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**The Turkish defence industry.
First-class strategic asset.**

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La industria turca de defensa. Activo estratégico de primer orden

Resumen:

Como ha quedado patente con ocasión del reciente conflicto en Nagorno-Karabaj, la industria turca de defensa ha demostrado su valor como activo estratégico que proporciona a Turquía una autonomía que le permite, por un lado, reducir su dependencia del exterior y, por otro, influir en su entorno para reforzar su cada vez más asertiva política exterior. Aunque en particular han sido los drones los sistemas de armas que han sobresalido durante este conflicto, la industria de defensa ha evolucionado durante las últimas décadas para cubrir hoy en día la mayor parte de las necesidades de la defensa nacional. A pesar del espectacular desarrollo, esta industria continúa siendo dependiente tecnológicamente del exterior en ciertas capacidades críticas. La manera en que Turquía trate de solventar estas carencias se dejará notar en su inestable equilibrio estratégico entre Rusia, por un lado, y EE. UU. y países occidentales, por otro.

Palabras clave:

Turquía, industria de defensa, drones, UAV, UCAV, estrategia.

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The Turkish defence industry. First-class strategic asset.

Abstract:

As the recent Nagorno-Karabakh conflict has shown, the Turkish defence industry has proved its value as a strategic asset that provides Turkey with an autonomy that allows it, on the one hand, to reduce its dependence on the outside world and, on the other, to influence its environment in order to strengthen its increasingly assertive foreign policy. Although drones in particular have been the weapon systems that have excelled during this conflict, the defence industry has evolved over the past decades to cover most of today's national defence needs. Despite spectacular development, the industry remains technologically dependent on foreign technology in certain critical capacities. How Turkey deals with these shortcomings will have an impact on its unstable strategic balance between Russia on the one hand, and the US and Western countries on the other.

Keywords:

Turkey, defence industry, drones, UAV, UCAV, strategy.

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Introduction

A little over two months after the ceasefire agreement was reached that ended hostilities between Armenia and Azerbaijan in Nagorno-Karabakh, many analysts have focused their attention on the decisive role that the use of unmanned aerial vehicles (UAVs) by the Azeri armed forces has played in the development of the conflict. One such analysis, which has had some impact among experts, concludes that “Europe should look carefully at the military lessons of this conflict, and not dismiss it as a minor war between poor countries... Most of the EU’s armies – especially those of small and medium-sized member states – would do as miserably as the Armenian army in a modern kinetic war. That should make them think – and worry”¹.

It is true that UAVs have been used for decades on battlefields around the world in intelligence, surveillance, target acquisition and reconnaissance (ISTAR) missions. But more recently, companies have begun developing attack-capable unmanned aerial vehicles, or armed drones, known generically asUCAVs², elevating these systems to a new category.

The combined effect of UAVs andUCAVs in the conflict has been so powerfully striking that, in certain circles, it has been anticipated that we are witnessing one of those moments in history when the irruption on the battlefield of a new material substantially alters the art of war, as previously happened with tanks, military aviation or the introduction of mounted cavalry back in the 9th century BC. It is perhaps premature and perhaps exaggerated to draw conclusions in this regard. Let us consider that a quantitative and qualitative analysis of the military capabilities of both contenders points to a clear military superiority of Azerbaijan, which makes it difficult to imagine, even

¹ GRESSEL, Gustav, “Military lessons from Nagorno-Karabakh: Reason for Europe to worry”, *European Council on Foreign Relations*, 24 November 2020. Available at: <https://ecfr.eu/article/military-lessons-from-nagorno-karabakh-reason-for-europe-to-worry/>. (accessed in December 2020).

² Unmanned Combat Aerial Vehicle.

without the use of drones, an outcome different from the one we have witnessed³. But there is no doubt that UAVs and UACVs are one of those critical capabilities that, due to their physical and psychological effects, have had a considerable weight in the outcome of the confrontation. And Turkey's role in this area has been decisive.

The aim of this paper is precisely to assess this issue. In it, after analysing the contribution of UAVs/UACVs to the Nagorno-Karabakh conflict, we will delve into Turkey's indigenous development of these capabilities and the strategic value of its defence industry as a resource of national power.

Nagorno-Karabaj

Attempting to quantify the actual effect that drones have had on the campaign and to determine the number of Armenian targets destroyed by direct intervention of these systems is, at this point in time, a near-impossible task. Official data provided by both sides are scarce and, where they do exist, appear to be greatly exaggerated. Some sources venture to provide figures and claim that through the use of the Turkish UCAV Bayraktar TB2 alone, Azerbaijan has destroyed a total of 660 Armenian military targets (138 tanks, 49 armoured vehicles, 31 air defence systems, 16 radars, 257 pieces of artillery, 10 communications centres and 386 various vehicles) with an economic value of almost \$2 billion⁴. Be that as it may, the use of drones has undoubtedly been decisive and, also in this field, Azerbaijan's superiority is significant (Table 1).

³ The inventories available in specialised sources such as the Military Balance 2020, of the International Institute for Strategic Studies (IISS, www.iiss.org), or the Global Fire Power website(www.globalfirepower.com/) show a substantial military superiority of Azerbaijan.

