the groundwork for a permanent defence industry infrastructure. These projects, which were carried out in various fields such as aviation, ammunition, and weapons production, had

a significant impact on Turkish society, not only in terms of military power, but also in terms of the emergence of industrial cities, the formation of technological knowledge, and the expansion of workforce capacity.

These initiatives, launched in the defence industry in the early years of the Republic, allowed for a rapid shift away from a previously foreign-dependent structure and resulted in a significant transformation in meeting the Turkish army's needs with domestic resources. Cities such as Ankara, Kayseri, Eskişehir, and Kırıkkale emerged as Türkiye's modern industrial centres and were instrumental in driving economic growth owing to the public's faith and participation in these initiatives.

1.2.1.1. General Directorate of Military Facilities

The General Directorate of Military Facilities was established in 1921 during the most difficult periods of the War of Independence, and it was the Republic's first defence industry institution to ensure that domestic resources provided military and logistical support in Türkiye's fight for independence. With its military ammunition production and repair activities, the Directorate laid the groundwork for the modern defence industry and played an important role in addressing the economic and logistical challenges posed by war. The General Directorate of Military Facilities, established in Ankara, formed an organised structure by bringing together repair shops, weapons workshops and ammunition factories that were moved from the occupied territories to Anatolia, and the light weapons, ammunition and logistic equipment that the Turkish army needed during the war were provided with domestic means. The Directorate has fulfilled its primary responsibilities, which include the production of weapons and ammunition for use on the front lines, the repair and refurbishment of faulty weapons, the provision of engineering solutions in workshops to respond quickly to military requirements, and the promotion of domestic manufacturing for logistical support.

Throughout the war, the Directorate, along with the local workshops it organised, maintained existing weapons, repaired critical military equipment such as artillery and rifles, and helped produce artillery shells, grenades, and infantry ammunition. These initiatives provided a strategic advantage in terms of war sustainability by reducing the army's external dependency. The Directorate made a great contribution to the victory in the War of Independence through activities such as repairing unusable rifles and artillery and sending them back to the frontline, eliminating ammunition shortages with domestically produced bullets and grenades, and creating qualified human resources by training the local workforce.

Following the war, in the Republican period, the significance of the General Directorate of Military Facilities increased further and it was modernised and expanded as the first step towards an independent defence industry. Larger and better-equipped

facilities were established within the Directorate, new engineers and technicians were trained, and assistance was provided for the modernisation of the Turkish Armed Forces through increased domestic production capacity.

Providing long-term contributions such as establishing the Turkish industrial infrastructure by encouraging domestic production, reducing Türkiye's external dependency by meeting defence needs with domestic resources and transferring the experience gained during the War of Independence to the industrialisation policies of the Republican period, the Directorate not only served as a production centre during the war but also laid the foundations for an independent defence industry.

The knowledge and legacy left by the General Directorate of Military Facilities played a significant role in the emergence of defence industry giants such as ASELSAN, TAI, and Mechanical and Chemical Industry Corporation (MKE) and became the starting point for Türkiye's vision of developing an independent defence industry. Today, Türkiye's globally recognised defence industry power is a reflection of this directorate and its vision.

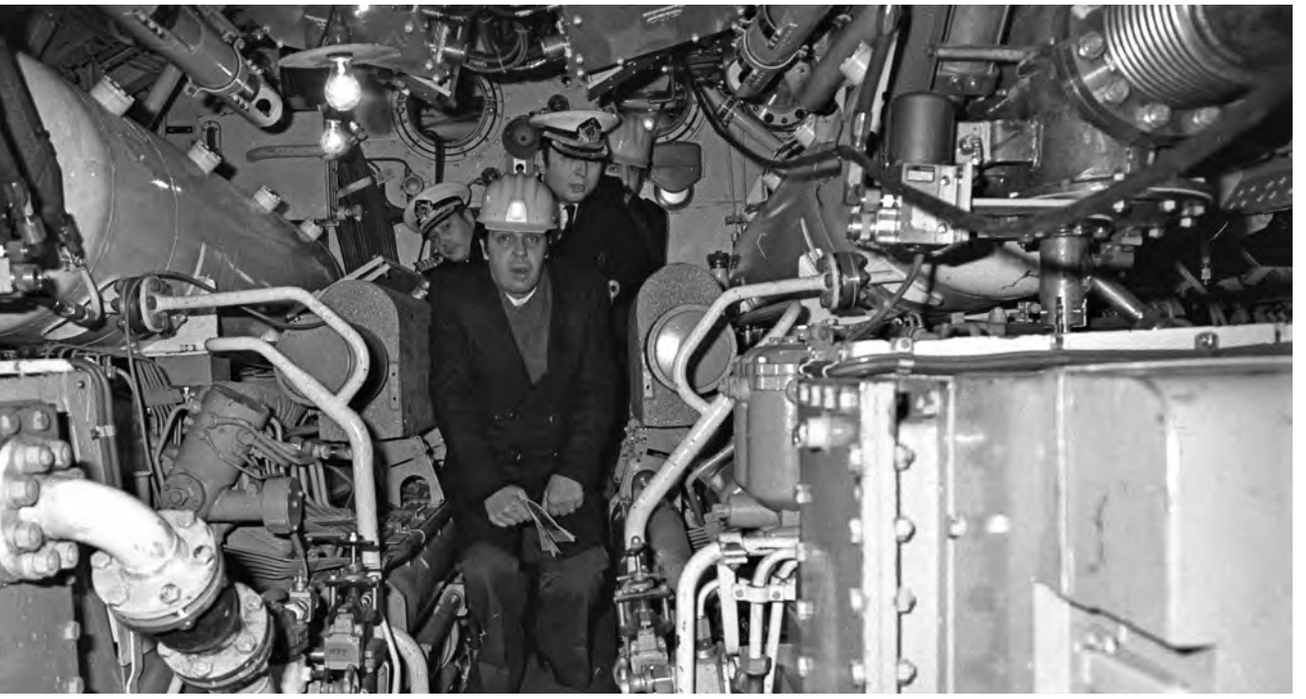
1.2.1.2. Ankara Light Weapon and Artillery Repair Workshops

Ankara Light Weapon and Artillery Repair Workshops, established in 1924, hold great significance as one of the first organised steps taken in Türkiye's defence industry. These facilities were established to meet the local maintenance and repair needs of military equipment, and they later became a pillar in the development of Türkiye's defence industry. These workshops were envisioned as an institutionalised extension of the experience gained during the War of Independence in the maintenance and repair of operational weapons. The fact that the majority of the weapons used during the Ottoman period were of foreign origin caused serious difficulties in repair and maintenance processes. With the establishment of the Republic and the goal of reducing external dependency, these workshops were planned not only to repair existing equipment but also to serve as the foundation for future industrial investments.

As one of Türkiye's first domestic engineering initiatives, Ankara Light Weapon and Artillery Repair Workshops laid the foundation for the modern defence industry and paved the way for larger industrial projects. These workshops, which provide continuous maintenance and repair capacity to the Turkish Armed Forces, have also aided in the specialisation of the local workforce and engineers in defence technologies. Technicians and engineers trained in the workshops have played critical roles in the execution of advanced defence projects. These workshops, one of the first organisational structures in the Republic's defence industry, created know-how that reduced Türkiye's dependency on foreign weapons and ammunition, enabling the establishment of modern facilities like the Kırıkkale Ammunition Factory and the emergence of significant institutions such as the Mechanical and Chemical Industry Corporation (MKE).

1.2.1.3. Gölcük Naval Shipyard

Gölcük Naval Shipyard was established in 1924 as the first concrete step towards Türkiye's goal of self-sufficiency in naval defence. Following the War of Independence, the



A photograph from the construction process of the Batıray submarine at the Gölcük Naval Shipyard. (1978).

reconstruction of naval infrastructure became a strategic priority in the early years of the Republic, and due to the inadequacy of Istanbul's historical shipyards, Gölcük on the Marmara coast was chosen as the ideal location for a modern shipyard.

Initially established to meet the needs of the Turkish Naval Forces, the shipyard maintained and repaired ships from the Ottoman era as well as fleets damaged during the War of Independence in its early years. At the same time, it has served as a training centre for analysing foreign ship technologies and developing domestic production techniques based on this knowledge.

Over time, the shipyard has taken an active role in the design and production of both military and commercial ships, as well as providing services for naval modernisation and civil maritime transportation, thanks to its infrastructure development. Gölcük Naval Shipyard, with its enclosed maintenance workshops, open work areas, and port facilities, has evolved into a comprehensive naval defence base, contributing to Türkiye's defence industry by training domestic engineers and technicians.[25]

In the early years of the Republic, the shipyard, which carried out warship modernisation and maintenance processes with local resources, reducing the Turkish Naval Forces' reliance on foreign countries, increased Türkiye's maritime deterrence. At the same time, it has aided economic development by promoting civilian maritime transportation and allowing for more experience in the construction of larger ships. The Gölcük Naval Shipyard laid the groundwork for Türkiye's world-renowned naval defence industry.

[25] Timur, T. MİLGEM'e Varan Yolun Başlangıcı: Gölcük Tankeri. https://tanseltimur.blogspot.com/2018/09/milgeme-varan-yolun-baslangc-golcuk.html (Accessed: 06.01.2025).

Turkish Military and Metal Industry Factory.

1.2.1.4. Turkish Military and Metal Industry Factory

The Turkish Military and Metal Industry Factory, founded by Şakir Zümre in 1925, is significant for being the first private sector initiative in the Turkish defence industry. The inclusion of the private sector in domestic production efforts following the Republic's proclamation marked a new chapter in Türkiye's industrialisation and modernisation process. This factory, established in Istanbul by Şakir Zümre, an entrepreneur of Balkan origin, played a pioneering role, especially in the production of military munitions and weapons, and quickly achieved significant success both domestically and internationally. Şakir Zümre aimed to establish a factory that could meet the Turkish army's ammunition needs and compete in international markets through exports. This vision provided a private sector perspective to the Republic's industrialisation initiative, inspiring other entrepreneurs as well.[26]

The factory's ammunition was exported to neighbouring countries such as Greece and Bulgaria, and this success established the Turkish defence industry's place in the international market. The success of exports has increased the economic strength of the

[26] "Türkiye's First Arms Manufacturer: Şakir Zümre". *Sanayici Dergisi [Industrialist Journal]*. https://www.sanayicidergisi.com.tr/ sanayii-tarihi/turkiyenin-ilk-silah-fabrikatoru-sakir-zumre-h711.html (Accessed: 07.01.2025).

factory and encouraged investments in the defence industry. It has also helped shape Türkiye's defence industry identity in the international arena.

This factory demonstrated the strength and potential of the private sector in the Turkish defence industry, proved that actors other than the public sector can also succeed in the defence industry, and contributed to the development of domestic industry awareness in Türkiye. The factory reduced foreign dependency by meeting the Turkish army's ammunition requirements, achieved international competitiveness through high quality standards, and set a precedent for other industrial sectors by increasing local production capacity.

The factory established by Şakir Zümre played a pioneering role in the production of military ammunition and weapons.

Due to changing economic and strategic balances following World War, the factory reduced defence industry production and ceased operations in the following years.

1.2.1.5. Eskişehir Air Repair Facility

Following the proclamation of the Republic, one of the top priorities was to modernise the Turkish Air Force. At the time, carrying out aircraft maintenance and repair operations abroad was expensive and limited the military air force's independence. In this context, Atatürk led the establishment of the Eskişehir Air Repair Facility in 1926.

The Eskişehir Air Repair Facility built a strategic infrastructure for the Turkish Air Force, performing tasks such as aircraft maintenance and repair, restoring damaged aircraft to service, modernisation processes, and training domestic engineers and technicians. This facility reduced costs by reducing reliance on foreign sources in the aviation industry and contributed to increased operational capacity.

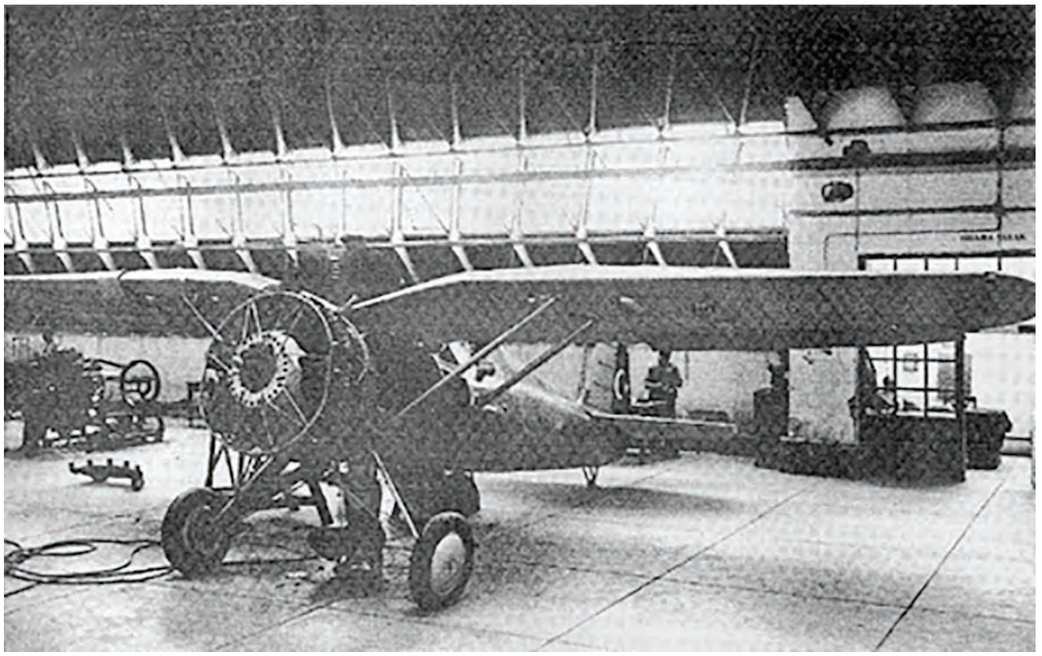
Engineers and technicians working at the Eskişehir Air Repair Facility.

The repair facility not only provided technical maintenance services but also spearheaded the development of Turkish aviation engineering and technical expertise. The experts trained here took on important roles in the Turkish Aeronautical Association and defence industry projects in the following years, thus providing know-how.

The Eskişehir Air Repair Facility marked a watershed moment in Turkish aviation history, laying the groundwork for the implementation of major aviation projects.

1.2.1.6. Aircraft and Engine Turk Inc. (TOMTAŞ)

Founded in 1925, the Aircraft and Engine Turk Inc. (TOMTAŞ) became Türkiye's first large-scale aviation initiative. This facility, designed to meet the needs of the Turkish Air Force and civil aviation, aimed to bring the most advanced technologies of the time to Türkiye. The aircraft manufacturing facility in Kayseri and the maintenance-repair centre in Eskişehir were the two main pillars of this vision. The company, founded in collaboration with the German Junkers firm, has helped Turkish engineers and technicians become acquainted with modern aircraft production processes, contributed to their training, and advanced Türkiye one step closer to aviation independence.



1936 series P.Z.L. P-24's motor assembly.[28]

During its active period, TOMTAŞ marked a significant milestone in the aviation industry. Aircraft produced with Junkers technology represent the most advanced techniques of the era in terms of design and engineering. Suitable for light bombing and reconnaissance missions for the Turkish army's military operations, the Junkers A-20 aircraft attracted attention with their all-aluminium body and robust structure. Moreover, the Junkers F-13, used in the field of civil aviation and logistics, was designed as the world's first all-metal passenger aircraft and boosted Türkiye's commercial aviation potential[27].

Despite generating much hope in a short amount of time, TOMTAŞ had to cease its operations in 1928 due to economic difficulties. During that period, Türkiye's limited industrial infrastructure and the high costs of the aviation industry made the sustainability of projects difficult, while administrative and financial disputes with the Junkers company also adversely impacted the company's activities. However, TOMTAŞ's ceasing of operations did not mean that efforts towards developing the aviation industry would end. The know-how accumulated and the expert staff trained through this initiative constituted the foundation of important institutions such as the Turkish Aeronautical Association, Etimesgut Aircraft Factory, and TAI.

[27] Yavuz, İ. (2023) TOMTAŞ: Tayyare ve Motor Türk Anonim Şirketi ve Kayseri Tayyare Fabrikası. https://akdenizdergi.com/post/tomtas-tayyare-ve-motor-turk-anonim-sirketi-ve-kayseri-tayyare-fabrikasi (Accessed: 12.11.2024).

[28] Yeşilköy Hava Müzesi Komutanlığı Arşivi.

1.2.1.7. Kırıkkale Ammunition and Weapons Factory

Founded in 1928, the Kırıkkale Ammunition and Weapons Factory played a pioneering role in the modernisation of the Turkish defence industry, standing out as a facility that enabled military production with local resources. The factory was established with the aims of meeting the Turkish army's needs for light weapons and ammunition with domestic resources, ensuring the sustainability of military power, and enhancing technical capacity with local labour. The first munitions produced by the factory significantly reduced the Turkish army's dependence on foreign sources and contributed to the strengthening of national defence awareness.

This factory was opened in Kırıkkale, Türkiye, in accordance with the decision to invest in domestic industry to modernise the army and reduce dependence on foreign sources following the War of Independence. Thanks to its geographical location, ease of transportation, and suitable terrain, Kırıkkale hosted Türkiye's first comprehensive ammunition and weapons factory. The establishment of the factory transformed Kırıkkale, a small settlement, into an industrial city and profoundly changed the region's economic and social structure. The labour force that came to the region to work at the factory revitalised the local economy and provided opportunities for the training of skilled technicians and engineers. This development contributed to the improvement of region's infrastucture and the revitalisation of its social life.

The long-term impacts of the factory are listed as pioneering the modernisation of the Turkish defence industry, enabling Kırıkkale to gain the identity of an industrial city, and making contributions towards Türkiye becoming an internationally recognised player in the field of defence.

Ghazi Mustafa Kemal Atatürk's visit to the Kırıkkale Ammunition and Weapons Factory.

1.2.1.8. Nuri Killigil's Sütlüce Weapons Factory

In the early years of the Republic, private sector entrepreneurship in the defence industry made progress under the leadership of Nuri Killigil. The factory established by Killigil in the Sütlüce district of İstanbul constituted an important step towards achieving the goals of domestic production and independence in the Turkish defence industry. Killigil worked to meet the needs of the Turkish army and contribute to the economy through exports by bringing his military experiences in the Balkans and Central Asia to domestic ammunition production.

Nuri Killigil, at the Sütlüce Weapons Factory.

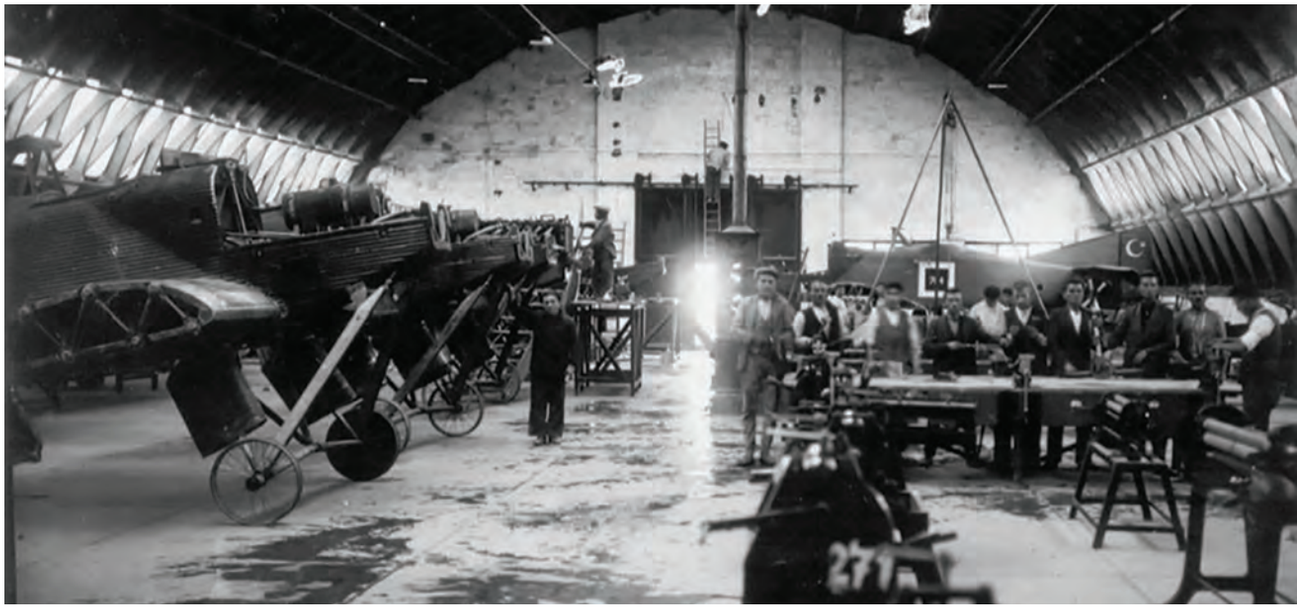
The Sütlüce Weapons Factory promoted Türkiye among international defence industry players by providing ammunition and light weapons not only to the Turkish army but also to Middle Eastern and Balkan countries by way of exports. The durability and reliability of the products demonstrated Türkiye's competitive capacity in this field[29].

Killigil's initiative demonstrated the importance and potential of the private sector in the defence industry and contributed to the development of domestic production with modern engineering practices. However, after an explosion in 1949, which resulted in Killigil's death, the factory's operations ceased. This tragic event has gone down in history as a significant loss for the Turkish defence industry.

[29] Türetken, M. (2018). "Yerli ve Millî Silah Sanayisinin Temellerini Atan İsim: Nuri Killigil Paşa". *Anadolu Ajansı*. https://www.aa.com.tr/tr/turkiye/yerli-ve-millî-silah-sanayisinin-temellerini-atan-isim-nuri- killigil-pasa/1100413

1.2.1.9. Etimesgut Aircraft Factory

Founded in 1941, the Etimesgut Aircraft Factory has been an important symbol of the goal of self-sufficiency in the Turkish aviation industry. The factory, built by the Turkish Aeronautical Association, carried out the production of civilian and military aircraft in what is one of the most important projects in the aviation field of the Republic's domestic industry initiative. During The global effects of World War II revealed the necessity for Türkiye to establish an independent aviation industry, and to this end, the factory was established in a strategic location in Ankara[30].



Etimesgut Aircraft Factory established in 1941.

Etimesgut Aircraft Factory aimed to meet the Turkish Air Force's military aircraft needs through domestic production, to design and produce aircraft for civil aviation, and also to increase local engineering capacity. In addition, the factory developed Türkiye's aviation know-how by providing opportunities for the training of local engineers and technicians. The factory has become one of the cornerstones of Turkish aviation engineering by providing training in modern aircraft design, production, and maintenance.

Projects such as the THK-1 Glider and the THK-5 Ambulance Aircraft enabled Türkiye to become acquainted with aviation technology and demonstrated its domestic production capacity. The factory supported Türkiye's vision of independence in the field of aviation and demonstrated its capacity to develop its own technology in both civil and military aviation[31].

[30] "THK Etimesgut Uçak Fabrikası'nın İlk Uçağı 78 Yıl Önce Bugün Havalandı". *Savunma Sanayii Dergilik*. https://www.savunmasanayiidergilik.com/tr/HaberDergilik/THK-Etimesgut-Ucak-Fabrikasi-nin-ilk-ucagi-78-yil-once-bugun-havalandi (Accessed: 08.12.2025).

[31] "Our First Aircraft Took Off in Etimesgut" (2018). Fikriyat. https://www.fikriyat.com/tarih/2018/06/07/eti- mesgutta-ilk-ucagimiz-havalandi (Accessed: 08.01.2025).

These initiatives enabled Turkish engineers and technicians to become familiar with modern technologies, establishing the country's strategic infrastructure and laying the foundation for globally recognised organisations such as ASELSAN, TAI, and ROKETSAN. Türkiye's goal of independence in the defence industry is building on the legacy of these early initiatives and enabling the country to become more deterrent on the international stage through domestic production. This legacy continues to inspire innovative projects.

1.3. Cold War Era and Foreign Dependence in the Defence Industry

The period from 1919, when the National Struggle began, to 1947 was the time in which Türkiye set forth the goal of establishing a national defence industry and the first initiatives in this field were undertaken. However, these investments sometimes failed for economic reasons and sometimes for political ones, and with the growing Soviet threat after World War II, Türkiye drew closer to the Western Bloc, leading to a decline in the Turkish defence industry.

The Mechanical and Chemical Industry Corporation was established in 1950.[32]

[32] MKE Makina Kimya Endüstrisi Kurumu (MKEK) Şirket Profili. https://teknoformat.com/mke-makina-kimya-endustrisi-kurumu-mkek-sirket-profili-5765. (Accessed: 12.01.2025).

In this process, Türkiye, regarded as a strategic ally because of its geographical location and border with the Soviet Union, started meeting much of its defence needs from the USA and other NATO countries. Due to the growing foreign defence aid after World War II, domestic defence industry initiatives in the early years of the Republic could not be sustained. Thus, during the Cold War era, Türkiye's defence industry grew heavily reliant on foreign sources. In the following years, the Cyprus Problem of the 1960s and, in particular, the embargoes imposed after the 1974 Cyprus Peace Operation deepened the crises, highlighting Türkiye's need to advance its national defence industry.

Following the National Struggle, the Republic of Türkiye set the goal of establishing a national defence industry as part of its aim for full independence, and although various organisations were created, it is noted that this objective began to be abandoned from 1947 onwards. In this period, numerous initiatives were ended, and the factories that had been established were shut down. As a result, Türkiye entered a period of heavy foreign dependence lasting about 40 years to fulfil its military requirements.

Establishment of the Machinery and Chemical Industry Corporation

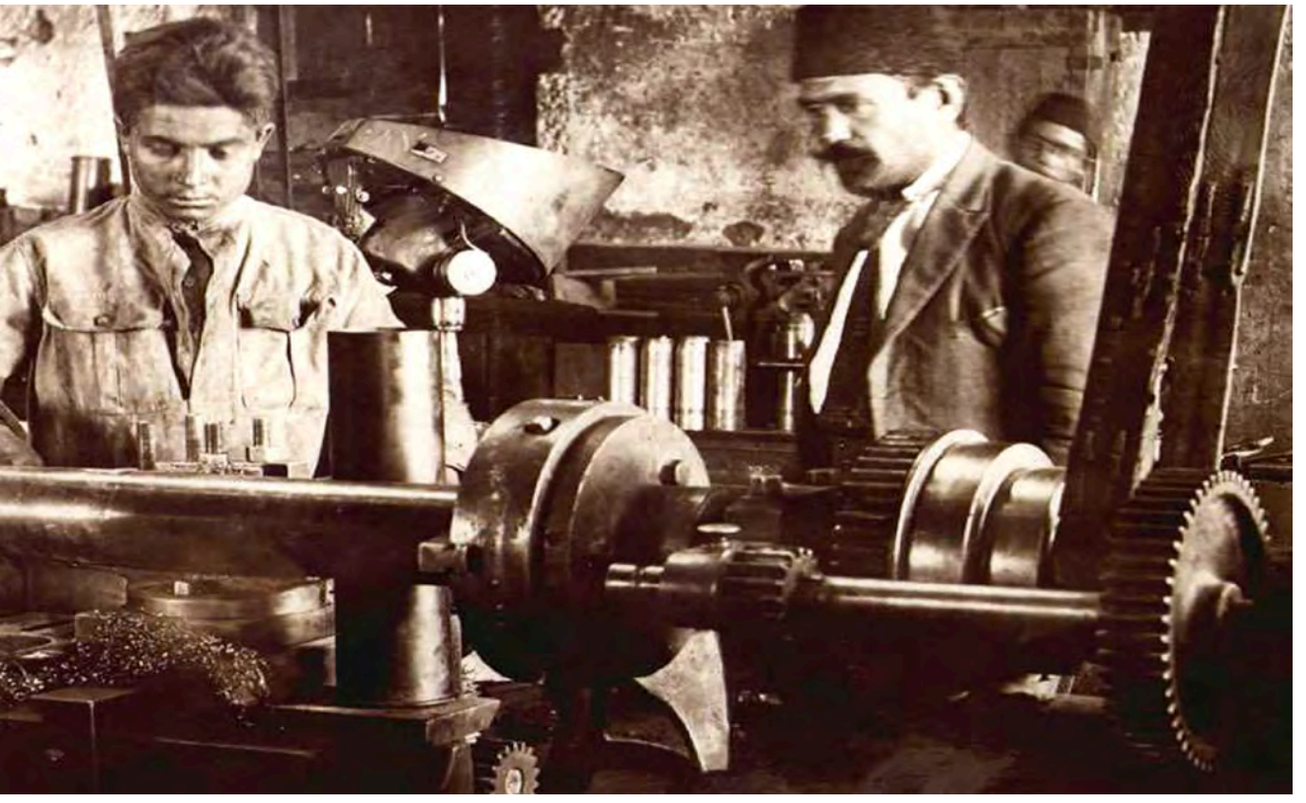
In the 1940s, the General Directorate of Military Factories faced administrative challenges and economic hardships that caused major disruptions in the defence industry. Foreign aid caused a decline in domestic orders, resulting in the loss of functionality of military factories. In 1950, the General Directorate of Military Factories was reorganised as the Machinery and Chemical Industry Institution (MKE) and assigned the responsibility of supplying weapons and ammunition to the Turkish Armed Forces.

The Machinery and Chemical Industry Corporation Logo

In the 1950s, MKE set up an ammunition factory in Ankara in line with NATO standards, thus fulfilling domestic requirements and acquiring the ability to export. Additionally, G-3 and MG-3 rifles, along with Cobra anti-tank rockets, were manufactured under licence from West Germany[33]. Shortly after its founding, MKE doubled its production capacity and expanded into manufacturing railway tracks, steel sheets, and textile materials. However, developments such as the transfer of aircraft and engine factories affiliated with the Turkish Armed Forces to MKE, the start of tractor production in 1963, and the conversion to a textile factory in 1968 show that the defence industry has shifted to civilian initiatives. This period is often referred to as the "lost years" regarding the development of the defence industry[34].

[33] Makine ve Kimya EndüstrisiKurumu Kızmaz, E. (2010). Turkish defence industry and Undersecretariat for Defence Industries: Defence industry policies. *LAP LAMBERT Academic Publishing*. p. 60.

[34] Mühimmat Üretimi ve MKEK. *Savunma ve Havacılık. Volume 7. No:4*. July-August 1993. p. 109.



Soon after its establishment, MKE doubled its production capacity.[35]

Türkiye's efforts to build a national defence industry have been impeded by both internal dynamics and external influences. In this context, World War II represents a critical turning point. Although Türkiye did not participate directly in the war, the technological advancements achieved during it and the postwar international system exacerbated the negative effects on the defence industry. After World War I, Türkiye aimed to keep up with military technological advancements and experienced swift shifts in military paradigms during World War II. This transformation, spanning cavalry to armoured units, light aircraft to jet fighters, and artillery to missile technology, has intensified structural challenges by imposing ambitious targets on the Turkish defence industry[36].

After the war, the shifting international system brought an end to Türkiye's balance policy grounded in the principle of full independence. During the Cold War, the USSR's encirclement policy and revisionist demands toward Türkiye compelled the country to abandon its balance policy and adopt an alternative strategy.

[35] MKE Makina Kimya Endüstrisi Kurumu (MKEK) Şirket Profili. https://teknoformat.com/mke-makinakimya-endustrisi-kurumu-mkek-sirket-profili-5765. (Erişim Tarihi: 12.01.2025).

[36] Türk Savunma Sanayii Tarihi. T.C. Cumhurbaşkanlığı *Savunma Sanayii Başkanlığı Yayınları* (Unpublished Work). p. 98.

The Impact of Foreign Military Aid

Following Türkiye's accession to NATO in 1952, the United States intensified its military aid to Türkiye, aiming to position it as a bulwark against Soviet expansionism. Rising foreign military aid fulfilled Türkiye's defence needs but undermined the motivation for domestic production. Aid provided through the U.S. "Lend-Lease" Act, followed by the Truman Doctrine and the Marshall Plan, weakened initiatives to develop the domestic defence industry of Türkiye. These aids imposed significant strains on the budget, and sustainability was not achieved due to the lack of technology transfer. Moreover, the limitations of the 1947 agreement with the USA created significant problems during the 1974 Cyprus Peace Operation. For instance, in the 1964 letter from U.S. President Johnson to Türkiye, the warning that weapons of U.S. origin could not be used during the Cyprus intervention weakened Türkiye's trust in NATO and clearly underscored the drawbacks of external dependency. In this context, initiatives to develop the domestic defence industry accelerated, with the 1974 Cyprus Peace Operation marking a crucial turning point and triggering a major paradigm shift.


Milliyet
Halk Gazetesi

● Irmak: «ABD yardımı kesilmiştir. Yunanlılara, Rumlara, Amerikalılara verilecek tavizimiz yok»

● Ecevit: «NATO ortak güvenlik kavramı tümüyle yeniden ele alınmalıdır»

● TBMM'de sıkıyönetim görüşülürken dış konulara değinildi ve gizli oturum yapıldı

ABD YARDIMI KESİLİYOR

Hükûmet bildiri yayımladı: «NATO savunmasına olan katkımızın yeniden düzenlenmesi gerekiyor»

KİSSİNGER: «YARDIMIN KESİLMESİ BİR TRAJEDİ»

TÜRK

YUNAN

Milliyet Newspaper, 05.02.1975

Between 1970 and 1980, several foundations were created to support the defence industry: the Air Force Strengthening Foundation in 1970, the Naval Forces Strengthening Foundation in 1972, and the Land Forces Strengthening Foundation in 1974, all of which were consolidated under the Turkish Armed Forces Strengthening Foundation in 1987. With the support of these foundations, Military Electronics Industry (Askerî Elektronik Sanayii-ASELSAN) was founded in 1975, İşbir Electricity Industry Inc. (İşbir Elektrik Sanayi A.Ş.-İŞBİR) in 1979, Military Battery Industry and Trade Inc. (Askerî Pil Sanayii ve Ticaret-ASPİLSAN) in 1981, and Avionics Industry (Hava Elektronik Sanayii-HAVELSAN) in 1982. Founded in 1973 under the Ministry of Industry, Turkish Aerospace Industry Inc. (TUSAŞ) represented a key step in replacing the Turkish Armed

Forces' outdated aircraft and providing maintenance and repair services for existing ones. Thus, the foundations of the Turkish defence industry were established[37].

In addition, scientific research was intensified, leading to the establishment of the Defence Industry Research and Development Institute within TÜBİTAK in 1972. The institute has continued its work to secure Türkiye's independence in defence technologies and develop competitive products, forming the basis of today's R&D-driven defence approach.

The Meeting of the Turkish Air Force Strengthening Foundation - 1997.

In the same period, a 1975 draft law aimed at creating the' Defence Industry Institution' to build its institutional infrastructure was developed, but was put on hold between 1977 and 1979 due to ongoing debates. In 1983, the General Directorate of Defence Equipment Affairs was founded as a public economic enterprise and was reorganised later that year into the General Directorate of Defence Equipment Enterprises. This directorate was dissolved in 1985, making way for the establishment of the Defence Industry Development and Support Administration, which underpins today's defence industry.

[37] About us. *TUSAŞ*. https://www.tusas.com/kurumsal/hakkimizda (Accessed: 12.11.2024)

This period from 1985 to 2004 marks a significant phase during which modernisation and nationalisation advanced in the Turkish defence industry. The law numbered 3238, which was enacted in 1985 with the objective of modernising the Turkish Armed Forces and establishing a modern defence industry, was a significant initiative in the pursuit of national production objectives in the defence sector, with an emphasis on research and development activities. The economic policies of the period, characterised by financial liberalism, entrepreneurship, and export-oriented growth, supported efforts in the defence industry. The Defence Industry Fund provided financial support to private companies, and private sector investments were encouraged as a result of the state's termination of its monopoly position during this period.

In 1985, the Defence Industry Development and Support Administration (SAGEB) and the Defence Industry High Coordination Board (SSYKK) were established as critical institutional structures that served as the foundation for the Undersecretariat for Defence Industries (SSM). SSYKK and the Defence Industry Executive Committee (SSİK) have directed the defence policies during this period. The established structures have enabled the Presidency, the Prime Ministry, the Grand National Assembly of Türkiye (TBMM), and other state institutions to operate effectively within the decision-making mechanisms of the defence industry.

The Defence Industry Support Fund (SSDF) has established financial sustainability through various sources, including income and corporate taxes, fuel consumption tax, monopoly revenues, foreign credits, national lottery, arms sales, and paid military service. In 1989, it underwent restructuring and was renamed the Undersecretariat for Defence Industries (SSM) through Decree LawNo. 390, resulting in a strengthened institutional framework. This process represents a significant milestone in the modernisation efforts of the Turkish defence industry.

1.4. Collaborative Approaches in the Defence Industry During the 1990s

Since the 1990s, procurement projects in the Turkish defence industry have evolved from direct purchases to joint production, and in the 2000s, to a model focused on domestic development. Nevertheless, adequate resources could not be devoted to R&D activities, and this shortfall could not be rectified due to budgetary limitations, despite the endeavours of the governments throughout that time. Furthermore, Türkiye's inaugural substantial offset[38] experience within the defence sector took place in 1984 with the collaborative production of F-16s, and this approach has evolved into a significant component of defence industry strategies. SSM formed a dedicated commission to oversee offset processes, published the "Offset Handbook" in 1991, and collaborated with the Undersecretariat of Foreign Trade to regulate the practices.[39]

[38] Industrial Participation/Offset refers to activities that are conducted to capitalise on the capabilities and opportunities of domestic industrial companies, enhance their international competitiveness through exports, and facilitate technological cooperation, investment, and R&D opportunities.

[39] Türk Savunma Sanayisinde 'offset' Uygulamaları. *TÜSİAD*. Publication No. TÜSİAD-T/99-12/276-1. December 1997.

F-16 Fighting Falcon produced by TAI - 1999.

In 1984, TUSAŞ Aviation and Space Industry Inc. (TAI) was established as a Turkish-American joint venture company for 25 years to manufacture the F-16 aircraft, integrate the aircraft's systems, and conduct flight tests in order to serve the Turkish Air Force's requirement for fighter jets. In 2005, prior to the conclusion of the 25-year period, Turkish shareholders acquired the foreign shares of TAI, leading to a restructuring of the company. In this context, TAI and TUSAŞ have merged to enhance their operations under the umbrella of TUSAŞ – Turkish Aerospace Industries Inc., positioning themselves as Türkiye's technology hub for the development, modernisation, production, system integration, and lifecycle support of aerospace and space industry systems.

The establishment of TAI and the manufacturing of F-16s have marked a substantial advancement for the Turkish defence sector. TAI has produced 278 F-16 aircraft, some of which have been exported, and has introduced novel technologies to the defence industry. As the aviation sector emerges as the primary catalyst for the Turkish defence industry, TAI has consequently established itself as a leading export entity in subsequent years. Additionally, TEI, founded in 1985 through a collaboration between TAI and General Electric to manufacture aircraft engines, constitutes one of the notable accomplishments of this era.[40]

[40] The First F-16 Fully Assembled in Türkiye Was Delivered to the Turkish Air Force 35 Years Ago. (2023). *TRT News*. https://www.trthaber.com/foto-galeri/montajinin-tamami-turkiyede-yapilan-ilk-f-16-35-yil-once-turk-hava-kuvvetlerine-teslim-edildi/54684/sayfa-1.html (Accessed: 14.01.2025).

In 1986, FMC and NUROL entered into an agreement with the objective of establishing FNSS Defence Systems Inc. (FNSS) in the future, and subsequently participated in the SSB's Armoured Combat Vehicle (ACV) tender. In January 1988, the SSB decided to initiate negotiations with the FMC-NUROL collaboration, and with the agreement taking effect, the ZMA Project officially launched on August 15, 1989. FNSS, the very first private defence industry enterprise in Türkiye, has embarked on one of the most substantial initiatives for the Turkish Armed Forces, marking a noteworthy advancement in land defence systems.

ZMA-15-2018 produced by FNSS.

Founded in 1988 with the SSİK decision, ROKETSAN has been at the forefront of designing, developing, and producing rocket and missile systems, establishing itself as an essential component of the Turkishdefence industry. The advancements have enhanced national capabilities within the Turkish defence industry and facilitated the path for domestic and national production.

