



Brief n. 40/January 2022

## Turkey's Drone Experience

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Con il sostegno di



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di San Paolo

## ***Background***

Turkey's history with drones starts in late 1980's when TUSAS (Turk Ucak Sanayii; Turkish Aerospace Industries) developed an experimental drone, designated UAV X1. The drone was used as a test bed for gaining experience in design, development, manufacture, and remote control of such platforms. During early 1990's, Turkish Armed Forces (TAF) faced with a requirement to have time-critical intelligence and surveillance capability, because of the increasing terrorist activities in mountainous region in the Southeastern Turkey. As a result of an extensive technical evaluation phase, Turkey purchased GNAT and GNAT-750 drones from United States in mid-1990's. During the same period, Turkey received surplus CL-89 surveillance drones from Germany. GNAT, GNAT-750 and CL-89 platform formed the backbone of infrastructure and expertise for drone operations, maintenance, and training capability in Turkey.

Despite the fact that there had not been prior operational experience, Turkey quickly realized the significance and impact of drones in military operations. A strategic decision on developing a national industrial capability for design, development, manufacture and sustainment of drones was made in late 1990's. Subsequently, Turkey's Savunma Sanayii Mustesarligi (SSM; Undersecretariat for Defense Industries) started an off-the-shelf procurement project to meet urgent operational requirements, while simultaneously preparing for an indigenous development project.

The off-the-shelf procurement project resulted in with the selection of the Heron drone in 2006 from a consortium of Israeli firms, Israel Aerospace Industries (IAI) and Elbit. The consortium modified the Heron according to Turkey's operational and technical requirements, including integration of an electro-optical system developed by ASELSAN. The modification process took longer than planned and to fulfill the capability gap until delivery, Turkey leased several drones from Israel, which did not perform as advertised. Around the same time, Turkey requested sale of Predator armed drones from United States in early 2009 for use in counter terrorism operations. The deal did not proceed, reportedly due to Washington's reluctance to share this capability with Turkey. These bitter experiences reinforced the determination of Turkish decision makers as well as general public opinion regarding the importance of achieving self-sufficiency in drone technology.

## ***Platforms***

Starting from early 2000's, many different companies designed and manufactured drones in Turkey. Today, the two most prominent platforms of Turkey's drone force are Anka and Bayraktar TB2.

The Anka is developed by TUSAS and made its first flight in 2010. Anka has several different variants depending on payload. It can fly for around 24 hours at an altitude of 30,000ft with a maximum payload capacity of 250kg. The main variant of Anka is the Anka S, which is equipped with satellite communications (SATCOM) system. SATCOM enables Anka S to exchange data with the ground control station over long ranges. This capability also offers a certain degree of protection against enemy electronic attack attempts to disrupt or severe communications between the ground station and the drone.

Baykar Savunma developed the Bayraktar TB2 under a project by SSM to meet the provide the Turkish Land Forces a tactical drone capability. was commissioned by the SSM in 2007 as a part of a project to meet the tactical UAV needs of the Turkish Ground Forces. The Bayraktar TB2 made its first flight in 2014. It has a maximum endurance of 27 hours and a service ceiling of 27,000 feet. The TB2 has a fully automatic flight control with triple redundant autopilot system.

Both drones are capable of carrying laser guided precision guided bombs MAM-L and MAM-C, developed by ROKETSAN as well as Bozok by TUBITAK SAGE. Anka S and Bayraktar TB2 acted as the tip of the spear during Turkey's cross border operations in Iraq and Syria, the most notable example being Operation Spring Shield in March 2020.

Both TUSAS and Baykar are working on more advanced drones, which have started to enter service in 2021. The Aksungur, developed by TUSAS is a medium altitude long endurance (MALE) class drone. Aksungur is capable of performing intelligence, surveillance, reconnaissance, and strike missions. It can be equipped with various electro-optical and electronic warfare payloads as well as precision guided munitions. Aksungur is powered by two PD-170 turbodiesel engines, which are developed and manufactured by TEI (TUSAS Engine Industries).