⁴ "Bayraktar TB2 Armed UAVs have caused great losses to the Armenian Armed Forces", *The Cyber Shafarat – Treadstone 71*, 11 de November 2020. Available at: <https://cybershafarat.com/2020/11/08/bayraktar-tb2-armed-uavs-have-caused-great-losses-to-the-armenian-armed-forces/> (accessed in December 2020).

ARMENIA				AZERBAIYÁN		
CLASE (OTAN)	TIPO	ORIGEN	CANTIDAD	TIPO	ORIGEN	CANTIDAD
I (< 150 Kg)	Baze	Armenia	No Disponible	SkyStriker (1)	Israel	100
	Ptero-5E	Rusia	No Disponible	Orbiter-1K (1)	Israel	80
	Krunk	Armenia	15	Orbiter-3 (1)	Israel	10
	Orlan 10 (2)	Rusia	No Disponible	Harop (1)	Israel	50
II (150-600 Kg)				Bayraktar TB2 (3)	Turquía	No Disponible
				Aerostar	Israel	14
				Hermes 450	Israel	10
III (> 600 Kg)				Heron TP	Israel	2
				Hermes 900	Israel	2

(1) Loitering munition.

(2) There is no record of their acquisition by Armenia, but there are reports of their use during the conflict.

(3) Their acquisition by Azerbaijan has not been confirmed, but their use in the conflict is confirmed.

Table 1. Comparative UAV inventories for 2019. Source. The Drone Databook⁵; CSIS⁶, Balance Militar 2020.

In particular, there are twoUCAV models that have generated headlines in the international press: the Harop suicide (*loitering munition*) drone, developed by the Israeli industry to carry out suppression of enemy anti-aircraft defences (SEAD) attacks, and the Turkish Bayraktar TB2, a tactical drone operational in the Turkish Armed Forces since 2014 and which has both ISTAR and armed versions⁷. Of the former, it is estimated that Azerbaijan had about 50 units before the outbreak of hostilities and the effectiveness of

⁵ The Drone Databook, *Center for Study of the Drone at Bard College*, 2019, p. XII. Available at <https://dronecenter.bard.edu/files/2019/10/CSD-Drone-Databook-Web.pdf> (accessed in December 2020).

⁶ "The Air and Missile War in Nagorno-Karabakh: Lessons for the Future of Strike and Defense," *CSIS*, 8 December 2020. Available at: <https://www.csis.org/analysis/air-and-missile-war-nagorno-karabakh-lessons-future-strike-and-defense> (accessed in January 2021).

⁷ BAYKAR, information about BAYRAKTAR TB2. Available at https://www.baykarsavunma.com/upload/ingilizce/Baykar_catalog_eng.pdf (accessed in January 2021).

their use in the conflict has been widely reported both from government sources and through the press⁸.

The second of these seems somewhat more diffuse, as there is no official information on their possession by the Azeri Armed Forces. It is known that, during the past year, negotiations were conducted for the acquisition by Azerbaijan of an unspecified number of them, but their outcome is unknown⁹. What no one doubts, however, is their use in the conflict. In addition, photographs have been published of these devices at the victory parade in Baku on 10 December in Azerbaijani colours, which would prove their ownership (Figure 1).



Figure 1. Bayraktar TB2 during the victory parade in Baku, 10 December 2020. Photo published by *Daily Sabah*, credits to the press office of the Presidency of the Republic of Turkey.

⁸ "Azerbaijan's Harop destroying the Armenian soldiers' underground shelter - NO COMMENT - VIDEO", *Azerbaijan24*, 29 September 2020. Available at: <https://www.azerbaijan24.com/en/azerbaijan-s-harop-destroying-the-armenian-soldiers-underground-shelter-no-comment-video/> (accessed in December 2020).

⁹ "Azerbaijan to buy armed drones from Turkey", *Defence News*. Available at: <https://www.defensenews.com/unmanned/2020/06/25/azerbaijan-to-buy-armed-drones-from-turkey/> (accessed in December 2020).

There has been much speculation as to whether the UCAVs involved in the operations were Azeri or Turkish, and by whom they were operated. It is true that Azerbaijan had already gained some experience in the tactical use of these means prior to the conflict, being one of only 10 countries in the world known to have carried out armed drone strikes¹⁰. But the time between the supposed acquisition in June or July 2020, as reported in various media, and the start of the conflict is too short for the system to have been delivered, put into service and the Azeri military personnel trained for their effective use. This has led some analysts to conclude that these weapons systems may have been operated by the Turkish Army itself¹¹.

Time will eventually confirm or refute this hypothesis, but what is relevant here is that a nation such as Turkey has managed, largely through the use of these means, to decisively influence the evolution of the conflict. A remarkable success that consolidates it as a true power in both the manufacture and use of these weapon systems. How this evolution has been possible is the question we address below.

Turkey, a drone power

Turkey's progress in the field of drones has been based on two fundamental pillars: the development of systems with its own technology, insofar as this has been possible, and the experience acquired in their tactical use in the different conflict zones in which the Turkish Armed Forces have been involved in recent years.

Technological development

Turkey's entry into the world of drones took place in the mid-1990s with the acquisition of the GNAT 750 and I GNSAT tactical reconnaissance systems from the US firm General Atomics, which were used by the Turkish Army between 1995 and 2005¹².

¹⁰ The Drone Databook, *Op. Cit*, p. XIII.