A long-term strategy, political stability, and patience are necessary for the successful completion of defence industry projects. Nonetheless, the political turbulence in Türkiye throughout the 1990s had a detrimental impact on defence industry initiatives. During this period, substantial measures were undertaken; in 1991, Defence Technologies Engineering and Trade Inc. (STM) was founded, and in 1998, a strategy document entitled "Defence Industry Policy and Strategy Principles" was issued. STM has engaged in fields such as systems engineering and project management to address the requirements of the Turkish Armed Forces (TSK) and the Undersecretariat for Defence Industries (SSM).

The organisation of defence industry fairs was intended to enhance export capabilities, beginning with the IDEA fair in 1987, followed by consistent participation in esteemed international events such as IDEX and the Paris Air Show in subsequent years. The increase in the number of participants at the IDEA fair has demonstrated[41] Türkiye's defence industry development and its importance as an international actor.

During the early 1990s, initial endeavours towards the development of unmanned aerial vehicles were initiated under the auspices of TUSAŞ; however, these projects ultimately remained unfinished owing to technical challenges and financial limitations. Nonetheless, the TR-122 Mızrak and T-122 Sakarya Multi Barrel Rocket Launcher System projects developed by ROKETSAN have reached completion and were incorporated into the inventory in 1996. [42]These projects were recorded as significant achievements for the Turkish defence industry.

Towards the end of the Cold War, although Türkiye did not yet possess a fully independent defence sector, it took decisive steps to reduce its foreign dependency and began to lay the foundations of a national infrastructure. This groundwork paved the way for the acceleration of domestic defence projects in the 2000s. For instance, the foundations of today's Altay Tank and Bayraktar TB2 projects were laid through the strategic initiatives undertaken during this period.

1.5. Structural Changes and Strategic Investment Policies in the Turkish Defence Industry post-2000

The structural reforms and transformations introduced in Türkiye's defence industry after 2000 gained momentum in line with the country's goals of economic independence and its security policies. The domestic production strategy, first initiated in the aftermath of the 1980s, was significantly accelerated in the 2000s, elevating Türkiye to a position where it could compete on a global scale in the production of high-tech defence products. During this period, the Turkish defence industry underwent major structural reforms through private-sector partnerships, the reduction of foreign dependency, and a strong emphasis on domestic production.

Türkiye's geographical position and the security risks in its surroundings compelled a greater resource allocation to the defence sector. In this context, Türkiye identified the development of domestic defence technologies as a primary objective in countering security threats, thereby seeking to safeguard its independence in the economic and technological domains as well. In this period, leading Turkish defence companies, such as Turkish Aerospace (TUSAŞ), ASELSAN, and ROKETSAN, secured places in global defence industry rankings, thereby strengthening Türkiye's influence in international markets.[43]

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41 Kızmaz E., (2010). Turkish defence industry and Undersecretariat for Defence Industries: Defence industry policies. *LAP LAMBERT Academic Publishing*. p. 74.

42 About us. *ROKETSAN*. https://www.roketsan.com.tr/tr/biz-kimiz/hakkimizda, (Accessed: 27.01.2023).

43 2023 Activity Report. *ASELSAN*. https://www.aselsan.com/tr/yatirimci-iliskileri/faaliyet-raporlari?s=2024. (Accessed: 27.01.2023).

These reforms in the defence industry also made notable contributions to the Turkish economy. The expansion of domestic production capacity created employment, enabled technology transfer, and generated a wide range of economic benefits. In terms of exports, Türkiye enhanced its competitiveness in areas such as armoured vehicles and unmanned aerial vehicles (UAVs), reaching a level where it could compete with major exporters such as the United States, Russia and Germany. In the post-2000 period, Türkiye implemented major structural changes and strategic investment policies in its defence industry.

The structural reforms and strategic investment policies undertaken with the aim of enabling Türkiye to achieve self-sufficiency in the military field are summarised below:

- **The Structural Transformation of the Undersecretariat for Defence Industries (SSM):** At the beginning of the 2000s, the mandate of the Undersecretariat for Defence Industries was expanded, and fundamental changes were introduced to its operations. With this transformation, the SSM prioritised projects supporting domestic production and introduced policies to integrate the private sector into the defence industry. In 2018, this body was reorganised as the Presidency of Defence Industries (SSB), which became the central authority for the management of sectoral projects. Through this restructuring, Türkiye was able to plan strategically, finance effectively, and manage international partnerships in its domestic defence projects with far greater efficiency.[44]

Logo of the Secretariat of Defence Industries

Secretariat of Defence Industries

- **The National Technology Initiative and R&D Studies**: Under the umbrella of the National Technology Initiative, major investments were channelled into research and development within the defence industry, accelerating the advancement of indigenous technologies.[45] In this framework, cooperation with universities, research centres and the private sector was strengthened. Projects supported by institutions such as TÜBİTAK

[44] Defence Industry/History, T.C. Cumhurbaşkanlığı Savunma Sanayii Başkanlığı, *https://www.ssb.gov.* tr/WebSite/contentlist.aspx?PageID=47&LangID=1 (Accessed: 08.01.2025).

[45] Directorate General of National Technology *T.C. Sanayi ve Teknoloji Bakanlığı* https://sanayi.gov.tr/merkez-birimi/c03f1f3bae27/hakkimizda. (Accessed: 08.01.2025).

particularly encouraged domestic production in the fields of UAVs, land vehicles, submarine technologies, missile systems, and electronic warfare systems.[46]

- **Increased Private Sector Participation**: Following the reforms introduced after 2000, the defence industry was rendered more attractive to private enterprise. Private sector companies were encouraged to participate in defence projects, and new production facilities were established through public–private partnerships. Alongside major state-owned corporations such as ASELSAN, TAI, ROKETSAN and HAVELSAN, private companies including Baykar, FNSS and BMC also began to undertake important projects. These collaborations significantly expanded Türkiye's domestic production capacity.

- **Defence Industry Support Fund and Financing Strategies:** To ensure the financing of defence industry projects, the Defence Industry Support Fund was established. This fund channelled resources towards projects, accelerated production processes, and supported domestic investments aimed at reducing foreign dependency. Special financing programmes were developed for the defence industry, and credit support was extended through public banks. Thanks to these strategies, the sustainability of large-scale projects was enhanced, and production capacity was expanded.[47]

- **Strategic Successes in UAV Production:**Since the 2000s, Türkiye has witnessed rapid progress in the field of UAVs and UCAVs. In particular, Unmanned Aerial Vehicle projects such as Bayraktar and ANKA strengthened the country's domestic and national production capacity and propelled Türkiye into the ranks of leading nations in this domain. UAVs and UCAVs have become some of the most tangible examples of the success of domestic production in the defence sector. These systems are used effectively in Türkiye's domestic security operations and cross-border military campaigns. Moreover, the export of UAVs and UCAVs to numerous countries through international sales has made a significant contribution to Türkiye's defence industry exports.

- **International Cooperation and the Expansion of Exports**: Türkiye has attached great importance to international partnerships in order to increase the export of its defence industry products. Within this framework, a series of defenceagreements were signed with friendly and allied nations. The export of UAVs, armoured vehicles, missile systems, and other defence

[46] The Scientific and Technological Research Council of Türkiye (TÜBİTAK) Industrial R&D Projects Support Program. *TÜBİTAK*. https://tubitak.gov.tr/tr/destekler/sa- nayi/ulusal-destek-programlari/1501-tubitak-sanayi-ar-ge-projeleri-destekleme-programi (Accessed: 08.01.2025).

[47] Defence Industry Sectoral Strategy Document (2023-2027). T.C. *Cumhurbaşkanlığı Stratejive Bütçe Başkanlığı*. http://www.sp.gov.tr/tr/temel-belge/s/242/Savunma+Sanayi+Sektorel+Strateji+Belgesi+_2023-2027. (Accessed: 08.01.2025).

products to countries such as Pakistan, Qatar, and Azerbaijan has significantly increased Türkiye's defence industry revenues. These exports have consolidated Türkiye's position in the global defence sector.[48]

- **Development of a Domestic Supply Chain in the Defence Industry:**Strengthening the domestic supply chain has been made a priority in order to reduce foreign dependency in the defence sector. Capacities for local production expanded in critical materials and technological fields, while cooperation with domestic suppliers in areas such as armour materials, rocket fuels, radar systems, and communications technologies enabled the establishment of an independent supply chain.

- **Investment in Space and Satellite Technologies**: As part of the broader development of the defence industry, significant investments have been made in space and satellite technologies. The development of TÜRKSAT satellites, the Göktürk reconnaissance satellites, and the production of domestically manufactured satellites have all strengthened Türkiye's independence in space. These projects, by aiming to meet Türkiye's military and civilian satellite needs, have become vital parts of defence industry strategies.

The launch of Türkiye's first domestic and national communication satellite, Türksat 6A into space – 2024.

[48] Defence Industry Economic Data. *Türkiye İstatistik Kurumu (TÜİK).* https://www.tuik.gov.tr (Accessed: 02.01.2025).

Thanks to these structural changes and strategic investments post-2000, Türkiye has made significant strides in the defence industry, and with an eye on domestic production, technological development and independent defence capabilities, it has become an important regional power. These developments have both met Türkiye's security needs and enhanced its competitiveness in the global defence market.

Domestic Technologies and Global Impact of Strategic Transformation

Türkiye has undergone a historic and profound transformation in the defence industry post-2014. President Recep Tayyip Erdoğan's leadership has driven strategic initiatives focused on national technology and independence, resulting in permanent and sustainable growth across every sector of the defence industry. During this process, referred to as "advanced technologies" and "harvest time", the number of Turkish defence industry projects and companies has significantly increased, and institutional structures have been strengthened.[49] As of the end of 2024, the total turnover of the defence and aerospace sector, which includes all defence and aerospace sales of defence firms and reflects the size of the industry, has reached 20 billion dollars. While only 62 defence projects were being carried out in 2002, the number of projects increased 17-fold by 2024, exceeding 1,380.[50]

President Erdoğan attended TEKNOFEST BLACK SEA held in Samsun on September 3, 2022, and signed the Bayraktar Kızılelma.

[49] Recep Tayyip Erdoğan. X Hesabı. https://twitter.com/rterdogan/sta- tus/1615740926005071874. (Erişim Tarihi: 27.01.2023).

[50] Savunma Sanayiimiz/ Mevcut Durum. *Savunma Sanayii Başkanlığı*. https://www.ssb.gov.tr/WebSite/contentlist.aspx?PageID=48&LangID=1. (Erişim Tarihi: 08.07.2025).

The restructuring of the Undersecretariat for Defence Industries as the Secretariat of Defence Industries (SSB) in 2018 significantly contributed to the historic growth of the Turkish defence industry in every area—from the number of companies and scale of projects to budget size and export revenues[51]. Prior to 2006, the Turkish defence industry was largely dependent on foreign sources; however, in the 2000s, a shift toward prioritising domestic production was adopted. Over the past 20 years, the rate of foreign dependency has been reduced from around 80% to 20%, and a strong defence industry has been established through domestic solutions. [52]

As part of the National Combat Aircraft KAAN Project, initiated by the Secretariat of Defence Industries and developed by TAI, a sales agreement was signed with Indonesia for 48 units.

Support for subcontractors and R&D investments has played a big role in the success of the Turkish defence industry. With the support of the Secretariat of Defence Industries, the subcontractors kept pace with global technological developments and brought dynamism to the sector. The Turkish Armed Forces' demands, aligned with high-quality standards, have boosted R&D investments and accelerated the Turkish defence industry's progress toward becoming a global player.

Companies such as TAI, ASELSAN, and Baykar have made significant strides in unmanned aerial vehicle (UAV) technologies, boosting the international recognition of the Turkish defence industry. TAI, which is internationally recognised and highly regarded, stands out with its deep-rooted projects that strengthen Türkiye's national capacity in

[51] 2022 Defence Industry Exports Announced. SavunmaSanayiİST. 02.01.2023, https://www.savunmasanayist.com/2022-yili-savunma-sa- nayii-ihracati-belli-oldu. (Accessed: 27.01.2023).

[52] Ibid.

the defence and aerospace sectors. As a key player in important UAV projects, TAI's ANKA unmanned aerial vehicles have not only met Turkish Armed Forces' needs in terms of intelligence and reconnaissance utilising national capabilities, but also have extended its area of impact with its electronic warfare capabilities. The ANKA, which made its first flight on December 30, 2010, entered serial production in October 2013 following the signing of a production contract for 10 aircraft (ANKA-S). ANKA fleets, with a high mission readiness rate, have been integrated into the inventories of various end-users and have surpassed a total flight time of 400,000 hours.[53]

Another important project, the HÜRKUŞ training aircraft, combines the pilot training and light attack missions on a single platform; it has successfully completed the international certification process and has become ready for export. The HÜRKUŞ is a tandem-seat, low-wing, single-engine turboprop training aircraft designed as a next-generation advanced trainer and light attack aircraft. It is intended to be used across all training phases between basic training and fighter conversion, as well as to perform close air support missions in challenging operations, delivering superior performance. Currently, the production of 15 aircraft has been completed.[54] The T129 attack helicopter stands out for its high manoeuvrability, advanced targeting systems, and integration of domestic munitions. The ATAK helicopter's performance is optimised for challenging "hot weather–high altitude" missions. With its high manoeuvrability and performance capabilities suitable for both day and night conditions, it effectively carries out its duties in operations conducted by the Turkish Armed Forces. ATAK is employed in cross-border operations and has also been exported to countries such as the Philippines and Pakistan.

The T129 ATAK attack helicopter and the T-625 Gökbey helicopter, both featured at TEKNOFEST, performed a demonstration flight.

[53] Medium Altitude Long Endurance (MALE) UAV System – ANKA. *TUSAŞ*. https://www.tusas.com/urunler/iha/ operatif-stratejik-iha-sistemleri/anka. (Accessed: 01.07.2025).

[54] New Generation Basic Training Aircraft HÜRKUŞ *TUSAŞ*. https://www.tusas.com/urunler/ucak/ozgun-gelistirme/ hurkus. (Accessed: 01.07.2025).

Another ambitious project by TAI, the fifth-generation fighter jet KAAN successfully completed its first prototype flight in 2024. KAAN, with its low radar visibility, supersonic speed and artificial intelligence-supported avionic systems, symbolises independence and technological excellence in Türkiye's defence aviation. With capabilities to be gained in technology such as low visibility, internal weapons bays, high manoeuvrability, enhanced situational awareness, and sensor fusion, all essential features of a new generation aircraft, KAAN has positioned Türkiye among a select group of countries, including the USA, Russia, and China, that possess the infrastructure and technology to develop a fifth-generation combat aircraft[55].

Ranked among the "World's Top 20 Aviation Companies" by FlightGlobal in 2024, TAI became Türkiye's 11th largest industrial enterprise by achieving 98 billion lira in net sales in the same year.[56] Technology transfer and joint production agreements signed with countries in the Gulf, Asia and Africa enhance Türkiye's influence in the global aviation market. TAI, as one of Türkiye's leading organisations in R&D investments, continuously develops its technology and production infrastructure. In addition, TAI has executed product and service exports to 15 countries under 21 different contracts. Within this scope, 5 HÜRKUŞ primary trainer aircraft, 12 ATAK attack helicopters, and 75 ANKA and AKSUNGUR MALE-class UAVs have been delivered to friendly and allied countries.[57]

With its development of unmanned aerial vehicles (UAVs) and unmanned combat aerial vehicles (UCAVs), Baykar has become one of the pioneering institutions of Türkiye's defence industry initiative. The Bayraktar TB2 Tactical Unmanned Combat Aerial Vehicle, which made its maiden flight in 2014, has become the most preferred light-class UCAV worldwide, with an endurance exceeding 27 hours, a payload capacity of 150 kilogrammes, and a control range of 150 kilometers. The Bayraktar TB2, a Medium Altitude Long Endurance (MALE) UAV designed for reconnaissance and intelligence missions, which has surpassed one million hours of operational flight, has been actively serving within the Turkish Armed Forces, Gendarmerie, and Turkish National Police since 2014. Currently, hundreds of Bayraktar TB2 UAV/UCAV platforms are in service in the inventories of all recipient countries, primarily Qatar, Ukraine, and Azerbaijan. Bayraktar TB2 holds the record in the Turkish aviation history for endurance (with 27 hours 3 minutes) and for altitude (with 25.030 feet). Bayraktar TB2 is also the first-ever aircraft in its category to be exported abroad.[58]

Following the TB2, Baykar has also become a pioneer in heavy-class attack UAV technology with the development of the Bayraktar AKINCI. With its satellite-enabled long-range operational capability and a payload capacity of 1,350 kilogrammes, AKINCI can carry strategic munitions such as the SOM cruise missile, thereby enhancing Türkiye's

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55 KAAN. *TUSAŞ*. https://www.tusas.com/urunler/ucak/ozgun-gelistirme/kaan. (Accessed: 13.06.2025).

56 TAI has become Türkiye's 11th largest industrial enterprise. *Anadolu Ajansı*. https://www.aa.com.tr/tr/savunma- sanayisi/tusas-turkiye-nin-11-buyuk-sanayi-kurulusu-oldu/3580880. (Accessed: 15.06.2025).

57 Export of products and services to 15 countries by TAİ. *Anadolu Ajansı*. https://www.aa.com.tr/tr/savunma- sanayisi/tusastan-15-ulkeye-urun-ve-hizmet-ihracati/3549313. (Accessed: 12.05.2025).

58 Bayraktar TB2. *BaykarTech. https://baykartech.com/tr/uav/bayraktar-tb2/*. (Accessed: 01.07.2025).

strategic deep strike capabilities through unmanned systems. AKINCI, which also aims to be a leader in its class like the Bayraktar TB2, is planned to conduct some of the operations performed by fighter jets.[59] With AKINCI, which will reduce the burden on manned combat aircraft, airstrikes can also be conducted.

The jet-powered Bayraktar KIZILELMA Fighter UAV, which made its maiden flight in 2022, has become a symbol of Türkiye's leadership in the field of fifth-generation unmanned combat aircraft, with its high manoeuvrability, low radar cross-section, and a payload capacity of approximately 1.5 tonnes. The Bayraktar KIZILELMA Fighter UAV system, whose development as a national and indigenous platform by Baykar is ongoing, is intended to shape the future combat concept. Bayraktar KIZILELMA will be able to take off and land on short-runway aircraft carriers, and carry out missions with internally-carried munitions.[60]

As of 2024, Baykar exports to more than 30 countries, with 83% of the company's total revenues coming from exports; the 2024 export figures stand at 1.8 billion USD. Baykar's entry into the top 150 of the 'Largest Global defence Companies' list, published by the US-based Defence News, is a tangible indicator of its global competitiveness. Furthermore, being selected by TIME magazine in 2022 as one of the most influential innovation companies demonstrates Baykar's global prestige in defence technologies.

In addition, Baykar, which has been the uninterrupted export leader in the defence and aerospace sector for the past four years, succeeded in 2024 in becoming one of Türkiye's top 10 companies with the highest merchandise exports. At the "Export Champions Award Ceremony" hosted by the Turkish Exporters Assembly (TIM) at the İstanbul Haliç Congress Centre, Baykar was awarded as one of Türkiye's top ten merchandise exporters. At the ceremony, President Recep Tayyip Erdoğan personally presented the award, which was accepted on Baykar's behalf by Baykar Chairman of the Board Selçuk Bayraktar[61].

Bayraktar KIZILELMA.

[59] Bayraktar AKINCI. *BaykarTech*. https://baykartech.com/tr/uav/bayraktar-akinci/. (Accessed: 08.07.2025).

[60] Bayraktar KIZILELMA. BaykarTech. https://baykartech.com/tr/uav/bayraktar-kizilelma/ . (Erişim Tarihi: 05.05.2025).

[61] Baykar İhracatın Zirvesine Demir Attı. BaykarTech. https://baykartech.com/tr/haberler/baykar-ihracatin-zirvesine-demir-atti/. (Erişim Tarihi: 08.07.2025).

The documents of the cooperation agreement between Baykar and Leonardo were mutually exchanged in the presence of President Recep Tayyip Erdoğan and Prime Minister Giorgia Meloni of Italy during the ceremony at the 4th Türkiye–Italy Intergovernmental Summit.

On April 29, 2025, Baykar, which is steadily strengthening its presence in the global UCAV market through agreements with international companies, signed a cooperation agreement with Leonardo, one of the world's largest defence companies. At the Türkiye-Italy 4th Intergovernmental Summit, during a ceremony attended by President Recep Tayyip Erdoğan and Prime Minister Giorgia Meloni of Italy, the agreement documents between the two companies were mutually exchanged by Baykar Chairman of the Board Selçuk Bayraktar and Leonardo CEO and General Manager Roberto Cingolani. Under the agreement, the two companies will jointly produce UAVs in Italy. Through this cooperation, Baykar's advanced capabilities in UAV and artificial intelligence technologies are intended to be combined with Leonardo's expertise in mission systems, payloads, and certification. The two companies also plan to extend their cooperation to the field of space studies.

In June 2024, Baykar took another historic step in the Turkish defence industry by acquiring Piaggio Aerospace, Italy's 140-year-old established aerospace company. With this strategic acquisition, Piaggio's advanced production facilities in northern Italy will be transformed into a European production and integration hub for both P.180 Avanti EVO jets and national UAV systems developed by Baykar. This development, which demonstrates that Türkiye has become not only a technology developer but also an actor shaping international production chains in the defence industry, concretises Baykar's vision regarding global technology investments and Türkiye's strategic outreach. [62]This acquisition demonstrates that the Turkish defence industry has entered a new phase, not only exporting but also integrating foreign technology and infrastructure into the national ecosystem.

[62] Baykar İtalyan Havacılık Devi Piaggio'yu Resmen Bünyesine Kattı. *BaykarTech*. https://baykartech.com/tr/haberler/baykar-italyan-havacilik-devi-piaggioyu-resmen-bunyesine-katti/ (Accessed: 01.07.2025).

ASELSAN develops world-class products in defence electronics, radar systems, command and control, and communication technologies. In 2024, ASELSAN's revenue increased by 13% compared to the previous year, reaching 120 billion TL, while its net profit margin rose from 10% to 13%. ASELSAN achieved exports worth 508 million USD, marking a 67% increase compared to the previous year. [63]The newly signed export contracts amounted to one billion USD, reflecting a 70% increase. ROKETSAN produces high-precision munitions in missile and rocket technologies that alter regional balances. Missiles such as CİRİT, UMTAS, and KARAOK have proven their effectiveness in the field, enhancing Türkiye's deterrence capability.

ASELSAN showcased its advanced maritime systems at the Euronaval exhibition held in Paris.

TAI, ASELSAN, and Baykar's presence on prestigious global aviation and electronic defence lists and the innovation and technology awards received internationally demonstrate that Türkiye has achieved global competitiveness in the field of defence technologies. Türkiye's defence industry has not only increased its production capacity in the period after 2014, but has also become a story of sustainable success in line with the goals of developing national technology, strategic autonomy, and global market leadership.

63 ASELSAN 50. Yılını Rekorlarla Karşıladı. *ASELSAN*. https://www.aselsan.com/tr/haberler/detay/253/aselsan-50-yilini-rekorlarla-karsiladi. (Accessed: 18.05.2025).

The defence industry ecosystem, comprised of Baykar, TAI, ASELSAN, ROKETSAN, and many subcontractor firms, fortifies Türkiye's national security and contributes to strengthening regional stability. At the same time, this ecosystem creates unique, effective, and sustainable solutions for the defence needs of friendly and allied peoples. The military operations conducted in areas such as Iraq, Syria, Karabakh, and Libya constituted a critical threshold in the development of the Turkish defence industry; enabling domestic defence technologies to be tested on the field and achieve the status of *"combat proven."* This process enhanced the competitive power of domestic systems in the international market, while laying the groundwork for a structural advancement that expands both the technological depth and market access of Türkiye's defence exports. At the core of this success lies the state's strong will, strategic R&D investments, and the nation's determination of independence in the field of defence.


KIZILELMA

II

Transformation in the Defence Industry: The Role of the National Technology Initiative

TRANSFORMATION IN THE DEFENCE INDUSTRY: **THE ROLE OF THE NATIONAL TECHNOLOGY INITIATIVE**

As President Recep Tayyip Erdoğan stated, "*In today's world, the fundamental condition for independence is to become a country that designs, develops, produces, and exports technology.*"[64] Producing, developing, and exporting advanced technology is one of the most important factors that strengthen the national security of countries and reinforce their independence. Being a country that produces and exports advanced technology also helps countries strengthen their economic independence and gain a strong position in the international arena.

Advanced technology, which strengthens the national security of countries and reinforces their independence is the driving force of competition in the international arena today. States with the ability to produce and export innovative and original technologies are leading the competition for power in the international arena. With this awareness, Türkiye aims to strengthen its national security, economic and technological independence, and increase its global competitiveness by making innovative and original technological advances in all sectors. In this regard, with the aim of strengthening Türkiye's independence in every aspect and increasing its global competitiveness, the National Technology Initiative (MTH) was launched under the leadership of President Recep Tayyip Erdoğan in the 100th year of the Republic[65]. MTH is a development initiative that encourages the production of domestic and national technology by reducing dependency on foreign technology. This move aims to eliminate Türkiye's dependence on foreign countries by developing its own technologies in all sectors such as defence, industry, energy, and space, and to become a competitive player in the global technology market by exporting the technologies it produces. In this context, MTH is "*The name of a vision that will ensure the economic and technological independence of our country; it defines our effort to elevate our capabilities to design, develop, and produce critical technologies and products with national means to the highest level.*"[66]

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64 Türkiye'nin İlk Havacılık, Uzay ve Teknoloji Festivali Sona Erdi. *TÜBİTAK*. https://tubitak.gov.tr/tr/haber/turkiyenin-ilk-havacilik-uzay-ve-teknoloji-festivali-sona-erdi. (Accessed: 06.12.2024).

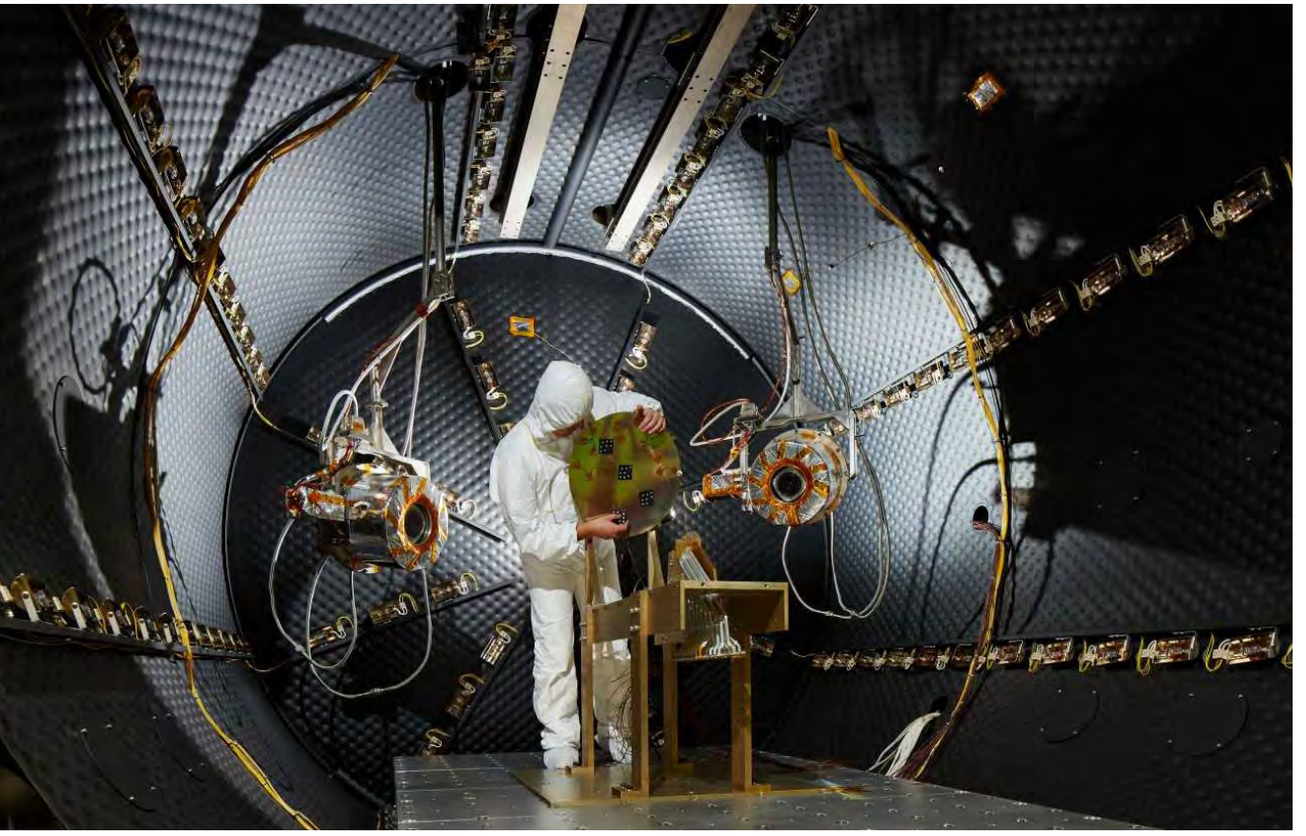
65 Millî Teknoloji Hamlesi. *Türkiye Bilimleri Akademisi*. https://tuba.gov.tr/files/yayinlar/bilim-ve-dusun/TUBA-978-625-8352-16-0.pdf. p.1. (Access: 06.12.2024).

66 Ibid., p. 6.


GÖKBEY


TEKNOFEST

2.1. National Technology Initiative



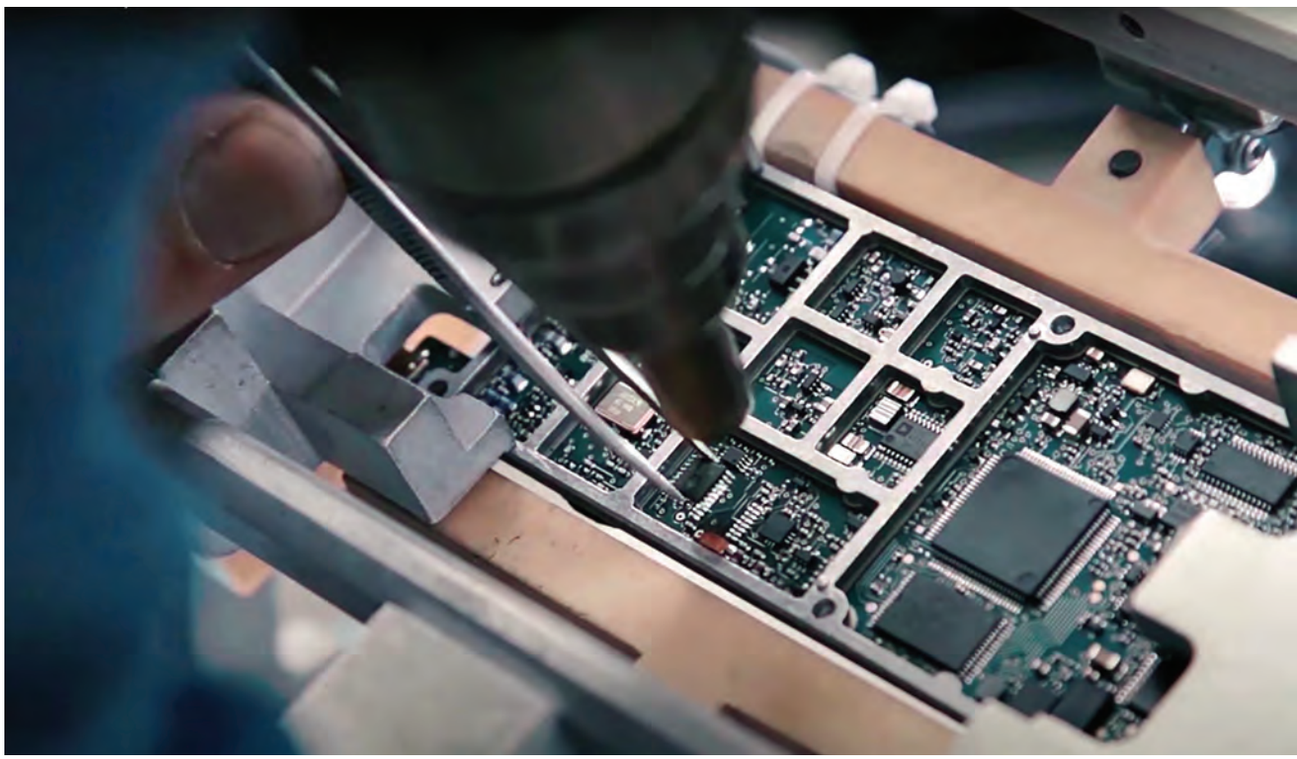
ASELSAN has accelerated its efforts regardig satellite technologies in line with Türkiye's recent satellite/space roadmap.

The National Technology Initiative is a comprehensive strategy aimed at eliminating Türkiye's dependence on foreign sources in the field of advanced technology, developing domestic and national products, accelerating economic development, and becoming a stronger player in the global market. With this move, Türkiye is building a comprehensive, long-term, and competitive technology strategy; adopting a proactive approach that incorporates domestic, national, innovative, and original technological advancements. This move, which encourages Türkiye's domestic and national technology production, aims to ensure independence in strategic sectors such as defence, industry, and energy by concentrating the process of producing and developing technology within the country. Strengthening Türkiye's independence in terms of both national security and economy, this move is a very important initiative that shapes the future.

The MTH is an extension of a strong tradition that guides Türkiye's technological advancement through the bold and determined initiatives of many scientists, from Nuri Demirağ to Nuri Killigil, and from Vecihi Hürkuş to Şakir Zümre. This initiative allows the revival of this tradition, which was previously thwarted by bureaucratic obstacles and deterrent factors such as intimidation policies; and ensures the determined and strong implementation of technological advancements and policies across all sectors and fields, from defence to industry, energy to space, and health to food. The technolo-

gy move aims to transform Türkiye, which has been dependent on foreign technology for many years due to bureaucratic obstacles, intimidation policies, and external deterrent factors, into a country that closely follows, adopts, implements, and even leads the revolutions, advancements, and developments in the field of technology.

The MTH prioritises the establishment of necessary infrastructure and ecosystems, as well as the training of qualified human resources, with the aim of producing, developing, and exporting domestic, national, original, and innovative technological products in all the aforementioned fields. In this regard, it is aimed to support university students' research projects in the field of technology throughout Türkiye, increase R&D



Firms involved in the defence, aviation, and space industries came together at SAHA Istanbul within the scope of MTH.

activities, establish national technology workshops where students can carry out their projects, and support technical and vocational training processes in these workshops. Additionally, priority is given to strengthening the collaboration between the defence industry, universities, and technology companies[67]. In accordance with this vision, incentives and support are provided for public institutions and organisations, universities, and local defence and technology companies to work in harmony and as a team in cooperation at all stages, including the development of domestic and national technological products, export of these products to the world, and the spread of an innovation culture.

[67] 2023 Sanayi ve Teknoloji Stratejisi. *T.C. Sanayi ve Teknoloji Başkanlığı*. https://www.sanayi.gov.tr/assets/pdf/SanayiStratejiBelgesi2023.pdf. pp. 17-23. (Access: 07.12.2024).

2.1.1. Three Fundamental Elements of the National Technology Initiative: Domestic, National, and Original

The National Technology Initiative, launched to support and strengthen Türkiye's technological advancement, presents a vision that includes strategic policies and initiatives aimed at ensuring the country's technological transformation, encouraging entrepreneurship and innovation, and developing domestic and national technologies. The "2023 Industry and Technology Strategy" published by the Republic of Türkiye Ministry of Industry and Technology on September 18, 2019, is the official document of the National Technology Initiative. The 2023 Industry and Technology Strategy provides an overview of the National Technology Initiative, including its purpose, components, long-term goals, and policies.[68][69]

Asil Çelik, Türkiye's largest steel producer, and ASELSANNET, a subsidiary of ASELSAN, are among the members of SAHA Istanbul, Türkiye's largest industrial cluster.

As stated in the aforementioned strategy, the essence of the national technology strategy, also known as MTH, consists of three concepts: "domestic, national, and original".[70] Türkiye's national technology strategy is based on three principles: domestic, national, and original. This strategy aims to develop, produce, and export innovative high-tech products to international markets by utilising domestic and national resources. Türkiye aspires to be a leading country in high-tech production by increasing its export share in the global technology market with domestic, national, and original high-tech products, as well as strengthening its national security with products tailored to national security needs and consolidating its national independence.

The term "domestic" refers to what is geographically part of Türkiye. Even if it is founded with foreign capital, the production of a factory located within the country is domestic; a product that obtains the majority of its production inputs from the country's

68 Ibid.

69 Ibid., pp. 15-25.

70 Ibid., p. 18.

resources is considered domestic. Domestic production contributes to an increase in exports, a decrease in imports, and an increase in domestic market demand.[71]

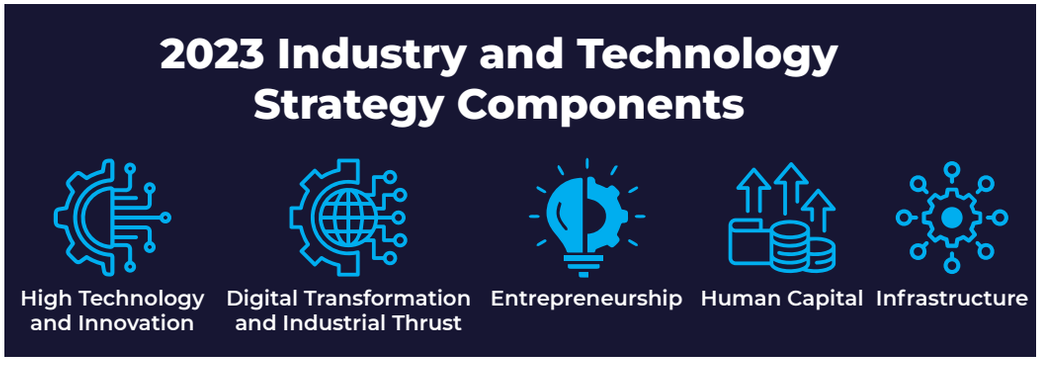
The term *"national"* refers to what is characteristic of the Turkish people. Every production in which Türkiye owns intellectual and industrial property rights, decision-making mechanisms, management, and capital and is carried out in accordance with national interests is considered national production.[72] Being national is regarded as a priority approach in strategic sectors such as defence, industry, energy, and space; the development of national technology products, particularly in these sectors, but also in many other areas ranging from health to food, is considered strategically important.

Originality refers to presenting a product or service that is not influenced by similar or equivalent ones.[73] Originality promotes productivity, diversity, and innovation in products and services; it ensures the development of unique products and services tailored to the country's specific strategic needs in critical areas such as defence, industry, and energy.

The National Technology Initiative, which includes domestic, national, and original technology production and projects, particularly in the defence, industry, and energy sectors, is a strategic approach that accelerates Türkiye's economic development, positions it as a strong player in the global technology market, strengthens national security, and consolidates its independence.