The first prototype of Aksungur made its maiden flight in March 2019. The drone performed live fire tests with indigenous guided weapon systems, including Teber precision guided bombs, developed by ROKETSAN. The Aksungur entered service with the Turkish Navy (TuN) in October 2021. Under TuN service Aksungur will be used for maritime surveillance and anti-submarine warfare (ASW) missions.

Baykar Savunma's Akinci is a twin turboprop engine drone designed to fulfill high profile strike and strategic reconnaissance and surveillance missions. Akinci has been envisaged as a strategic platform which is able to perform multiple tasks with various payloads. The Akinci is equipped with dual artificial intelligence avionics to support signal processing, sensor fusion and situational awareness in real time. The drone has a payload carrying capacity of around 1,500kg.

Among the mission systems Akinci will carry are dual satellite communication systems (SATCOM), electro-optical camera, collision avoidance radar, and synthetic aperture radar. The drone will be able to operate at altitudes up to 40,000ft and have an endurance of more than 24 hours. Triple redundant flight control system will be supported by fully autonomous take-off, flight and landing system which incorporates GPS-independent navigation and positioning system. One of the distinctive features of Akinci is its capability to carry and fire the SOM air launched cruise missile, produced by ROKETSAN. The Akinci started entering service with the Turkish Armed Forces in August 2021.

### ***The impact of drones***

The establishment of a local drone industry and the use of indigenously developed armed drones have created three major impacts.

The first impact is in the military domain. Turkey started using armed drones in late 2015 and they have so far proved to be extremely effective in conducting counter terrorism operations. Armed drones offer the capability to dramatically shorten the "sensor-to-shooter" cycle through the capability of hitting time-critical targets and collecting time-sensitive actionable intelligence. Furthermore, Turkey managed to enhance this capability with the integrated use of electronic warfare and artillery firepower, which produced the outcome in conflicts in Syria, Libya, and in Nagorno Karabakh.

Armed drones in the world are generally used in three main roles: Conducting precision strike with guided munitions, providing target information to other strike units (artillery and air force), and lastly collecting intelligence. The main differentiating factor of Turkey's deployment of armed drones is achieving a balance between quality and quantity: Turkish drones, especially the Bayraktar TB2 are being manufactured and deployed in large numbers and can easily be replaced in the event of a malfunction, shoot down or crash. Furthermore, and more importantly, Turkey deploys drones in coordination with electronic warfare and

other units such as artillery and air force, which enables rapid concentration of effective firepower. The Operation Spring Shield is a stark example to the outcome of this capacity: Many armed drones in coordination with artillery and air force elements wreaked havoc on Syrian regime forces in Idlib.

An indirect impact of the operational capability provided by armed drones is the resultant strategic or political outcome. As seen in the Libya conflict and more recently in Nagorno Karabakh War, armed drones might enable a quick and decisive military result while inflicting serious damage to the enemy. The destructive capacity is multiplied by the psychological warfare element incorporated through distribution of camera footage of destroyed enemy materiel and personnel. These factors contribute to achieving leverage in political domain in terms of negotiating power, exerting pressure, or imposing political - military conditions.

The second impact is seen in industrial and military relations with the recipient countries. In theaters such as Syria, Libya, Eastern Mediterranean, Ukraine and lastly Nagorno Karabakh, armed drones have become the symbol of Turkey's assertive and ambitious foreign policy with an increasing flavor of military equipment and strategy. Both export and deployment of Turkey's indigenous drones reinforced Turkey's military-industrial footprint with these countries, while also assisting in leveraging Turkey's foreign policy actions.

As a direct result of their performance in various conflicts, Turkish drones have attracted interest of many countries. Turkey has so far exported Bayraktar TB2 to Qatar, Ukraine, Azerbaijan, Libya, Morocco, Poland, Kyrgyzstan, and Turkmenistan while TUSAS sold the Anka to Tunisia. Selçuk Bayraktar, the chief technology officer of Baykar Savunma has recently stated that the company is in talks with ten countries for the export of Bayraktar TB2. As a result of these sales, Turkey has become a major drone exporter, competing with China in several markets.