¹¹ MIROVALEV, Mansur, Azerbaijan Celebrates a Victory Made Possible by Turkey, WhoWhatWhy.org, Jan. 11, 2021, available at <https://whowhatwhy.org/2021/01/11/azerbaijan-celebrates-a-victory-made-possible-by-turkey/> (accessed in January 2021).

¹² DÜZ, Sibel, "The Ascent of Turkey as a Drone Power", *SETA - Analysis*, July 2020.

The operational needs of the Turkish Armed Forces in their particular fight against the PKK ended up showing the limitations of these "rudimentary" systems, which is why, in the mid-2000s, Ankara turned to the Israeli industry, with extensive and solvent experience in the use of these technologies. The then Undersecretariat of Defence Industries (SSM) signed contracts for the procurement of 10 Heron drones, manufactured by the UAV Partnership (IUP) consortium, a 50/50 joint venture between Israel Aircraft Industries (IAI) and Elbit Systems¹³. Subsequent contracts between 2007 and 2010 added other Israeli systems to the Turkish Armed Forces' inventories¹⁴.

But geopolitical logic eventually prevailed. The difficulties that marked the execution of these contracts¹⁵ and, above all, the deterioration of diplomatic relations between the two countries due to the Gaza flotilla incident in May 2010¹⁶ made cooperation in this area impossible.

The North American market, partly due to these same issues, was also not viable and negotiations for the acquisition of the PREDATOR system (General Atomics) did not come to fruition¹⁷. Neither the US nor Israel were willing to share technology, so the Turkish government, considering the classic *off-the-shelf* procurement system inadequate, decided to proceed on its own.

¹³ "Israel Aircraft Industries (IAI) to Supply Jointly With Elbit Systems UAV Systems to The Turkish MOD; Contract Valued at \$150 million", *BUSINESS WIRE*, 1 September 2005. Available at: <https://www.businesswire.com/news/home/20050901005383/en/Israel-Aircraft-Industries-IAI-to-Supply-Jointly-With-Elbit-Systems-UAV-Systems-to-The-Turkish-MOD-Contract-Valued-at-150-million> (accessed in January 2021).

¹⁴ One Searcher (Israel Aircraft Industries) and 3 Aerostar (Aeronautics Defense Systems Ltd.), already out of service. In addition, a Dominator UAV (Israel Aeronautics Defense Systems Ltd.) was added to its inventories on a rental basis.

¹⁵ "Turkey's Military Procurement Dilemma with Israel", *EURASIA DAILY MONITOR*, 22 May 2009. Available at: <https://jamestown.org/program/turkeys-military-procurement-dilemma-with-israel/> (accessed in December 2020).

¹⁶ On 31 May 2010, Israeli forces boarded ships from a flotilla chartered from Turkey to deliver humanitarian aid to the Gaza Strip, under Israeli blockade. Nine Turkish activists were killed in the assault.

¹⁷ "Turkey Seeks to Purchase Armed Predator Drones From US," *Al Monitor*, 19 May 2012. Available at: <https://www.al-monitor.com/pulse/security/01/05/turkey-wants-armed-predators.html> (accessed in January 2021).

Fortunately, the Turkish industry had already started working on these systems. Since 2004, the state-owned company Turkish Aerospace Industries (TAI) had been working on the development of a medium-altitude, long-endurance UAV (MALE), the ANKA, which, however, got off to a somewhat rocky start¹⁸.

The private sector had not been left behind either, and the Bayrak Makina company¹⁹, which manufactures automotive components and had begun to show interest in UAV manufacturing in the early 2000s, won an initial tender in 2006 for the manufacture of 19 Bayraktar Mini drones for the Turkish Armed Forces²⁰.

These earlier, albeit modest, developments put Turkish industry in a position to make the most of the impetus provided by the government, and today, according to the catalogue of the Presidency of Defence Industries (SSB)²¹, Turkey manufactures a total of 24 unmanned aerial platforms of different capabilities²².

Among those in the public sector are the multipurpose platforms (UAV andUCAV) manufactured by TAI, the ANKA (payload 250 kg, autonomy 24 hours, maximum altitude 30,000 feet)²³ in different versions, including one with satellite control (ANKA-S) that increases its range to 1,000 km, and the AKSUNGUR (payload 750 kg, autonomy 12 hours, maximum altitude 40,000 feet)²⁴. Both can carry smart ammunition manufactured by ROKETSAN, also a state-owned company. The AKSUNGUR, in the final stages of development, will be delivered to the Turkish Armed Forces during 2021.

¹⁸ The first prototype crashed during its maiden flight in December 2010.

¹⁹ The son of the owner and real driver of this company's UAV development is Selçuk Bayraktar, married since May 2016 to Sümmeye Erdoğan, the youngest daughter of President Erdoğan.

²⁰ FAROOQ, Umar, "The Second Drone Age," *The Intercept*, 14 May 2019. Available at: <https://theintercept.com/2019/05/14/turkey-second-drone-age/> (accessed in January 2021).

²¹ The Undersecretariat of Defence Industries (SSM), originally part of the Ministry of Defence, was transferred in December 2017 to the Presidency of the Republic, changing its name to Presidency of Defence Industries (SSB).

²² TURKISH DEFENCE INDUSTRY CATALOGUE, pp. 141 - 151. Available at: <https://www.ssb.gov.tr/urun katalog/en/142/> (accessed in January 2021).

²³ TAI, ANKA, available at: <https://www.tusas.com/en/product/anka-multi-role-isr-system> (accessed in January 2021).