2.1.2. Components of the National Technology Initiative

According to the 2023 Industry and Technology Strategy, Türkiye's National Technology Initiative is divided into five major components: "High Technology and Innovation", "Digital Transformation and Industrial Thrust," "Entrepreneurship," "Human Capital," and "Infrastructure."[74]



The first of these components, High Technology and Innovation, includes the following phases:

71 Ibid., p. 30.

72 Ibid., p. 31.

73 Ibid., p. 32.

74 Ibid., p. 32.

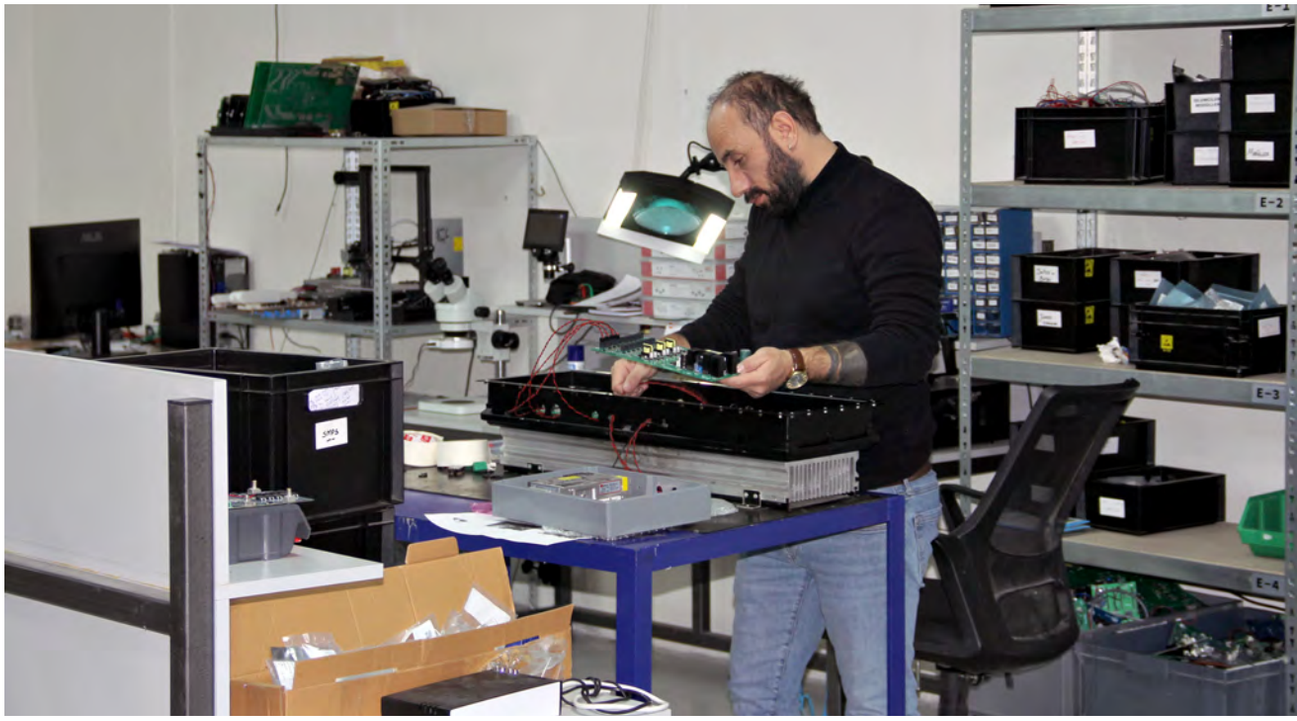
- Development of strategic roadmaps taking into account ecosystem dynamics to enhance the technological capabilities of all sectors,
- Development of critical materials in sectors of strategic importance and making medium- and long-term resource planning accordingly,
- Transformation of R&D activities into a result-oriented and high-tech-based structure through stakeholder collaboration,
- The establishment of technical committees through collaboration of universities and industrial organisations to determine technology and production standards, as well as participation in international standard development processes,
- The establishment of regional and sectoral-based test centres for product standardisation and certification required by industries,
- The implementation of legal regulations regarding intellectual property rights in order to encourage value-added production,
- Taking necessary measures to ensure that the intellectual and industrial rights of strategic initiatives supported by public funds remain in Türkiye.[75]

As part of the Digital Transformation and Industrial Thrust, it has been planned to establish digital transformation centres at organised industrial zones (OIZs), industrial zones,

The raw material produced using advanced technology improves the durability of armoured vehicles.

[75] Ibid., pp. 34-43.

and technology development zones to accelerate the digital transformation of the manufacturing industry in Türkiye. The goal is to improve corporate governance skills and establish support mechanisms for industrialists operating or investing in global markets. Additionally, as part of the technology-focused industrial thrust, R&D and investment incentives have been provided for the domestic production of medium-high and high technology products; added value and export-oriented high technology products have been prioritised with new incentive models. Clustering in sub-sectors, branding, and diversification of financial resources to support regional development are also among the priority steps.[76]



In a factory built with the assistance of TÜBİTAK's Entrepreneurship Support Programme, a company in Kayseri is manufacturing domestic batteries for the defence industry and other sectors.

As part of the entrepreneurship component, an entrepreneurship ecosystem platform will be established to encompass all processes from idea emergence to idea maturity, with the goal of activating the entrepreneurship ecosystem and increasing the number of entrepreneurs. This platform combines initiative information, investor introductions, support summaries, educational content, and sector developments. Furthermore, it aims to develop bilateral support programmes to strengthen the capacities of technology suppliers and entrepreneurs, as well as introduce new products and services to industrialists.[77]

In terms of human capital, it is planned to disseminate data analytics and data literacy training primarily to the public sector in order to develop human capital, as well as to

[76] Ibid., pp. 45-58.

[77] Ibid., pp. 63-67.

assist continuous education centres, universities, and similar institutions in developing hybrid (digital and face-to-face) education models. To train a qualified workforce in the field of digital transformation and high technology, young people aged 9 to 17 are given basic technology education in technology workshops set up in 81 provinces, and they are encouraged to develop projects. Furthermore, as part of the open source platform initiative launched in collaboration with domestic and foreign technology companies, it is planned to establish a software developer ecosystem that brings together the public and private sectors, non-governmental organisations (NGOs), and universities.[78]

DENEYAP Technology Workshops are expanding across Türkiye.

Finally, within the scope of the infrastructure component, cooperation with relevant institutions is planned to complete gigabit-per-second data communication infrastructure in industrial and technology development zones, universities, research centres, and residential areas. The aim is to create a public data pool from data collected by the public with the Presidency's Digital Transformation Office and make it accessible to the public. To enhance data communication and storage performance, support is provided to academics, entrepreneurs, and technology providers for the development of cloud computing, fog computing, and edge computing technologies. In the field of cybersecu-

[78] Ibid., pp. 70-73.

rity, it is planned to develop open-source and domestic solutions against potential risks in national projects and to organise training sessions in the public and private sectors to raise awareness. [79] Furthermore, it is aimed to establish transmission investments and support mechanisms that will facilitate access to energy to ensure energy security in Organised Industrial Zones (OIZs) where priority sectors are concentrated for the development of the national blockchain infrastructure.

Critical testing infrastructures in technology are being localised.

The National Technology Initiative aims at the production, development, and export of domestic, national, original, and innovative high technologies. Within this scope, it is envisaged that public institutions, the private sector, NGOs, and universities work in cooperation. In order to develop high-technology products, it is aimed to increase the share of R&D in national income by prioritising R&D activities through cooperation with universities, schools, and research centres. Cooperation between educational institutions and technology workshops is encouraged to enable young people to receive technology education and implement their projects. In addition, it is aimed to develop a qualified human resource to produce high-technology products and services, support domestic and national enterprises, and provide financial resources to these enterprises.

It is planned to complete the digital transformation of all sectors, including defence, industry, energy, transportation, health, and food, and enhance the quality of products and services through technologies such as artificial intelligence, autonomous systems, cloud computing, and big data. Within this scope, with all these components, the National Technology Initiative is transforming Türkiye into a country that has achieved digital transformation in the technology field, possesses high technological competence, gener-

[79] ibid., pp. 77-81.

ates added value, enhances product quality and efficiency, while increasing its global competitiveness and strengthening its independence.

2.1.3. Priorities of the National Technology Initiative

In order to ensure the effectiveness and sustainability of the National Technology Initiative, there are six fundamental priorities considered throughout all its processes, from the planning stage to implementation. [80]These priorities are, respectively: an inclusive, holistic, and stakeholder-oriented approach; data-driven, impact-focused, and accountable objectives; policies that closely monitor global developments and guide pioneering initiatives; agile, change-oriented, and innovation-adaptive policies; policies that prioritise the development of human capital; and independence and global competitiveness.

Within this scope, by adopting an inclusive, holistic, and stakeholder-oriented approach in industrial, technology, and economic policies, it is aimed to strengthen cooperation among industrialists, entrepreneurs, R&D specialists, and public institutions. In line with data-driven, impact-focused, and accountable objectives, a knowledge-based management approach will be promoted, and by analysing the effects of activities, an oversight mechanism will be established that stakeholders can monitor. Taking global and regional developments into account, Türkiye's industrial and technology policies will be shaped with a holistic approach, and strategies will be developed to establish Türkiye as a leading country. With dynamic and change-oriented policies, mechanisms that can adapt to innovations will be prioritised during implementation processes, while regular review and updating of these policies will be ensured. [81]In order to develop human capital, project-based early-age education and technology competitions will be expanded; by increasing productivity in advanced technology fields, Türkiye's political and economic independence will be reinforced, ensuring a strong position in global competition.

[80] Ibid., p. 24.

[81] Ibid.

2.2. Fundamental Implementation Area of the National Technology Initiative: Defence Industry

Türkiye has experienced a profound transformation in the defence industry in recent years and has accomplished notable achievements and gains. The National Technology Initiative has been a major driving force in strengthening Türkiye's defence industry and securing notable gains. One of the core objectives of the National Technology Initiative is for Türkiye to develop its own systems and technologies, enabling it to produce and advance all critical products and systems necessary for national security without external dependency. [82]In this context, the Turkish defence industry serves as the primary implementation area where the most significant initiatives and projects are carried out within the scope of the National Technology Initiative. [83]Indeed, in 2002, the domestic production rate in the Turkish defence industry was only 20%, whereas today it has exceeded 80% thanks to the National Technology Initiative's efforts based on domestic and national production. With this level of domestic production, the defence industry's capacity to produce high-technology defence systems and equipment has increased, while Türkiye's import items have been reduced, thereby decreasing economic dependence on foreign sources.

TCG IŞIN, produced under the Rescue and Towing Ships Project.

Within the scope of the National Technology Initiative, advancements in the defence industry have enhanced Türkiye's defence capabilities while enabling companies in the sector to take part in projects in line with their competencies. [84] Moreover, a culture of cooperation has flourished in the defence industry, giving rise to institutions and com-

[82] Millî Teknoloji Hamlesi. Türkiye Teknoloji Takımı. https://www.t3vakfi.org/tr/hakkimizda/mth/. (Accessed: 04.01.2025).

[83] Cumhurbaşkanı Yardımcısı Cevdet Yılmaz: Savunma Sanayisinde Yerlilik Oranı Yüzde 80'leri Aştı. (2024). *DHA*. https://www.dha.com.tr/politika/cevdet-yilmaz-savunma-sanayisinde-yerlilik-orani-yuzde-80leri-asti-2507058 (Accessed: 05.01.2025).

[84] *Defence Industry Sectoral Strategy Document – 2024/2028. T.C. Cumhurbaşkanlığı Savunma Sanayii Başkanlığı. https://www.ssb.gov.tr/Images/Uploads/MyContents/F_20240917164305314800.pdf. p. 19. (Accessed: 05.01.2025).*

panies of various scales that develop proactive solutions. Through these collaborations supported within the framework of the National Technology Initiative, Türkiye is developing its own defence systems and technologies, increasing its production capacity, and producing many strategic defence industry items with domestic and national resources. [85]Türkiye is producing various defence industry systems and inventories using domestic and national resources, ranging from state-of-the-art UAVs to UCAVs, laser weapons to satellite and satellite launch projects, tanks to cruise missiles, electronic warfare and radar systems to the design of combat aircraft. All these products are in high demand worldwide and are exported to many countries across the globe.[86]

T129 Atak Helicopter.

The National Technology Initiative is a strategy focused on enabling Türkiye to develop domestic and national technologies without external dependency. This strategy not only focuses on the advancement of existing technologies but also encompasses strengthening the defence industry through innovative and original solutions. In this regard, major R&D projects are underway in the defence industry, with substantial investments directed toward developing advanced domestic products. At the same time, through technology transfer—meaning the transfer of technological knowledge, patents, skills, techniques, products, or services from one organisation to another—ad-

[85] Cumhuriyetin 100. Yılında T.C. Cumhurbaşkanlığı Savunma Sanayii Başkanlığı. Savunma Sanayii Başkanlığı Yayınları (Unpublished Work). p. 85. "Savunma ve Havacılık Sanayii İhracatında Rekor". (2025).

[86] TSKGV. https://tskgv.org.tr/savunmasanayii- gundem/savunma-ve-havacilik-sanayii-ihracatinda-rekor#. (Accessed: 06.01.2025)https://tskgv.org.tr/savunmasanayii-gundem/savunma-ve-havacilik-sanayii-ihracatinda-rekor%23

vanced technologies are being localised and incorporated into defence industry production processes[87]. Investments in designing and producing high-tech domestic and national products, along with R&D projects and technology transfer, have driven a major transformation in Türkiye's defence industry, leading companies such as ASELSAN, HAVELSAN, ROKETSAN, and TAI to concentrate on developing advanced domestic and national products. Indeed, this transformation within the framework of MTH has allowed Türkiye to design and develop its fighter aircraft, such as the KAAN project, realised with national resources rather than external dependence[88].

T625 Gökbey Helicopter.

In recent years, under the scope of MTH, the Turkish defence industry has advanced its high-tech production capacity by deepening cooperation with universities and technocities. Numerous universities in Türkiye are partnering with the defence industry to carry out R&D projects and develop innovative technologies. For instance, a collaboration between ASELSAN and Bilkent University enabled the domestic production of gallium nitride transistors used in radar and electronic warfare[89]. The Air-Deployed Guided Smart Bottom Mine (UÇA) project, developed entirely with domestic and national resources by Mechanical and Chemical Industry Corporation, Koç Defence, and TÜBİTAK SAGE, stands as a candidate to become the first long-range smart bottom mine in global literature[90]. In another case, under a project approved by TAI, students from the Polymer Materials Engineering Department of Bursa Technical University

87 Teknoloji Transferi ve ASELSAN. *Savunma Sanayii Dergilik*. https://savunmasanayiidergilik.com/tr/HaberDergilik/Teknoloji-transferi-ve-ASELSAN. (Accessed: 07.01.2025).

88 KAAN. TUSAŞ. https://www.tusas.com/urunler/ucak/ozgun-gelistirme/kaan. (Accessed: 08.01.2025).

89 ASELSAN Succeeded in Producing the Gallium Nitride Transistor of the AESA Radar. Savunmasanayi.org. https:// www.savunmasanayi.org/aselsan-aesa-radarin-galyum-nitrat-transistorunu-de-uretmeyi-basardi/. (Accessed: 08.01.2025).

90 Türkiye's New Weapon "UÇA" Will Tie the Enemy's Hands. *Anadolu Ajansı*. https://www.aa.com. tr/tr/ekonomi/turkiyenin-yeni-silahi-uca-dusmanin-elini-kolunu-baglayacak/2952695. (Accessed: 14.01.2025).

developed a project aimed at enhancing the composite performance of TAI aircraft[91]. These examples highlight the significance and diversity of tangible collaborations between the Turkish defence industry and universities and technocities. Collaborations with universities support the development of new technologies in the defence industry, the localisation of technologies, the acceleration of R&D efforts, and the creation of innovative solutions.

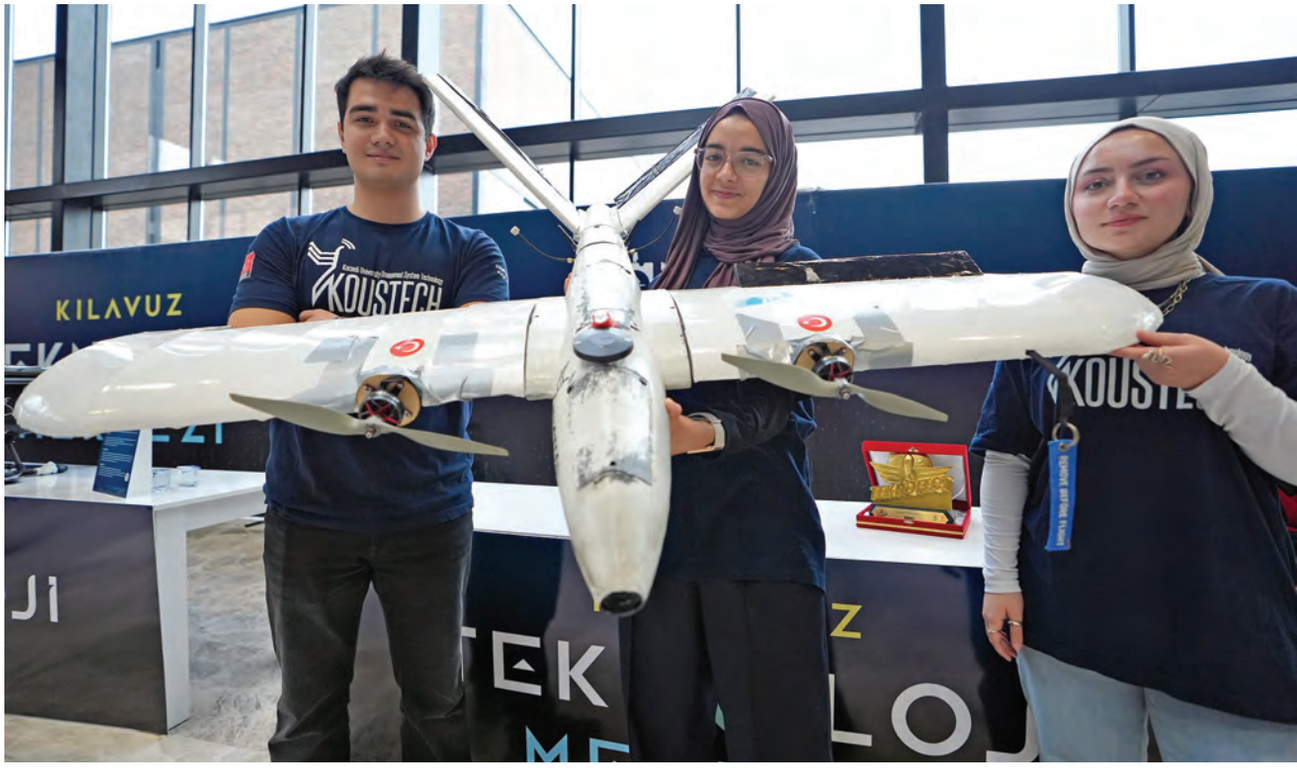
President Erdoğan attends TEKNOFEST BLACK SEA 2022.

The Technology and Innovation Fair (TEKNOFEST), designed to boost interest in innovative technologies and the National Technology Initiative across society, allows young people to create innovative projects for the defence industry[92]. Each year, through partnerships with numerous defence industry organisations, Türkiye's largest aviation, space, and technology festival, TEKNOFEST, offers young people a platform to present their innovative defence industry projects and fosters strong collaboration among

[91] A Project to Improve the Composite Performance of TAI Aircraft Developed at Bursa Technical University. *Anadolu Ajansı*. https://www.aa.com.tr/tr/bilim-teknoloji/bursa-teknik-universitesinde-tusas-ucaklarinin-kompozit-performansini-iyilestirecek-proje-gelistirildi/3442931. (Accessed: 08.01.2025).

[92] Frequently Asked Questions. *TEKNOFEST*. https://teknofest.org/tr/corporate/faq/. (Accessed: 09.01.2025).

universities, technology companies, and public institutions. Within the scope of TEKNOFEST, technology competitions are organised in various disciplines and categories[93]. These competitions motivate students to engage in research projects and contribute to technology development. Additionally, these activities create opportunities for key Turkish defence industry organisations and students to collaborate. Promising young participants in these competitions receive internship and employment opportunities within the defence industry[94]. In this context, the event enables young people to create innovative defence industry projects while also supporting the development of a skilled workforce.



The UCAV project that won first place in the 'Fighting UAV' competition

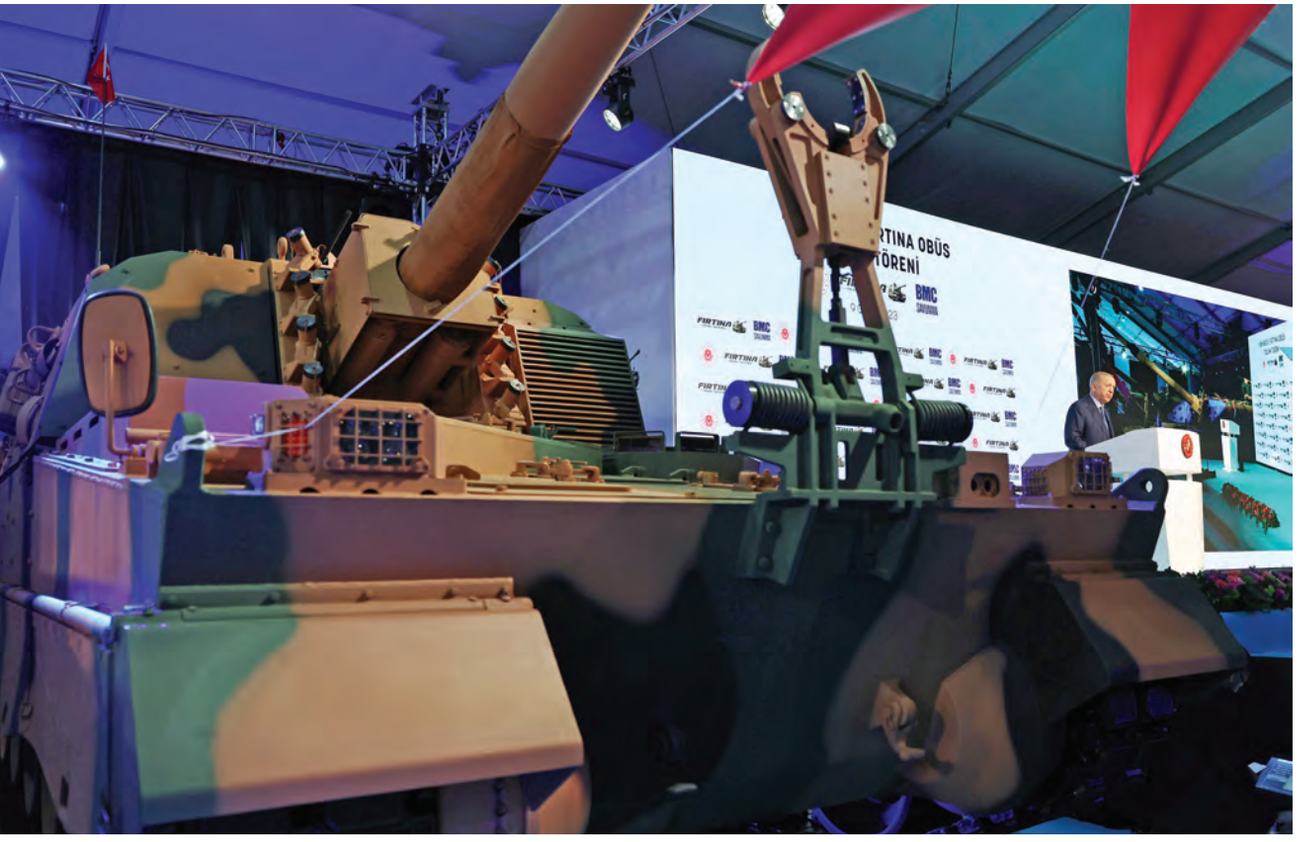
Technological innovations in the defence industry—driven by MTH initiatives, R&D projects, technology transfer and adaptation processes, TEKNOFEST events, and collaborations among defence companies, universities, and technocities—promote domestic and national production. These developments strengthen Türkiye's national security by boosting defence capabilities and further accelerate economic growth through increased defence industry exports. In addition, by facilitating the global production of defence industry tools, it establishes Türkiye as a strong contender in defence industry exports.

93 About us. *TEKNOFEST*. https://www.teknofest.org/tr/corporate/about/. (Accessed: 09.01.2025).

94 Facilities Provided to Contestants. *TEKNOFEST*. https://www.teknofest.org/tr/competitions/opportunity/. (Accessed: 09.01.2025).

2.3. The Military, Economic, and Strategic Benefits of Domestic and National Production in the Defence Industry

Within the framework of the National Technology Initiative, the defence industry's emphasis on domestic and national production delivers substantial military, economic, and strategic benefits to Türkiye. In particular, addressing the growing defence and security demands stemming from Türkiye's geographical location, enhancing military capabilities, and safeguarding national security are among the primary priorities. Türkiye occupies a crucial geopolitical position regionally and globally, and it is directly impacted by the political and economic instabilities, conflicts, and security challenges in its surrounding areas. In this regard, domestically developed high-tech vehicles and equipment in the defence industry strengthen the Turkish Armed Forces capabilities and address Türkiye's security needs. Moreover, these advancements reinforce Türkiye's position as a regional leader, promoting security and stability in the region.



President Erdoğan attended the New Generation Fırtına Howitzer Delivery Ceremony.

Another benefit of emphasising domestic and national production in the defence industry is the ability to develop military strategies independently, minimising foreign dependency and potential external interference. Today, reliance on defence systems and technologies sourced from other countries can expose a nation's defence capabilities to vulnerabilities if disputes arise with the supplier country. As a matter of fact,

Türkiye faced various difficulties when it procured defence industry products from other countries. The first notable challenge arose during the 1974 Cyprus Peace Operation[95] conducted by the Turkish Armed Forces. During the operation, the United States imposed arms embargoes on Türkiye[96]. This arms embargo highlighted that full independence in acquiring defence technologies and equipment, along with reliance on domestic and national production for defence needs, is essential[97]. To prevent facing such challenges again, establishing the defence industry on domestic and national production has become a key priority.

Another military benefit of a high level of domestic production in the defence industry is its ability to provide timely and flexible manufacturing. Driven by high-tech developments, the defence industry may at times require the urgent and strategic procurement of certain products and services. An extended procurement period for these products and systems from other countries may lead to disruptions in the supply chain and create defence and security vulnerabilities in times of crisis. Developing a domestic and national technological production infrastructure under the National Technology Initiative (MTH) enhances the flexibility of the defence industry. It ensures the timely fulfilment of urgent demands during military operations or crises by preventing delays or breaks in the supply chain, while also facilitating the development of alternative solutions when required. This allows Türkiye to implement its security strategies in a timely and efficient manner.

UÇA, developed entirely with domestic and national resources, is a strong candidate to be the first long-range smart bottom mine in the global literature.

95 "The Guarantee of Peace: Cyprus Peace Operation." *Yurtdışı Türkler ve Akraba Topluluklar Başkanlığı*. https://ytb. gov.tr/haberler/barisin-teminati-kibris-baris-harekati. (Accessed: 10.01.2025).

96 Presidency of the Republic of Türkiye Presidency of Defence Industries in the 100th Year of the Republic. *Savunma Sanayii Yayınları*. (Unpublished Work). p. 42.

97 ibid., p. 39.

An additional strategic advantage is the ability to exercise full control over the defence industry equipment and technologies. Today, the high-tech defence systems and equipment supplied from other countries may carry various security vulnerabilities, such as technological backdoors, viruses and spyware implanted by the selling country. This undermines the purchasing country's ability to maintain full control over its systems and exposes it to unauthorised access to sensitive defence information, as well as national security risks resulting from vulnerabilities intentionally embedded by the selling country.[98] Developing domestic and national defence technologies and producing defence products and systems—both software and hardware—using domestic resources protects Türkiye from security vulnerabilities and, by enhancing its technological independence, strengthens national security.

President Erdoğan attended the "T625 Gökbey Helicopter Delivery Ceremony".

The advantages of a fully independent defence industry initiative in the field of economy include reducing foreign dependence, boosting the economy through exports, creating new job opportunities, and accelerating economic development. The defence industry is a sector where high value-added production is achieved, driven by the latest technological innovations. Türkiye, using domestic production technologies, increas-

[98] The 7 Most Common Cyber Attack Methods. *Savunma Sanayii* Dergilik. https://savunmasanayiidergilik.com/tr/ HaberDergilik/En-yaygin-7-siber-saldiri-yontemi. (Accessed: 12.01.2025).

es the output of high value-added products and exports them globally[99]. Exporting high-value-added products reduces Türkiye's economic dependence on foreign sources and diversifies its income streams. A defence industry rooted in domestic production also generates new job opportunities in high-tech manufacturing and engineering fields. This creates expanding opportunities for the economy alongside the defence industry sector and provides momentum for economic growth.

Students exhibited models of national technology initiative products they prepared for "Domestic Goods Week".

An additional benefit of the high-tech, domestically driven defence industry initiative—both economically and strategically—under the scope of MTH is that it enables Türkiye to assert its presence in global competition through its exports and to secure a strategic position in foreign relations. Domestic and national defence industry products are in high demand and contribute significantly to the economy. Defence industry products were exported to 185 countries, and in 2024, exports reached 7.154 billion dollars.[100] Exports pursued on a global scale enable Türkiye to expand its sphere of influence and secure a strategic position in foreign relations through economic ties.[101]

99 "The Value-Added Power of Türkiye's Economy: The Defence Industry". *Savunma Sanayii Dergilik*. https://savunmasanayiidergilik.com/tr/HaberDergilik/Turkiye-ekonomisinin-katma-degerli-gucu-savunma-sanayii. (Accessed: 12.01.2025).

100 Record in Defence and Aviation Industry Exports.. *TSKGV*. https://tskgv.org.tr/savunmasanayiigundem/savunma-ve-havacilik-sanayii-ihracatinda-rekor#. (Accessed: 06.01.2025).

101 Defence Industry Sectoral Strategy Document – 2024/2028. *T.C. Cumhurbaşkanlığı Savunma Sanayii Başkanlığı (SSB)*. https://www.ssb.gov.tr/Images/Uploads/MyContents/F_20240917164305314800.pdf. s. 5. (Accessed: 05.01.2024).

Another strategic benefit of focusing on domestic and national production in the defence industry is that it serves as a driving force for high technology and innovation across other sectors as well. Technological revolutions and initiatives in the defence industry have a profound impact on both the defence and civilian sectors, paving the way for significant transformations. For instance, innovations achieved in the aviation sector of the defence industry also make significant contributions to the overall development of the civil aviation industry. Technological infrastructure initiatives within the defence industry similarly play a crucial role in strengthening Türkiye's national technology infrastructure. In this respect, the technological revolutions and initiatives in the defence industry—along with R&D projects and technological infrastructure efforts—are reflected in other sectors, fostering the spread of an innovation culture.

On the other hand, the nationalisation policy in the defence industry allows enhancing cyber security and strengthening digital independence. Due to its nature, the defence industry sector is faced with serious cyber attacks and threats. Implementing domestic high-tech infrastructure initiatives in response to such attacks contributes to enhancing cybersecurity and strengthening digital independence.[102] By reducing dependency on foreign software and hardware, the defence industry protects against risks such as backdoors, malware, and security vulnerabilities; strengthens cybersecurity through domestic and national high-tech production; and enhances control capabilities in the digital realm.

As part of MTH, advancing the Turkish defence industry through the latest technological developments and domestic production not only addresses military and security needs but also significantly contributes to economic and technological independence. Domestic and national production capacity offers strategic benefits, including meeting defence needs, strengthening national security, reducing foreign dependency, providing production flexibility during crises, enhancing technological independence, and supporting economic development. In addition, it enables Türkiye to become a more independent and competitive player in the global market through the export of high value-added products. In conclusion, the initiatives achieved in the Turkish defence industry contribute to ensuring national security, accelerating economic development, and enhancing Türkiye's strategic influence on the international stage.

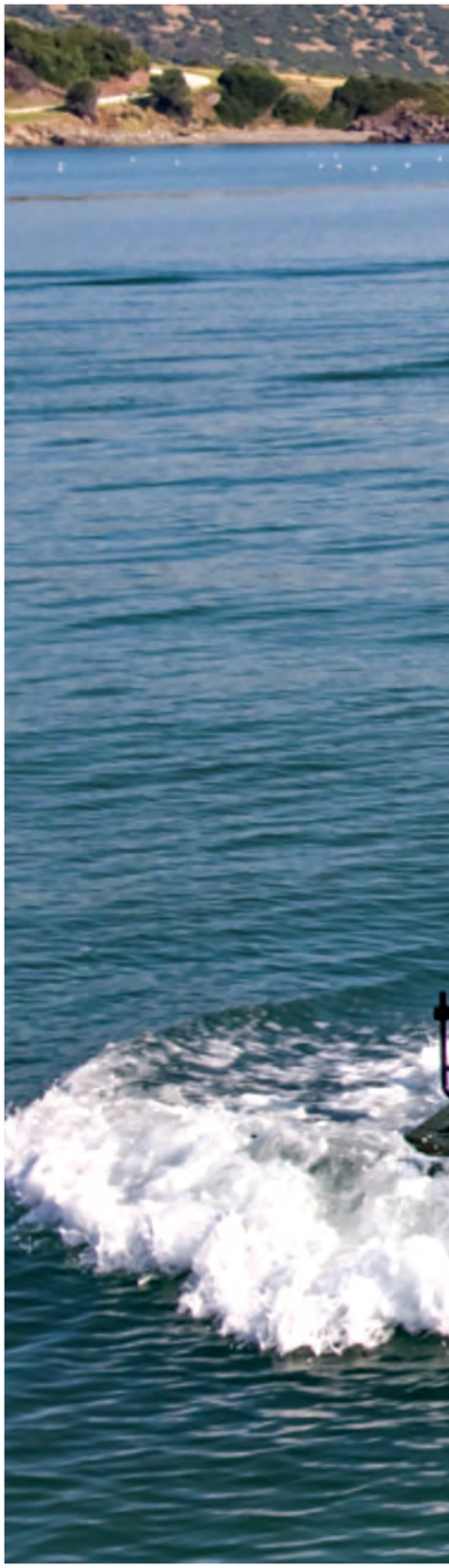
[102] Determination in Combating Cyber Threats. *T.C. Sanayi ve Teknoloji Başkanlığı*. https://sanayi.gov.tr/medya/ haber/siber-tehditlerle-mucadelede-kararlilik. (Accessed: 13.01.2025).


SSB

III

Strategic Products and Projects in the Turkish Defence Industry

STRATEGIC PRODUCTS AND PROJECTS IN THE TURKISH DEFENCE INDUSTRY



Türkiye, with the advent of the 21st century, has made a significant breakthrough in the defence industry, becoming one of the leading countries in this field worldwide. In this process, numerous administrative regulations and strategic plans were prepared and put into effect. Among the planning initiatives that yielded concrete results, the 9th Development Plan, published in 2006, stands out. Covering the years 2007 to 2013, this plan set as a fundamental goal the development of production within a competitive, self-sufficient, and flexible structure, integrated with the national industry, and ensuring the secure and stable fulfillment of defence needs through national means. It further emphasized active participation in international cooperation in joint production, design, and R&D, while acquiring the necessary infrastructure as well as technological and managerial capabilities[103]. Thanks to the steps taken in line with this strategic document, significant gains were achieved in the defence industry, particularly in expanding domestic production capacity, supporting the goals of independence in the sector, and advancing technology development. During this plan period, the Turkish defence industry recorded substantial growth in production capacity, and the breakthroughs made during this process laid the foundation for the sector to become a global actor in the following years.

The 10th Development Plan (2014–2018), covering the subsequent four-year period, emphasized transforming the defence industry into a competitive structure, meeting defence system and logistics needs in a sustainable manner based on original design and integrated with the national industry, increasing the share allocated to R&D together with the localization rate, ensuring the dual-use of appropriate technologies for civilian purposes, and supporting network and clustering structures in certain defence industry areas. In alignment with the plan, the Strategic Plan covering the years 2017–2021 set objectives and targets "to manage programs that will enhance the sustainability of the defence industry by developing capabilities that will strengthen our country's

[103] History of Our Defence Industry. *REPUBLIC OF TÜRKİYE Cumhurbaşkanlığı Savunma Sanayii Başkanlığı*. https:// www.ssb.gov.tr/WebSite/contentlist.aspx?PageID=47&LangID=1 (Accessed: 16.01.2025).

power in defence and security, thereby making Türkiye a global player in defence and security with original design and advanced technological capabilities.[104] In this period, significant progress was made in line with the goals of localization, technological advancement, and strengthening international competitiveness in the defence industry. The local contribution rate in the defence industry was increased, significantly reducing external dependency; national solutions were developed in critical areas such as unmanned aerial vehicles, armored land vehicles, and air defence systems.

Following this period of major achievements, the 11th Development Plan (2019–2023) also set forth strategic goals aimed at enhancing technological independence and global competitiveness in the defence industry. In this context, the primary goals were defined as reducing external dependency by raising the domestic production rate above 70 percent, and increasing R&D investments in high-technology areas such as artificial intelligence, cybersecurity, autonomous systems, and space technologies. The development of national defence projects and the expansion of export capacity were planned, with a particular focus on strategic projects such as the national combat aircraft, air defence systems, unmanned vehicles, and satellite technologies. Furthermore, training qualified human resources and strengthening international cooperation in the defence industry were also included among the leading objectives.

In line with all the goals outlined above, under the leadership of the Presidency of Defence Industries (SSB), which manages numerous projects aimed at protecting the *Sky Homeland, Blue Homeland,* and *Cyber Homeland*, large-scale initiatives continue to be implemented with the participation of many domestically developed and nationally produced companies. These projects range from laser weapons, satellites and satellite launch programs, and the development of unmanned aerial vehicles, to rockets and missiles, helicopter engines, and the design of combat aircraft. At present, more than 1,380 systems, products, and projects are underway in the Turkish defence industry.

Türksat 6A.

[104] Ibid.

3.1. Land Defence Vehicle Projects

Through its innovative projects in the field of land defence vehicles, Türkiye is positioning itself as a strategic actor at both the regional and global levels. Developed in line with the goal of domestically developed and nationally produced production, these vehicles have become an important instrument that not only meets the operational requirements of the Turkish Armed Forces (TAF) but also deepens defence cooperation with allied and partner nations. These projects, ranging from armored combat vehicles to unmanned land platforms, from tactical wheeled vehicles to modern logistics support systems, stand out with their advanced engineering solutions, high-technology integration, and operational effectiveness. Türkiye's land defence vehicle projects represent not only a component that strengthens national defence capacity but also a concrete reflection of the country's ability to develop domestic technology, modernize its industrial infrastructure, and pursue the goal of strategic independence.


ALPAR


ALTAY


PARS


ZAHA


EJDER


VURAN

3.1.1. ALTAY Tank

The project initiated to meet the modern tank requirements of the Land Forces Command (KKK) and to acquire the technology for the design, production, and testing of tanks and tank subsystems domestically was named ALTAY. ALTAY is the name given to the main battle tank project of 3rd generation and above developed in Türkiye. It takes its name from Fahrettin Altay, who commanded the 5th Cavalry Corps during the Turkish War of Independence. The project, launched on March 30, 2007, is being continued with the serial production agreement signed between the Presidency of Defence Industries and BMC. ALTAY tanks were delivered to the Turkish Armed Forces (TAF) on April 23, 2023, to undergo testing. With the systems developed by ASELSAN, the ALTAY tank was provided with high firepower, enhanced survivability, and self-protection capabilities. In addition, ALTAY tanks feature a domestically developed and nationally produced armor system, high mine protection, and a nuclear and chemical threat detection system. Capable of reaching a speed of up to 65 kilometers per hour, ALTAY also has the capability to cross underwater up to 4 meters, making it a fully equipped project.[105]

ALTAY Tank.

[105] "ALTAY Tankı'nın Yeni Seri üretim Tarihi Açıklandı". *Savunma Sanayist*. https://www.savunmasanayist.com/altay-tankinin-yeni-seri-uretim-tarihi-aciklandi/ (Accessed: 13.01.2025).

3.1.2. Armored Amphibious Assault Vehicle (ZAHA)

The Armored Amphibious Assault Vehicle (ZAHA) is a vehicle project designed to cover the distance between ship and shore as quickly as possible during an amphibious landing operation. The project planned the procurement of three different configurations (Personnel Carrier, Command Vehicle, and Recovery Vehicle) with certain levels of ballistic and mine protection, to ensure the safe transfer of units stationed on the Amphibious Assault Ship to the shore and land targets under harsh sea conditions.

With its hull design and powerful water jets, the vehicles are capable of reaching a maximum speed of 7 knots at sea and 70 kilometers per hour on land. In addition to their self-righting capability in case of capsizing at sea, they can operate on a 60 percent gradient and a 40 percent side slope, cross a 2-meter trench, and surmount a 90-centimeter vertical obstacle. It was announced that deliveries of ZAHA began on March 25, 2023, making Türkiye one of the two countries in the world with such capability, with mine and armor protection, firepower, and mobility features.[106]

ZAHA.

[106] Zırhlı Amfibi Hücum Aracı (ZAHA) Projesi. *REPUBLIC OF TÜRKİYE Cumhurbaşkanlığı Savunma Sanayii Başkanlığı*. https:// www.ssb.gov.tr/WebSite/contentlist.aspx?PageID=367&LangID=1 (Accessed: 13.01.2025).

3.1.3. VURAN

The VURAN vehicle, procured under the Tactical Wheeled Armored Vehicles (TWAV) Project, provides high-level protection with its monocoque armored cabin and 9-personnel capacity, in addition to a 4X4 drive system, monocoque body, armored cabin and windows, shock-absorbing seats, weapon station, and emergency exit hatch, ensuring protection for passengers against mines and ballistic threats. The vehicle is equipped with special vision systems, an automatic fire suppression system, a central tire inflation system, and a remotely controlled automatic weapon station. Reaching a speed of 110 kilometers per hour, VURAN can pass through water up to 800 mm deep, overcome many obstacles with its 400 mm ground clearance, climb a 60 percent gradient, and handle a 30 percent side slope. Tests of the domestically developed engine created within the scope of the project were completed in 2023, and the vehicle was delivered to the TAF with the domestic engine (TUNA) in early 2025. Entering inventory in 2019, the armored vehicle equipped with a domestic engine has also been exported to allied and partner countries such as Kosovo.[107]

VURAN.