An armed drone such as TB2 or Anka can be considered as a "system of systems". The air vehicle is controlled by a ground control station incorporating several communication and data handling systems and supported by ground support equipment. Operation, sustainment, training, and modification of the overall system requires skilled, well-trained personnel. The drone is equipped with state-of-the-art imaging, targeting and communications equipment, all of which require skill and expertise to operate and maintain. Therefore, the export of an armed drone inevitably establishes a long term military - industrial relationship between the producer and the recipient country for the training, support, and sustainment of the system. In this way, drone exports, as well as export of other sophisticated platforms such helicopters and warships contribute to Turkey's foreign policy goals. Furthermore, as seen in the Ukraine case, transfer of technology, establishment of local maintenance and manufacture facilities, and licensed production of the drones help increase Turkey's military - industrial footprint in the region.

Third, Turkey's drones have created significant political impact in regional politics as well as multilateral relations. The most obvious and most recent example to this is the Ukrainian case, where the use of Bayraktar TB2 armed drones in Donbas have been a nuisance for Russia. Russian President Vladimir Putin criticized Ukraine for deploying Turkish-made drones in its conflict with pro-Moscow separatists during a call with Turkey's President Recep Tayyip Erdogan in December 2021. In his message to President, Putin said Kiev was aiming to disrupt peace agreements in eastern Ukraine, with "provocative" military action, "including the use of Bayraktar unmanned aerial vehicles," which are produced by Turkey. Russia's explicit express of discomfort is especially noteworthy, given the increased Turkish – Russian military relations in the past few years.

A closer look at the recent export sales of Turkey's drones reveals a very interesting pattern: Ukraine, Poland, Azerbaijan, Kyrgyzstan and Turkmenistan are all in the close neighborhood of Russia and except Poland, they are all former Soviet states. While this may not necessarily mean an encirclement of Russia by armed drones, the trend is unmistakable, so much so that the Bayraktar TB2 has so far destroyed a large number of Russian-made air defence and electronic warfare systems as well as armored vehicles. Increasing military-industrial footprint in Russia's hinterland through drone exports might be a leverage for Ankara in its relations with Moscow.

Of particular importance in the political aspect of Turkey's drone exports is the order by Poland in May 2021. Poland's purchase of Bayraktar TB2's from Turkey is a big achievement for the Turkish defense sector and foreign policy, since Poland is both a member of NATO and the European Union (EU). Poland's selection of Turkish armed drones might be interpreted as an attempt to diversify arms suppliers against Russia. Turkey's sale of such sophisticated platforms might reinforce its position within NATO, a much needed boost in times of increased criticism towards Ankara because of the S-400 purchase.

Last, but not least, recent achievements in drone technology have provided boost to national pride and self confidence in Turkey, as evident in official rhetoric. Turkey's request for Predator B armed drones from Washington in early 2009 was left unanswered and the reluctance by United States in supplying the drones stimulated Turkey to focus on local resources to develop indigenous platforms. The resultant systems and their effective performance convinced Ankara to expand in allocation of resources and priority to national defence industry as a major asset of foreign policy.

### ***Conclusion***

Turkey's breakthrough in drone technology and deployment came as a surprise to many observers. The effectiveness of armed drones, especially against much advertised air defence systems in Syria, Libya and Nagorno Karabakh was indeed unexpected. However, this outcome is the result of more than 25 years of accumulation of operational and industrial experience as well as investment in technology and human capital. Turkey is one of the few countries which noticed the importance and effectiveness of armed drones in counter-terrorism and border security operations as well as cross border missions. It is worth underlining that Turkish drones have achieved a delicate balance between performance and cost, a factor which contributed to the significant export success.

As a result, it can be claimed that Turkey's experience with drones is a significant case study for the impact of development and successful deployment of advanced technologies in foreign policy.