²⁴ TAI, AKSUNGUR, available at: <https://www.tusas.com/en/product/aksungur-unmanned-aerial-vehicle> (accessed in January 2021).



Figure 2. UCAV AKSUNGUR (TAI) on display at the IDEF 2019 armament fair (Istanbul), photo by Paolo Valpolini, European Defence Review.

In the private sector, mention should be made of the aforementioned Bayrak Makina, manufacturer of the BAYRAKTAR TB2 (payload 150 kg, autonomy of 27 hours, maximum altitude 24,000 feet)²⁵ and which is finalising²⁶ the development of the AKINCI (payload 1 350 kg, autonomy of 24 hours and maximum altitude of 40,000 feet)²⁷. Like the TAI models, these platforms are armed with missiles manufactured by the state-owned ROKETSAN.

Continuing in the private sector, it is worth mentioning the company VESTEL, which manufactures the KARAYEV, a somewhat modest UAV (payload 70 kg, autonomy of 20 hours and maximum altitude of 22,500 feet)²⁸.

²⁵ BAYKAR SAVUNMA, BAYRAKTAR TB2. Available at: <https://baykardefence.com/uav-15.html> (accessed in January 2021).

²⁶ "Turkish Akinci Combat Drone's 2nd Prototype Completes Maiden Flight," *DefenseWorld.NET*, 17 August 2020. Available at: https://www.defenseworld.net/news/27651/Turkish_Akinci_Combat_Drone_s_2nd_Prototype_Completes_Maiden_Flight (accessed in January 2021).

²⁷ BAYKAR SAVUNMA, AKINCI. Available at: <https://baykardefence.com/uav-14.html> (accessed in January 2021).

²⁸ VESTEL SAVUNMA, KARAYEL. Available at: https://vestelsavunma.com/uploads/docs/1608022372_karayeltacticaluaveng-tr.pdf (accessed in January 2021).



Figure 3. UCAV AKINCI, Bayraktar. Photograph by ANADOLU Agency.

Tactical use

As has already been mentioned, the second pillar on which Turkey's prominent position in the field of drones is based is the experience accumulated after years of tactical use of these materials in the conflicts in which it has been involved. Although Turkey gained experience in the use of these means in previous operations, it was only recently, in the operations in Idlib at the beginning of 2020 (operation "Spring Shield"), that Turkey made massive use of these means for the first time against an external adversary, backed, moreover, by a major military power such as Russia. In this campaign, indigenous systems, such as the aforementioned ANKA-S and Bayraktar TB2, were intensively tested, with noteworthy results. With the help of these drones, in just one night Turkish forces destroyed nearly 200 Syrian military targets, including 5 helicopters, 23 tanks, 23 artillery pieces and at least 8 launchers of the Russian-made Pantsir-1S anti-aircraft

system, causing 309 casualties among the enemy ranks²⁹. A remarkable performance that has been possible thanks to the mastery of the electromagnetic spectrum of the battlefield obtained through the use of electronic warfare (EW) systems operated from Turkish territory, specifically from the operations centres of the 2nd Army Headquarters in Malatya, in the province of central Anatolia, and of the Defence General Staff in Ankara. Such systems have also been used in Libya, albeit on a smaller scale. And it should be noted that, in any case, not with worse results. An admittedly limited deployment of these means, without the involvement of ground forces, has been sufficient not only to contain Haftar's offensive on Tripoli but also to allow the Government of National Unity (GNA) to recover considerable tracts of Libyan territory and substantially alter the balance of power in the country.

None of this would have been possible in a different context to the one that has, for decades, fostered the development of the Turkish defence industry in general, an aspect that we address below.

Development of the Turkish defence industry

For geopolitical reasons, the development of an indigenous defence industry has been, since the 1970s, a priority strategic objective of all governments that, regardless of their ideological leanings, have succeeded each other in power. The arms embargo imposed by the US Congress in 1974 in retaliation for Turkey's military intervention in the Cyprus crisis³⁰ highlighted the advisability of having a defence industry capable of guaranteeing the country's strategic autonomy. At that time, the foundations of the current industry were laid, establishing the so-called Land Forces, Air Forces and Naval Forces Foundations as bodies capable of obtaining funding for the development of a defence industry, both public and private, outside the annual budgets of the Armed Forces. Later unified into a single Foundation for the Armed Forces³¹, it is through this organisation that the State manages the large state-owned companies that today form the backbone of this industry

²⁹ NIKOLOV, Boyko, Statements by Defence Minister Hulusi Akar, quoted in "Turkey has destroyed missile systems, dozens of tanks and five helicopters in Idlib", *BULGARIANMILITARY.COM*, 28 February 2020. Available at: <https://bulgarianmilitary.com/2020/02/28/turkey-has-destroyed-missile-systems-dozens-of-tanks-and-five-helicopters-in-idlib/> (accessed in January 2021).

³⁰ BRUMAGE, Jody, "The Turkish Arms Embargo, Part I", *Byrd Center*, 2015. Available at: <https://www.byrdcenter.org/byrd-center-blog/the-turkish-arms-embargo-part-i> (accessed in January 2021).

³¹ Law 3388, 17 June 1987.