[107] Bayraklı, E. Cumhuriyetin 100. yılında Cumhurbaşkanlığı Savunma Sanayii Başkanlığı. Istanbul: *Türkiye Araştırmaları Vakfı Yayınları*. s. 90.

3.1.4. Ejder Yalçın

The EJDER Yalçın 4x4 Tactical Wheeled Armored Vehicle is a unique platform with proven performance in the operational field, developed to meet the operational needs of military units and security forces in all regions and terrain conditions, including urban and rural areas, with high protection and mobility capabilities. The EJDER Yalçın 4x4 Tactical Wheeled Armored Vehicle offers high off-road performance with its high-torque diesel engine and fully independent suspension system. During the development of the EJDER Yalçın 4x4, in addition to superior survivability features, the operational and ergonomic needs of the user were also taken into account to create an ideal platform for personnel to perform their duties safely and effectively. Initiated by Nurol Makina in 2012, the project achieved significant progress in a short time, and EJDER Yalçın has secured its place among Türkiye's exported land vehicles. Following rigorous desert tests, EJDER Yalçın made its first export in 2017 to Tunisia[108].

EJDER YALÇIN.

[108] "Türk Zırhlısı Ejder Yalçın 1000'inci İhracata Hazırlanıyor". Anadolu Ajansı. https://www.aa.com.tr/tr/ekonomi/turk-zirhlisi-ejder-yalcin-1000inci-ihracata-hazirlaniyor/2552173 (Erişim Tarihi: 13.01.2025).

3.1.5. Unmanned Ground Vehicles (UGV)

With the Light-Class Unmanned Ground Vehicles Projects, different types and models of UGVs are being developed. These vehicles are capable of reconnaissance, surveillance, and target detection. In addition, different weapon systems and required payloads can be integrated onto them, and they can be operated with a defined level of autonomy or remote control. Three categories of UGVs are being developed—light, medium, and heavy—ranging in weight from 500 kg to 3,500 kg. In addition to Kaplan produced by ASELSAN, Boğaç produced by Elektroland Defence, and Demirhan produced by Oğuzkaan Defence, many UGV projects such as Ukap, Kbrn, Alkar, and Ertuğrul are being carried out.

With its serial hybrid electric drive infrastructure that allows completely silent missions, ALPAR is Türkiye's first unmanned heavy-class ground vehicle. Its modular electronic infrastructure provides solutions tailored to different mission requirements, combining reconnaissance, surveillance, or combat capabilities with autonomy and remote control, low thermal and acoustic signature, vehicle tracking capability, and maneuverability equivalent to light tanks and similar vehicles. ALPAR was introduced in June 2024 at Eurosatory in Paris, one of Europe's largest and the world's leading defence industry fairs.

ALPAR.

3.1.6. Weapon Carrier Vehicles

Within the scope of the Weapon Carrier Vehicles (WCV) Project, the goal was to domestically develop and produce tracked and wheeled vehicles armed with anti-tank missiles, along with anti-tank missile turrets to be integrated into these vehicles. Due to the project's high ballistic and mine protection requirements, weight and dimensional limits, and amphibious requirements, the tracked KAPLAN-WCV and wheeled PARS-WCV vehicles were developed as entirely new mission-specific platforms.[109]

PARS-WCV, unlike general-purpose 4x4 vehicles, was designed as a true wheeled tank destroyer with mobility performance provided by the power pack positioned at the rear. Within the scope of the project, the PARS-WCV and KAPLAN-WCV vehicles underwent performance tests on land, at sea, and under various conditions for more than a year, and successfully completed their qualifications.

During qualification activities, the anti-tank missile capabilities of the KORNET-E and OMTAS turrets were also tested and qualified. By the end of 2019, serial production of the vehicles had been carried out, and many units were delivered to their deployment locations across the country and put into service by the TAF. In addition to anti-tank missiles, all of the vehicles are equipped with 7.62 mm machine guns integrated into the turrets. The vehicles, with their domestically developed armor systems, have superior survivability and also possess the capability to operate in CBRN environments.

Weapon Carrier Vehicles.

[109] Silah Taşıyıcı Araçlar (STA) Projesi. *T.R. Cumhurbaşkanlığı Savunma Sanayii Başkanlığı.* https://www.ssb. gov.tr/WebSite/contentlist.aspx?PageID=2547&LangID=1 (Accessed: 13.01.2025).

3.1.7. Capability Enhancement for Tanks: Leopard 2A4

The Leopard 2A4 (TİYK-LEO 2A4) project is being carried out to enhance the capabilities of tanks. The aim is to improve the survivability, fire control, and mobility of the tanks in the Land Forces Command (KKK) inventory to meet today's requirements, taking into account changing threats, operational areas, and expectations for effectiveness. In this context, it was planned to modernize 81 Leopard 2A4 tanks to meet the needs of the modern battlefield.[110]

3.2. Naval Defence Vehicle Projects

Through advanced projects in the field of naval defence vehicles, Türkiye continues its strategic transformation in the defence industry, specifically within the scope of the Blue Homeland. Developed in line with national defence strategies, these projects not only increase Türkiye's capacity to protect its maritime security and sovereign rights but also aim to strengthen its effectiveness in regional and international maritime activities. Covering a wide range that includes assault ships, submarines, corvettes, frigates, unmanned surface and underwater vehicles, and logistics support ships, these projects are designed and produced based on domestic engineering expertise and R&D capacity. Türkiye's initiatives in this field are regarded as an important reflection of the process of implementing the principles of independence and sustainability in defence technologies.


TCG Derya (A-1590)


Yeni Tip Denizaltı


TCG Kınalıada (F-514)

Kontrol Botu

TCG Anadolu (L-400)

[110] Bayraklı, Enes (2004). *Cumhuriyetin 100. yılında Cumhurbaşkanlığı Savunma Sanayii Başkanlığı. Istanbul: Türkiye Araştırmaları Vakfı Yayınları*, s. 91.

3.2.1. Multipurpose Amphibious Assault Ship (TCG Anadolu)

Capable of transporting a battalion-sized force with the necessary combat and support vehicles to crisis zones without main base support, and of participating in landing operations with its well deck carrying landing craft, it also features a flight deck enabling day-and-night operations with helicopters and UAVs[111].

TCG Anadolu includes a hospital with a capacity of at least 30 beds, operating rooms, X-ray equipment, dental treatment units, intensive care, and infection rooms. In this respect, it can also be used as a hospital ship. Planned to be the flagship of the Turkish Naval Forces, TCG Anadolu's flight deck will be able to accommodate 10 helicopters or 50 UCAVs[112].

With a full load displacement of 27,436 tons and a length of 231 meters, the Multipurpose Amphibious Assault Ship TCG Anadolu is the largest naval platform in the Turkish fleet.

TCG Anadolu Ship.

[111] Deniz Araçları Projeleri. *T.C. Cumhurbaşkanlığı Savunma Sanayii Başkanlığı.* https://www.ssb.gov.tr/WebSite/contentlist.aspx?PageID=373&LangID=1 (Erişim Tarihi: 13.01.2025).

[112] Bayraklı, Enes (2004). *Cumhuriyetin 100. yılında Cumhurbaşkanlığı Savunma Sanayii Başkanlığı. İstanbul: Türkiye Araştırmaları Vakfı Yayınları*, s. 91.

3.2.2. Replenishment Combat Support Ship Project (DİMDEG)

The Replenishment Combat Support Ship (DİMDEG) was designed to rapidly provide fuel (including helicopter fuel) and water supplies to naval units at sea through underway replenishment. In addition to replenishment for combat elements and forward bases, DİMDEG is also equipped to perform missions in peace support operations, disaster and emergency response, and humanitarian aid.[113]

The ship will also provide support for the maintenance and repair of manned and unmanned surface and underwater vehicles, helicopters, and UAVs deployed onboard, at a certain level. Provisional Acceptance was completed on January 19, 2024. The warranty period has commenced. After TCG Anadolu, it is projected to be the second-largest ship of the Turkish Naval Forces.

DİMDEG.

[113] Deniz Araçları Projeleri. *REPUBLIC OF TÜRKİYE Cumhurbaşkanlığı Savunma Sanayii Başkanlığı*. https://www.ssb.gov.tr/ WebSite/contentlist.aspx?PageID=376&LangID=1 (Accessed: 13.01.2025).

3.2.3. MİLGEM 5th Ship Procurement Project

This project is the fifth ship of the MİLGEM program, and the first of the I-class frigates, which will be the first national frigate. Around 80 subcontractors are working on more than 150 systems in the project. The total number of contracted and ordered companies has reached 220. The localization rate of the Istanbul Frigate is planned to be increased above 75 percent. This ship will introduce critical national weapon and sensor systems into inventory for the first time[114].

MİLGEM 5th Ship.

[114] Ibid.

3.2.4. New Type Submarine Project (YTDP)

With the New Type Submarine Project, also known as the Piri Reis Project, it was aimed to construct six air-independent propulsion submarines at Gölcük Shipyard Command with maximum participation of Turkish industry, in order to meet the needs of the Naval Forces Command and to fulfill the criteria of the Submarine Operational Concept. These submarines, to be equipped with modern combat systems, will have the capability to remain submerged longer than their counterparts. This is expected to provide the Turkish Naval Forces Command with significant superiority in terms of submarine operations. Within the scope of the project, many domestic companies' products have been used on a submarine platform for the first time, and in this context, domestic industry companies have been enabled to take part in many areas, including submarine design capability.[115]

New Type Submarine.

[115] TCG PİRİREİS Denizaltısı Deniz Denemelerine Başladı. *Defence Turk*. https://www.defenceturk.net/piri-reis-denizaltisi-deniz-denemelerine-basladi (Accessed:13.01.2025).

3.2.5. Patrol Boat Project

In order to meet the needs of the Coast Guard Command and the General Directorate of Security for carrying out maritime safety, maritime security, and anti-smuggling missions in areas close to strategic facilities, bases, ports, and coasts, as well as combating irregular migration and conducting and supporting search and rescue operations in regions with concentrated migration flows, the procurement of 173 patrol boats was planned. Designed domestically as a V-section, single-hull, planing-type vessel, the construction of the Patrol Boats is ongoing. In 2021, provisional acceptance of the first boat was carried out, and thereafter serial production activities and their provisional acceptances have been continuing intensively within the scope of the project. As of the end of 2023, provisional acceptance of 103 boats had been completed.[116]

Patrol Boat.

[116] Ibid.

3.2.6. Turkish-Type Fast Attack Craft Project

With this project, it is planned to produce a fast attack craft with a Turkish design, using a domestically developed and nationally produced approach from design to production, drawing upon the experience gained from projects realized in Türkiye's defence industry sector. In this context, it was aimed to make effective and extensive use of Türkiye's accumulated experience in engineering and production. Thus, it is intended to produce a Turkish-type fast attack craft, equipped with effective weapons and sensors as well as high speed and maneuverability, without reliance on foreign sources[117].

3.2.7. Unmanned Surface Vehicle (USV) Projects

The Unmanned Surface Vehicle (USV) projects hold strategic importance in line with the objectives of strengthening maritime security, achieving technological independence, and enhancing global competitiveness. These projects have a wide potential for use in both military and civilian applications, providing effective and innovative solutions particularly in reconnaissance and surveillance, mine countermeasures, anti-submarine warfare, and logistics support operations.

- **MARLİN-ASV:** An Armed Unmanned Surface Vehicle (ASV) capable of conducting Intelligence-Surveillance-Reconnaissance, Surface Warfare, and Electronic Warfare (EW) missions; interoperable with different manned/unmanned platforms; and operable via remote control, semi-autonomous, or fully autonomous modes.
- **ULAQ ASV:** An Armed Unmanned Surface Vehicle (ASV) capable of conducting Intelligence-Surveillance-Reconnaissance, Surface Warfare, and Anti-Submarine Warfare (ASW) missions; interoperable with different manned/unmanned platforms; and operable via remote control, semi-autonomous, or fully autonomous modes.
- **SANCAR ASV:** An Armed Unmanned Surface Vehicle (ASV) capable of conducting Intelligence-Surveillance-Reconnaissance, Surface Warfare, and Mine Countermeasures (MCM) missions; interoperable with different manned/unmanned platforms; and operable via remote control, semi-autonomous, or fully autonomous modes.
- **SALVO ASV:** An Armed Unmanned Surface Vehicle (ASV) capable of conducting Intelligence-Surveillance-Reconnaissance, Surface Warfare, and drone-assisted missions; interoperable with different manned/unmanned platforms; and operable via remote control, semi-autonomous, or autonomous modes.
- **MİR USV:** An Unmanned Surface Vehicle (USV) with the capability to perform special missions both underwater and on the surface; interoperable with different manned/unmanned platforms; equipped with swarm capabilities; and operable in autonomous or semi-autonomous modes.
- **Albatros-S USV:** An Unmanned Surface Vehicle (USV) with swarm capability, designed for cost-effective use in highly risky missions such as engaging suspicious boats/ships, search and rescue, wide-area scanning, escorting and protecting high-value platforms; interoperable with different manned/unmanned platforms; and operable in autonomous or semi-autonomous modes.

[117] Ibid.

3.2.8. Preveze-Class Submarine Mid-Life Modernization Project

This is the project to modernize four Preveze-class submarines in the inventory of the Naval Forces Command, equipping them with weapons, sensors, navigation, communication, and platform systems developed largely through domestic and national means, in line with the requirements of contemporary and future naval warfare.

For the first time, systems developed locally for Türkiye will be used in the modernization activities, and such a large-scale submarine modernization project can only be undertaken by very few countries worldwide[118].

3.2.9. Barbaros-Class Frigate Mid-Life Modernization Project

This is the project to equip four Barbaros-Class Frigates in the inventory of the Naval Forces Command with domestically developed and nationally produced systems, replacing the existing combat systems consisting of weapons and sensors, in line with the requirements of the age. This project, carried out with domestic and national resources, is distinguished as a first in the world in terms of the scope of modernization[119].

TCG Oruçreis Frigate.

[118] Ibid.

[119] Ibid.

3.3. Aviation and Space Projects

The progress made by the Turkish defence industry in the field of aviation and space technologies in recent years, in line with the vision of domestically developed and nationally produced production, has been followed with great interest and praise internationally. The projects developed within this scope not only strengthen Türkiye's air and space defence capacity but also aim to enhance the country's technology development capabilities and competitiveness in the global defence market. Ranging from UAVs to satellite systems, from combat aircraft to space observation platforms, these projects have become key components of national security strategies, equipped with advanced engineering solutions and innovative technologies.


KAAN

HÜRJET


BAYRAKTAR KIZILELMA


T129 ATAK


BAYRAKTAR TB3


BAYRAKTAR TB2


AKSUNGUR SİHA


AKINCI İHA


ANKA SİHA


ANKA III SİHA

3.3.1. National Combat Aircraft (KAAN)

Within the scope of the National Combat Aircraft (KAAN) Development Project, the goal is to design and produce a new-generation fighter aircraft to replace F-16s from the late 2020s onward, while ensuring that KAAN can operate compatibly with other air assets and platforms in Türkiye's inventory. The KAAN Project aims to enhance Türkiye's capabilities in fifth-generation combat aircraft and to place the country among the limited number of nations worldwide in this field. KAAN will feature advanced technological capabilities such as low observability, an internal weapons bay, high maneuverability, enhanced situational awareness, and sensor fusion. These features will make KAAN advantageous in both air-to-air and air-to-ground combat[120].

A contract for Phase-I, Stage-I "Preliminary Design" activities of the project was signed with Turkish Aerospace (TUSAŞ) on August 5, 2016. Under this contract, the Preliminary Design Review (PDR) milestone was completed at the beginning of 2023.

Within the scope of the project, original design activities are being carried out with maximum use of domestic industry. Accordingly, technology development and localization activities for critical subsystems are being undertaken.

After the completion of the testing stage, the National Combat Aircraft KAAN conducted its maiden flight on February 21, 2024, remaining airborne for 13 minutes.

National Combat Aircraft KAAN.

[120] Havacılık ve Uzay Araçları Projeleri. *T.C. Cumhurbaşkanlığı Savunma Sanayii Başkanlığı*. https://www.ssb.gov.tr/WebSite/contentlist.aspx?PageID=362&LangID=1 (Erişim Tarihi: 14.01.2025).

3.3.2. Bayraktar TB2

Developed and fielded by Baykar, the Bayraktar TB2 Tactical UCAV System is an integrated network-based system architecture that provides users with all solutions in one package. The system consists of the Bayraktar TB2 UCAV platform, Ground Control Station, Ground Data Terminal, Remote Video Terminal, Forward Base, and generator with trailer modules. The entire Bayraktar TB2 system is produced domestically and nationally.[121]

The Bayraktar TB2 Tactical Unmanned Combat Aerial Vehicle, in the MALE (Medium Altitude Long Endurance) class, is designed for reconnaissance and intelligence missions. With its triple-redundant avionics systems and sensor fusion architecture, it is capable of fully autonomous taxiing, takeoff, landing, and normal flight. Having flown more than 1,000,000 hours, the TB2 has been actively in service since 2014 with the TAF, the Gendarmerie, and the Police. Currently, hundreds of Bayraktar TB2 UCAV platforms are in the inventories of Türkiye, Qatar, Ukraine, Azerbaijan, and other recipient countries. The Bayraktar TB2 broke Turkish aviation records for endurance (27 hours 3 minutes) and altitude (25,030 feet). The Bayraktar TB2 also holds the distinction of being the first air platform of this scale to be exported.

Successfully carrying out reconnaissance, persistent aerial surveillance, and intelligence missions, the TB2 has also been integrated with ROKETSAN's MAM-L and MAM-C smart munitions. The Bayraktar TB2 UCAV, equipped with a built-in laser target designator, can perform precision targeting and deploy up to four smart munitions to destroy targets. The Bayraktar TB2 also has a rapid "see-and-strike" capability to minimize collateral damage in areas close to targets. These features ensure that civilian safety is prioritized. To date, agreements have been signed with 33 countries for the TB2.[122]

Bayraktar TB2.

[121] Bayraktar TB2. *Baykar Teknoloji*. https://baykartech.com/tr/uav/bayraktar-tb2/ Accessed (14.01.2025).

[122] Bayraktar TB2'den Dünyada Bir İlk Daha. *Baykar Teknoloji*. https://baykartech.com/tr/haberler/bayraktar-tb2den-dunyada-bir-ilk-daha/ Accessed (14.01.2025).

3.3.3. Bayraktar TB3

Developed domestically and nationally, the Bayraktar TB3 UCAV is an unmanned combat aerial vehicle system capable of takeoff and landing from short-runway ships. In addition to reconnaissance, surveillance, and intelligence missions, it is capable of carrying out operations with domestically produced smart munitions under its wings. With its foldable wing structure, it is designed for use on helicopter carriers and aircraft carriers. It provides the capability of conducting operations with unmanned combat aerial vehicles in overseas missions. In addition to line-of-sight communication, the Bayraktar TB3 is also equipped with beyond line-of-sight communication, enabling it to be controlled from very long distances.[123]

Bayraktar TB3.

[123] Bayraktar TB3. Baykar Teknoloji. https://baykartech.com/tr/uav/bayraktar-tb3/ (Accessed: 14.01.2025).

3.3.4. Bayraktar Kızılelma

The combat unmanned aircraft system Bayraktar KIZILELMA, currently under indigenous and national development by Baykar, is considered likely to shape the combat concepts of the future. Building on the achievements of the Bayraktar UAV/UCAV systems, which have spearheaded a paradigm shift in this field worldwide, the combat unmanned aircraft system aims to add an innovative dimension to modern warfare doctrines by being equipped with advanced defence technologies. Bayraktar KIZILELMA (MIUS), capable of conducting air-to-air combat with aggressive maneuvers, will provide security forces with an advantage thanks to its low radar cross-section. Bayraktar KIZILELMA (MIUS), capable of takeoff and landing from short-runway ships, will carry out strikes on designated targets with munitions stored inside its fuselage.[124]

Bayraktar KIZILELMA.

[124] Bayraktar Kızılelma. Baykar Teknoloji. https://baykartech.com/tr/uav/bayraktar-kizilelma/(Accessed: 14.01.2025).

3.3.5. AKINCI Unmanned Aerial Vehicle (AKINCI UAV)

With the AKINCI UAV project, the aim is to develop and procure a national UAV capable of long endurance, striking targets with a variety of munitions, providing laser target designation for friendly combat aircraft when necessary, and carrying a high payload capacity. Developed by Baykar Defence, the system made its maiden flight on December 6, 2019, and entered the TAF inventory for the first time on August 29, 2021. There are three different variants—AKINCI A, AKINCI B, and AKINCI C—each equipped with different engines.[125] Baykar has announced that export contracts for the AKINCI UAV have been signed with 9 countries to date.[126]

AKINCI UAV.

[125] Bayraktar Akıncı. Baykar Teknoloji. https://baykartech.com/tr/uav/bayraktar-akinci/ Accessed (14.01.2025).

[126] Bayraktar TB2'den Dünyada Bir İlk Daha. Baykar Teknoloji. https://baykartech.com/tr/haberler/bayraktar-tb2den-dunyada-bir-ilk-daha/ Accessed (14.01.2025).

3.3.6. ANKA Unmanned Combat Aerial Vehicle

Developed by Turkish Aerospace (TUSAŞ) engineers with contributions from many domestic subcontractors, the ANKA Unmanned Aerial Vehicle was first rolled out of the hangar at TUSAŞ facilities on July 16, 2010, following assembly.

Subsequently, ANKA performed its maiden flight on December 30, 2010. Following the successful completion of project activities, serial production began and the system's scope of use was expanded.

Designed for reconnaissance, surveillance, detection, identification, tracking, and elimination of fixed/mobile targets in both day and night conditions, the ANKA UAV system is capable of providing real-time imagery intelligence, operating at altitudes of 30,000 feet with a minimum endurance of 24 hours.

Today, thanks to its high operational readiness, ANKA fleets actively serve in the inventories of various users and have exceeded 400,000 flight hours, making it one of the most important success stories of the Turkish defence industry.

ANKA UCAV.

3.3.7. AKSUNGUR Unmanned Combat Aerial Vehicle

The more advanced and larger version of ANKA, AKSUNGUR, is a UAV system developed by TUSAŞ. It was designed for long-endurance surveillance, intelligence, maritime patrol missions, or to be used as a UCAV. Performing its maiden flight on March 20, 2019, AKSUNGUR entered serial production as of December 2020. TUSAŞ announced that, as of May 2023, it would be able to produce two AKSUNGUR UAVs per month.[127] Furthermore, in 2022, AKSUNGUR UAVs were integrated with the PD-170 engine produced by TEI, making them part of the class of UAVs utilizing a domestic engine after ANKA.

AKSUNGUR UCAV.

[127] TUSAŞ'tan AKSUNGUR İHA'da Kapasite Arttırma Kararı. Savunma Sanay iST. https://www.savunmasana- yist.com/tusastan-aksungur-ihada-kapasite-arttirma-karari/ Accessed (14.01.2025).

3.3.8. ANKA III Unmanned Combat Aerial Vehicle

Developed by Turkish Aerospace (TUSAŞ) and first started in 2023 with engine ignition, ANKA III met the skies with its successful flight on December 28, 2023. The test stages of ANKA III were completed at extraordinary speed, during which its armed trials were also successfully executed.

With its flying-wing design providing low radar visibility, its turbofan engine enabling high speeds, and its strong payload capacity carried in internal stations, ANKA III has a takeoff weight of approximately 7 tons. This next-generation unmanned aerial vehicle can operate at an altitude of 40,000 feet, reach a speed of Mach 0.7, and remain airborne for up to 10 hours.

In the ANKA III project, which progressed rapidly from the idea stage to its first flight, AI-supported modeling, simulation, and flight control systems were used extensively. Built upon the engineering experience gained from the ANKA and AKSUNGUR programs and more than 250,000 flight hours, ANKA III has reached the capability to meet versatile operational needs thanks to common ground systems.

ANKA III UCAV.

3.3.9. T129 ATAK Attack and Tactical Reconnaissance Helicopter

The T129 ATAK Attack and Tactical Reconnaissance Helicopter is equipped with a tandem cockpit design, allowing both pilots maximum environmental visibility, wheeled main landing gear, a five-blade main rotor system with superior maneuverability, a newly designed two-blade tail rotor system, and two high-performance LHTEC CTS800-4A turboshaft engines—each generating 1,373 shp—enhancing survivability. Features such as high performance, high maneuverability, asymmetric weapons load, low visibility, acoustic and radar signature, high impact resistance, and ballistic tolerance provide the T129 ATAK Helicopter with versatile superior operational capability in various combat scenarios.[128]

The ASELFLIR-300T Day and Night Imaging System, located on the front of the helicopter, can rotate 360° and detect targets at a distance of up to approximately 20 km, while identifying targets up to 10 km away. The AVCI Helmet Integrated Cueing System, developed specifically for the T129 ATAK Helicopter, enables automatic orientation of target acquisition and weapons systems to the pilot's line of sight thanks to its high tracking precision.

Equipped for close air support missions with up to 76 unguided rockets and 500 rounds of ammunition capacity, the T129 ATAK is also suitable for multi-role missions with 8 UMTAS Anti-Tank Missiles, 16 CİRİT Laser-Guided Missiles, 8 STINGER Air-to-Air Missiles, and the most modern electronic warfare and electro-optical systems.

T129 ATAK Attack and Tactical Reconnaissance Helicopter.

[128] T129 ATAK Taarruz ve Taktik Keşif Helikopteri. *REPUBLIC OF TÜRKİYE Cumhurbaşkanlığı Savunma Sanayii Başkanlığı*. https://www.ssb.gov.tr/WebSite/contentlist.aspx?PageID=363&LangID=1 (Accessed: 14.01.2025).

3.3.10. HÜRJET

A turbofan-powered advanced jet trainer aircraft project under development by Turkish Aerospace (TUSAŞ). The project was initiated to replace the T-38 aircraft used in Jet Advanced Training and the F-5 aircraft used in aerobatic demonstrations, to be included in the Turkish Air Force inventory.[129] On January 12, 2022, a decision for the first phase of serial production was made. HÜRJET successfully conducted its first engine run on February 2, 2023, performed its first taxi on March 18, 2023, and achieved its maiden flight on April 25, 2023.

HÜRJET.

3.3.11. ATAK 2

The T929 Heavy-Class Attack Helicopter, developed by Turkish Aerospace (TUSAŞ) as the upgraded version of the T129, is similar in size to the AH-64 Apache Attack Helicopter. It has been designed for missions such as attack, close air support, air-to-ground and air-to-air combat, joint attack operations, and armed reconnaissance and surveillance. It has been announced that three ATAK 2 helicopters will be delivered to the Land Forces Command in 2025.

[129] HÜRJET. *TUSAŞ*. https://www.tusas.com/urunler/ucak/ozgun-gelistirme/hurjet (Accessed: 14.01.2025).

3.3.12. Indigenous Helicopter Program

On June 26, 2013, the contract for the Indigenous Helicopter Program was signed with the aim of designing, developing, producing prototypes, and certifying general-purpose helicopters for the TAF and other organizations in need, using domestic capabilities.

With a maximum takeoff weight of 6,050 kg, a passenger capacity of 12 (14 in dense configuration), a service ceiling of 20,000 feet, and a maximum cruise speed of 165 knots, the twin-turboshaft GÖKBEY is expected not only to meet domestic requirements but also to achieve a broad market share as a competitive platform in the global market.

The GÖKBEY helicopter will be capable of operating actively in challenging climates and geographies, at high altitudes and high temperatures, and in both day and night conditions. Advanced avionics and a digital cockpit, designed and produced domestically, are integrated into the helicopter, taking into account both current and future operational requirements.[130]

Under the Indigenous Helicopter Program carried out by Turkish Aerospace (TUSAŞ), design and production activities are ongoing.

[130] Havacılık ve Uzay Araçları Projeleri. *REPUBLIC OF TÜRKİYE Cumhurbaşkanlığı Savunma Sanayii Başkanlığı*. https://www. ssb.gov.tr/WebSite/contentlist.aspx?PageID=4155&LangID=1 (Accessed: 14.01.2025).

3.3.13. HÜRKUŞ New Generation Basic Trainer Aircraft

The HÜRKUŞ Project was launched to design, develop, produce prototypes, begin serial production, and carry out international certification of an original training aircraft, built with domestic capabilities, to meet the training aircraft needs of the TAF and to secure a share in the global market.

Within the scope of the project conducted by Turkish Aerospace (TUSAŞ), two prototypes and 15 New Generation Basic Trainer aircraft were produced to meet the Turkish Air Force Command's requirement for 15 basic trainer aircraft.

On July 11, 2016, the "TT32 Aircraft Type Certificate" was obtained from the Directorate General of Civil Aviation (SHGM), and on the same day, the certificate was validated by the European Aviation Safety Agency (EASA) as valid across all European countries. Thus, HÜRKUŞ became the first Turkish aircraft to receive a type certificate from the European Aviation Authority[131].

Designed entirely by Turkish engineers, HÜRKUŞ, with its new-generation digital cockpit structure and advanced mission computer developed by ASELSAN, is competitive in the international market.

HÜRKUŞ at Adana TEKNOFEST.

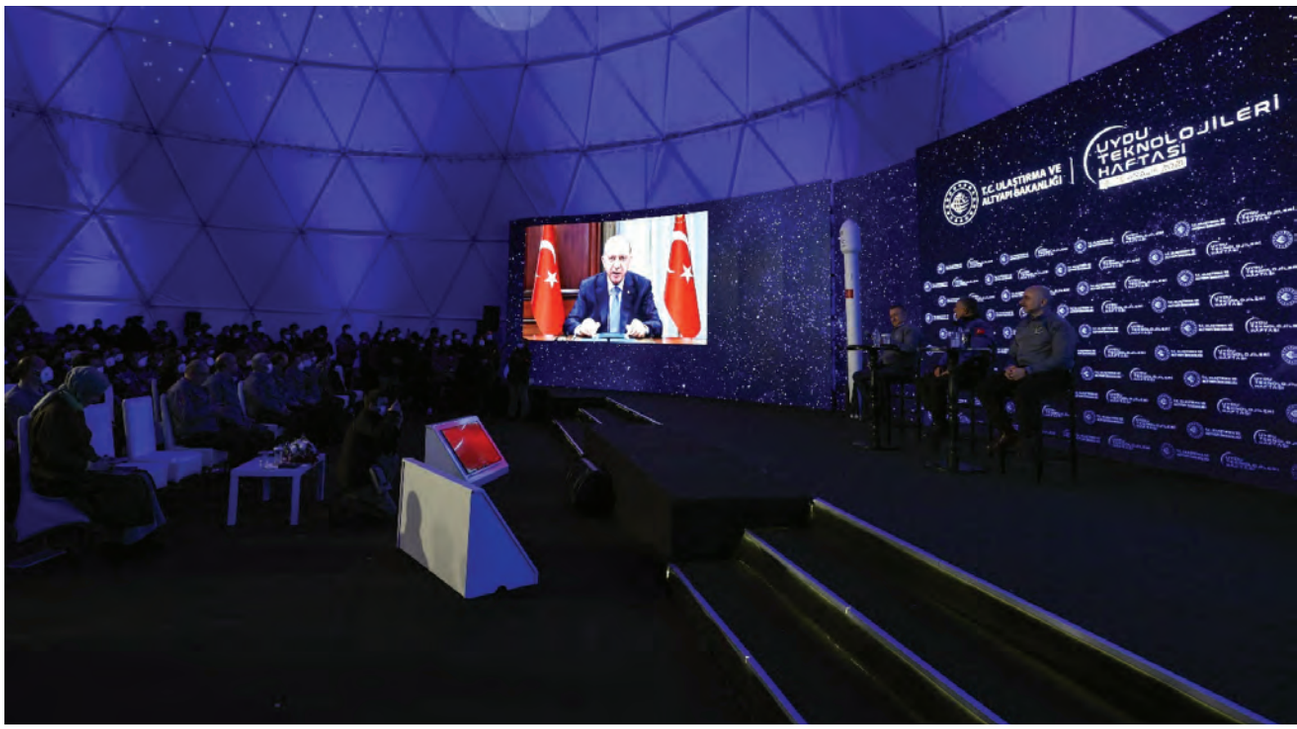
[131] Ibid.

3.3.14. Satellite Systems

Satellite systems in the Turkish defence industry have shown significant progress in recent years and have become an important field enhancing Türkiye's national security capacity. Within the framework of Türkiye's National Space Program, the development of satellite systems and space technologies is being targeted. This program aims to strengthen Türkiye's independence in space and to increase domestic satellite production capacity. In addition, various satellite projects that can be used in both military and civilian fields stand out as instruments enhancing Türkiye's strategic power.

- **GÖKTÜRK Earth Observation Satellites:** The aim of the GÖKTÜRK Project is to procure a satellite system, based on technology transfer and co-development principles, that will provide high-resolution imagery for military intelligence purposes from any region of the world while also meeting civilian needs such as monitoring forested areas, tracking illegal construction, damage assessment after natural disasters, crop yield estimation, and generating geographic mapping data.

Through the GÖKTÜRK Project, significant achievements have been realized, including providing a modern and effective method for monitoring Türkiye's surrounding regions and territorial waters, creating a domestic industrialization model in the space and satellite field, acquiring system and subsystem-level design capabilities, and establishing an assembly, integration, and testing center.



The Türksat 5B Satellite was launched into space.

- **Türksat Satellite Network:** Türksat is one of the most important institutions providing Türkiye's satellite communication and broadcasting infrastructure. In the Turkish defence industry, satellites developed and operated by Türksat have broad applications in both military and civilian domains.

- **ASELSAT Satellite Systems:** ASELSAN has undertaken significant projects in the field of satellite systems. ASELSAN develops satellite communication systems, ground stations, and satellite-based communication solutions. These systems are employed to enhance the operational capabilities of the Turkish Armed Forces (TAF).

- **İMECE:** İMECE, one of Türkiye's domestically produced observation satellites, was launched in 2023. This satellite is a project aimed at enhancing Türkiye's capacity in domestic satellite technologies and is particularly notable for its high-resolution imaging and intelligence-gathering functions.

- **Fergani FGN-100-d1:** Fergani Space launched its first satellite, the FGN-100-d1, into orbit aboard SpaceX's Falcon 9 rocket, marking the beginning of a new era in the Small-GEO category. Expected to provide global coverage in communication and geolocation services, the satellite is anticipated to lead future technologies[132].

Fergani FGN-100-d1 Uydusu uzaya fırlatıldı.

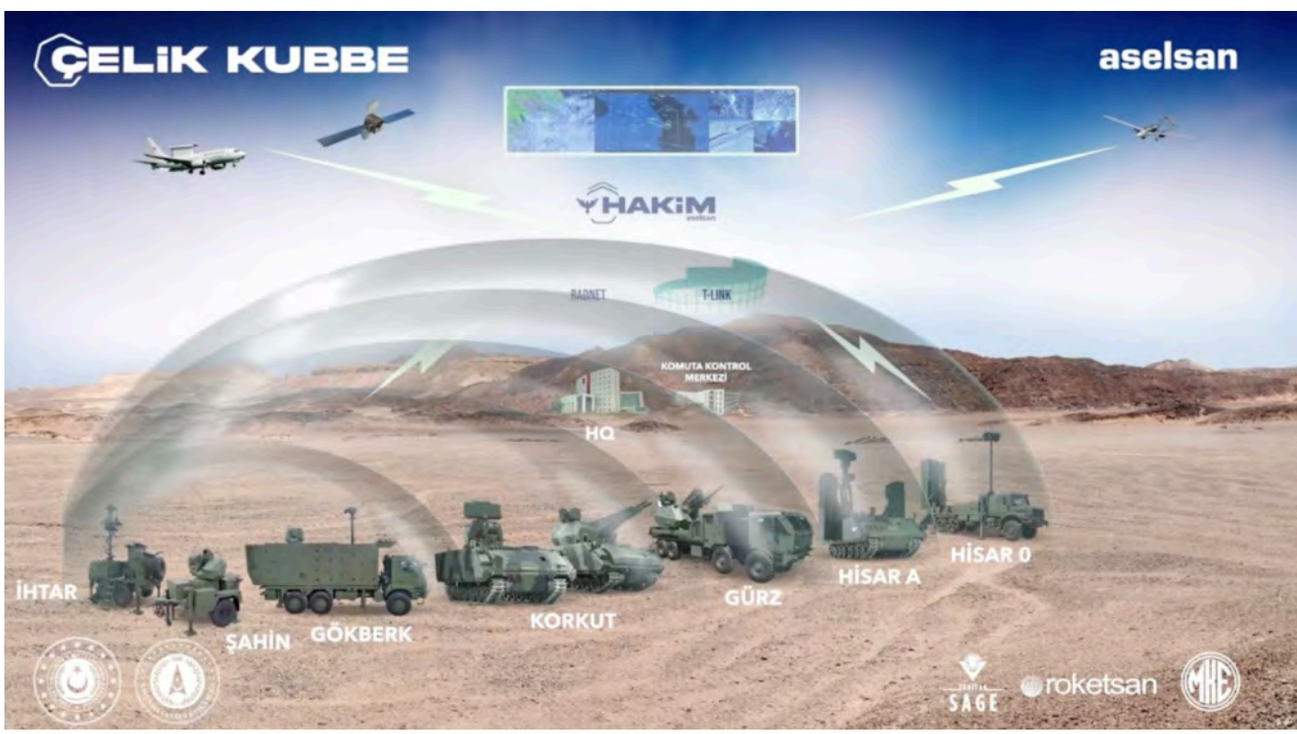
[132] "Millî Uzay Ekosistemini Güçlendirecek 5 Uydu Uzaya Fırlatıldı". *Anadolu Ajansı*. https://www.aa.com.tr/tr/bilim-teknoloji/millî-uzay-ekosistemini-guclendirecek-5-uydu-uzaya-firlatildi/3450439 (Erişim Tarihi: 16.01.2025).

3.4. Air Defence and Weapons Ammunition Systems Projects

Air defence and weapons ammunition systems constitute one of the fundamental elements of modern defence strategies. With innovative projects carried out in this field, Türkiye aims both to meet its national security needs and to achieve a competitive position in the global defence industry. Developed with a domestically developed and nationally produced technology-focused approach, these systems provide effective solutions across a wide operational spectrum, from threat detection to target elimination. Spanning from long-range air defence systems to precision-guided munitions, these projects reflect Türkiye's vision of independence and sustainability in the defence industry. In this context, these projects are regarded as critical building blocks that strengthen Türkiye's defence capacity both technologically and strategically.

Çelik Kubbe (*lit.* Steel Dome) Project

The Çelik Kubbe Project, developed domestically and nationally, stands out as one of the critical projects of the Turkish defence industry. With layered air defence systems, it ensures that all sensors and weapons operate in an integrated manner under a network structure, generating a common air picture, transmitting it to operational centers in real time, and presenting it to decision-makers through AI-supported systems. Positioned at the center of Türkiye's comprehensive defence modernization efforts, this Project aims to build a multi-layered, integrated, and network-centric defence architecture against air and missile threats.



Developed with a "system of systems" approach, this Project incorporates domestic and national elements that ensure the coordination of sensors, weapons systems, and command-and-control components. The main goal of the Project is to generate a common threat picture of the airspace, deliver this data in real time to operational centers, and enable effective intervention through AI-supported decision support systems.

Developed under the coordination of the Presidency of Defence Industries (SSB), the system provides an integrated "security umbrella" against low, medium, and high-altitude threats. Within this framework, the KORKUT system developed by ASELSAN stands out as a mobile and effective solution against low-altitude threats, while the HİSAR-A+ and HİSAR-O+ systems, developed in cooperation between ASELSAN and ROKETSAN, assume critical roles in low- and medium-altitude air defence. The SİPER system, developed against long-range and high-altitude threats, is being carried out in partnership between ASELSAN, ROKETSAN, and TÜBİTAK SAGE, with the first phase already inducted into the TAF inventory[133].

Another important element of the project involves systems developed within the framework of a hybrid defence concept, integrating missile, gun, and laser-based weapons into the same architecture. In this context, ASELSAN's GÜRZ, GÖKER, GÖKDENİZ, and GÖKSUR, ROKETSAN's LEVENT, as well as laser-based systems such as GÖKBERK and ALKA, provide scalable and scenario-specific solutions against different types of threats.