(ASELSAN³², TAI or TUSAŞ³³, ROKETSAN³⁴, HAVELSAN³⁵, ISBIR³⁶ and ASPILSAN³⁷). These state-owned companies must be considered in addition to a long list of private companies (BMC Otomotiv, STM, FNSS, etc.)³⁸.

In accordance with this philosophy, the development of the national defence industry in recent years has been spectacular and, in 2020, seven Turkish companies (ASELSAN, TAI, BMC Otomotiv, ROKETSAN, STM, FNSS and HAVELSAN) have managed to place themselves in the *Defense News* ranking among the 100 largest in the world, a striking fact when compared with countries such as the United Kingdom (10 companies), France (4 companies), Germany (3 companies) and Spain (1 company)³⁹.

Under these conditions, 70% of the Turkish Armed Forces' 2019 armament needs were covered by local production, a percentage that is intended to increase, according to the industrial strategy for the period 2019-2023, to 75% in 2023⁴⁰.

Major ongoing or recently completed projects can be summarised in the following (non-exhaustive) table⁴¹:

³² Electronics, communication systems, electro-optics, integrated weapons systems, etc. - ASELSAN website: <https://www.aselsan.com.tr/en> (accessed in January 2021).

³³ Aviation, satellites, aerospace - TAI/TUSAŞ website: <https://www.tusas.com/en/> (accessed in January 2021).

³⁴ Rockets and Missiles - ROKETSAN website: <https://www.roketsan.com.tr/en/> (accessed in January 2021).

³⁵ Command and control systems, simulation, security and cybersecurity systems, information and communication systems, etc. - HAVELSAN website: <https://www.havelsan.com.tr/en> (accessed in January 2021)

³⁶ Power Generation Systems - ISBIR website: <http://www.isbirelektrik.com.tr/en/> (accessed in January 2021).

³⁷ Batteries for vehicles and all means of all Armed Forces - ASPILSAN website: <https://www.aspilsan.com/default.asp?dil=ENG> (accessed in January 2021).

³⁸ A detailed list of defence companies and their production area can be found in the catalogue of the Presidency of Defence Industries (SSB): TURKISH DEFENCE INDUSTRY CATALOGUE. Available at: <https://www.ssb.gov.tr/urunkatalog/en/12/> (accessed in January 2021).

³⁹ "Top 100 for 2020", *DefenseNews*. Available at: <https://people.defensenews.com/top-100/> (accessed in December 2020).

⁴⁰ 11th Development Plan 2019-2023, approved by the National Assembly on 18 July 2019, available at https://www.sbb.gov.tr/wp-content/uploads/2020/06/Eleventh_Development_Plan-2019-2023.pdf (accessed in January 2021).

⁴¹ SSB Catalogue, *Op. Cit.*

MEDIOS TERRESTRES	PLATAFORMAS NAVALES
<ul style="list-style-type: none"> • Carro de Combate ALTAY • Vehículos acorazados de ruedas y cadenas (TULPAR, Serie ACV, KAPLAN, ARMA 8x8, ARMA 67x6, PARS 8x8, PARS 6x6) • Camiones pesados 8x8 • Maquinas de Ingenieros • Fusil de asalto MPT-76 • Armamento y Material diverso 	<ul style="list-style-type: none"> • Patrullero rápido clase TUZLA • Corbeta+ (MILGEM) • LHD (basado en el español Juan Carlos I) • Buque Anfibia rápido (LCT) • Buque Anfibia (LST) • Modernización de fragatas y submarinos
MEDIOS AÉREOS	COHETES Y MISILES
<ul style="list-style-type: none"> • Avión de entrenamiento HURKÜS • Desarrollo del avión de combate de 5ª generación TF-X • Helicóptero de Ataque ATAK • UAVs y UCAVs (ANKA, AKINCI, BAYRAKTAR TB2, AKSUNGUR) • Satélites GÖKTÜRK 1/3/6 	<ul style="list-style-type: none"> • Bomba Antibunker para aviación (2.000 lb) • Lanzacohetes múltiple T-300 MBRL • Cohetes diversos para Artillería • Bombas y misiles guiados por GPS y por LASER para aviación. • Micro munición guiada inteligente para UCAV,s (15 lb)

Table 2. Major projects in progress or recently completed. Source. Presidency of Defence Industries (SSB).



Figure 4. Infantry Combat Vehicle (ICV) TULPAR, from the Otokar company, at the Victory Day parade in August 2015. Photograph by the author.



Figure 5. FNSS 8x8 wheeled armoured vehicles at the Victory Day parade in August 2015.
Photograph by the author.

In many cases, however, these are not projects that have been developed by Turkey from scratch, but are based on initial models that already exist abroad. In these cases, the procedure is usually the same: once the need has been identified, the existing product is sought on the market and cooperation agreements are established for its production in Turkey. Turkish companies are always the main contractors of the project, which, in turn, subcontract the foreign companies with which they have to cooperate. In case intellectual property rights exist, the subcontracted foreign company must transfer them (in whole or in part) to the contractor, either the Turkish main contractor or the Turkish State itself. A good example of this is the cooperation between the Turkish shipyard SEDEF and the Spanish NAVANTIA for the development of a LHD⁴², the ANADOLU, following the model of the Juan Carlos I (figure 7). SSB⁴³ awarded the contract to SEDEF, which in turn subcontracted NAVANTIA (mainly for design cooperation)⁴⁴.

⁴² Landing Helicopter Dock.