The Çelik Kubbe architecture not only focuses on defence but also integrates various national systems for detection and elimination of threats at their source. Accordingly, strategic weapon systems such as the MAM series munitions, OMTAS, UMTAS, KARAOK anti-tank systems, TRLG-122/230, UAV-122/230, K+ guided rockets, TAYFUN, AKYA, ÇAKIR, ATMACA, and SOM enhance Türkiye's deterrence on the battlefield. Additionally, systems such as the GÖKTUĞ missile, which enhances engagement capacity against aerial platforms, and SUNGUR, developed for low-altitude defence, expand the operational capability spectrum.

GÖKTUĞ AIR-TO-AIR MISSILE (Bozdoğan – Gökdoğan)

[133] Günyol, A. (2025). Millî entegre hava savunma mimarisi Çelik Kubbe, kabiliyetlerini artırmaya devam ediyor. *Anadolu Ajansı*. https://www.aa.com.tr/tr/savunma-sanayisi/milli-entegre-hava-savunma-mimarisi-celik-kubbe-kabiliyetlerini-artirmaya-devam-ediyor/3604371 (Erişim Tarihi: 04.08.2025).

3.4.1. HİSAR Projects

Under the HİSAR contracts signed between the Presidency of Defence Industries and ASELSAN, it is aimed to carry out the design, development, and production of national low- and medium-altitude air defence missile systems using domestic defence industry capabilities, effective against combat aircraft, cruise missiles, UAVs, helicopters, and air-to-ground missiles. In the HİSAR Projects, ASELSAN is responsible for ground systems, ROKETSAN for missiles, and TÜBİTAK SAGE for warheads, with many domestic companies, institutions, and organizations participating.[134]

HİSAR-O+ Project.

Under the HİSAR-A+ Project, design and development activities of two configurations—autonomous and towed—of low-altitude air defence missile systems have been completed, and the systems have started to enter inventory. Within the scope of the HİSAR-O+ Project, the design and development activities of medium-altitude air defence missile systems were completed in 2021, and the systems were delivered to the TAF.

3.4.2. SİPER System

Developed under a contract signed between the SSB, ASELSAN, ROKETSAN, and TÜBİTAK SAGE, this is an air defence system against long-range and high-altitude targets, initiated in 2018. On November 6, 2021, the test firing of the SİPER air defence missile was publicly announced for the first time, and in trials conducted in late 2022, the missile was reported to have exceeded a range of 100 km.[135]

[134] Bayraklı, Enes. Cumhuriyetin 100. yılında Cumhurbaşkanlığı Savunma Sanayii Başkanlığı. Istanbul: Türkiye Araştırmaları Vakfı Yayınları, 2024, s. 93.

[135] Hava Savunma ve Silah Mühimmat Sistemleri. T.R. Cumhurbaşkanlığı Savunma Sanayii Başkanlığı. https://www.ssb.gov.tr/WebSite/contentlist.aspx?PageID=4152&LangID=1 (Accessed: 14.01.2025).

3.4.3. KORKUT System

The KORKUT system will operate in teams consisting of a Command and Control Vehicle and associated Weapon System Vehicles. The system can perform its air defence mission connected to the HERİKKS air defence early warning and command-and-control system, or it can autonomously execute target detection, identification, tracking, and interception functions as a KORKUT team. The KORKUT System is highly effective not only against conventional air threats such as aircraft and helicopters but also against modern threats such as cruise missiles, air-to-ground missiles, and UAVs.[136]

3.4.4. UMTAS

UMTAS is a long-range anti-tank weapon system project. Although initially designed in 2005 as the anti-tank missile system for the National Attack Helicopter (T-129), it can also be integrated into UAVs, land vehicles, fixed platforms, light attack aircraft, and naval platforms, remaining effective against all types of armored systems. Developed by ROKETSAN, the system can operate under all weather conditions, day and night, thanks to its infrared imaging seeker.[137]

At SAHA EXPO, ASELSAN's UMTAS/OMTAS "Seeker Heads" were exhibited.

136 Ibid.
137 Uzun Menzilli Tanksavar Füze Sistemi. ROKETSAN. https://www.roketsan.com.tr/tr/urunler/umtas-uzun- menzilli-tanksavar-fuze-sistemi (Accessed: 14.01.2025).

3.4.5. STAMP

STAMP is a remotely operated stabilized weapon system project developed for land and naval platforms. It can be mounted on different types and classes of naval and land vehicles. The system can be placed on a stabilized turret and operated remotely. With its automatic target-tracking feature, the STAMP system is especially used on warships, coast guard boats, landing ships, and other vessels against close-range and asymmetric threats[138].

STAMP.

3.4.6. National Infantry Rifle MPT-76

The National Infantry Rifle (MPT-76), produced entirely with national resources without foreign technical assistance, successfully passed all 42 NATO-standard extreme tests, including cold and hot weather, sand, rain, and mud. The rifle continues to operate without malfunction even under conditions of –40 and +65 degrees Celsius, pressurized water exposure, and sludge, with a firing rate of 650 rounds per minute. It has attracted international attention in global markets[139].

National Infantry Rifle.

[138] Ibid.
[139] Ibid.

3.4.7. Cruise Missile (SOM-J)

The SOM-J Cruise Missile was developed to enable F-35 Joint Strike Fighters to strike targets from long range while maintaining critical stealth capability during covert flight, with up to four SOM-Js carried inside the aircraft fuselage. The missiles, designed for use against heavily protected land and naval targets, have a range of 185 kilometers. Flying at very low altitude within this range to evade radar detection, the SOM-J uses a terrain-following navigation system to conceal itself and achieve high accuracy in striking its target. With its high-resolution imaging infrared seeker, the SOM-J enables precision targeting and allows for in-flight retargeting via coordination with airborne early warning and control aircraft. Likewise, changes to terminal attack angle and approach altitude can also be executed during flight.[140]

3.4.8. EJDERHA/AD 200

The EJDERHA/AD 200 system, developed by ASELSAN, is a directed-energy weapon system designed on the basis of high-power electromagnetic wave technology. Without requiring physical contact, the system creates electromagnetic disruption over a wide area, providing the capability to neutralize especially mini- and micro-class UAVs. This technology provides a selective and effective countermeasure against the electronic components of low-cost and widely used UAVs, playing a deterrent role in protecting critical infrastructure and strategic areas. Another distinguishing feature of the EJDERHA/AD 200 is its high mobility and modular structure combined with its original design. The system can be configured for different mission definitions, offers rapid deployment capability, and can operate effectively in diverse geographical conditions. This flexible and reconfigurable architecture enhances the ability of security units to adapt to evolving threat environments and provides immediate intervention capability in the field.[141]

3.4.9. TAYFUN BLOK-4

The TAYFUN BLOK-4 ballistic missile system, developed by ROKETSAN, is an indigenous, high-technology platform with the potential to significantly enhance Türkiye's strategic defence capacity. As the longest-range ballistic missile developed to date with national capabilities, this system represents a critical threshold in terms of deterrence and operational effectiveness. One of the most notable technical advantages of the TAYFUN BLOK-4 is its increased warhead capacity. This capacity elevates the destructive power on target, thereby enabling more effective neutralization of strategically significant targets. Its long range and high payload capacity transform the missile from being merely a defence asset into a force multiplier and a key element of deterrence. Another noteworthy feature of the system is its integration of hypersonic ballistic missile technology. This capability provides superiority in speed, maneuverability, and time-to-tar-

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[140] Ibid.

[141] ASELSAN'dan Yeni Nesil Anti-İHA Sistemi: EJDERHA/AD 200. (2025). *Türk Silahlı Kuvvetlerini Güçlendirme Vakfı*. https://tskgv.org.tr/savunma-sanayii-gundem/aselsandan-yeni-nesil-anti-iha-sistemi-ejderhaad-200. (Accessed: 04.08.2025).

get during both endo-atmospheric and exo-atmospheric flight phases. Thus, the TAYFUN BLOK-4 offers an advanced missile solution with qualities that will be decisive on the battlefields of the future.[142]

3.4.10. GAZAP Bomb

Developed by the Ministry of National Defence R&D Center, the GAZAP bomb is the most destructive domestically produced conventional air munition Türkiye has manufactured to date. Designed entirely with national engineering capabilities, this system reduces foreign dependency and represents a strategic product with the potential to boost Türkiye's defence industry export capacity. Although similar to the standard MK-84 munition that has been in use for many years on F-16 and F-4 fighter aircraft, the fundamental difference of the GAZAP bomb is its high particle-density structure. Containing approximately 10,000 fragments, the munition disperses these particles over a wide area upon detonation. With a total weight of about 970 kilograms, the munition delivers three times the destructive power of its counterparts thanks to its high explosive capacity.[143]

3.5. Electronic Warfare and Radar Systems

Electronic warfare and radar systems are technologies of critical importance for gaining strategic superiority in modern battlefields. Türkiye has strengthened its national defence capacity with domestically developed and nationally produced projects in this field. Electronic warfare offers an effective defence strategy against enemy radars, communication networks, and other electronic systems, while radar systems play a vital role in detecting security threats in air, land, and naval domains. Türkiye's projects in this area combine advanced technology and engineering capacity, developing sustainable solutions for the defence industry.

3.5.1. Stand-off Jammer / Airborne Electronic Support and Attack Capability Project (HAVA SOJ)

It has been announced that four HAVA SOJ Systems will be procured to meet the needs of the Turkish Air Force Command. The HAVA SOJ Project aims to detect/identify and locate enemy communication systems and radars (air defence, early warning, etc.) and to jam and deceive them so they cannot be used against friendly forces,

ASELSAN, with its domestically developed Airborne Satellite Communication System, is preparing to meet the communication needs of the Turkish defence industry's new UAVs.

[142] Türkiye'nin Güçlü Füzesi TAYFUN BLOK-4 IDEF 2025'te Görücüye Çıktı. (2025). *Türk Silahlı Kuvvetlerini Güçlendirme Vakfı*. https://tskgv.org.tr/savunmasanayiigundem/turkiyenin-guclu-fuzesi-tayfun-blok-4-idef-2025te-gorucuye-cikti. (Accessed: 04.08.2025).

[143] Millî Savunma Bakanlığı AR-GE Merkezinin Ürettiği GAZAP ve NEB Bombaları, Basında Geniş Yer Buldu. (2025). *Millî Savunma Bakanlığı*. https://www.msb.gov.tr/SlaytHaber/9bf36f7d205048aea5fbaa9094eb17a3. (Accessed: 04.08.2025)

particularly in cross-border operations. The mission systems to be integrated into the HAVA SOJ Systems will be produced with domestic capabilities.[144]

3.5.2. Land-Based Remote Electronic Support / Electronic Attack Capability Acquisition Project (KARA SOJ)

Within the scope of the KARA SOJ Project, the system developed consists of an Electronic Support System (KARA SOJ ED) and an Electronic Attack System (KARA SOJ ET), both integrated into military tactical vehicles and operating across a wide frequency band. The purpose of the system is to create vulnerabilities in the target country's early warning and air defence radar systems within the area of operations of the Turkish Air Force Command; thereby exploiting enemy command-and-control and air defence weaknesses, and supporting the Turkish Air Force Command's offensive, defensive, and support elements in successfully completing their missions in a reduced-risk environment.

For this purpose, the KARA SOJ ED System performs radar detection, identification, and direction-finding functions, while the KARA SOJ ET System performs jamming, deception, and neutralization of target radars. With these features, the KARA SOJ System will create vulnerabilities in the air defence systems of target countries.[145]

KARA SOJ System.

[144] Elektronik Harp ve Radar Sistemleri. T.R. Cumhurbaşkanlığı Savunma Sanayii Başkanlığı. https://www.ssb.gov.tr/WebSite/contentlist.aspx?PageID=1081&LangID=1 (Accessed: 14.01.2025)

[145] Ibid.

The know-how gained through the development of the KARA SOJ System has also provided a significant infrastructure for the domestic development of new electronic warfare systems. The system was developed and produced entirely with national capabilities by ASELSAN in line with the requirements of the Turkish Air Force Command.

3.5.3. HEWS Helicopter Electronic Warfare Suite Development Project

HEWS/HEHSİS is a helicopter electronic warfare suite development project. The project is an integrated Electronic Warfare Self-Protection System developed by ASELSAN for fixed- and rotary-wing air platforms. The integrated electronic warfare self-protection system includes subsystems such as a Missile Warning System, Radar Warning Receiver System, Laser Warning Receiver System, Radio Frequency Jammer System, Countermeasure Dispensing System, and a Suite Central Management Computer to protect against infrared, laser, and radio frequency-guided missile threats[146].

3.5.4. Multi-Function Phased Array Radar (ÇAFRAD)

The ÇAFRAD Project, a Multi-Function Phased Array Radar, is being conducted by ASELSAN, METEKSAN, and TÜBİTAK to domestically develop the ÇAFRAD System as the main sensor of the Turkish Navy's TF-2000 Air Defence Destroyer. It is planned to be used as an Identification Friend-or-Foe (IFF) system. The system also features phased-array radar technology capable of simultaneously tracking thousands of targets and performing three-dimensional mapping.

SPEWS-II System on F-16 Aircraft.

3.5.5. SPEWS-II

The SPEWS-II Project is an electronic warfare self-protection system for F-16C Block-50 aircraft in the inventory of the Turkish Air Force Command. The SPEWS-II System, consisting of a radar warning receiver and an RF jammer, was jointly developed by

[146] Bayraklı, Enes (2024). Cumhuriyetin 100. Yılında Cumhurbaşkanlığı Savunma Sanayii Başkanlığı. *Türkiye Araştırmaları Vakfı Yayınları*. s. 96.

ASELSAN and BAE Systems. The system's primary function is to work in coordination with other avionics and the countermeasure dispensing system on the platform to detect, identify, jam, and deceive threat radars[147].

3.5.6. Early Warning Radar System Project (EİRS)

Launched in 2011, this project aims to develop and procure early warning radar systems required by the Turkish Air Force Command. The system has two configurations: Transportable EİRS (TEİRS) and Fixed EİRS (SEİRS), with a declared range of 460 km.

3.6. Cybersecurity and R&D Projects

The Presidency of Defence Industries (SSB) also carries out important projects in the field of cybersecurity for the development of the Turkish defence industry. In this scope, the Defence Industry Research Center (SİSAMER) and Cyber Cluster projects are at the forefront. Through the SİSAMER Project, the cybersecurity of TAF's information systems is strengthened with national software, enabling the TAF to respond instantly to cyber incidents and mitigate their potential impacts. Within the framework of the contract signed in 2016, the Cyber Defence Operations Center was established in 2017, and in the first quarter of 2020, the nationally developed cybersecurity software was provisionally accepted and delivered for use by the TAF. While the first phase of the project has been completed, it has been stated that the second phase will begin soon. Another important project carried out in the field of cybersecurity is the Türkiye Cybersecurity Cluster. The Türkiye Cybersecurity Cluster was established on June 28, 2018, under the auspices of the SSB to identify Türkiye's cybersecurity needs and meet

[147] Elektronik Harp ve Radar Sistemleri. T.C. Cumhurbaşkanlığı Savunma Sanayii Başkanlığı. https://www.ssb.gov.tr/WebSite/contentlist.aspx?PageID=1344&LangID=1 (Erişim Tarihi: 14.01.2025).

them through innovative methods, ensuring fair competition conditions with the highest level of cooperation, and to develop the domestic cybersecurity ecosystem. The project is carried out by SSTEK A.Ş. On February 1, 2021, a protocol was signed between the SSB and the Presidency's Digital Transformation Office to jointly conduct the activities of the Türkiye Cybersecurity Cluster Platform. The aim is to increase the number of cybersecurity firms in Türkiye and to strengthen their competitiveness both nationally and internationally.

On the other hand, a wide range of R&D activities are being carried out in the Turkish defence industry to maximize the benefits of advanced technology in every field. Through these projects, a process is being followed in which fundamental scientific issues are researched and transformed into technology, ultimately aiming to develop effective weapon systems.

- **AVCI Helmet Integrated Control System Project**

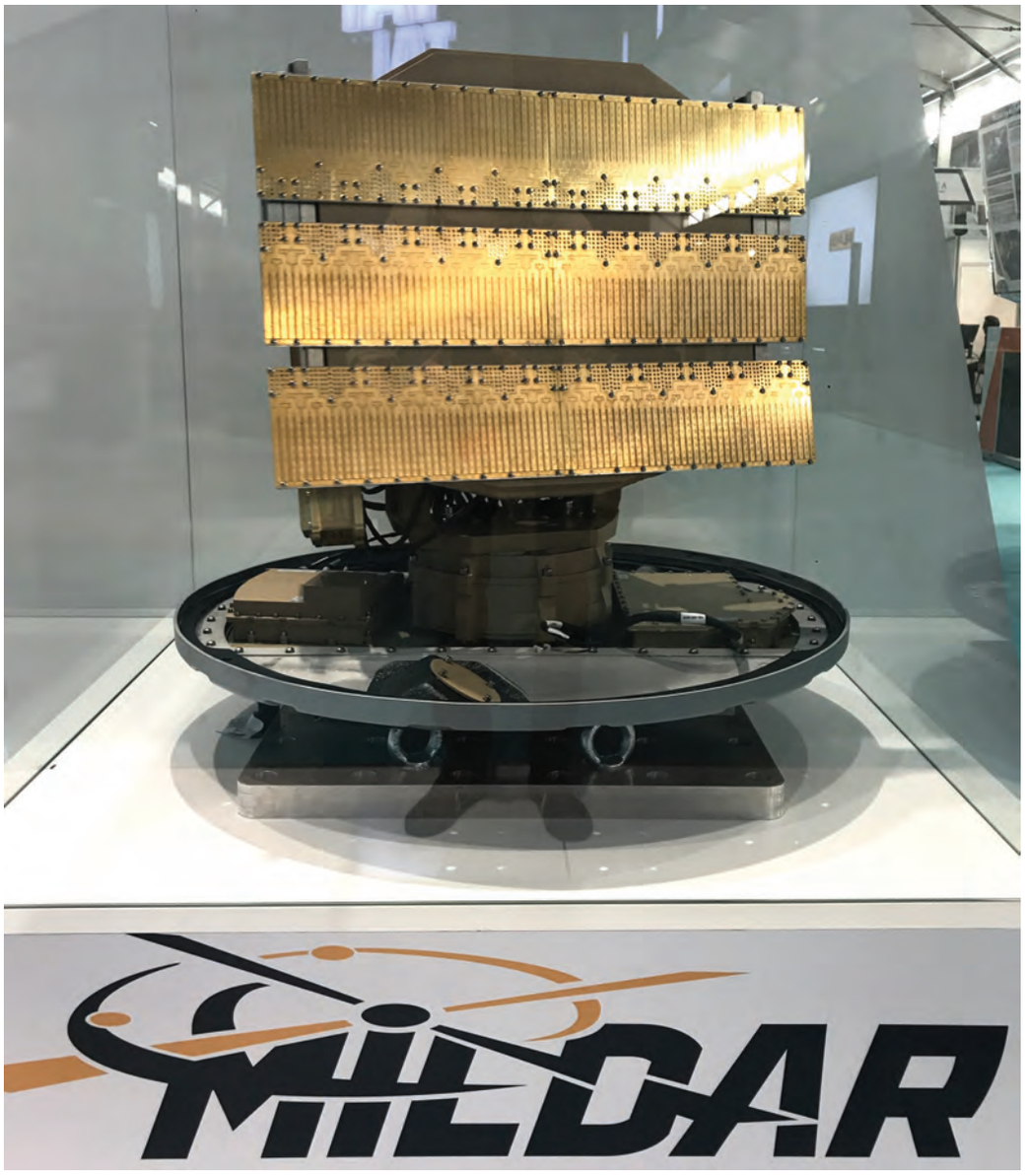
A helicopter pilot with the AVCI helmet.

The project aims to design, with original solutions, the units constituting the helmet-mounted control system that will be integrated into helicopter avionics and weapon systems, display day/night imagery, navigation, and flight management data and symbology to the pilot, direct the gun and target detection system (FLIR) via the mission computer, perform the pilot's internal/external communications, and protect the pilot's eyes from lasers and the head from potential impacts. It is planned to be integrated into the ATAK Helicopter.[148]

[148] AR-GE Projeleri. T.R. Cumhurbaşkanlığı Savunma Sanayii Başkanlığı. https://www.ssb.gov.tr/WebSite/contentlist.aspx?PageID=1073&LangID=1 (Accessed: 15.01.2025).

- **Airborne Millimeter-Wave Radar Development Project (MİLDAR)**

Within the scope of the project, in order to increase the combat effectiveness of air platforms, prototypes of multi-functional, low-volume and lightweight radars operating in the millimeter-wave band will be developed domestically for use on helicopters and UAV platforms, along with a radar unit to perform automatic take-off and landing of UAV platforms. The project consists of three phases: in the first phase, the Helicopter Millimeter-Wave Radar (MİLDAR); in the second phase, the Automatic Take-Off and Landing System; and in the third phase, the UAV MİLDAR will be developed[149].



MİLDAR System.

[149] Ibid.

In addition, R&D projects such as Tuygun (advanced imaging technology project), Ulak (fourth-generation communication technology project), İPEK (carbon-fiber-reinforced thermoset resin prepreg development project for aerospace), and Kristal (nickel super-alloy material and manufacturing process development project for aerospace) are ongoing.

Ulak, the fourth-generation communication technology project.

IV

The Economic Transformation of the Defence Industry: Domestic Production, Global Competition

THE ECONOMIC TRANSFORMATION OF THE DEFENCE INDUSTRY: **DOMESTIC PRODUCTION, GLOBAL COMPETITION**

Türkiye has undergone a globally recognized transformation in the defence industry with the progress achieved in recent years. While Türkiye relied heavily on imports to meet its defence needs until the 2000s, today, with products that have a high share of domestic production, it has become a strong player in both regional and international markets. This transformation contributes significantly not only to security and strategic independence but also to economic development.

The defence industry is of central importance not only for securing a nation's security but also for accelerating economic development, fostering technological innovation, and sustaining strategic independence. This sector provides multidimensional benefits such as high value-added production, creation of qualified employment, and enhanced competitiveness in international markets, going beyond merely strengthening military capacity. Considering the size of investments made in the defence industry and the advanced technologies employed, it is known that a significant portion of national income is allocated to this sector in many countries worldwide.[150]

[150] Küçükoğlu, M., (2023). Türk Savunma Sanayisindeki Gelişmelerin Ekonomiye Etkileri (2000-2023). *Sakarya İktisat Dergisi*. C.12, S.1. https://dergipark.org.tr/tr/download/article-file/3032204 (Accessed: 13.01.2025).

President Erdoğan attended TEKNOFEST Istanbul Aviation, Space, and Technology Festival on September 22, 2018.

Advanced technology products of Turkish Defence companies were showcased at SAHA EXPO.

Türkiye has set the increase of domestic and national production ratios in the defence industry as a fundamental goal and has taken important steps in this direction. This strategic approach aims to reduce foreign dependency by promoting domestic production. Today, with more than 3,500 firms and over 90,000 employees, Türkiye's defence industry ecosystem has become one of the sectors making the greatest contribution to the national economy. While the domestic production ratio in the defence industry stood at around 20 percent in 2002, as of 2024 it has exceeded 80 percent. The fact that five Turkish companies—ASELSAN, TUSAŞ, ROKETSAN, MKE, and ASFAT—are listed among the world's top 100 defence companies[151] is concrete proof of Türkiye's strategic and economic success in the defence industry. In the field of UAVs produced with domestic and national capabilities, Türkiye ranks among the top five countries worldwide in design, production, and sales.[152]

[151] Cevdet Yılmaz: Savunma Sanayisinde Yerlilik Oranı Yüzde 80'leri Aştı. DHA. https://www.dha.com.tr/ politika/cevdet-yilmaz-savunma-sanayisinde-yerlilik-orani-yuzde-80leri-asti-2507058 (Accessed: 13.01.2025).

[152] "Top 100 Defence Companies-2024". *Defence News*. https://people.defensenews.com/top-100/ (Accessed: 13.01.2025).

Turkish companies among the world's top 100 defence companies[146].

Position Among the World's Top 100 Defence Companies	Company Name	2023 Defence Revenue (Million $)	2022 Defence Revenue (Million $)	Change in Defence Revenue	2023 Total Revenue (Million $)
42	ASELSAN	2,986.77	2,307.08	%29	3,186.12
50	TUSAŞ	2,205.74	1,483.70	%49	2,673.76
71	ROKETSAN	1,256.26	1,591.47	%-21	1,256.26
84	MKE	905.75	553.88	%64	905.75
94	ASFAT	656.88	885.92	%-26	656.88

The defence industry, with its technology-intensive structure and innovative production processes, has become an important driving force of Türkiye's economy. This sector not only meets security needs but also contributes significantly to economic growth by increasing export volume, positively impacting Gross Domestic Product (GDP), and creating highly qualified employment opportunities. The impact of the defence industry on the economy is further strengthened by the investments made in the sector and the positive externalities these investments create for subcontractors and small- and medium-sized enterprises (SMEs). In addition, R&D investments in the defence industry support innovative production processes, enable technology transfer, and allow for the enhancement of domestic production capacity. These elements contribute to economic diversification and the enhancement of competitiveness, while also promoting the development of sub-industries linked to the sector. This dynamic reduces Türkiye's external dependency in the field of defence industry and plays a critical role in achieving national development goals.

4.1. Export Volume of The Defence Industry and Contribution to GDP

In recent years, the Turkish defence industry has become not only a domestic market player but also a significant actor in global markets. These developments in the defence industry have contributed substantially to Türkiye's economic growth and created a positive impact on the balance of foreign trade. Defence industry exports contribute not only to Türkiye's economic growth but also directly to GDP. This section examines the volume of Türkiye's defence industry exports, their impact on GDP, and the role of the defence industry in economic growth.

Localization in the Turkish defence industry has significantly reduced import costs while also decreasing foreign dependency and ensuring strategic autonomy. Between 1970 and 1979, 50 percent of Türkiye's military and defence expenditures were import-based, while this rate fell below 10 percent after 2000.[154] Moreover, the increase in the Turkish defence industry's technological capacity and the international recognition it has achieved have been among the main drivers behind the remarkable rise in export figures.

[153] Ibid.

[154] "Savunmadaki 'millî hamle' Türkiye'ye kazandırdı". *Anadolu Ajansı*. https://www.aa.com.tr/tr/savunma-sanayisi/savunmadaki-millî-hamle-turkiyeye-kazandirdi/3362358 (Accessed: 13.01.2025).

The first flight of the second prototype of HÜRJET.

The export performance of the Turkish defence industry over the last four years highlights the sector's strong and stable growth and the notable success it has achieved in international markets. In 2020, Türkiye carried out defence exports worth USD 2,278,695,000; in 2021, USD 3.2 billion; and in 2022, USD 4.4 billion. In 2023, exporting [155]more than 230 defence products to 185 countries, Türkiye recorded a 27 percent increase and raised its export revenue to USD 5.5 billion.[156] This steady momentum continued in 2024, with defence and aerospace exports reaching USD 5.761 billion in the first 11 months of the year. By the end of the year, defence and aerospace exports exceeded the 2024 target of USD 6.5 billion by 11 percent; including NATO and service exports, they rose by 29 percent to USD 7.154 billion, marking a new record.[157] As of today,

155 Cumhurbaşkanı Erdoğan:"Türkiye Cumhuriyeti Devleti, Bekasına Yönelik Tüm Tehditleri Kaynağında Bertaraf Etme Gücüne, Kapasitesine ve Kararlılığına Sahiptir". T.R. Cumhurbaşkanlığı İletişim Başkanlığı. https://www.iletisim.gov.tr/turkce/haberler/detay/cumhurbaskani-erdogan-turkiye-cumhuriyeti-devleti-bekasina-yonelik-tum-tehditleri-kaynaginda-bertaraf-etme-gucune-kapasitesine-ve-kararliligina-sahiptir. (Accessed: 13.01.2025).

156 "Türk Savunma Sanayiinin Yükselişi Sürüyor." *TRT Haber*. https://www.trthaber.com/haber/gundem/turk-savunma-sanayiinin-yukselisi-suruyor-835204.html#:~:text=T%C3%BCrk%20Savunma%20Sanayii%202020%20y%C4%B1l%C4%B1n%C4%B1,milyar%20500%20milyon%20dolara%20y%C3%BCkseltti. (Accessed: 13.01.2025).

157 Haluk Görgün X Hesabı. https://x.com/halukgorgun/status/1875168786707263825. (Accessed: 13.01.2025).

Türkiye holds a 1.6 percent share of global arms exports, ranking 11th among the highest exporting countries. In 2024 alone, defence industry products were exported to 171 different countries. These figures clearly demonstrate the direct contribution of domestic production to the national economy.

Export Performance Of The Turkish Defence Industry (2020–2024)

Growth in the defence industry not only strengthens Türkiye's role in regional security but also enhances its competitiveness in international markets. In the 12th Development Plan covering 2024-2028, priority has been given to the defence industry, with the aim of increasing defence and aerospace exports to USD 11 billion and making Türkiye one of the world's top 10 exporters. To achieve this target, increasing domestic production capacity, strengthening technological infrastructure, and implementing strategic export policies for international markets have been identified as fundamental priorities.[158]

In the early 2000s, the Turkish defence industry largely operated based on public tenders and domestic production. However, from the mid-2000s onwards, reforms in the defence industry, R&D investments, and the expansion of domestic production capacity significantly increased the sector's revenues. As of 2022, this figure had reached USD 11 billion, and by 2025, it had risen to USD 20 billion. This growth resulted from factors such as the expansion of defence industry production capacity, the development of new products, and the strengthening of domestic supply chains.

[158] Uluslararası İşbirliği ve İhracat Stratejisi 2024-2028. T.R. Cumhurbaşkanlığı Savunma Sanayii Başkanlığı. https://www.ssb.gov.tr/Images/Uploads/MyContents/F_20240724173435223083.pdf. (Accessed: 13.01.2025).

Another key driver of the increase in defence industry revenues has been the improvement in the quality and diversity of Türkiye's defence industry products. In particular, the production and export of UAVs, naval platforms, land systems, rocket technologies, and electronic warfare systems have made a significant contribution to the sector. Furthermore, the competitiveness of the Turkish defence industry in global markets has boosted overseas sales and supported the growth of the sector's revenues.

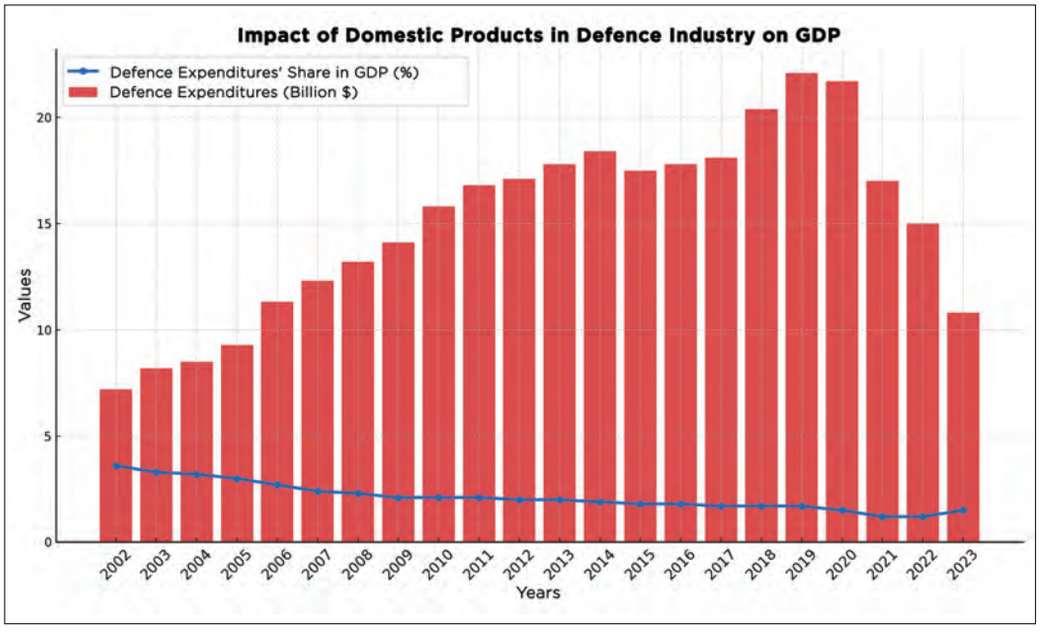
Revenues of the Turkish Defence Industry and Contribution to GDP (2000–2022)[159]

Year	Total Revenue (Million $)	Annual Change (%)	Sector Revenue's Share in GDP (%)
2000	851.852.000		0,32
2001	848.897.075	-0,35	0,43
2002	1.062.375.000	25,15	0,46
2003	1.301.000.329	22,46	0,43
2004	1.337.120.000	2,78	0,34
2005	1.591.162.692	19,00	0,33
2006	1.855.291.882	16,60	0,35
2007	2.437.625.437	31,39	0,38
2008	3.067.336.444	25,83	0,42
2009	2.900.147.387	-5,45	0,47
2010	3.706.740.570	27,81	0,51
2011	4.380.884.736	18,19	0,57
2012	4.756.380.652	8,57	0,60
2013	5.076.000.000	6,7	0,62
2014	5.101.000.000	0,49	0,64
2015	4.908.000.000	-3,78	0,68
2016	5.968.000.000	21,60	0,70
2017	6.693.000.000	12,15	0,79
2018	8.761.000.000	30,90	1,12
2019	10.884.081.347	24,23	1,43
2020	8.555.799.282	-21,39	1,18
2021	10.159.297.769	14,72	1,24
2022	12.196.447.159	20,05	1,34

[159] YılmazTürk, A., (2023), Türkiye'de Savunma Sanayi Sektörü ve Ekonomi Üzerindeki Etkisinin Değerlendirilmesi. *Enderun Dergisi*. https://dergipark.org.tr/tr/download/article-file/3344374. (Erişim Tarihi: 13.01.2025).

The table above presents the Turkish defence industry's revenue figures between 2000 and 2022, along with their annual percentage changes. Overall, the sector's revenue has shown an upward trend. In 2022, total sales revenue increased by 20.05 percent compared to the previous year, reaching USD 12.196 billion.[160]

The contribution of the defence industry to Türkiye's GDP can be assessed in two ways: direct and indirect. Direct contribution is measured by the impact of revenues generated from the defence industry on GDP, while indirect contribution arises from the industry's influence on other sectors.



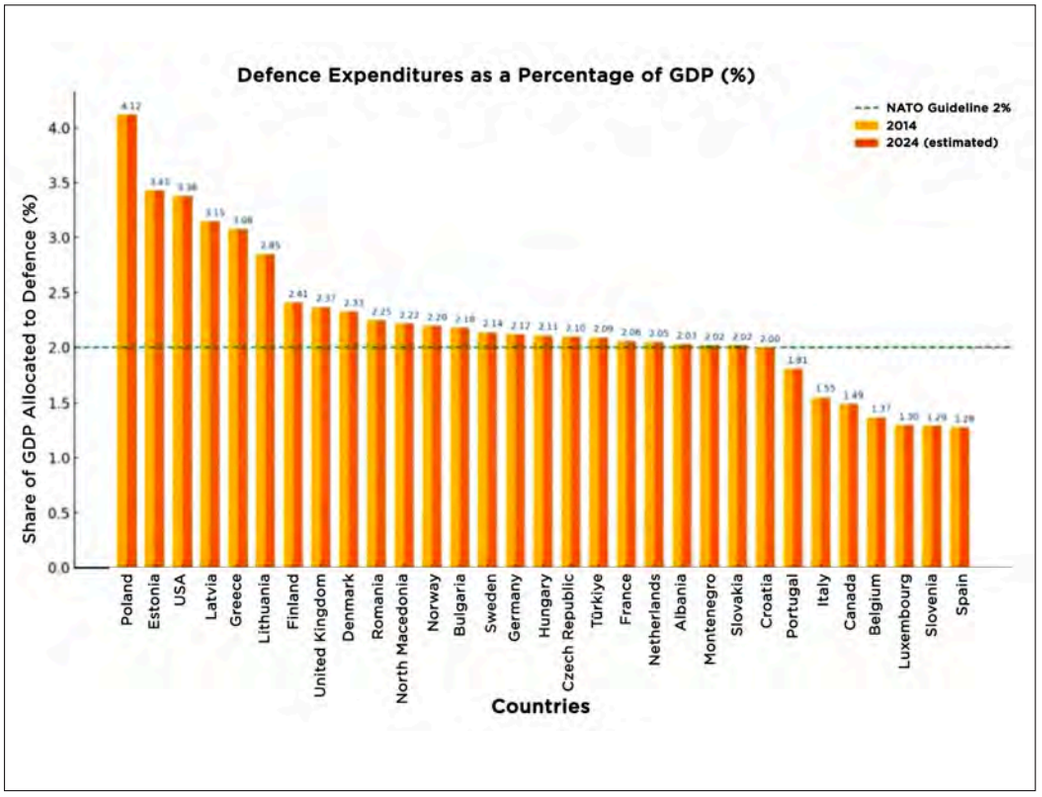
Impact Of Domestic Defence Industry Products On Gdp (2002–2023).

Between 2000 and 2022, the contribution of the Turkish defence industry to GDP showed a steady increase. At the beginning of the 2000s, the contribution of the defence industry to GDP was around 0.3 percent, whereas by 2022 this rate had risen to approximately 1.5 percent. This increase is directly related to the growth of defence industry production capacity, rising exports, and higher domestic production rates. Projects such as the ALTAY Tank, Bayraktar UAV, and ATAK Helicopter have not only expanded Türkiye's defence industry export capacity internationally but have also made a direct contribution to GDP. This upward trend in the sector's revenue has also positively contributed to Türkiye's foreign trade balance by increasing foreign exchange earnings.

On the other hand, between 2014 and 2023, Türkiye's defence expenditures as a share of GDP remained at around 1.5 percent. As shown in the chart below, in 2024 this ratio was announced as 2.09 percent. Thus, Türkiye achieved the 2 percent benchmark accepted for NATO member countries.

[160] SASAD Sektör Performans Raporu 2022. Savunma ve Havacılık Sanayii İmalatçılar Derneği. https://www.sasad.org.tr/sasad-sektor-performans-raporu-2022. (Accessed: 13.01.2025).

In terms of the share allocated from the budget for equipment procurement, Türkiye ranked above NATO's 20 percent target with 34.2 percent.



Defence Expenditures As A Percentage Of Gdp[161].

4.2. Employment Potential and Socioeconomic Development

The defence industry is a field where advanced applications of high technology are realized. Türkiye's defence industry has become a pioneering sector in the transition to high technology. The achievements in this area are expected to create a rapid spillover effect across all sectors. Over the last 20 years, the Turkish defence industry has undergone a significant transformation both globally and domestically, contributing not only to meeting defence needs but also to the country's economic and social structure. As a high-technology, R&D-oriented sector, the defence industry stands out with its employment creation potential and impact on socioeconomic development.[161]

Between 2000 and 2022, the annual revenue of the Turkish defence industry rose from USD 1 billion to USD 11 billion, and by 2025 it reached USD 20 billion. This growth has also increased employment in the sector. This increase has not only generated employment but also strengthened domestic production capacity and improved the overall quality of Türkiye's industrial output. The growth of the defence industry has further

[161] NATO Ülkelerinin Savunma Harcamaları Raporu (2012-2024) https://www.nato.int/nato_static_fl2014/assets/pdf/2024/6/pdf/240617-def-exp-2024-en.pdf (Erişim Tarihi: 14.01.2024).

contributed to Türkiye's broader development strategies by boosting the pool of qualified labor in high-engineering and technology-intensive sectors. In this context, the employment generation potential of the Turkish defence industry and its impact on socioeconomic development are of vital importance not only in terms of economic growth but also in enhancing societal welfare.

Graduation ceremony of the SAHA MBA Program.

Since the defence industry is a field requiring advanced technology, it generates demand for a qualified workforce. According to data from the Presidency of Defence Industries (SSB), as of 2025, the total number of directly employed individuals exceeded 100,000, demonstrating the continuous increase in demand for skilled labor.[162] Bringing technical skills into the economy stands out as one of the social benefits of the defence industry. Companies such as ASELSAN, HAVELSAN, TUSAŞ, and ROKETSAN create both direct and indirect employment. Sub-industries are also expanding as a result of this process.

[162] Savunma Sanayii Sektörel Strateji Dokümanı- 2023/2027. T.R. Cumhurbaşkanlığı Savunma Sanayii Başkanlığı. https://www.ssb.gov.tr/Images/Uploads/MyContents/F_20231106165507582242.pdf (Accessed: 14.01.2024)

To enhance competencies in the defence industry ecosystem and ensure sustainable development in this field, the Defence Industry Executive Committee launched the National Competency Initiative on August 6, 2024. Through the National Competency Initiative carried out by the Defence Industry Academy under the Presidency of Defence Industries, the aim has been to place talent and competency values at the core, uniting numerous elements under a single framework and spreading them throughout the entire ecosystem. According to data from the Presidency of Defence Industries, within one year of this initiative: 25,000 people continued their development through the digital learning platform. 87,061 individuals enhanced their knowledge and experience in 26 different events, while 3,444 high school and university students received competency training. More than 10,000 individuals participated in physical training programs. Within the scope of the National Competency Initiative, supported by 77 companies, 206 universities, 4 ministries, and 12 institutions, activities held in various European countries have taken steps to reverse brain drain.

Presidency of Defence Industries, National Competency Initiative launch program.

The socioeconomic contributions of the defence industry extend beyond economic growth, significantly influencing social, cultural, and technological development processes. These contributions cover a range of critical areas, particularly regional development, labor markets, technology production, and societal security. The impact of the

Turkish defence industry on regional development is especially evident in SMEs and subcontractors located in developing provinces. The support provided by defence industry projects to these enterprises allows local economies to grow and helps reduce regional disparities. In addition, the spread of industry clusters and technoparks centered around the defence industry not only strengthens technology production capacity but also increases local employment opportunities, not only in major cities but also in rural and mid-sized urban areas.

At TEKNOFEST held in Adana in 2024, students showed great interest.

The contributions to regional development also align with Türkiye's broader development strategies, enabling the local labor market to cultivate qualified human capital. In particular, the demand created by defence industry projects for production processes based on high technology has elevated the education level of the local workforce and led to the emergence of new professional fields to meet sectoral labor needs. While the defence industry contributes to the growth of local economies, it also plays a critical role in strengthening technological and engineering infrastructure. In this context, technoparks and industrial clusters in major cities such as Ankara, Istanbul, and Izmir have promoted economic diversification and increased technology production capacity.

The development of the defence industry has also contributed to the strengthening of security and independence within society. This process not only ensures national security

but also enhances public trust in the defence industry and encourages broader societal interest in the sector. This effect, particularly through university-industry collaborations and R&D activities, has increased young people's interest in STEM (Science, Technology, Engineering, and Mathematics) fields. All these factors encourage innovative thinking and entrepreneurial spirit, playing an active role in achieving the country's long-term development goals.

The number of young women preparing to become aircraft technicians in the defence industry is rising.

Increasing opportunities for women's employment in the defence industry are also strengthening gender equality in the sector. For women engineers and technicians, the defence industry offers an expanding field of employment, with many leading companies developing policies to increase female participation. The growing presence of women in the field enhances diversity within the sector, paving the way for more innovative and sustainable solutions.

The effects of the defence industry on human resources are highly significant in terms of diversifying and advancing competencies within the sector. Today, it is recognized that employing individuals specialized in only one field is insufficient for the defence industry, which instead requires a multidisciplinary, technology-focused, and continuously evolving workforce. Türkiye aims to build a labor force potential that is flexible and

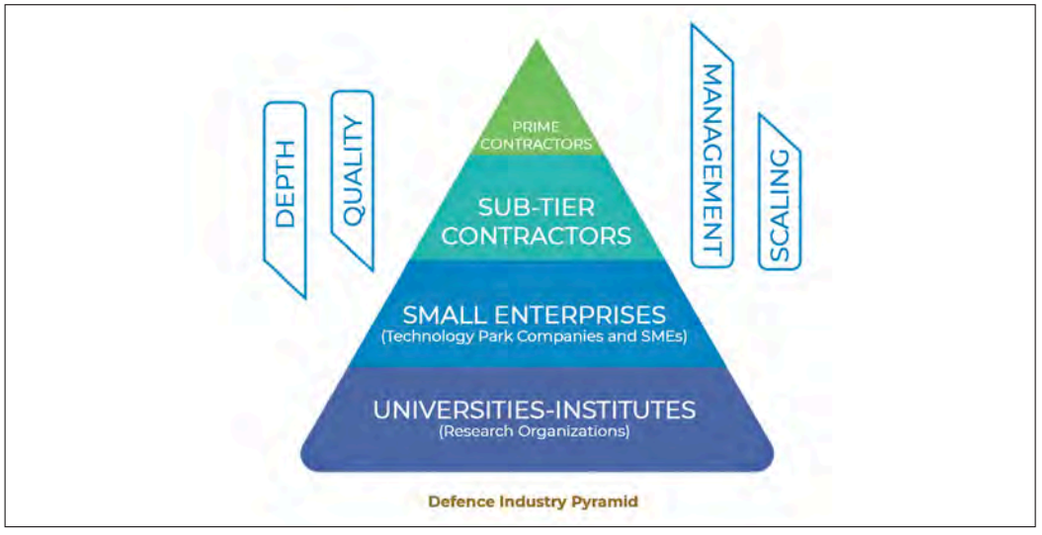
equipped with multidisciplinary competencies in this regard. To achieve this goal, many new human resources and training programs are being planned and implemented.

At Bursa Technical University, an R&D project is being carried out to improve the performance of TUSAŞ aircraft.

These training processes not only aim to enhance technical knowledge and skills but also to cultivate creative thinking, problem-solving, and innovation. In this context, the socioeconomic effects of the defence industry extend beyond economic growth, reaching across a wide spectrum of impact. The defence industry presents a holistic structure that supports not only economic development but also social, cultural, and technological advancement. These impacts, as part of Türkiye's national development strategies, strengthen the country's position at both national and international levels while enhancing its global competitiveness.

4.3. Investment and Financial Supports

Before discussing investment and financial supports in the defence industry, the 2023–2027 Defence Industry Sectoral Strategy Document of the Presidency of Defence Industries [163]is examined. According to this document, in order to increase the technological depth and domestic content rate of the defence industry, to minimize foreign dependency, and to ensure sustainability, the defence industry supply chain has been structured in a pyramidal model consisting of main contractors, subcontractors, SMEs, and universities/institutes/research organizations.



Supply Chain Pyramid of the Turkish Defence Industry.[164]

As seen in the chart, the Turkish defence industry is organized in a pyramid structure. This structure consists of main contractors, subcontractors, SMEs, and universities/institutes. While main contractors manage large-scale projects, subcontractors handle subsystem production and integration, and SMEs are engaged in component and part manufacturing. Universities and research organizations are tasked with R&D and training qualified human resources.

The fundamental elements of the industrialization approach carried out by the Presidency of Defence Industries are as follows:[165]

- **Competency Inventory (YETEN):** Developed by the Presidency of Defence Industries, YETEN is an application software designed to collect data, analyze

[163] Savunma Sanayii Sektörel Strateji Dokümanı- 2023/2027. T.R. Cumhurbaşkanlığı Savunma Sanayii Başkanlığı. https://www.ssb.gov.tr/Images/Uploads/MyContents/F_20231106165507582242.pdf (Accessed: 13.01.2025).

[164] Savunma Sanayii Sektörel Strateji Dokümanı- 2023/2027. T.C. Cumhurbaşkanlığı Savunma Sanayii Başkanlığı. S.19. https://www.ssb.gov.tr/Images/Uploads/MyContents/F_20231106165507582242.pdf (Erişim Tarihi: 13.01.2025).

[165] a.g.e, s. 20.

the competencies of defence industry firms, and guide them according to requirements. With YETEN, the aim is to meet the need for all defence industry products and services to the maximum extent domestically, using the resources and capabilities of the national industry. YETEN can generate alternative scenarios with artificial intelligence support and identify gaps in the sector. By 2027, it is targeted that the number of companies registered in YETEN will reach 5,000 and the number of products will reach 10,000. This program not only ensures that firms aligned with the strategic needs of the defence industry can advance but also contributes to strengthening domestic production capacity.

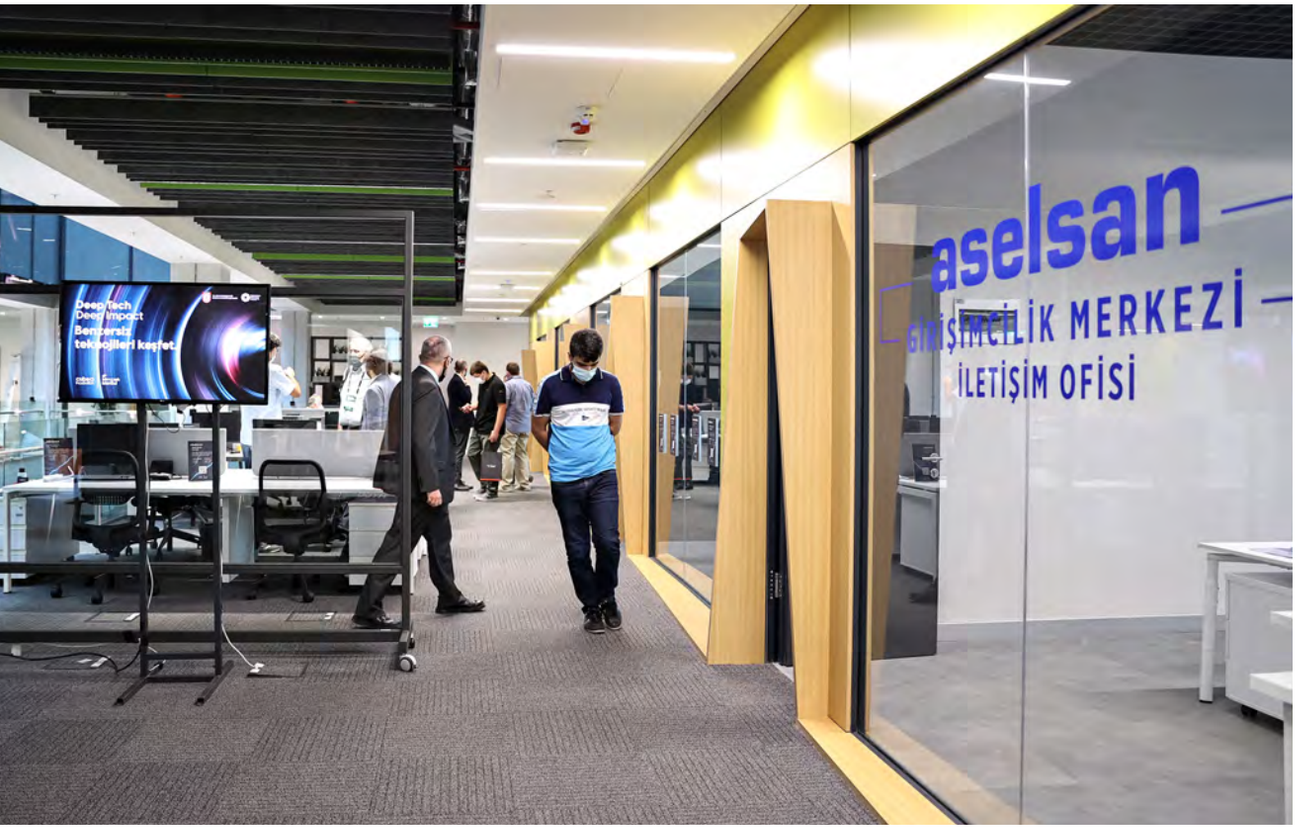
- **Industrial Competency Assessment and Support Program (EYDEP):** A mechanism established to analyze and improve the competencies of SMEs and subcontractors to support their growth. Through EYDEP evaluations, companies are certified and their development areas are identified. Mentorship programs are also carried out in cooperation with main contractors. EYDEP enables the strengthening of domestic production in the defence industry and enhances the competitiveness of SMEs.

- **Solution Partner and Product Library Approaches:** Critical products are localized and SMEs are included in the process as solution partners. The Product Library was created to promote domestic production and ensure that these products are used in projects. This library ensures that products used in the defence industry are procured from domestic manufacturers, thereby reducing foreign dependency. These strategies aim to increase domestic production capacity, ensure technological independence, and enhance the effectiveness of local companies in the sector.

With their capabilities, SMEs are developing domestic, national, and original cybersecurity solutions.

- **Subcontractor/SME Work Share Practices:** To increase domestic contribution in defence industry projects, the SME work share ratio has been set at 21%. Companies evaluated under EYDEP are encouraged to participate more extensively in projects. The Subcontractor/SME work share practice, which requires a certain proportion of project activities to be carried out by SMEs, aims to develop and sustain a qualified subcontractor base capable of producing high-performance, cost-effective solutions aligned with the needs of the defence industry.

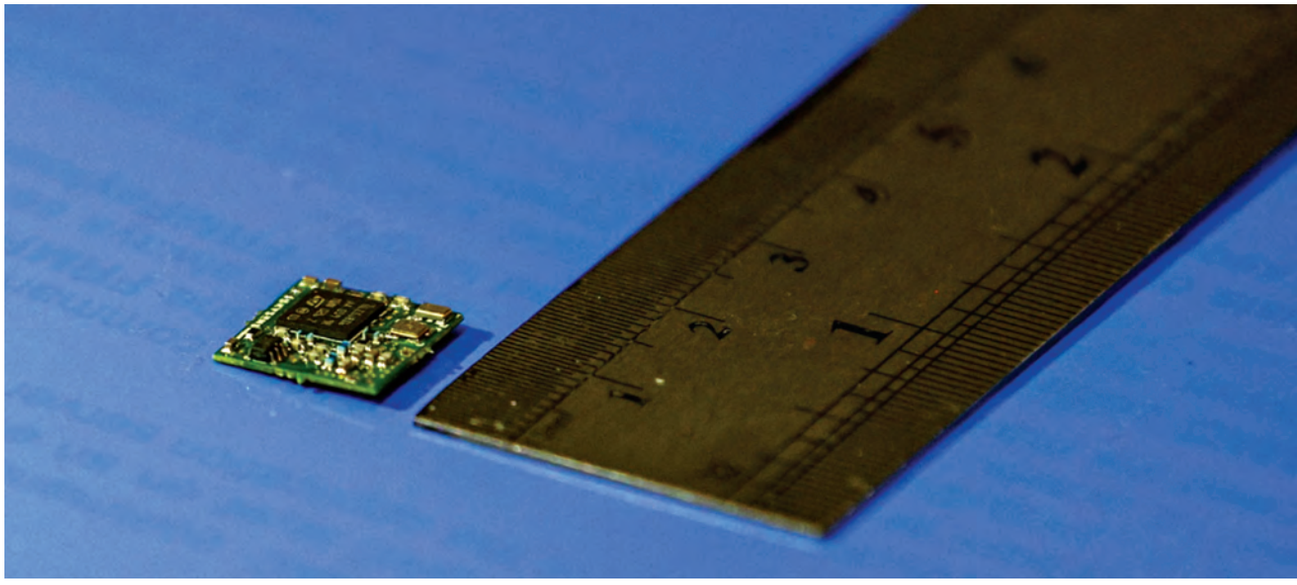
- **EYDEP Work Share:** Domestic contractors are required to ensure that at least 70% of the value of work carried out by SMEs within projects is executed by companies rated A, B, or C through EYDEP evaluation. With the EYDEP work share practice, the goal is both to provide companies with knowledge and experience in defence industry projects and to increase the number of applications submitted for EYDEP evaluations.



Teknopark Istanbul has invested TL 100 million in an international entrepreneurship center.

R&D investments made to ensure the technological independence of the Turkish defence industry and enhance its global competitiveness are among the most important strategic priorities in the sector. These investments not only focus on improving existing technologies but also on developing new and advanced technologies.

Investments in areas such as autonomy, swarm intelligence, and cybersecurity ensure that critical technologies for the future needs of the Turkish defence industry are developed domestically. These investments also strengthen the interaction of the defence industry with other sectors, enabling the transfer of advanced technologies to those sectors. Collaboration models developed between universities, SMEs, and large-scale companies play an important role in the development and dissemination of these technologies.



A technology company located in Ege Technopark has developed sensors and software that transmit machine data to the internet with low energy consumption.

Financial support provided for the sustainable growth of the defence industry is not limited to low-interest loans offered by the state. Public incentives such as tax exemptions, land allocations, and investment supports make defence industry projects more attractive. In addition, various incentive programs are implemented by the Presidency of Defence Industries (SSB) and other public institutions to support companies, especially in regions with growth potential. These supports contribute to strengthening the domestic production capacity of the defence industry and enhancing competitiveness in the sector.

The development of the Turkish defence industry is not limited to financial support provided to the sector but also makes significant contributions to the country's economic growth and strategic independence goals. Investments and financial supports strengthen the domestic industry, reduce foreign dependency, and increase the global competitiveness of the defence industry. Moreover, the support provided to SMEs and subcontractors in this sector triggers regional development and enables the strengthening of the domestic industry. This rise of the Turkish defence industry has become a driving force that not only strengthens the country's geopolitical position in the international arena but also reinforces its economic independence. These dynamics are expected to continue to increase Türkiye's economic prosperity in the long term.

V

International Cooperation in the Defence Industry and the Vision of the Century of Türkiye

INTERNATIONAL COOPERATION IN THE **DEFENCE INDUSTRY AND THE VISION OF THE CENTURY OF TÜRKİYE**

The rapidly changing and increasingly competitive nature of the international system has made the traditional methods of achieving power and gains inadequate for building a sustainable future. This transformation, further intensified by developments in technology and information at a geometric pace, has brought forth a new global context in which physical distances lose their meaning and borders become increasingly blurred. This new context, in which the concept of a "global village" has fully materialized and dense interaction networks prevail, has evolved into a complex structure where economic, environmental, and social factors intertwine, and where every actor is inevitably affected by the actions—or even the inaction—of others.[166] This has led the modern international system to create a new dynamic that combines both cooperation and competition, requiring a paradoxical balance.

Within this framework, the geopolitical stage of the 21st century has become one where nation-states can influence the balance of the system not only through military capabilities but also through their economic power, technological competencies, and international cooperation strategies. In this new world order shaped by reciprocal and complex interdependencies and dominated by a multidimensional understanding of power, the defence perspective is no longer seen solely as a component of conventional hard power but has increasingly become associated with soft power, gaining a new and complex dimension.[167]

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166 McLuhan, M. (2011). *The Gutenberg Galaxy: The Making of Typographic Man*. Toronto, Buffalo, London: University of Toronto Press. s. 25.

167 Yatağan, A. G. (2018). "Sert Güç Unsurlarının Yumuşak Güç Aracı Olarak Etkileri". *Kara Harp Okulu Bilim Dergisi*. 28(2), 69-94. Dergipark

In this sense,[168] the defence industry has come to be regarded as an example of the "smart power" approach that integrates hard and soft power, assuming a strategic role not only in security but also in economic development, foreign policy objectives, and the shaping of regional and global balances.

A Turkish defence industry company has begun exporting ultrasonic underwater hull cleaning devices.

In the multilayered power dynamics of the modern world, the defence industry emerges as a strategic lever and an indispensable element in building the future. A strong defence industry not only enhances military capacity but also generates multifaceted positive externalities that improve trade balances, support economic growth, encourage technological innovation, and determine the role and position of states in international politics. These gains create significant opportunities that enhance the effectiveness of states' diplomatic initiatives and security policies while consolidating their global influence.

On the other hand, foreign dependency in the defence industry creates not only economic costs but also diplomatic challenges in the international arena and poses serious vulnerabilities for national security. Located at the intersection of some of the world's most crisis-prone and conflict-ridden lines, Türkiye has historically had to play an active role both at the diplomatic table and in the field on regional issues. In this context, Türkiye has faced serious obstacles in the procurement and maintenance processes of defence industry products, and even experienced difficulties in accessing defence sys-

[168] Nye, J. S., Jr. (2006). "Think Again: Soft Power". *Foreign Policy*. https://foreignpolicy.com/2006/02/23/think-again-soft-power/. (Accessed: 12.01.2025).

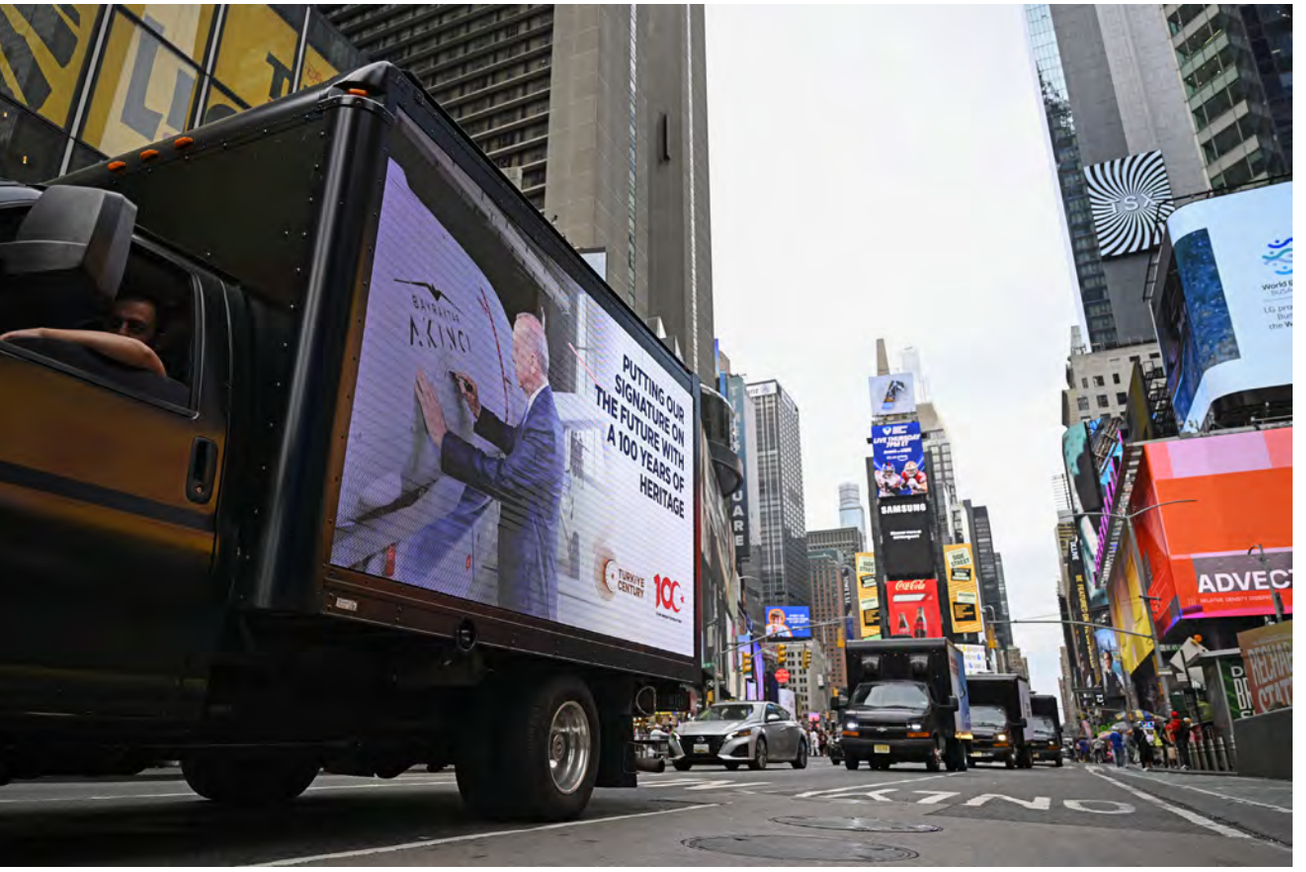
tems despite fulfilling its financial obligations. For many years, Türkiye had to contend with explicit or implicit embargoes designed to restrict its national security policies and weaken its military capacity. This situation has once again demonstrated how critical it is to have an independent defence infrastructure, especially for countries like Türkiye, whose geopolitical position places unavoidable responsibilities upon it.

The experiences Türkiye has gained throughout this process have shown that safeguarding national security is only possible by developing national and unique technologies. The responsibilities imposed by its geopolitical position and the threats arising from foreign dependency have made the goal of independence in the defence industry not a choice but a strategic necessity for Türkiye. Rather than discouraging Türkiye, which has historically been committed to the ideal of full independence, all the challenges encountered have further reinforced its determination to produce national and unique technologies. Once among the world's largest arms importers, Türkiye has, in just 20 years, transformed itself into the 11th largest arms exporter worldwide, achieving a remarkable transformation. This determination and resolve found renewed meaning after the terrorist attack targeting one of the most important institutions of the Turkish defence industry, Turkish Aerospace Industries (TUSAŞ), on October 23, 2024, when an engineer declared: “In defiance of the traitors, we will work harder and produce more!” This outcry became a powerful expression of the collective spirit carried from the past to the present by pioneers such as Nuri Demirağ, Vecihi Hürkuş, Şakir Zümre, and Nuri Killigil.

HÜRJET produced by TUSAŞ.

The Century of Türkiye vision, shaped under the guidance of this collective spirit, reflects the determination of the Turkish nation to build the second century of the Republic, inspired by its historical legacy. With comprehensive transformations targeted in political, economic, and legal fields, this century aims to achieve the ideal of a strong

and prosperous Türkiye. Grounded in a production economy that is national, innovative, and sustainable, this vision offers Türkiye a clear roadmap designed to strengthen its global competitiveness across all fields, from industry to agriculture. In this direction, Türkiye continues its determination to realize its goal of becoming an influential power in the modern world through a transformation focused on national technology.



Turkish defence industry products showcased in New York.

This determination, which includes the goal of becoming an influential power internationally, has transformed Türkiye from being merely a regional actor into a global game-changer. Within this framework, the breakthroughs in the defence industry—one of the core elements of the Century of Türkiye vision shaped under the leadership of President Recep Tayyip Erdoğan—have ensured that this goal is supported with tangible achievements. Today, Türkiye aims to further elevate its international competitiveness by pursuing a strategy of continuously enhancing its national capabilities in the defence industry. Advancing with the motto "A game-changer in technology, a disruptor on the battlefield," Türkiye reflects its historical mission in the defence industry, taking one step closer each day to the vision of a great and strong Türkiye.

5.1. Turkish Defence Industry in the Century of Türkiye Vision

Despite facing embargoes, sanctions, and various obstacles throughout its history, Türkiye has managed to overcome these challenges and achieve a remarkable transformation in its defence industry. Particularly with innovative solutions developed in strategic fields such as air and naval platforms, Türkiye has increased its competitiveness in the international market and emerged as a prominent actor on the global stage. Türkiye's reduction of foreign dependency in the defence industry from around 80% to 20% is regarded as a tangible indicator of its achievements in this field.[169]

Investments made in the defence industry since the 2000s have enabled Türkiye to increase its export volume while significantly reducing its imports. For instance, Türkiye's share in global arms imports declined from 2.4% in the 2013-2017 period to 1.3% in the 2018-2022 period. Moreover, while Türkiye ranked as the 7th largest recipient of arms imports from the United States during 2013-2017, it dropped to 27th place during 2018-2022, marking notable progress in reducing foreign dependency.[170]

With these breakthroughs, Türkiye has established a broad product range in the defence industry. From naval vessels to communication technologies, from smart munitions to radar systems, the domestically developed and nationally produced technologies have placed Türkiye in a competitive position in the global market. The effective use of these products both by the Turkish Armed Forces (TSK) and by importing countries has enhanced their international recognition and prestige.[171] Particularly in critical fields such as UAVs, armored platforms, missile systems, and radar technologies, the unique solutions developed have propelled Türkiye to the forefront of the global defence market. The wide adoption of high-tech products such as Bayraktar TB2 has positioned Türkiye as a reliable actor in this domain. According to a report published by the U.S.-based Center for a New American Security (CNAS), Türkiye has exported 69 armed UAVs to more than 40 countries since 2018, capturing a 65% market share. This rate is well above the market shares of countries such as China (26 percent) and the United States (8 percent).[172]

169 Cevdet Yılmaz: Savunma Sanayisinde Yerlilik Oranı Yüzde 80'leri Aştı. (2024). *DHA*. https://www.dha.com.tr/politika/cevdet-yilmaz-savunma-sanayisinde-yerlilik-orani-yuzde-80leri-asti-2507058. (Accessed: 05.01.2025).

170 Bakir, A. (2023). "Türkiye's Defence Industry is on the Rise. The GCC is One of Its Top Buyers". *Atlantic Council*. https://www.atlanticcouncil.org/blogs/menasource/turkey-defense-baykar-gcc-gulf/. (Accessed: 12.01.2025).

171 Bayraklı, Z. Ç. (2024). "Türkiye'nin Savunma ve Havacılık Sanayii ve İhracatının Analizi (2002-2023)". *Mevzu Sosyal Bilimler Dergisi (Journal of Social Sciences)*, 11, 205-240. https://dergipark.org.tr/tr/download/article-file/3569829. (Accessed: 13.01.2025).

172 "2024 Savunma Sanayisinde Tarihi Başarılarla Sona Eriyor". *Anadolu Ajansı*. https://www.aa.com.tr/tr/ savunma-sanayisi/2024-savunma-sanayisinde-tarihi-basarilarla-sona-eriyor/3437010. (Accessed: 12.01.2025).

Bayraktar TB2 set a new record by surpassing 1 million flight hours.

The effective use of Turkish defence products in conflict zones and their impact in altering the course of battles have resonated widely in the international media. In the world press, expressions such as "Turkish UCAVs are reshaping conflict zones and geopolitics," "Game changer in wars," and "Türkiye's defence industry has become larger and more self-sufficient than ever;[173] as the country with NATO's second-largest army, Türkiye met 70 percent of its defence needs from foreign suppliers in the 2000s, while today this rate has fallen to 30 percent; [174]the UAVs that have become the symbol of the Turkish defence industry are among the most striking elements of this transformation" — statements like these underscore this success and reveal its decisive role in global security dynamics.

[173] Marson, J., Forrest, B., (2024). Armed Low-Cost Drones, Made by Türkiye, Reshape Battlefields and Geopolitics. *The Wall Street Journal*. https://www.wsj.com/articles/armed-low-cost-drones-made-by-turkey-reshape-battlefields-and-geopolitics-11622727370. (Accessed: 12.01.2025).

[174] Türkiye is The Arms Industry's New Upstart (2022). *The Economist*. https://www.economist.com/europe/2022/02/12/turkey-is-the-arms-industrys-new-upstart. (Accessed: 12.01.2025).

The Wall Street Journal article on Turkish UAVs.

In this context, advances particularly in UAV and UCAV technologies have provided Türkiye with global prestige and laid the groundwork for securing an important strategic position. As of 2024, Türkiye dominates 65 percent of the UCAV market and is the world leader in this field.[175] Bayraktar TB2, which has proven its effectiveness with successes in conflict zones such as Syria, Azerbaijan, Ukraine, and Libya, and is seen as Türkiye's most significant representative in the global UCAV market, continues to maintain its international popularity.[176] Bayraktar TB2 unmanned aerial vehicles have gone beyond being merely a military system worldwide and have become a symbol of hope. In Ukraine, the naming of newborn children "Bayraktar" stands as a rare example of how a hard-power asset can generate soft-power effects. This demonstrates that the strength of Turkish defence industry products, stemming from their quality and originality, has the potential to influence broad audiences beyond the sector itself.

The success of domestically developed and nationally produced UAVs has also come under the scrutiny of international think tanks. For example, an analysis conducted by the U.S.-based Crisis Group noted that, as of 2023, Bayraktar TB2s were in the inventories of at least 26 countries, 7 countries were in the delivery process, and 8 coun-

[175] "Baykar Yönetim Kurulu Başkanı Bayraktar: Dünya SİHA Pazarının Yüzde 65'i Türkiye'nin Elinde". *Anadolu Ajansı*. https://www.aa.com.tr/tr/gundem/baykar-yonetim-kurulu-baskani-bayraktar-dunya-siha-pa- zarinin-su-anda-yuzde-65i-turkiyenin-elinde/3375654. (Accessed: 12.01.2025).

[176] Tuna, Z. (2024). "Türk Savunma Sanayii ve Terörle Mücadele: Gelişim ve Katkı Analizi". TASAM. https://tasam.org/tr-TR/Icerik/72653/turk_savunma_sanayii_ve_terorle_mucadele_gelisim_ve_katki_analizi. (Accessed: 12.01.2025).

tries had officially declared their interest in these technologies.[177] In addition, the report's reference to them as "Turkish UAVs" highlights not only the operational effectiveness of Bayraktar TB2s but also the contribution they provide to Türkiye's national brand.

The National Combat Aircraft KAAN successfully completed its second flight.

The increase in the Turkish defence industry's technological capacity and the recognition it has gained internationally has also been one of the main pillars underpinning the remarkable rise in export figures. Exports of Turkish defence and aerospace products reached USD 7.154 billion in 2024 with a 29 percent increase, setting a new record.[178] As of today, Türkiye holds a 1.6 percent share of global arms exports and ranks 11th among the countries with the highest exports. Having succeeded in becoming one of only 10 countries capable of building[179] its own warship, [180]Türkiye commissioned the world's first UCAV carrier, TCG Anadolu, in 2023 and achieved significant progress in its national submarine projects.[181] In addition, with its National Combat Aircraft

177 International Crisis Group. (2023). "Türkiye's Growing Drone Exports". Crisis Group. https://www.crisisgroup.org/europe-central-asia/western-europemediterranean/turkiye/turkiyes-growing-drone-exports. (Accessed: 12.01.2025).

178 Görgün, H. X Account. https://x.com/halukgorgun/status/1875168786707263825. (Accessed: 12.01.2025)

179 "Erdoğan Hails Record H1 Defence Exports, Sets $6B Bar for 2023". *Daily Sabah*. https://www.dailysabah. com/business/defense/erdogan-hails-record-h1-defense-exports-sets-6b-bar-for-2023. (Accessed: 12.01.2025).

180 President Erdoğan: "Savunma Alanında Bağımsız Olamayan Milletlerin İstikballerine Güvenle Bakabilmeleri Mümkün Değildir". T.R. Cumhurbaşkanlığı İletişim Başkanlığı. https://www.iletisim.gov. tr/turkce/haberler/detay/cumhurbaskani-erdogan-savunma-alaninda-bagimsiz-olamayan-milletlerin- istikballerine-guvenle-bakabilmeleri-mumkun-degildir. (Accessed: 12.01.2025).

181 "Cumhurbaşkanı Erdoğan, Dünyanın İlk SİHA, Türkiye'nin En Büyük Savaş Gemisi 'TCG Anadolu'nun Teslim Töreni'ne Katıldı". T.R. Cumhurbaşkanlığı İletişim Başkanlığı. https://www.iletisim.gov.tr/turkce/yerel_basin/detay/cumhurbaskani-erdogan-dunyanin-ilk-siha-turkiyenin-en-buyuk-savas-gemisi-tcg-anadolunun-teslim-torenine-katildi. (Accessed: 12.01.2025).

KAAN, it achieved the success of being one of four countries with the capacity to produce fifth-generation fighter aircraft.[182] These steps, which have left their mark on the history of the global defence industry, have become tangible indicators of the Century of Türkiye vision.

Bayraktar TB3 became the first UAV to take off from and land on a short-runway ship.

In addition, the year 2024 witnessed many historic developments for the Turkish defence industry. Bayraktar TB3 made aviation history as the first UAV capable of taking off from and landing on a short-runway ship. Bayraktar TB2, on the other hand, surpassed 1 million flight hours in 2024, setting a new record and solidifying its[183] title as the "UCAV preferred by the most countries." In the same period, Bayraktar AKINCI was exported to 10 countries, further enhancing Türkiye's global influence in UCAV technologies.[184] With more than 70 percent of its sales derived from exports, Otokar signed

[182] "2024 Savunma Sanayisinde Tarihi Başarılarla Sona Eriyor." *Anadolu Ajansı*. https://www.aa.com.tr/tr/ savunma-sanayisi/2024-savunma-sanayisinde-tarihi-basarilarla-sona-eriyor/3437010. (Accessed: 12.01.2025).

[183] Ibid.

[184] "Take Off İstanbul, Selçuk Bayraktar'ın Katıldığı Kapanış Töreni ile Sona Erdi". *Anadolu Ajansı*. https://www.aa.com.tr/tr/bilim-teknoloji/take-off-istanbul-selcuk-bayraktarin-katildigi-kapanis-toreni-ile-sona-erdi/3423036. (Accessed: 12.01.2025).

a contract worth approximately USD 1 billion on November 27, 2024, to meet Romania's needs (a 1,059-vehicle COBRA II tender), marking the largest export contract in Türkiye's land vehicles sector.[185]

Otokar has developed the mine-resistant vehicle version of the Cobra II.

For the first time in its history, Türkiye signed a military ship export agreement with a European Union (EU) and NATO member state, marking a significant achievement. On December 17, 2024, contracts were signed for the construction of two replenishment and logistics support ships for the Portuguese Navy, and this agreement once again demonstrated the effectiveness and competitiveness of the Turkish defence industry in the international arena.[186] In addition, defence industry fairs such as SAHA EXPO have increased the international visibility of these achievements. At SAHA EXPO, held on October 22–26, 2024, with the participation of 1,478 companies from more than 120 countries, contracts totaling USD 6.2 billion were signed, USD 4.6 billion of which were export-oriented.[187]

185 "Otokar Genel Müdürü Özüner AA Teknoloji Masası'na konuk oldu". *Anadolu Ajansı*. https://www.aa.com.tr/tr/savunma-sanayisi/otokar-genel-muduru-ozuner-aa-teknoloji-masasina-konuk-oldu/3437831. (Accessed: 12.01.2025).

186 "Cumhurbaşkanı Yardımcısı Yılmaz: İsrail'in Golan Tepelerini Aşan Eylemlerini Son Derece Tehlikeli Görüyoruz". *Anadolu Ajansı*. https://www.aa.com.tr/tr/gundem/cumhurbaskani-yardimcisi-yilmaz-israilin-golan-tepelerini-asan-eylemlerini-son-derece-tehlikeli-goruyoruz/3427196. (Accessed: 12.01.2025).

187 "SAHA EXPO 2024'te 6,2 Milyar Dolarlık Sözleşme İmzalandı." *Anadolu Ajansı*. https://www.aa.com.tr/tr/ekonomi/saha-expo-2024te-6-2-milyar-dolarlik-sozlesme-imzalandi/3374498. (Accessed: 12.01.2025).

This rise of the Turkish defence industry has also manifested itself in international defence industry rankings. Companies such as ASELSAN, Baykar, and TUSAŞ succeeded in entering the Stockholm International Peace Research Institute's (SIPRI) list of the world's top 100 companies in terms of arms and military services sales as of 2023, increasing their total revenues by 24 percent compared to the previous year and reaching USD 6 billion.[188]

ASELSAN is conducting joint production with Azerbaijan.

On the last day of 2024, Baykar announced the acquisition of Piaggio Aerospace, one of Europe's leading aviation companies, marking an important step that expanded the strategic capacity of the Turkish defence industry in the international arena. This move aims to facilitate overcoming the reservations of NATO and EU countries about directly procuring military products from Türkiye, while mitigating the effects of defence industry embargoes by enabling production in Italy.[189] For many years, the Turkish defence industry

188 "World's Top Arms Producers See Revenues Rise on the Back of Wars and Regional Tensions". Stockholm International Peace Research Institute.https://www.sipri.org/media/press-release/2024/worlds-top-arms-producers-see-revenues-rise-back-wars-and-regional-tensions. (Accessed: 12.01.2025)

189 "Baykar'dan Stratejik Hamle: Piaggio ile 140 Yıllık Tecrübe de Satın Alındı". *Anadolu Ajansı*. https://www.aa.com.tr/tr/analiz/baykardan-stratejik-hamle-piaggio-ile-140-yillik-tecrube-de-satin-alindi/3437767. (Accessed: 12.01.2025)

has not faltered in the face of unfair embargoes and obstacles restricting competition;it has demonstrated its determination to strengthen the understanding of domestically developed and nationally produced systems and to develop innovative solutions. The acquisition of Piaggio Aerospace stands out as a strategic example of Türkiye's efforts to increase its influence in international markets and rise as an independent actor by overcoming existing restrictions.

Turkish defence industry products are regarded as strategic solutions by many countries around the world, and particularly in UAV and UCAV systems—which are currently operating effectively in[190] the airspace of 34 different countries—Türkiye has become the world's largest supplier.[191] The fact that products which were previously difficult to procure or inaccessible are today being exported to all corners of the world clearly demonstrates the development and transformation of Türkiye in this sector.

The defence industry has gone beyond being merely a component of military capability and has become a critical tool that shapes today's delicate international balances both as a deterrent and as a strategic power. Fully aware of this strategic weight in global dynamics, Türkiye is shaping its "Century of Türkiye" vision accordingly, embracing a multidimensional approach that prioritizes not only national security but also global peace and stability.