⁴³ At that time, the SSB was still integrated into the structures of the Ministry of Defence as Undersecretary of State (SSM).

⁴⁴ "Navantia firma en Turquía el contrato para la construcción de un buque de desembarco anfibia", *Infodefensa.com*, 5 May 2015. Available at: <http://www.infodefensa.com/es/2015/05/07/noticia-navantia-firma-turquia-contrato-construccion-buque-desembarco-anfibio.html> (accessed in January 2021).



Figure 6. Construction of ANADOLU at SEDEF shipyard, 9 January 2020. TCG Anadolu (L-400).jpg
photo by 2020Istanbul, Wikimedia Commons

Despite this, in some projects there are still components whose ownership remains with the original industry. Such is the case of the power unit of the Altay tank, the pride of Turkish industry. Originally planned to incorporate the German company MTU, the reservation of rights and the imposition of limitations on future exports of the material has made it necessary to abandon the cooperation with this company and look for alternatives. This is no easy matter and, although the national industry should be privileged, the development times for such a complex component are unbearable, which is why Turkey has been forced to turn to Korean industry (Hunday Rotem, Doosan and S&T Dynamics), with whom, in any case, it began the project years ago⁴⁵. Ultimately, the Altay is nothing more than a Turkish development of the South Korean K2 "Black Panther" tank (figure 7).

⁴⁵ "Turkey in talks with South Korea to salvage Altay tank program," *Defense News*, 19 November 2020. Available at: <https://www.defensenews.com/industry/2020/11/19/turkey-in-talks-with-south-korea-to-salvage-altay-tank-program/> (accessed in January 2021).



Figure 7. ALTAY battle tank at the Victory Day parade in August 2015. Photograph by the author.

Economic considerations

As you can imagine, an industrial conglomerate of this size moves enormous amounts of money. According to SSB Chairman Ismail Demir, the defence industry (public and private) has progressed from developing 66 projects worth \$5 billion in 2012 to more than 700 in 2020, worth \$60 billion, rising to \$75 billion if all projects currently in the bidding phase are taken into account, with the state having invested some \$1.5 billion in R&D in the same year⁴⁶.

In addition to its own corporate profits, the State injects financial resources into the system through Ministry of Defence procurement⁴⁷ and through the Defence Industry Support

⁴⁶ DEMIR, Ismail, "Transformation of the Turkish Defense Industry: The Story and Rationale of the Great Rise", *Insight Turkey* 2020, Vol. 22 / No. 3 / pp. 17-40.

⁴⁷ Turkey's defence budget has risen to a total of \$18 billion (constant 2015 prices) by 2020, of which 36.9% is dedicated to procurement. NATO Press release, Defence Expenditure of NATO Countries (2013-2020), 21 October 2020. Available at: https://www.nato.int/nato_static_fl2014/assets/pdf/2020/10/pdf/pr-2020-104-en.pdf (accessed in January 2021).

Fund (SSDF), which is financed outside the regular budget and managed by the SSB, a fund that in 2016 accounted for about \$3 billion⁴⁸.

Much of the defence industry's activity is export-oriented, reaching \$3 billion in 2020⁴⁹. For various reasons, the European and North American markets are not receptive to Turkish products, but their quality-price ratio makes them enormously attractive in areas such as the Middle East, Central Asia, Southeast Asia, Africa and even Latin America⁵⁰. Given the unstable environment in which Turkey finds itself, its systems are usually tested by its own Armed Forces in real combat situations, which acts as an effective letter of introduction. This position as an exporter gives Turkey enormous influence in these markets, making the industry a strategic asset of great importance.

With some countries, in addition to export, Turkey has established formal industrial cooperation agreements, as is the case with Ukraine and Azerbaijan. With the former, cooperation covers the areas of UAV/UCAV, anti-aircraft systems and naval platforms⁵¹, while with the latter, with a more modest industry, cooperation is limited to the modernisation of certain systems⁵². The picture is completed by the participation of Georgia, which, in 2019, signed a tripartite cooperation agreement with Turkey and Azerbaijan⁵³.

⁴⁸ GURCAN, Mettin, "Erdogan takes total control of Turkish defense industry", *Al Monitor*, 8 January 2018. Available at: <https://www.al-monitor.com/pulse/originals/2018/01/turkey-erdogan-assumes-turkish-defense-industry.html> (accessed in January 2021).

⁴⁹ VARANK, Mustafa, Minister of Industry and Technology, statements published in "Turkey's defense industry not far from becoming trendsetter", *Daily Sabah*, 22 January 2021. Available at: <https://www.dailysabah.com/business/defense/turkeys-defense-industry-not-far-from-becoming-trendsetter> (accessed in January 2021).

⁵⁰ For example, in 2016 the Chilean Army purchased the ASELSAN HEWS (Helicopter Electronic Warning System) chaff/flare warning and dispensing system for its helicopters. *Defensa.com*, available at <https://www.defensa.com/chile/helicopteros-ejercito-chile-dispensador-chaff-flare> (accessed in January 2021).

⁵¹ KASAPOGLU, Can, Turkey and Ukraine Boost Mutual Defense Ties, *The Jamestown Foundation*, 16 November 2020, available at <https://jamestown.org/program/turkey-and-ukraine-boost-mutual-defense-ties/> (accessed in January 2021).

⁵² "Turkey, Azerbaijan discuss defense industry cooperation", ANADOLU Agency, 17 July 2020. Available at: <https://www.aa.com.tr/en/turkey/turkey-azerbaijan-discuss-defense-industry-cooperation/1913897> (accessed in January 2021).

⁵³ "Turkey, Georgia and Azerbaijan to boost cooperation in military, defense," *NordicMonitor*, 17 June 2019. Available at: <https://nordicmonitor.com/2019/06/turkey-georgia-and-azerbaijan-to-boost-cooperation-in-military-defense/> (accessed in January 2021).

In principle, everyone benefits from these agreements, albeit in some cases asymmetrically. But, above all, industrial cooperation enables these countries to consolidate their strategic alignment in areas of particular sensitivity on Russia's periphery, such as the Black Sea, including the Crimean peninsula, and the Caucasus. None of this is lost on Russia, which after its intervention as a mediator in the resolution of the Nagorno-Karabakh conflict has largely succeeded in blocking Turkey's penetration into the Caucasus. But the case of Ukraine is from Russia's perspective somewhat more worrying and Turkey will have to act prudently if they intend to limit Russian influence in Ukraine and the Black Sea without falling into provocation. The controversial acquisition of the S-400 system, which we deal with in the following section, is at least partly in response to these considerations.

Gaps and strategic implications

However, certain capabilities essential to the Turkish Armed Forces of great technological complexity remain beyond the reach of its industry. Because of the strategic impact this issue is having, it is necessary to mention two closely related shortfalls for which Turkey has been seeking options for more than a decade: a medium- and long-range air defence system and a new 5th generation fighter aircraft. Both issues have been negatively influenced by deteriorating US- Turkish relations, and the solutions Turkey has sought as an alternative are proving highly problematic.

For the first of these, Turkey initially negotiated with the US for the acquisition of the PATRIOT system, although the US refusal to transfer technology, as we have seen a requirement of Turkish industry, prevented the formalisation of an agreement. After unsuccessfully exploring several options, including the French-Italian EUROSAM SAMP/T system and the Chinese CPMIEC, Turkey finally opted for the Russian S-400⁵⁴. This was certainly a political decision in which Turkey's interest in mending relations with Russia, practically broken after the downing of a Russian fighter jet that invaded Turkish airspace in November 2015, could have been decisive.

⁵⁴ The delivery of the system (2 batteries) was completed in September 2019 and should have entered service in May 2020.

But US opposition to this acquisition has been enormous and, although Turkey has postponed *sine die* its entry into service, it has not been able to avoid becoming the first allied country subject to sanctions⁵⁵. The sanctions have been aimed at SSB and its president and, although their effects are not likely to be felt in the short term⁵⁶, they will end up having a considerable impact on Turkish industry in the medium or long term, which is still largely dependent on US industry. The arrival of President Biden in the US does not bode well for an improvement in relations between the two countries and, although the BSS presidency has described these sanctions as an opportunity to make progress in the search for national technological solutions, they will most likely end up hindering the achievement of the objectives set out in its 2019-2023 strategic plan (table 3).

Objetivos de la Industria de Defensa 2023

	2018	2023
Facturación (turnover) de la Industria de Aeroespacial y Defensa (Millones de dólares USA)	6.700	26.900
Exportaciones de la Industria de Aeroespacial y Defensa (Millones de dólares USA)	2.000	10.200
Puestos de trabajo en la Industria de Aeroespacial y Defensa	44.700	79.300
Producción nacional para armamento y material de las FA,s	65 %	75 %

Table 3. Objectives set for the Aerospace and Defence Industry in the 11th Development Plan 2019 - 2023.

The second consequence of the S-400 *affair* is Turkey's expulsion from the joint programme for the F-35, a fifth-generation fighter aircraft of which Turkey intended to incorporate 100 units to renew its air force. This is a matter of great strategic importance, as tensions in the Mediterranean area are only increasing and the incorporation of 5th

⁵⁵ In application of the US Countering Adversaries Through Sanctions Act, CAATSA Section 231 "Imposition of Sanctions on Turkish Presidency of Defense Industries," *U.S. Department of State*, 14 December 2020, available at <https://www.state.gov/caatsa-section-231-imposition-of-sanctions-on-turkish-presidency-of-defense-industries/> (accessed in January 2021).

⁵⁶ US companies are prohibited from exporting material or components for new projects, and ongoing projects are not affected.

generation equipment is essential to maintain the balance of power with its rivals in this region, particularly Israel, Egypt and Greece.

Israel already has two squadrons (33 units) of F-35I, the Israeli version known as "Adir" (Hebrew for "mighty"). Egypt has recently added 21 French-built Rafale 4.5-generation aircraft to its inventory and has contracted for the acquisition of 24 additional Russian-built Su-35s, also considered to be 4.5-generation⁵⁷. Greece is not lagging behind either and, despite its complicated economic situation, has recently contracted with the French company Dassault for the acquisition of 18 Rafale aircraft⁵⁸, also showing interest in acquiring between 18 and 24 F-35s⁵⁹.

With no options on the F-35, Turkey has embarked on the indigenous development of an equally 5th generation fighter aircraft, the TF-X, whose first prototype it intended to fly in 2023, the centenary of the founding of the Republic (Figure 8). It is a very ambitious project that is practically impossible to undertake alone, so it has sought the collaboration, not without difficulty, of the British aeronautical industry, eager to find commercial partners for the post-Brexit period⁶⁰.