5.2. Contribution of Defence Industry Investments to the "Türkiye" Brand

The success of defence industry investments has translated directly into a steady rise in Türkiye's brand value. Through these breakthroughs, Türkiye has not only strengthened regional security but also positioned itself as a prominent player in global markets. The Turkish defence industry is moving confidently toward becoming a recognized global brand, steadily elevating the prestige of the "Made in Türkiye" label.[192] By positioning the defence industry at the intersection of security, economic independence, and diplomatic influence, the credibility of the Türkiye brand has been firmly established. These achievements confirm to the world that Türkiye is a major actor in what is often described as the "champions league" of the defence industry.

The "Century of Türkiye" vision—which sets forth comprehensive transformation in areas such as the economy, health, justice, education, foreign policy, counter-terrorism, energy, transport, technology, communication, and the defence industry—offers a stra-

190 "President Erdoğan: Türkiye, Savunma Sanayi Alanında Adeta Destan Yazıyor". *Anadolu Ajansı*. https://www.aa.com.tr/tr/gundem/cumhurbaskani-erdogan-turkiye-savunma-sanayi-alaninda-adeta-destan-yaziyor/3147220. (Accessed: 12.01.2025).

191 "2024 Savunma Sanayisinde Tarihi Başarılarla Sona Eriyor". *Anadolu Ajansı*. https://www.aa.com.tr/tr/savunma-sanayisi/2024-savunma-sanayisinde-tarihi-basarilarla-sona-eriyor/3437010. (Accessed: 12.01.2025).

192 "Millî Savunma Bakanı Güler: 'Türkiye Yüzyılı' Vizyonumuz Doğrultusunda Stratejik Adımlar Atmaktayız". *Anadolu Ajansı*. https://www.aa.com.tr/tr/politika/millî-savunma-bakani-guler-turkiye-yuzyili-vizyonumuz-dogrultusunda-stratejik-adimlar-atmaktayiz/3370108. (Accessed: 12.01.2025).

TCG Anadolu delivery ceremony.

tegic roadmap for reaching the 2053 and 2071 targets. In this process, each domestically developed and nationally produced defence product further strengthens the Türkiye brand, just as in other sectors. Progress achieved in this strategic field is intended to spark a wave of transformation extending into every area of national development. Accordingly, the defence industry has been tasked not only with safeguarding national security but also with serving as a "strategic lever" for economic growth, international diplomacy, and technological leadership. Turkish defence systems developed under the National Technology Initiative—which have proven their effectiveness on the ground in cross-border operations and in the Azerbaijan–Armenia and Ukraine–Russia conflicts—continue to enhance Türkiye's military and political standing in the international arena.

HAVELSAN's unmanned ground vehicle BARKAN has entered the Turkish Armed Forces (TSK) inventory.

As projects spanning land, sea, air, and space are brought to life one by one, Türkiye's position in the defence industry will become even stronger in the near future. This comprehensive transformation and planning not only enhance military capacity, but also accelerate economic growth, drive technological innovation, and expand Türkiye's diplomatic influence on the global stage. As a tangible manifestation of the principle of full independence combined with a commitment to domestically developed and nationally produced systems, this transformation reflects Türkiye's determination to overcome every challenge on the world stage and claim its rightful place.

Guided by a vision that embraces building the future through science, technology, and innovation, Türkiye is shaping its long-term development goals on these foundations. This approach prioritizes support for scientific research, technological progress, and innovative solutions as essential to positioning Türkiye as a competitive and leading nation on the global stage. In this context, comprehensive investments and projects are being implemented in strategic areas of the defence industry such as homeland security, aviation, and space. Under the 2025 Presidential Annual Program, increased support

is planned for investments and qualified personnel in domestic industry, along with encouragement of R&D and product development efforts for both military and civilian applications in breakthrough areas such as quantum technologies, artificial intelligence, autonomous systems, and hypersonic technologies[193]. As of 2023, the defence industry became the sector with the highest increase in its share of total public R&D spending, rising by 167 percent to account for 43 percent of all public R&D expenditures[194].

The golden age of Turkish aviation.

Within the framework of the Twelfth Development Plan, the defence industry has also been positioned as a critical driver of economic growth and as a tool for advancing global and regional partnerships. The plan also highlights the strengthening of international competitiveness, bolstering foreign trade, and cultivating a qualified domestic workforce for the sector as key objectives[195]. Another central priority of the plan is to minimize foreign dependency in defence and security requirements by advancing national production capabilities in the industry's subcomponents. To this end, the plan aims to increase the number of entrepreneurial firms developing innovative technologies and to reinforce the domestic supply ecosystems of large-scale defence companies[196].

193 T.C. Cumhurbaşkanlığı Strateji ve Bütçe Başkanlığı (2025). 2025 Yılı Cumhurbaşkanlığı Yıllık Programı. https://www.sbb.gov.tr/wp-content/uploads/2024/11/2025-Yili-Cumhurbaskanligi-Yillik-Programi-05112024.pdf (Erişim Tarihi: 13.01.2025).

194 "Kamuda AR-GE Harcamalarında En Yüksek Pay Savunma Sanayisinin". *Anadolu Ajansı*. https://www.aa.com.tr/tr/ekonomi/kamuda-ar-ge-harcamalarinda-en-yuksek-pay-savunma-sanayisinin/3436986. (Erişim Tarihi: 12.01.2025).

195 T.C. Cumhurbaşkanlığı Strateji ve Bütçe Başkanlığı (2025). 2025 Yılı Cumhurbaşkanlığı Yıllık Programı. https://www.sbb.gov.tr/wp-content/uploads/2024/11/2025-Yili-Cumhurbaskanligi-Yillik-Programi-05112024.pdf (Erişim Tarihi: 13.01.2025).

196 Ibid.

In addition, to enhance the defence industry's global competitiveness and ensure the sector's sustainability in line with foreign trade balances, the plan foresees strengthening international partnerships and enabling the civilian application of high-tech capabilities developed in defence. Against this backdrop, the defence industry's ability to meet not only Türkiye's domestic defence and security needs but also those of allied and partner nations through national resources has been defined as a primary objective. Measures have also been proposed to increase the presence of Turkish firms in NATO tenders, including hosting cooperation meetings with high-export-potential countries to boost the industry's international impact[197]. These steps show how the defence industry has evolved beyond a security element into a strategic instrument that deepens international cooperation and supports economic development. At the same time, domestically developed and nationally produced systems spreading worldwide have further strengthened the Türkiye brand.

Türkiye's security is ensured by domestically developed missiles.

Shaped by the ideals of pioneers such as Vecihi Hürkuş, Selahattin Reşit Alan, Nuri Demirağ, and Nuri Killigil, the Turkish defence industry today has become not only a guarantor of national security but also one of the key actors of global security. Drawing inspiration from its forefathers, Türkiye is realizing its "Century of Türkiye" vision by placing the defence industry at the core of its drive toward full independence—moving forward with confidence as a future leader through innovative technologies, international partnerships, and a determined stance in global competition.

5.3. Cooperation Strategies: Regional and Global Partnerships in the Defence Industry

Unlike traditional commercial relations, the defence industry operates with unique dynamics and sensitive balances, standing out as a strategic domain that allows for deeper

[197] Ibid.

and stronger ties. The key factor enhancing the effectiveness of this strategic field is the capacity to build and sustain trust. Türkiye embraces "trust" as a fundamental principle in defence, prioritizing efforts to strengthen allies confidence in the capabilities and high standards of Turkish defence products[198]. In this regard, by demonstrating exceptional skills and competencies in the international arena, Türkiye continues to solidify its position in the global system as a reliable partner for allies and a strong deterrent for adversaries.

President Recep Tayyip Erdoğan's address at SAHA EXPO.

Within the perspective of the Century of Türkiye, it has been adopted as a principle that achieving success in foreign policy depends on the harmonious interplay of a strong defence industry and effective diplomatic initiatives.[199] This strategic approach both envisions deepening existing alliances and building new partnerships, while also allowing the global recognition and enhanced reputation gained through achievements in the defence industry to strengthen ties with countries where relations had been limited and to open the door to new alliances. In this context, while Türkiye employs its defence industry as an effective instrument in foreign policy, it also undertakes diplomatic initia-

198 Savunma Sanayii Başkanı Görgün: Millî Yetkinlik Hamlesi'nin Büyük Bir Dönüşümü Tetikleyeceğine İnanıyorum. *Anadolu Ajansı*. https://www.aa.com.tr/tr/savunma-sanayisi/savunma-sanayii-baskani-gorgun-millî-yetkinlik-hamlesinin-buyuk-bir-donusumu-tetikleyecegine-inaniyorum/3333427. (Accessed: 12.01.2025).

199 President Erdoğan: Türkiye, savunma sanayi alanında adeta destan yazıyor. Anadolu Ajansı. https://www.aa.com.tr/tr/gundem/cumhurbaskani-erdogan-turkiye-savunma-sanayi-alaninda-adeta- destan-yaziyor/3147220. (Accessed: 12.01.2025).

tives to strengthen this sector, and through this dual-track approach achieves multidimensional gains across diplomatic, economic, military, and social domains.

In recent years, Türkiye has drawn significant attention with its broad range of defence products and services, as well as its performance in defence exports. Through the export of diverse military equipment such as armored vehicles, missiles, UAVs, naval platforms, aircraft, and defence electronics, Türkiye has secured an important position among defence exporters.[200] This breakthrough in the defence industry has been made possible through the coordinated and synergistic work of a broad and dynamic ecosystem that brings together the Presidency of Defence Industries (SSB), relevant ministries, research institutes, the private sector, and universities. Today, Turkish defence products are widely preferred in many international platforms, particularly as a result of post-2000 investments in the sector, which enabled domestically resourced, high-technology defence products not only to meet domestic demand but also to direct production surpluses toward foreign markets.

President of Estonia Alar Karis signing the YÖRÜK 4X4 currently in production for his country.

Turkish defence products, which deliver capabilities exceeding global standards at competitive acquisition costs, continue to serve as a powerful force multiplier in Türkiye's strategic initiatives. In 2024 alone, Türkiye exported to 185 different countries, and the strategic partnerships [201]it has cultivated across a vast geography stretching from Europe to Asia have not only increased export revenues but also reinforced its position as an influential power within the international system.[202]

[200] Bayraklı, Z. Ç. (2024). "Türkiye'nin Savunma ve Havacılık Sanayii ve İhracatının Analizi (2002-2023)". *Mevzu Sosyal Bilimler Dergisi* (Journal of Social Sciences), 11, 205-240. https://dergipark.org.tr/tr/download/article-file/3569829 (Accessed: 13.01.2025).

[201] Görgün, H. X Account. https://x.com/halukgorgun/status/1875168786707263825. (Accessed: 12.01.2025).

[202] Çelik, S. (2022). Bayraktar TB2 mi ANKA-S mi? Türkiye'nin Ürettiği SİHA Sistemleri ile Savunma Sanayi Şirketleri ve Az Bildiklerimiz! https://selcukcelik.org/baykar-tb2-mi-anka-s-mi-turkiye-nin-urettigi-siha-sistemleri-ile-savunma-sanayi-sirketleri-ve-az-bildiklerimiz/. (Accessed: 12.01.2025).

HAVELSAN's "digital soldier" Cengâver.

5.3.1. Cooperation and Partnership Activities with European Countries

The success of the Turkish defence industry is not limited to national security and export potential. The strong collaboration among ecosystem actors, international-standard production capabilities, and innovative R&D approaches enable the delivery of security solutions that also meet the needs of allied and partner countries. In this respect, Türkiye has consistently pursued a win-win approach in the defence industry, maintaining an open stance toward sharing its resources and capabilities with allies and partners through the development of joint projects.[203] This approach positions the defence industry as an instrument that both deepens international cooperation and reinforces strategic ties. In this framework, Türkiye, recognizing that global challenges can only be addressed through collective effort, aims to crown its defence industry achievements with a sustainable cooperation model developed together with allied and partner countries.

Beyond forging significant global defence partnerships and strategic alliances, Türkiye also continues to pursue diplomatic initiatives to overcome existing barriers. Recently, through discussions held particularly with Canada and Norway, export restrictions on defence industry products have been lifted, while progress has also been made with Germany toward deepening defence cooperation, particularly in the export of naval defence systems.[204]

[203] Millî Savunma Bakanlığı. X Hesabı https://x.com/tcsavunma/status/1848719832130236490. (Accessed: 12.01.2025).

[204] "Belirsizlikler Çağında Kararlı ve Güçlü Türk Dış Politikası" (2025). T.R. Dışişleri Bakanlığı https://www.mfa.gov.tr/site_media/html/belirsizlikler-caginda-kararli-ve-guclu-turk-dis-politikasi-2025-kitapcik.pdf

Leading Turkish defence companies are likewise expanding their presence in the European market through cooperation agreements and sales contracts. On May 14, 2025, in Madrid, a landmark agreement was signed to pave the way for NATO and other countries to acquire Türkiye's first domestically developed jet trainer and light attack aircraft, HÜRJET. Under the memorandum of understanding signed by TUSAŞ, Airbus, and the Spanish Ministry of Defence, it is envisaged that HÜRJET will be sold to Spain and that joint infrastructure production of the aircraft will be carried out in Spain.

President Erdoğan's joint press conference with Hungarian President Viktor Orbán. (2023).

Meanwhile, Baykar's agreements with Italian defence firms are also significant in terms of strengthening the influence of Turkish companies in Europe. In April 2025, Baykar signed a cooperation agreement with Leonardo, one of the world's largest defence companies. Under the agreement, the two firms will jointly produce UCAVs in Italy. Baykar's advanced capabilities in UCAV and artificial intelligence technologies will be combined with Leonardo's expertise in mission systems, payloads, and certification, with the partnership also extending into space research. In addition, in June 2025 Baykar acquired Piaggio Aerospace, one of Italy's long-established aviation companies. At the same time, cooperation areas with friendly and allied countries in this sector are diversifying with each passing day. In particular, a number of defence industry agreements have been signed with Eastern European countries. On February 3, 2022, a Framework Agreement on Cooperation in the Field of High Technology and Aviation/Space Industry was signed between the Government of the Republic of Türkiye

and the Government of Ukraine[205]. Following this important cooperation, on December 19, 2023, the Türkiye-Hungary High-Level Strategic Cooperation Council Meeting was held, during which a Defence Industry Cooperation Memorandum of Understanding was signed[206]. After the meeting, Hungarian Prime Minister Viktor Orbán remarked: "Without Türkiye, there is no security for Hungary. (...) Of all the countries involved in the Ukraine-Russia war, only one managed to achieve results. Through the grain deal, that country was Türkiye," thereby underlining Türkiye's critical role in regional security and its effectiveness in resolving international crises[207]. Furthermore, an agreement was signed between the relevant institutions of the two countries for the export to Poland, a NATO and European Union (EU) member state, of warships designed and built in Türkiye.

5.3.2. Cooperation and Partnership Activities with Gulf Countries

Despite diplomatic and trade-related challenges with Western countries, Türkiye has taken important steps to sustain defence industry cooperation, while also building alternative partnerships and supply channels with friendly and allied actors in its region[208].

Türkiye's defence industry is diversifying its UAV exports.

[205] "Türkiye ile Ukrayna Arasında 8 Anlaşma İmzalandı". *Anadolu Ajansı*. https://www.aa.com.tr/tr/dunya/turkiye-ile-ukrayna-arasinda-8-anlasma-imzalandi/2493259. (Erişim Tarihi: 12.01.2025).

[206] "BAE, Türkiye ile Siyasi ve Ekonomik İlişkileri Güçlendirmek İstiyor". *Anadolu Ajansı*. https://www.aa.com.tr/tr/gundem/turkiye-ve-macaristan-arasinda-17-maddelik-is-birligi-anlasmasi-imzalandi/3086126. (Erişim Tarihi: 12.01.2025).

[207] "Macaristan Başbakanı Orban: Türkiye Olmadan Macaristan'ın Güvenliği Yok". *Anadolu Ajansı*. https://www.aa.com.tr/tr/dunya/macaristan-basbakani-orban-turkiye-olmadan-macaristanin-guvenligi-yok/3086063. (Erişim Tarihi: 12.01.2025).

[208] Mevlütoğlu, A. (2022). "Türkiye'nin Politikaları ve Savunma Sanayii: İHA İhracatı". https://www.perspektif.online/turkiyenin-politikalari-ve-savunma-sanayii-iha-ihracati/. (Erişim Tarihi: 12.01.2025).

In this context, defence agreements signed in recent years with Gulf Cooperation Council (GCC) countries have been particularly significant. Between 2018 and 2022, Türkiye's largest arms exports were to Qatar, the United Arab Emirates (UAE), and Oman, which together accounted for 50 percent of the country's total defence exports[209]. Expressing its desire to strengthen political and economic ties with Türkiye, the UAE[210] took an important step on February 14, 2022, by signing a Letter of Intent between the Government of the Republic of Türkiye and the Government of the UAE on launching Defence Industry Cooperation Meetings[211].

Similarly, on July 18, 2023, Türkiye and Saudi Arabia, another GCC member, signed a series of agreements covering defence and aerospace, investment, energy, and communications. Among these, the agreement for the sale of AKINCI unmanned combat aerial vehicles to Saudi Arabia stood out as the largest defence and aerospace export contract in the history of the Republic of Türkiye. Valued at over USD 3 billion, this agreement once again demonstrated Türkiye's success in defence exports[212].

Bayraktar AKINCI C Model.

[209] Bakir, A. (2023). "Turkey's Defence industry is on The Rise. The GCC is One of Its Top Buyers". *Atlantic Council*. https://www.atlanticcouncil.org/blogs/menasource/turkey-defense-baykar-gcc-gulf/. (Erişim Tarihi: 12.05.2025).

[210] "BAE, Türkiye ile Siyasi ve Ekonomik İlişkileri Güçlendirmek İstiyor". *Anadolu Ajansı*. https://www.aa.com.tr/tr/dunya/bae-turkiye-ile-siyasi-ve-ekonomik-iliskileri-guclendirmek-istiyor/2502420. (Erişim Tarihi: 12.01.2025).

[211] "Türkiye ile Birleşik Arap Emirlikleri Arasında 13 Anlaşma İmzalandı". *Anadolu Ajansı*. https://www.aa.com.tr/tr/dunya/turkiye-ile-birlesik-arap-emirlikleri-arasinda-13-anlasma-imzalandi/2502426. (Erişim Tarihi: 12.01.2025).

[212] Bakir, A. (2023). "Turkey's Defence industry is on The Rise. The GCC is One of Its Top Buyers". *Atlantic Council*. https://www.atlanticcouncil.org/blogs/menasource/turkey-defense-baykar-gcc-gulf/. (Erişim Tarihi: 12.05.2025).

Since 2014, Qatar has stood out as Türkiye's most important ally within the GCC. The foundations of the two countries' strategic partnership were laid with the signing of a memorandum of understanding on July 2, 2012, between the Government of the Republic of Türkiye and the Government of the State of Qatar, aimed at strengthening cooperation in the defence industry and developing joint projects in line with mutual interests. Following this memorandum, Qatar became the first GCC country to purchase Bayraktar TB2 UCAVs produced in Türkiye. To further advance this strategic cooperation, the Qatar Türkiye High Strategic Committee, established in 2014, proved instrumental in achieving notable progress, particularly in defence and military fields.[213] Reflecting these advancements, in 2018 Qatar signed a contract with Türkiye for the delivery of six TB2s, three ground control stations, and one training simulator — all successfully completed in just one year. In early 2023, Kuwait signed a USD 370 million procurement contract with Baykar, becoming the second GCC country to acquire TB2s.[214]

These partnerships developed with Gulf countries mark the beginning of a new era in Türkiye's defence industry exports and carry the potential to shape regional security dynamics. At present, the Gulf defence market is still dominated by Western systems of American and European origin. However, Gulf states efforts to reduce dependence on the West and to build their own defence industries make Türkiye an attractive partner for cooperation in the region. The high efficiency and competitive pricing of Türkiye's defence products align seamlessly with these countries strategic priorities. Türkiye's growing stature in the defence sector continues to increase interest from the Gulf and strengthens its potential to secure a larger share of the market. For instance, in 2022 it was reported that the UAE sought to procure 120 Bayraktar TB2 UAVs and associated munitions through a contract valued at approximately USD 2 billion.[215] This prospective deal underscored both the growing influence of Türkiye's defence industry in the region and the strong interest of Gulf countries in Turkish defence products.

5.3.3. Cooperation Projects and Partnerships with African Countries

High-tech defence products produced to NATO standards have also allowed Türkiye to emerge strongly in African and Central Asian markets. Over the past two decades, Türkiye's defence industry has entered a rapid phase of growth, with UAVs in particular gaining swift international popularity and significantly expanding market reach.[216]

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213 "Katar Savunma Bakanlığı: Türkiye ile Yeni İş Birliği Anlaşmaları İmzaladık". *Anadolu Ajansı*. https://www.aa.com.tr/tr/dunya/katar-savunma-bakanligi-turkiye-ile-yeni-is-birligi-anlasmalari-imzaladik/2162546. (Accessed: 12.01.2025)

214 Bakir, A. (2023). "Türkiye's Defence industry is on The Rise. The GCC is One of Its Top Buyers". *Atlantic Council*. https://www.atlanticcouncil.org/blogs/menasource/turkey-defense-baykar-gcc-gulf/. (Accessed: 12.05.2025)

215 Ibid.

216 Mevlütoğlu, A. (2022). "Türkiye'nin Politikaları ve Savunma Sanayii: İHA İhracatı." https://www.perspektif.online/turkiyenin-politikalari-ve-savunma-sanayii-iha-ihracati/. (Accessed: 12.01.2025)

With the deployment of the Ejder Yalçın 4x4 armored combat vehicle to an African country for a UN mission, the number of export destinations reached 15.

Türkiye's policy toward Africa differs markedly from the approaches of Western and other global actors, forming the foundation of a unique model of cooperation often described as the "Türkiye Model." This model is based on building equal partnerships with African nations, developing needs-driven projects, and supporting the continent's aspirations for independence and capacity-building. Through this approach, Türkiye has become a key supplier for African states, with bilateral trade exceeding USD 40 billion as of 2023.[217] Alongside economic cooperation, advances in the defence sector have made Türkiye an increasingly visible security and defence partner for the continent.

Particularly in the face of regional instability, African countries have turned to Türkiye — which they regard as a reliable partner — to deepen cooperation in defence. To date, 14 African nations — Burkina Faso, Algeria, Chad, Morocco, Ghana, Kenya, Mali, Mauritania, Niger, Nigeria, Senegal, Somalia, Rwanda, and Uganda — have procured a variety of weapons and military vehicles from Türkiye. Cost-effective, high-performance defence products such as the Bayraktar TB2 have emerged as attractive options for African states and have played a pivotal role in shaping these partnerships. In this process, Türkiye has secured a strong position among Africa's leading trade and investment partners, while also establishing itself as a strategic defence ally addressing the security needs of African nations.[218] In this context, on October 20, 2021, Türkiye and Nigeria signed the "Agreement on Defence Industry Cooperation between the Government of the Republic of Türkiye and the Government of the Federal Republic of Nigeria," aimed

[217] Doğan, Ö. F. (2025). "Afrika'nın Artan Potansiyeli ve Türkiye Modeli. ". *Anadolu Ajansı*. https://www.aa.com.tr/tr/analiz/afrikanin-artan-potansiyeli-ve-turkiye-modeli/3440821. (Accessed: 12.01.2025).

[218] Bayram, M. (2022). "Afrika'nın Savunmasında Türkiye". https://ytb.gov.tr/haberler/afrikanin-savunmasinda-turkiye. (Accessed: 12.01.2025).

at strengthening collaboration on defence and security matters.[219] Following this, on July 26, 2023, Türkiye and Kenya signed a "Defence Industry Cooperation Agreement," and on February 8, 2024[220], Türkiye and Somalia signed a "Defence and Economic Cooperation Framework Agreement," expanding the scope of their collaboration.[221]

Nigeria's Minister of Defence, Mohammed Badaru Abubakar, attended the ceremony marking the induction of the T129 ATAK attack helicopter procured from Türkiye.

5.3.4. Cooperation Projects and Partnerships with Asian Countries

Türkiye is also consolidating its role as a key player in South Asia. In this regard, numerous agreements have been signed with Asian nations for the export of defence industry products. The High-Level Strategic Cooperation Council, established with Pakistan in 2009, along with joint working groups formed under its framework with the participation of relevant institutions, has provided a structured basis for developing

219 "Cumhurbaşkanı Erdoğan: Nijerya'yla Askeri Savunma ve Güvenlik Konularında İş Birliğimizi Güçlendiriyoruz". *Anadolu Ajansı*. https://www.aa.com.tr/tr/gundem/cumhurbaskani-erdogan-nijeryayla-askeri-savunma-ve-guvenlik-konularinda-is-birligimizi-guclendiriyoruz/2397583. (Accessed: 12.01.2025).

220 "Türkiye ile Kenya Arasında Savunma Sanayi İşbirliği Anlaşması İmzalandı". *Anadolu Ajansı*. https://www.aa.com.tr/tr/gundem/turkiye-ile-kenya-arasinda-savunma-sanayi-isbirligi-anlasmasi-imzalandi/2954618. (Accessed: 12.01.2025).

221 "Türkiye ile Somali Arasında Savunma ve Ekonomik İşbirliği Çerçeve Anlaşması". *Anadolu Ajansı*. https://www.aa.com.tr/tr/gundem/turkiye-ile-somali-arasinda-savunma-ve-ekonomik-isbirligi-cerceve-anlasmasi-/3131682. (Accessed: 12.01.2025).

Launch of Pakistan's MİLGEM corvette.

bilateral relations and deepening cooperation. One of Türkiye's most comprehensive international defence undertakings — the MİLGEM corvette project — stands out as a flagship example of this strategic partnership, underscoring Türkiye's support for Pakistan and the depth of bilateral defence cooperation. Defence industry cooperation with Bangladesh has become a driving force in bilateral ties, contributing to Türkiye's vision of becoming a regional power in South Asia, while also deepening relations between the two countries and further strengthening Türkiye's position in the global defence ecosystem[222].

TUSAŞ participated in the Langkawi International Maritime and Aerospace Exhibition (LIMA) in Malaysia, showcasing its aircraft to regional military and civilian officials.

[222] "Belirsizlikler Çağında Kararlı ve Güçlü Türk Dış Politikası". (2025). T.C. Dışişleri Bakanlığı https://www.mfa.gov.tr/site_media/html/belirsizlikler-caginda-kararli-ve-guclu-turk-dis-politikasi-2025-kitapcik.pdf

Similarly, at the Kuala Lumpur Summit in 2019 with one of Türkiye's strategic partners in the Asia-Pacific, Malaysia, key agreements were signed to strengthen cooperation in the defence industry. These agreements encompassed critical areas such as unmanned aerial vehicle production, naval projects, land vehicle manufacturing, the integration of combat management systems, and the modernization of command-and-control systems. In addition, comprehensive cooperation initiatives were launched in defence technologies and systems integration, with both countries taking concrete steps to bolster their defence industry capabilities.[223]

Türkiye is exporting 48 KAAN National Combat Aircraft to Indonesia.

On June 14, 2025, a landmark export agreement was signed for KAAN, one of the flagship programs of the Turkish defence industry. Turkish Aerospace Industries (TUSAŞ) reached a deal with Indonesia to export 48 fifth-generation KAAN fighter aircraft. According to the agreement signed at the Indo Defence 2025 exhibition in Jakarta, the 48 aircraft will be completed and delivered within 120 months. The deal covers not only the delivery of the aircraft but also technology transfer and joint production processes. In this way, Türkiye's defence capabilities will extend beyond exports, enabling knowledge- and production-sharing with allied and partner nations.

[223] "Türkiye ile Malezya Arasındaki Anlaşmalar İslam Dünyasına İlham Veriyor". *Anadolu Ajansı*. https://www. aa.com.tr/tr/turkiye/turkiye-ile-malezya-arasindaki-anlasmalar-islam-dunyasina-ilham-veriyor/1679077. (Accessed: 12.01.2025).

5.3.5. Cooperation Projects and Partnerships with Turkic States

Türkiye continues to expand its cooperation and partnerships with Turkic States in the defence industry, as in many other areas. Within this context, the fraternal ties shaped by the "One Nation, Two States" principle with Azerbaijan are strongly reflected in defence cooperation. This partnership, which began with arrangements in the 1990s that enabled Azerbaijani military personnel to receive training in Türkiye, and was reinforced by the 2010 "Agreement on Strategic Partnership and Mutual Assistance," has since evolved into a military alliance that has reshaped the strategic balance of the South Caucasus[224]. One of the clearest demonstrations of this cooperation was during Azerbaijan's campaign to end nearly 30 years of occupation in Karabakh. In this process, Bayraktar TB2 UCAVs served as a critical force multiplier and were deployed effectively by the Azerbaijani Armed Forces across the entire front line during operations against Armenia. Because of their decisive impact on the course of the war, Turkish UCAVs received widespread global media coverage, hailed as a development that changed the history of modern warfare and positioned Turkish defence products as true game changers[225].

77 Azerbaijani soldiers received training as Bayraktar TB2 UCAV operators.

[224] Kasapoğlu, C. (2017). "Türkiye-Azerbaycan: Savunma İş Birliğinden Askeri İttifaka". *Anadolu Ajansı*. https://www.aa.com.tr/tr/analiz-haber/turkiye-azerbaycan-savunma-is-birliginden-askeri-ittifaka/952323. (Erişim Tarihi: 12.01.2025).

[225] "Bayraktar TB2, 1 milyon Saati Devirip Yeni Rekora İmza Attı". *Anadolu Ajansı*. https://www.aa.com.tr/tr/bilim-teknoloji/bayraktar-tb2-1-milyon-saati-devirip-yeni-rekora-imza-atti/3419699. (Erişim Tarihi: 12.01.2025).

Another recent example of Türkiye's defence industry cooperation with Turkic States is the agreement signed with Uzbekistan. The "Agreement on Cooperation in the Field of the Defence Industry," signed between the Republic of Türkiye and the Republic of Uzbekistan on March 23, 2021, was ratified on December 27, 2024, through Law No. 7506 and entered into force.[226] Similarly, on May 11, 2022, Türkiye and Kazakhstan issued a "Joint Declaration on Enhanced Strategic Partnership," agreeing to deepen cooperation in the defence industry,

ROKETSAN, now an international player in rocket and missile production, stands out with a wide product range spanning from air defence systems to naval platforms.

[226] "Türkiye Cumhuriyeti Hükümeti ve Özbekistan Cumhuriyeti Hükümeti Arasında Savunma Sanayi Alanında İşbirliği Anlaşması"nın onaylanmasına dair 9 sayılı Cumhurbaşkanlığı Kararnamesi. https://www.resmigazete.gov.tr/eskiler/2024/12/20241228-5.pdf. (Accessed: 12.01.2025).

including evaluating and pursuing opportunities for joint production.[227] Likewise, on November 5, 2024, Türkiye and Kyrgyzstan signed the "Joint Declaration on Elevating the Strategic Partnership Relations between the Republic of Türkiye and the Kyrgyz Republic to the Level of Comprehensive Strategic Partnership," followed by a "Defence Industry Cooperation Agreement," marking another important step in defence ties with Turkic States.[228] Through these initiatives, Türkiye aims to deepen cooperation with Turkic States—primarily in the defence industry—while promoting regional security and solidarity.[229]

Türkiye's rise in the defence sector represents not only a military achievement but also an economic, technological, and diplomatic success. In this process, Türkiye has developed national and original technologies at home, leveraging these achievements abroad as a powerful diplomatic tool. At the same time, Türkiye has established itself as a trusted partner for its allies while positioning itself as a credible deterrent against adversarial actors. Building such partnerships in a field as strategically critical as defence has strengthened Türkiye's role as a stakeholder in regional and global security.

The rise of Türkiye's defence industry is not limited to military achievements but forms part of a broader vision of international leadership. Within this framework, Türkiye has developed the "Century of Türkiye" vision—an inclusive strategy that places international cooperation at its core. This vision seeks to assume leadership in addressing global challenges, to reinforce regional and international partnerships, and to take responsibility for building a sustainable future. Through joint projects and multilateral cooperation strategies, Türkiye continues to solidify its place on the global stage as an active and influential actor.

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227 'Türkiye ile Kazakistan arasında Geliştirilmiş Stratejik Ortaklığa İlişkin Ortak Bildirisi' Yayımlandı. *Anadolu Ajansı*. https://www.aa.com.tr/tr/gundem/turkiye-ile-kazakistan-arasinda-gelistirilmis-stratejik-ortakliga-iliskin-ortak-bildirisi-yayimlandi/2584355. (Accessed: 12.01.2025).

228 Türkiye ile Kırgızistan Arasında 19 Anlaşma İmzalandı. *Anadolu Ajansı*. https://www.aa.com.tr/tr/gundem/turkiye-ile-kirgizistan-arasinda-19-anlasma-imzalandi/3384430. (Accessed: 12.01.2025).

229 Türkiye-Türk Cumhuriyetleri İlişkilerinde Yeni Ufuklar. *Anadolu Ajansı*. https://www.aa.com.tr/tranaliz/turkiye-turk-cumhuriyetleri-iliskilerinde-yeni-ufuklar/2172181. (Accessed: 12.01.2025).

CONCLUSION

The success story of Türkiye's defence industry reflects not only security-driven progress but also the country's pursuit of an independent, innovative, and sustainable model of development. Steps taken in the defence sector have not only strengthened national security but also elevated Türkiye's standing as a strategic actor in this domain. In this perspective, the defence industry plays a multidimensional role—supporting Türkiye's foreign policy vision, economic development strategies, and global strategic objectives in an integrated manner. Through domestic and national production initiatives, Türkiye has significantly reduced its dependence on external suppliers and developed high-technology, innovative, and original solutions that make meaningful contributions to the international security system. From an economic standpoint, the sector's expanding export volume, contribution to development, and job creation highlight Türkiye's steady progress toward becoming a regional and global hub for technology and industry.

In this context, an examination of the current strategic standing of the defence industry reveals four main pillars shaping its success and defining its future:

- **National Security and Independence:** Technological advances in the defence sector-along with the expansion of domestic and national production-have pushed the local content ratio to around 80%, reducing Türkiye's external dependence in this field to a significant degree. As a result, the defence industry has strengthened Türkiye's hand not only in national security but also in diplomacy and international relations. This substantial increase in local production capacity has given Türkiye greater flexibility in strategic decision-making during times of crisis and uncertainty, making it an indispensable element in safeguarding national interests.

- **Technological Advancement and Innovation:** Signature programs under the National Technology Initiative—such as the Bayraktar TB2, Akıncı, the Hisar air defence systems, and the MİLGEM projects—demonstrate Türkiye's capacity to design and deliver original defence technologies. These systems not only strengthen military capabilities but also contribute to Türkiye's innovation ecosystem through their civilian technology spillovers. In addition, investments in artificial intelligence, unmanned systems, and cybersecurity reinforce preparedness for the future battlefield environment.

In this respect, ongoing R&D initiatives, the cultivation of specialized talent, the strengthening of university-industry partnerships, and the proliferation of technology parks are essential for sustaining innovation in defence. Türkiye's overarching goal is to build a dynamic and innovative infrastructure, guided by a vision that positions the country at the forefront of next-generation technological transformation. At the same time, adapting to the demands of modern defence doctrine requires digitalization and the integration of artificial intelligence—both among the priority objectives of the Turkish defence industry.

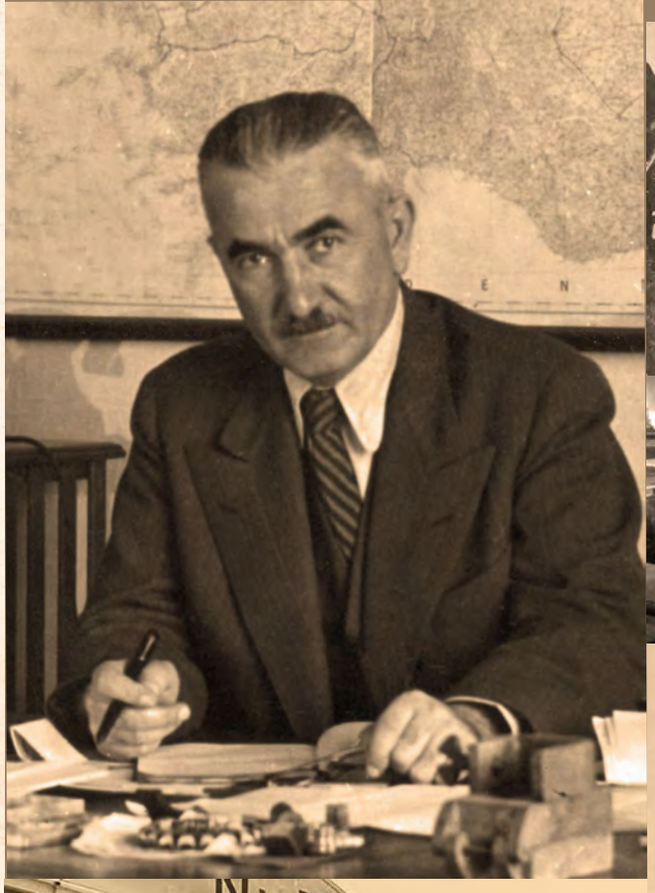
- **Economic and Industrial Contributions:** Today, the Turkish defence industry stands as a strategic sector, delivering significant value added to the economy while creating extensive employment opportunities. Rising export volumes not only make a direct contribution to the national economy but also support Türkiye's ambition to become a central node in global supply chains. Defence and aerospace exports reached USD 7.154 billion in 2024. The sector's growing turnover not only sustains employment but also stimulates growth across related industries connected to defence.

- **International Prestige and Diplomatic Influence:** The strong performance of Turkish defence products in conflict zones such as Libya, Karabakh, and Ukraine has drawn global attention-not only for their operational effectiveness but also for their technological sophistication and innovative edge. This success has reinforced Türkiye's international standing, transforming its defence industry into a strategic foreign policy instrument. In turn, these achievements have deepened Türkiye's ties with its allies and created new avenues for cooperation. Looking ahead, Türkiye seeks to leverage strategic partnerships with regional and global actors to strengthen technology-transfer initiatives and ensure the sector's deeper integration into the global defence ecosystem.

This study aims to provide a comprehensive account of the Turkish defence industry's journey—from its historical roots to its forward-looking vision—helping shape a more accurate and nuanced understanding within the international community. Yet this success story is not confined to today's accomplishments; it also embodies a powerful mission for the future. Under the leadership of President Recep Tayyip Erdoğan, the "Century of Türkiye" vision charts a course toward full independence in defence technologies, rapidly expanding export capacity, and robust international partnerships—positioning Türkiye not only as a producer of technology but as a leading shaper of

global security architecture. This vision defines the Turkish defence industry as one of the strategic game-changers of the future.

Moreover, the story of the Turkish defence industry serves not only Türkiye but also inspires friendly and allied nations seeking to build independent, national, innovative, and original defence capabilities. It demonstrates how visionary leadership, unwavering national objectives, strategic investments in technology, and international cooperation can enable a nation to transform its destiny.

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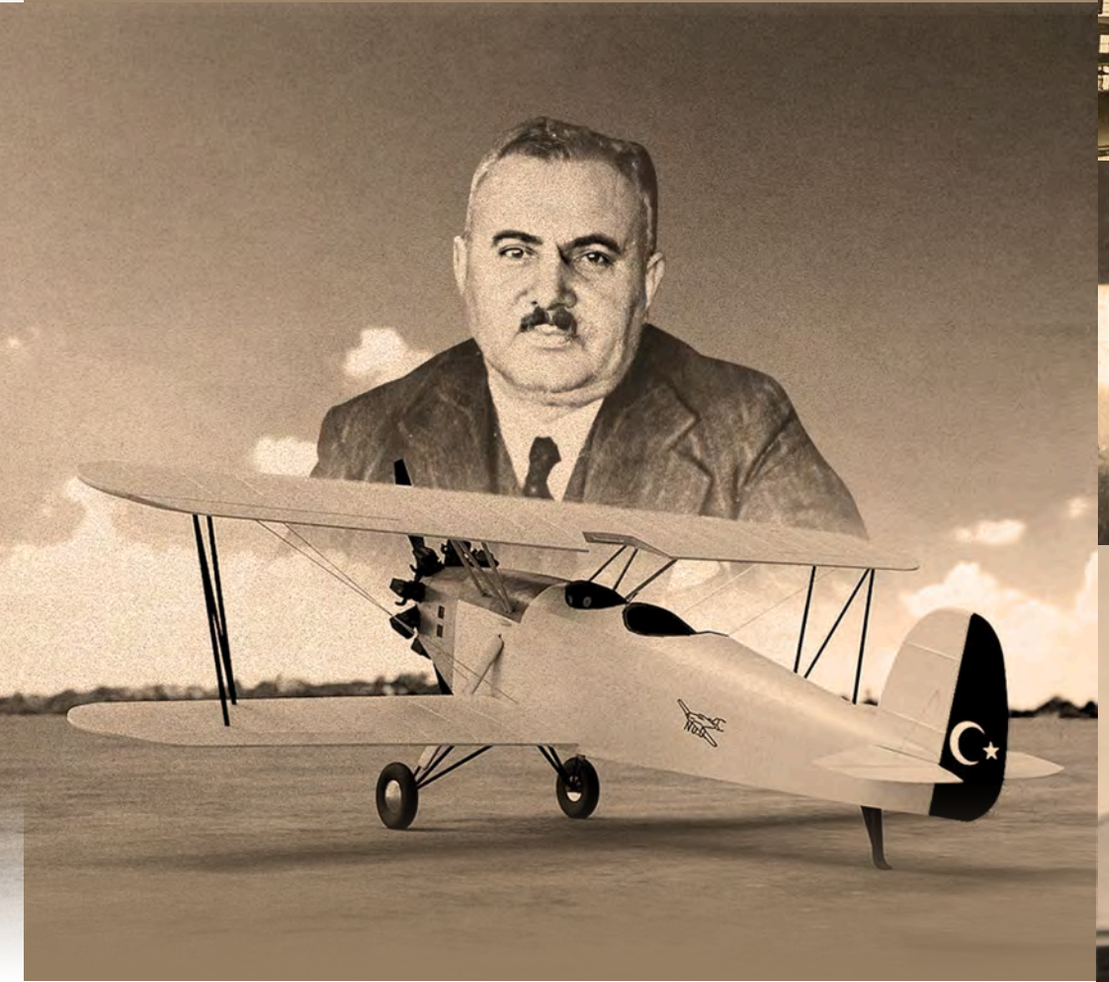



Nu.D.

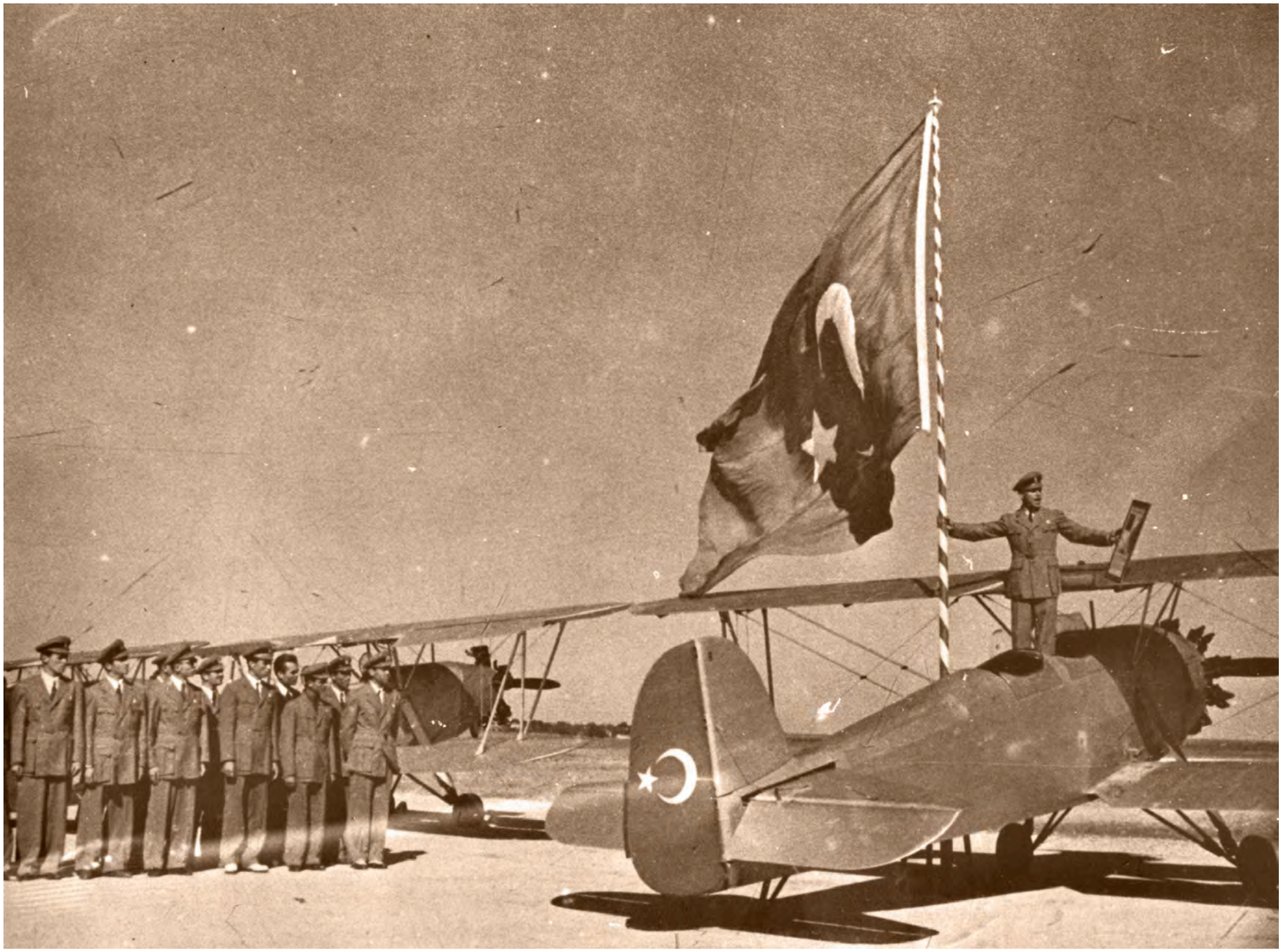
Pioneers of the Turkish Defence Industry: In the Footsteps of Courage, Struggle, and Inspiration

PIONEERS OF THE TURKISH DEFENCE INDUSTRY: **IN THE FOOTSTEPS OF COURAGE, STRUGGLE, AND INSPIRATION**

The technological maturity and industrial competence achieved by the Turkish defence industry today are not only the product of steady reforms and rational investment but also the result of decades of effort by scientists and visionaries who acted with courage, produced innovative ideas, and provided guiding leadership. These pioneering figures transcended the limitations of their times with a vision to shape the future, making critical contributions to Türkiye's path toward independence and international prominence in defence.

Through determination, focus, and the ability to turn even setbacks into opportunities for learning and growth, these individuals became emblematic figures in the struggle to position the Turkish defence industry as a global contender. Their stories—even with their unfinished chapters—carry the potential to provide inspiring perspectives for future generations.

This section presents the biographies of six pioneering figures who left a mark on different periods of the Turkish defence industry and broke new ground in their respective fields. Among them are: Şakir Zümre, who founded Türkiye's first private defence industry factory; Nuri Demirağ, a trailblazer whose initiatives laid the foundations of the aviation sector; the legendary pilot Vecihi Hürkuş, who designed and flew the country's first domestically built aircraft; visionary entrepreneur Nuri Killigil, who focused on ammunition production for the national defence industry; Selahattin Reşit Alan, one of Türkiye's first aeronautical engineers, who contributed to technical expertise; and Özdemir Bayraktar, one of the leading architects of the 21st-century National Technology Initiative and a key figure in driving a paradigm shift in defence.



Through these biographies, the section emphasizes that success should not be measured solely by final outcomes but also by the vision, determination, and perseverance that pave the way. At the same time, bringing broader recognition to the experiences of these pioneering scientists strengthens strategic awareness in the Turkish defence industry while enriching the inspirational legacy passed on to future generations.

Founder of Türkiye's First Private Defence Industry Factory:

Şakir Zümre (1885-1966)

During the War of Independence, Şakir Zümre was awarded the Medal of Independence by the Grand National Assembly of Türkiye (TBMM) for supplying the country with weapons and ammunition from abroad, and later established the Republic's first private-sector defence industry factory.

Born in Varna, Bulgaria, in 1885, Zümre completed his secondary education there before graduating from the Geneva Lycée and the Geneva Faculty of Law. After completing his law degree, he practiced as a lawyer and engaged in commerce, also serving as a deputy in the Bulgarian Parliament. Through his relative, Marshal Fevzi Çakmak, he was introduced to Staff Major Mustafa Kemal, then serving as military attaché in Sofia, and the two became friends[230].

[230] Rakipoğlu, Z. (03.04.2022). "Savunma Sanayi Öncüsü Şakir Zümre'nin Torunundan İHA-SİHA'ya 'Muhteşem' Yorumu". *Anadolu Ajansı*. https://www.aa.com.tr/tr/gundem/savunma-sanayi-oncusu-sakir-zumre- nin-torunundan-iha-sihaya-muhtesem-yorumu/2553815 (Accessed: 05.12.2024).

I. Following the signing of the Armistice of Mudros at the end of World War I, Zümre was imprisoned by the Bulgarian government on the grounds of advocating for Bulgaria to enter the war on Türkiye's side. After seven months of imprisonment, he was released with the formation of a new Bulgarian government and began working actively in support of the Turkish National Struggle. For his efforts in transporting arms and ammunition to Türkiye during the National Struggle, he was again awarded the Medal of Independence by the Grand National Assembly of Türkiye[231]. During the Armistice years, he launched commercial ventures in Istanbul, establishing a metal goods factory in 1920. Following the Armistice of Mudanya, he continued operations, including the export of raw materials such as iron and copper to Bulgaria.

After the victory of the War of Independence, Zümre moved to Istanbul in 1923 at the invitation of Gazi Mustafa Kemal Atatürk. In 1925, he established the Turkish Military and Metal Industry Factory on the Golden Horn, which became the first private-sector defence industry enterprise of the Republic. There, he undertook production ranging from Türkiye's first aerial bombs to weapons, ammunition, and even engines. Through the serial production of 100 kg, 300 kg, 500 kg, and 1,000 kg bombs, he met a critical need of the Turkish Air Force, while also producing depth charges, illumination flares, mines, hand grenades, and 5-horsepower diesel engines for the Turkish Navy.

[231] "Savunma Sanayii Kahramanları Serisi – 2". *Savunma Sanayii Dergilik*. https://www.youtube.com/watch?v=Bwy0jFWCJ9k&list=PLDaQPERdhleHeUTtQDNNNMY3Ex61Clofe&index=2&ab_channel=SavunmaSanayiiDergilik. (Accessed: 05.12.2024).

The country's first domestically produced submarine bombs were also manufactured at this factory[232]. Zümre went on to achieve international success, exporting defence products to countries such as Bulgaria, Poland, Greece, Egypt, Jordan, and Syria.

Despite significant challenges in securing raw materials and technical equipment during World War II, the factory maintained operations, but in the postwar years was forced to abandon defence production, shifting instead to agricultural tools and stoves.

Known for his contributions to Türkiye's industrial development, Zümre served as vice president of the Turkish Industrial Union and was a member of the Istanbul Chamber of Commerce and Industry. Şakir Zümre passed away on June 16, 1966.

[232] "Silah Üreten Fabrikası, Soba Üreten Fabrikaya Dönüştürülen Kahraman: Şakir Zümre". *Savunma Sanayii Dergilik*. https://savunmasanayiidergilik.com/tr/HaberDergilik/Silah-ureten-fabrikasi-soba-ureten-fabrikaya-donusturulen-kahraman-sakir-Zumre. (Accessed: 05.12.2024)

Pioneer of the Turkish Aviation Sector:

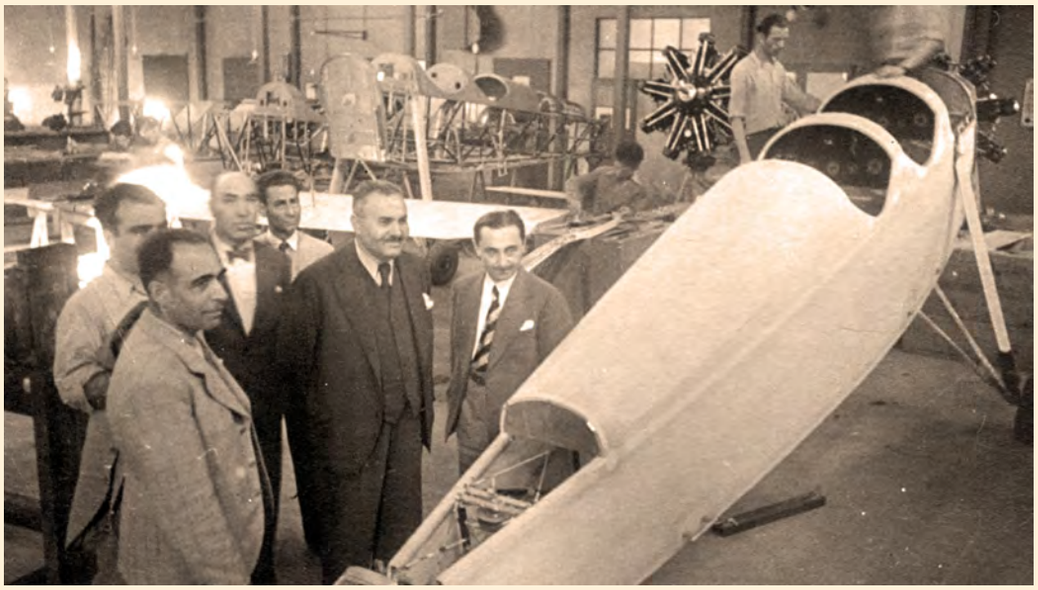
Mühürdarzade Nuri Demirağ (1886-1957)

Nuri Demirağ, who established the Republic's first aircraft factory, stands among the founding figures of Türkiye's aviation sector.

Born in 1886 in Divriği, Sivas, Demirağ began his career in public service at the age of 17, after passing the entrance exam of the Agricultural Bank (Ziraat Bankası). Following the proclamation of the Second Constitutional Monarchy, Agricultural Bank employees were tasked with reform efforts, and in 1911 Demirağ was appointed to a higher post in Istanbul[233]. While working as a revenue officer in Beyoğlu, he attended evening courses at the School of Commerce, continuing his higher education and further developing himself through additional studies in history, literature, and philosophy. In 1918, frustrated by the disrespectful behavior of occupying forces, he resigned from public service.[234] At that time, his entire fortune amounted to just 56 Turkish gold coins. Convert-

[233] Yalçın, O. (2009). Mühürdarzade Nuri Bey'in (Demirağ) Hayatı ve Çalışmaları (1886-1957). *Atatürk Yolu Dergisi*. 11(44), 743-769. https://doi.org/10.1501/Tite_0000000311(Accessed: 05.12.2024)

[234] "Hayatını Türk havacılığına adayan kahraman Nuri Demirağ". *Savunma Sanayii Dergilik*. 02.12.2024 https://www.savunmasanayiidergilik.com/tr/HaberDergilik/Hayatini-Turk-havaciligina-adayan-kahraman-Nuri-Demirag (Accessed: 02.12.2024)

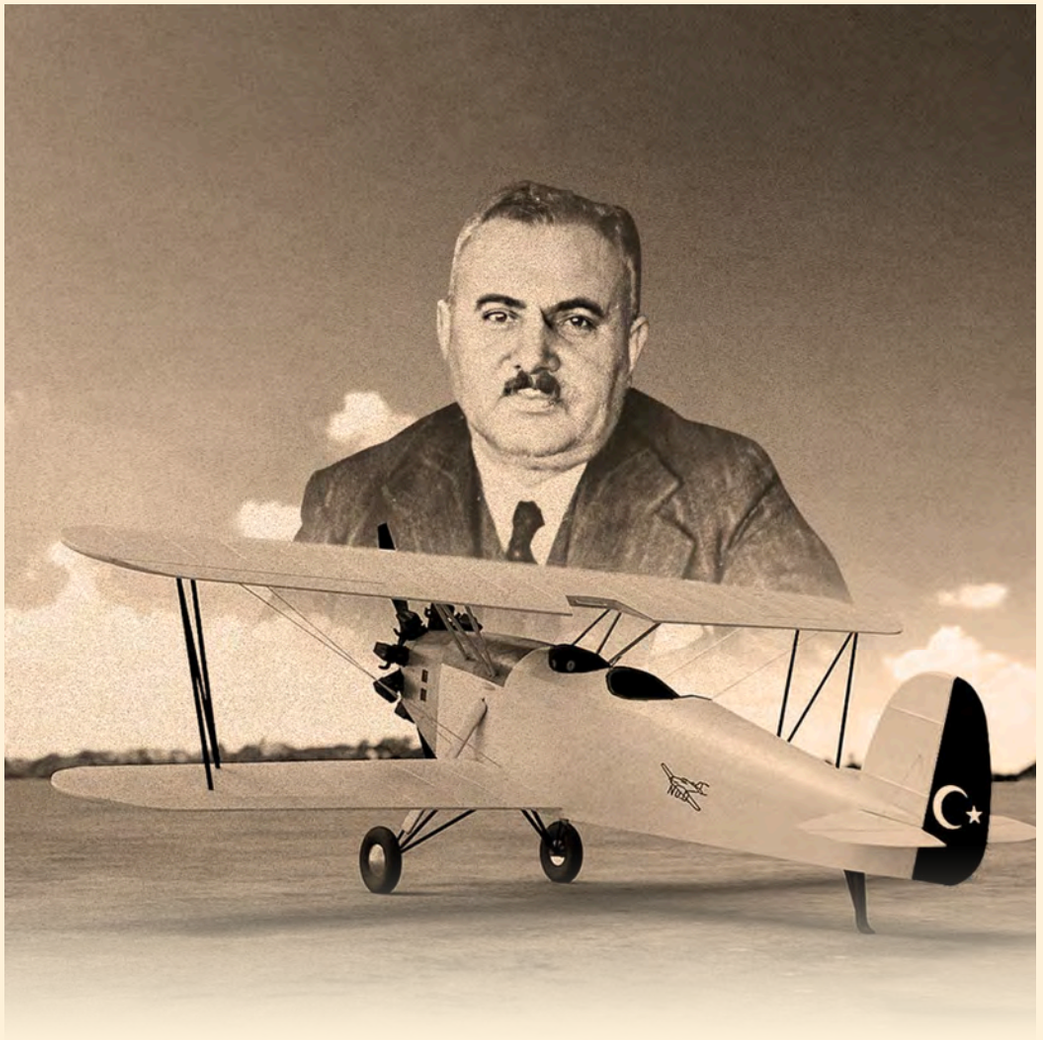


ing this into 256 Turkish lira, Demirağ decided to go into business.[235] His first venture in the private sector was the production of cigarette paper, a field then monopolized by foreign companies. In 1920, as the head of the Maçka Branch of the Association for the Defence of National Rights (Müdafaa-i Hukuk Cemiyeti), Demirağ expanded his commercial investments after the national struggle succeeded and the Republic was established.

In 1926, Demirağ took part in the Republic's project to build railroads using national resources, making significant contributions to laying down the backbone of Anatolia's rail network. Within this scope, he oversaw the construction of 2,012 kilometers of railroad. In recognition of his contributions to the development of the railways, Mustafa Kemal Atatürk personally gave him the surname "Demirağ" (literally "Iron Net"). During the 1930s, Nuri Demirağ's visionary character came to the forefront as he launched large-scale projects. Among these were his 1931 proposal for a bridge over the Bosphorus to connect Asia and Europe, and his 1933 plan for the Keban Dam.

As one of the figures who "wove Anatolia with iron rails," Demirağ established the Aircraft Study Workshop (Tayyare Etüt Atölyesi) in 1936 next to the Barbaros Hayrettin Pier in Beşiktaş—today the site of the Naval Museum—initiating ventures in aircraft production, and soon transformed it into a full-fledged aircraft factory. Around the same time, he purchased the Elmas Paşa Farm, a 1,500-acre tract in Yeşilköy, to build Türkiye's first civilian airfield, known as the "Sky Stadium," where he also constructed

[235] Yalçın, O. (2009). Mühürdarzade Nuri Bey'in (Demirağ) Hayatı ve Çalışmaları (1886-1957). *Atatürk Yolu Dergisi*. 11(44), s. 743-769. https://doi.org/10.1501/Tite_0000000311 (Accessed: 02.12.2024).



a flat runway. On the Elmas Paşa Farm, he established the Gök School (Gök Okulu), which began providing both aircraft production and aviation training.

The school offered pilot training as well as instruction in aircraft maintenance and technical support. Drawing its students from both the middle school-level Gök School he had founded in Divriği and from universities in Istanbul, Demirağ's institution went on to train 290 pilots.[236]

In his aircraft project, Demirağ collaborated with Selahattin Alan, one of Türkiye's first aircraft engineers, and produced the ND-36, the nation's first domestically designed and built single-engine aircraft. The aircraft received praise, and the Turkish Aeronautical Association placed an order for 65 units. In 1938, Demirağ produced the Nu.D.38,

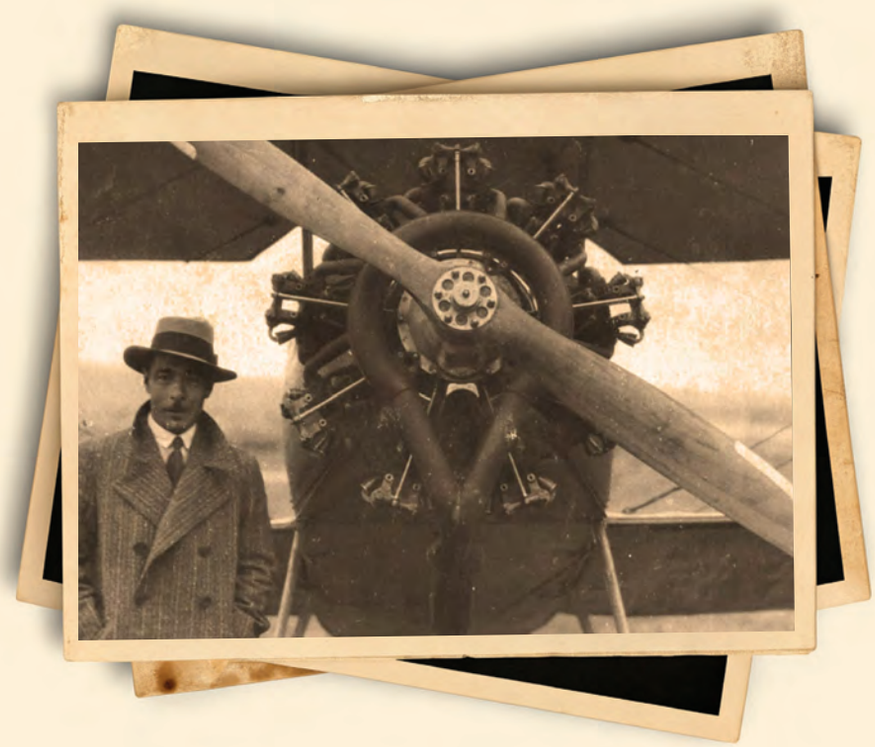
[236] Ibid.

a twin-engine passenger plane, which he planned to further develop into a bomber. However, one of the Nu.D.38 prototypes crashed due to pilot error, leading the Turkish Aeronautical Association to cancel its orders. Although it was officially reported that there was no technical fault with the plane, Demirağ persevered, pursuing a legal battle, and in 1944 he succeeded in securing an international flight certificate for the Nu.D.38. Nevertheless, foreign orders were obstructed, and without government support Demirağ's factory was forced to close, bringing aircraft production in Türkiye to a halt[237].

A key figure in Turkish aviation history, Demirağ founded the country's first private aircraft and parachute factory, produced both airplanes and gliders, and placed strong emphasis on aviation education. In 1939, thanks to his efforts, a new department for training aircraft engineers was established within the Mechanical Engineering Department of the Higher School of Engineering (Yüksek Mühendis Mektebi, today Istanbul Technical University – ITU). Furthermore, through Demirağ's initiative, Türkiye celebrated its first "Aviation Day" (Havacılık Bayramı) on August 17, 1941.

Nuri Demirağ later entered politics by founding the National Development Party (Millî Kalkınma Partisi), and passed away on November 13, 1957.

[237] Ibid.



Türkiye's First Chief Aviator:

Vecihi Hürkuş (1896-1969)

One of the most iconic figures in Turkish aviation history, pilot Vecihi Hürkuş produced the first Turkish-designed aircraft, the "Vecihi K-VI," in 1924. As the only pilot among the founders of Türkiye's first civil aviation organization, the Turkish Aeronautical Association (Türk Tayyare Cemiyeti), Hürkuş was honored with the title of Türkiye's Chief Aviator (Baştayyareci). His second design, the Vecihi XIV, became Türkiye's first civilian aircraft.

Born in Istanbul in 1896, Vecihi Hürkuş studied at Füyuzat-ı Osmaniye Middle School and Üsküdar Paşakapısı High School before graduating from the Tophane School of Industry. In 1912, he volunteered to fight alongside his brother-in-law, Staff Colonel Kemal Bey, in the Balkan Wars, and later served as commander of the prisoner-of-war camp at Serviburun in Beykoz, on assignment from the Istanbul Army Command.

Continuing his education, Hürkuş graduated from the Aircraft Mechanics School (Tayyare Makinist Mektebi) before being deployed as a mechanic to the Baghdad Front during World War I. He later completed training at the Aviation School (Tayyare Mektebi) in Yeşilköy and in 1916 carried out his first flight. In 1917, Hürkuş was assigned to the 7th Aircraft Squadron on the Caucasus Front, where he downed a Russian plane, earning a place in history as the first Turkish aviator to shoot down an enemy aircraft. On October 8, 1917, during an air battle, the plane he was piloting was shot down by Russian forces, and Hürkuş was taken prisoner and sent to Nargin Island in the Caspian Sea.

He escaped from captivity there with the help of Azerbaijani Turks[238]. I. Toward the end of World War I, he returned to Istanbul and was assigned to the Air Defence Battalion, where he worked on designing a fighter aircraft. However, this project was cut short by the signing of the Armistice of Mudros.[239]

Following the occupation of Istanbul, he sought ways to cross into Anatolia to join the ranks of the National Struggle, eventually traveling to Konya, where he participated in the War of Independence as a civilian pilot. During the War of Independence, he carried out successful reconnaissance flights and downed a Greek aircraft.[240] For his heroism in the War of Independence, Hürkuş became the only individual to receive three commendations from the Grand National Assembly of Türkiye (TBMM) and was awarded the Independence Medal with a red ribbon.[241]

238 Ulaş. F., (17.07.2023). "Türk Havacılık ve Sanayisine İlham Veren Pilot: Vecihi Hürkuş. *Anadolu Ajansı*. https://www.aa.com.tr/tr/gundem/turk-havacilik-ve-sanayisine-ilham-veren-pilot-vecihi-hurkus/2946883

239 Vecihi Hürkuş. Türk Hava Kurumu. https://www.thk.org.tr/vecihi_hurkus. (05.12.2024).

240 Ibid.

241 Yılmazer, İ. B., (2020). Vecihi Hürkuş (1895- 1969). *Atatürk Ansiklopedisi*. https://ataturkansiklopedisi.gov. tr/bilgi/vecihi-hurkus-1895-1969/ (Accessed: 05.12.2024)

After the War of Independence, he served as an instructor at the flying school established in İzmir/Seydiköy. Later focusing on aircraft design, Hürkuş produced his first Turkish aircraft, the single-engine "Vecihi K-VI," in 1924 and flew it for the first time in 1925.

However, because this flight was unauthorized, he was penalized.[242] That same year, as the only pilot among the founding members of Türkiye's first civilian aviation organization, the Turkish Aeronautical Association (Türk Tayyare Cemiyeti), Hürkuş was awarded the title of Türkiye's Chief Aviator (Baştayyareci) for the first time in the country's history.

Around this time, after the Ministry of National Defence signed an agreement with Tayyare ve Motor Türk Anonim Şirketi (TOMTAŞ) to establish a factory in Kayseri, Hürkuş was sent to Germany to work on correcting deficiencies in "Junkers A.20" aircraft. In 1926, he successfully completed test flights for the "Junkers A.35."[243] That same year, Türkiye's first parachute jump demonstration, performed with a Junkers F-13 piloted by Hürkuş, took place in Ankara. In the 1930s, continuing to design new aircraft models and types, Hürkuş rented a carpenter's shop in Kadıköy and within three months built the "Vecihi XIV." This two-seat, single-engine sport and training aircraft made its first flight in Kadıköy in 1930. The Vecihi XIV became Türkiye's first civilian aircraft and was the second aircraft Hürkuş had produced.

In 1931, after sending his aircraft to Czechoslovakia to obtain the required certification, he attempted to establish the "Ankara-Erzurum" and "Ankara-Istanbul" postal routes upon his return, but these projects could not be completed due to administrative obstacles. In 1932, he founded Türkiye's first civilian aviation school, the Vecihi Civil Aviation School (Vecihi Sivil Tayyare Mektebi), where he trained 12 students. In 1933, he manufactured the "Vecihi XVI" and "Vecihi XV" aircraft, taking a pioneering role in domestic aircraft production. However, the school was later closed due to financial difficulties and because its diplomas were not recognized as equivalent. In 1937, he traveled to Germany for engineering studies and obtained his diploma in aeronautical mechanical engineering. Returning to Türkiye in 1942, he published the book Vecihi in the Air (Vecihi Havada), and in 1947 he founded the Winged Union (Kanatlılar Birliği) and the agricultural spraying company "Turkish Wing" (Türk Kanadı).[244] In 1954, he established Hürkuş Airlines (Hürkuş Hava Yolları), but the company was shut down due to bureaucratic obstacles.

Vecihi Hürkuş passed away on July 16, 1969. His name was immortalized by being given to the new generation of basic training aircraft used by the Turkish Air Force to train pilots.

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[242] Ulaş. F., (17.07.2023). Türk havacılık ve sanayisine ilham veren pilot: Vecihi Hürkuş. Anadolu Ajansı. https://www.aa.com.tr/tr/gundem/turk-havacilik-ve-sanayisine-ilham-veren-pilot-vecihi-hurkus/2946883

[243] Vecihi Hürkuş'un Yaşam Öyküsü. Tayyareci Vecihi Hürkuş Müzesi Derneği. https://tayyarecivecihi.com/vecihi-hurkus/ (Accessed: 05.12.2024).

[244] Ulaş. F., (17.07.2023). Türk havacılık ve sanayisine ilham veren pilot: Vecihi Hürkuş. Anadolu Ajansı. https://www.aa.com.tr/tr/gundem/turk-havacilik-ve-sanayisine-ilham-veren-pilot-vecihi-hurkus/2946883 (Accessed: 05.12.2024).

One of Türkiye's First Aircraft Engineers:

Selahattin Reşit Alan (1901- 1938)

Selahattin Reşit Alan, one of the first aircraft engineers trained by the Republic of Türkiye, became a pioneering figure in Turkish aviation with the aircraft he designed.

Born in 1901 in the town of Prilep, Macedonia, Alan was among the first Turkish aircraft engineers and a trailblazer in the national defence industry. In 1926, he was selected by the Turkish Aeronautical Association (Türk Tayyare Cemiyeti) as part of the first group of five students sent abroad for training in aircraft engineering, and he studied at the École Supérieure d'Aéronautique in France. Atatürk, in a letter sent to Alan and his colleagues before their studies abroad, underscored the importance of their mission with these words: *"I am sending you as sparks; you must return as flames."*[245] After completing his engineering education in 1928, Alan completed technical training at Société Hanriot and later attended a pilot training course at Aéroplanes Morane-Saulnier.

[245] Savunma Sanayii Kahramanları Serisi 4. *REPUBLIC OF TÜRKİYE Cumhurbaşkanlığı Savunma Sanayii Başkanlığı (SSB)*. https://www.youtube.com/watch?v=ngXHO-jtBDQ&ab_channel=SavunmaSanayiiBa%C5%9Fkanl%C4%- B1%C4%9F%C4%B1 (Accessed: 05.12.2024).

Following his training in France, Alan returned to Türkiye in 1931 as a military-certified pilot. His first assignment was at the Eskişehir Aircraft Repair Workshop, affiliated with the Inspectorate General of the Air Forces (Kuva-yı Havaiye Müfettiş-i Umumisi), where he completed the design of the "Selahattin-1" aircraft.[246] Building on the "Selahattin-1" design, he developed the project for a training and reconnaissance aircraft under the Ministry of National Defence–1 (MMV-I) code and initiated prototype production. The prototype of this two-seat, single-engine, biplane was completed in 1932. Although the aircraft—manufactured domestically in all parts except its engine and propeller—successfully completed its test flight, production could not proceed due to lack of sufficient support.

In 1935, Selahattin Reşit Alan resigned from his position at the Eskişehir Aircraft Repair Workshop and entered into partnership with Nuri Demirağ in Istanbul. Together with the technical team of Demirağ's aircraft factory, Alan conducted research visits to facilities in Germany, Czechoslovakia, England, and the United States. During these visits, several German engineers were brought into the team through the German Civil Aviation Federation. Following these study tours, a 10-year "Action Plan" for aviation development was prepared.

Under Alan's technical leadership, the Nu.D.36 and Nu.D.38 aircraft were designed at Demirağ's factory. Alan also served as the test pilot for both aircraft, but tragically lost his life during a landing with the Nu.D.38 at İnönü Airfield.

[246] Türkiye'nin İlk Uçak Mühendislerinden Selahattin Reşit Alan. *Savunma Sanayii Dergilik*, https://savunmasanayiidergilik.com/tr/HaberDergilik/Turkiye-nin-ilk-ucak-muhendislerinden-Selahattin-Resit-Alan (Accessed: 05.12.2024).

The accident report stated that the aircraft struck a trench dug alongside the runway to keep animals from straying onto it.[247]

[247] Kakşa, G.N., Türkiye Cumhuriyeti'nin İlk Uçak Mühendisi: Selahattin Reşit Alan. https://www.savasanka-natlar.com/turkiye-cumhuriyetinin-ilk-ucak-muhendisi-selahattin-resit-alan/ (Accessed: 05.12.2024).

Entrepreneur of the National Defence Industry:

Nuri Killigil (1890–1949)

During the War of Independence, Nuri Killigil repaired captured weapons, and later, in the factory he founded, manufactured cannons, mortars, anti-aircraft ammunition and fuzes, as well as aircraft bombs. Killigil became one of the first private-sector entrepreneurs to advance Türkiye's national defence industry and strengthen the firepower of the Turkish Armed Forces.

Born in 1890 in Monastir, Killigil graduated from the Monastir Military Academy in 1909 as a second lieutenant.

He served in various regions of the Balkans and, after the Ottoman Empire entered World War I, was appointed aide-de-camp to the Sultan. He held posts in Tripolitania and Benghazi until 1917. When Azerbaijan and Dagestan sought assistance from the Ottoman Empire, Enver Pasha established the Caucasian Islamic Army and appointed his brother, Nuri Pasha, as its commander. This army liberated Baku on September 15, 1918. For his role in this victory, Nuri Pasha earned the title "Conqueror of Baku." He was later awarded the Independence Medal in 1929 for his contribution to the liberation of Sarıkamış during the War of Independence.

In 1921, Killigil went to Berlin, where he studied ceramics and in 1924 established the Kütahya Ceramics Company. After this initial success in private enterprise, he turned toward defence manufacturing. He purchased a coke coal company in Istanbul's Zeytinburnu district and established a factory there, producing pistols, canteens, iron rods, gas masks,

The unique emblem (logo) of Nuri Pasha
Factory was engraved on the weapons produced and printed on various documents associated with the factory.

The 9 mm "Nuri Pistol" manufactured by Nuri Killigil for Fevzi Çakmak.
The letters "F" and "Ç" engraved on the grip represent the initials of Fevzi Çakmak's name. Nuri Pasha personally crafted this weapon and presented it as a gift to Chief of the General Staff Fevzi Çakmak. Years later, Fevzi Çakmak passed the pistol on to his relative, Şakir Zümre.

and ammunition. Expanding his operations, Killigil relocated his factory to Sütlüce in 1946, where he also began producing mortars and mortar shells. Products from Killigil's factory were exported to countries including Egypt, Pakistan, Syria, and Palestine.[248]

Having worked during the War of Independence in workshops and factories in Erzurum to repair captured weapons and equipment, Killigil later went on to establish a factory where he manufactured cannons, mortars, anti-aircraft ammunition and fuzes, as well as aircraft bombs—becoming one of the first private entrepreneurs to contribute to the development of Türkiye's national defence industry and to strengthening the firepower of the Turkish Armed Forces.[249] At the Sütlüce Factory, he produced weapons and ammunition and designed several new firearms, securing patents for them. Among these was the "Nuri Pistol," Türkiye's first domestically produced 9 mm firearm, which was also put into serial production.

Supporting Arab armies and the Palestinian people during the Arab-Israeli War, and later manufacturing weapons and ammunition for Arab resistance fighters following the establishment of Israel, Killigil was martyred in a massive explosion at his Sütlüce factory on March 2, 1949.[250]

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248 "Savunma Sanayii Kahramanları Serisi – 1" *Savunma Sanayii Dergilik*. https://www.youtube.com/watch?v=-jqMrphjz6Ww&list=PLDaQPERdhleHeUTtQDNNNMY3Ex61Clofe&index=1&ab_channel=SavunmaSanayiiDergilik (Accessed: 05.12.2024).

249 Türetken, M. (05.12.2024). "Yerli ve Millî Silah Sanayisinin Temellerini Atan İsim: Nuri Killigil Paşa." *Anadolu Ajansı*. https://www.aa.com.tr/tr/turkiye/yerli-ve-millî-silah-sanayisinin-temellerini-atan-isim-nuri-killigil-pasa/1100413

250 Rehimov, R. (02.03.2024). "Türk Savunma Sanayisinin Öncülerinden Nuri Killigil'in Vefatının 75. Yılı" *Anadolu Ajansı*. https://www.aa.com.tr/tr/gundem/turk-savunma-sanayisinin-onculerinden-nuri-killigilin-vefatinin-75-yili/3153052 (Accessed: 05.12.2024).

Advocate of the National Technology Initiative:

Özdemir Bayraktar (1949-2021)

Özdemir Bayraktar, a prominent advocate for the National Technology Initiative, has been instrumental in advancing the development of national and innovative unmanned aerial vehicle technologies.

Özdemir Bayraktar was born in Istanbul in 1949. After completing his secondary education at Kabataş Boys' High School, he graduated in 1972 from the Faculty of Mechanical Engineering at Istanbul Technical University (İTÜ). Following graduation, he served for two years as a research assistant under Professor İsmail Hakkı Öz at the İTÜ Department of Engines, completing his master's studies on internal combustion engines.

Özdemir Bayraktar went on to play a pioneering role in Türkiye's industrial sector, taking on key technical management positions during the establishment and expansion phases of numerous factories. In 1984, with the aim of contributing to domestic production efforts in the automotive industry, Özdemir Bayraktar played a founding role in the establishment of Baykar Makina. What began with a single drill press soon grew into pioneering work in precision machining, where he led the design and manufacture of original machinery and the development of component processing apparatus. Özdemir

Bayraktar was a driving force in the development of Baykar's national and indigenous unmanned aerial vehicle (UAV) technologies, actively involved in every stage of these projects—from design, prototyping, and production to investment planning and execution.

He oversaw the R&D process for Bayraktar Mini UAV, the first unmanned aerial vehicle developed by Baykar for the Turkish Armed Forces (TSK), carrying out field studies between 2005 and 2009 in the Southeastern Anatolia Region.Expressing his vision for advancing UAV technology, Özdemir Bayraktar declared: “Our work will continue with all our strength, without pause, until our nation achieves full independence and global leadership in UAV technologies.” He personally directed the design processes of all the indigenous products developed by Baykar, including the signature designs of Bayraktar TB2 and Bayraktar AKINCI UCAV. For the contribution of Bayraktar TB2 UAVs to the liberation of Karabakh from Armenian occupation, Özdemir Bayraktar was awarded the Karabakh Order in 2021 by President Ilham Aliyev of the Republic of Azerbaijan.

A passionate aviation enthusiast, Bayraktar also held a private pilot’s license and is recognized as one of the pioneering figures in Türkiye’s unmanned aerial vehicle journey.

Özdemir Bayraktar’s legacy of advancing the nationalization and technological capacity of Türkiye’s defence industry is carried forward today with the same determination and dedication by his sons, Haluk Bayraktar and Selçuk Bayraktar.

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THE STORY OF TÜRKİYE'S RISING DEFENCE INDUSTRY

In an era where digital transformation and technological progress are redefining the architecture of global security, international strategies are being shaped not only by geopolitical power balances but also by cutting-edge defence technologies. Over the past two decades, Türkiye has pursued the goal of building an indigenous, national, and original defence industry—strengthening its own national security while at the same time emerging as a key actor reshaping the global security paradigm.

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PUBLICATIONS OF THE PRESIDENCY'S
DIRECTORATE OF COMMUNICATIONS

ISBN: 978-6-25628-163-9