Even so, Turkish industry remains technologically dependent on the outside world, which makes this programme particularly vulnerable to US sanctions. For the time being, a delay in the planned date for the first flights to 2030 has been announced⁶¹, and it cannot be ruled out that the project may end up being wrecked. In this case, Turkey will be forced to look for alternatives, and Russian industry appears, once again, as a real possibility.

⁵⁷ "Su-35 Jet Purchase: Egypt Seeks Equipment Equal to Israel's," *DefenseWorld.Net*, 5 August 2020. Available at:

https://www.defenseworld.net/news/27592/Su_35_Jet_Purchase_Egypt_Seeks_Equipment_Equal_to_Israel_s (accessed in January 2021).

⁵⁸ "Greece to sign €2.3bn deal for 18 Dassault-made Rafale fighter jets", *Airforce Technology*, 18 December 2020. Available at: <https://www.airforce-technology.com/news/greece-deal-18-dassault-made-rafale-fighter-jets/> (accessed in January 2021).

⁵⁹ "Greece Requests to Buy Squadron of US' F-35 Stealth Jets," *The Greek Reporter*, 16 November 2020. Available at: <https://greece.greekreporter.com/2020/11/16/greece-requests-to-buy-squadron-of-us-f-35-stealth-jets/> (accessed in January 2021).

⁶⁰ In 2017, Rolls Royce and Turkey's Kale group signed a collaboration agreement for the development of the engines, and TAI and BAE Systems signed a collaboration agreement for the development of the initial phases of the project. The deal between Rolls Royce and Kale has been on hold since 2019.

⁶¹ "A Look at Current Status of Turkish MMU/TF-X Program", *Defense Turkey*, Vol. 14, 2020. Available at: <https://www.defenceturkey.com/en/content/a-look-at-current-status-of-turkish-mmu-tf-x-program-4129> (accessed in January 2021).



Figure 8. Model of the TF-X presented at EUROSATORY (Paris) in June 2019. Photograph by ANADOLU Agency.

Conclusion

Intervention in the conflicts in Libya, Syria and, more recently, Nagorno-Karabakh have allowed Turkey to show the world military capabilities that attest to the fact that the country has a capable and efficient defence industry at the service of the state. This industry, which started out practically from scratch just over 40 years ago, has acquired over time a technological capacity and know-how that allows it to take on projects covering a broad spectrum of areas of interest to national security. Today, practically 70% of the needs of its Armed Forces are met by its national industry, something within the reach of very few countries.

This spectacular development is no coincidence. On the contrary, it is the result of meticulous planning and the determined impetus given from the highest levels of the State with the aim of reducing foreign dependence in such a sensitive area. Since the US imposed an ironclad arms embargo on Turkey in 1974 in retaliation for its intervention in the Cyprus conflict, the quest for strategic autonomy has been one of the few political

consensuses shared by successive governments. In the eyes of Turkish planners, the geopolitical tensions of recent decades have underlined the validity of this policy and the imposition of new sanctions by the US Congress over the acquisition of the Russian S-400 system only corroborates this.

The strategic advantages of having industrial "autarky" are obvious, but a powerful industry also enables Turkey to exert considerable influence on its environment, which it achieves in two ways: through direct exports of weapons systems, with the consequent economic benefit for the country's coffers and, above all, through industrial cooperation to strengthen strategic partnerships.

As far as exports are concerned, Turkish industry does not have an easy penetration in Western markets, but its quality-price ratio makes it very competitive in other markets compared to traditional Western suppliers. The success of their drones in Nagorno-Karabakh, observed around the world, is a great calling card for their industry. Many small and medium-sized countries are interested in its products, which gives Turkey considerable leverage.

On the other hand, among the strategic partnerships, the most significant is the one established with Ukraine and the Caucasus countries, recently strengthened through mutually beneficial industrial cooperation agreements that aim, among other considerations, to contain Russia's industrial penetration in these countries and limit its influence.

But despite the spectacular advances, Turkish industry continues to be technologically dependent on foreign technology in certain critical capabilities, such as the engines for certain land platforms (Altay tank), engines for its 5th generation combat aircraft, the TF-X, or the medium and long-range air defence system, all of which are weapons systems that can set it apart from its regional rivals in terms of military power.

The management of this technological dependence is manifestly influenced by Turkey's unstable strategic balance between Russia on the one hand and the US and other Western countries on the other. Pressure imposed from one of the extremes, for example in the form of sanctions, will inevitably have the effect of pushing Turkey in the opposite direction. In this respect, the arrival of the new Biden Administration is perceived in Turkey as an opportunity to bring positions closer together and the Turkish government, with a certain amount of optimism, has referred to a hypothetical lifting of sanctions and even to

a possible readmission to the F-35 programme. It is certainly a possibility, but there is nothing to suggest that this is the most likely scenario at this time.

If sanctions are maintained, Turkey will be incentivised to seek its own solutions, which in the long run may further strengthen its industry. But at the same time, Turkey will be tempted to move even closer to a Russia that offers it alternatives.

There are many difficulties facing the Turkish defence industry. But it has shown ambition and perseverance over the last 40 years. Directed as a resource of national power from the highest levels of the state, this particular Turkish capacity will have to be taken into account as a decisive factor in any strategic calculation in the region.

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