

THE RISE OF TURKISH DRONES AND POTENTIAL CONTRIBUTIONS TO THE EVOLVING EUROPEAN DEFENCE CONCEPT

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Over the last few decades, Unmanned Aerial Vehicles (UAVs), also known as drones, have been widely used in civilian and military contexts. This technology's significance lies in its capabilities, ranging from logistics to surveillance. When an UAV is used explicitly for combat, it is also named an Unmanned Combat Aerial Vehicle (UCAV) or a military drone. UCAVs are typically designed to be used in combat zones and are used for intelligence, surveillance, target acquisition, and reconnaissance. In addition to those capabilities, some UCAVs can carry aircraft ordnance such as anti-tank missiles or bombs for precision strikes in combat zones.¹

In recent hard conflicts, such as the Libyan and Syrian civil wars, the Second Karabakh War, and Russia's invasion of Ukraine, military drones have emerged as game-changing weapons with asymmetrical warfare use. These conflicts have demonstrated the transformative role of UCAVs in modern warfare, captured global attention and reshaped the national defence needs of states. Following this trend, the global UCAV market rapidly expanded. However, only a few countries have become global exporters of this strategic technology. In this defence industry niche, Türkiye appeared as a pivotal country in the relevant technology sector and a global UCAV exporter.

In this brief, the UCAV industry of Türkiye, with its positioning in the global UCAV market, will be focused on. Later, the EU's approach to UCAVs in its evolving defence concept, including the regulations and projects, will be discussed. The brief will be concluded with the prospects of Türkiye's possible contributions to European security as an international UCAV exporter and Türkiye- EU cooperation opportunities on this strategic and fast-developing technology.

Background: Introduction to the UAV and UCAV Technologies

Unmanned Aerial Vehicles are commonly defined as aircraft that operate without an onboard human pilot and can be controlled remotely or operate autonomously through pre-programmed flight paths, which often have complex onboard systems. UAVs, also known as drones, are widely understood as an advancement in aerospace technology that combines some aspects of aviation, electronics, and autonomous systems.²

The origins of UAV technology can be found in military applications that date back to the early 20th century. One of the first instances was during World War I when the United States developed the Kettering Bug in 1918, a rudimentary drone that could carry explosives and follow a preset course to its target. Although the Kettering Bug saw limited operational use, it set the stage for future developments in autonomous flight. In the

¹ Kumar, Shashank, A Brief Review on Unmanned Combat Aerial Vehicle (U.C.A.V) (May 5, 2020). Available at SSRN: <https://ssrn.com/abstract=3593220> or <http://dx.doi.org/10.2139/ssrn.3593220>, Access: 09.11.2024

² Ibid.



period between the two world wars, the United Kingdom and the United States continued experimenting with radio-controlled aircraft for training purposes and target practice, marking the early versions ofUCAV technology.³

However, the practical use ofUCAVs began to emerge during World War II. The German V-1 flying bomb, also known as the "Buzz Bomb," was an early example of a cruise missile that shared characteristics with modern UAVs, including autonomous guidance systems. Simultaneously, the United States developed remote-controlled aircraft such as the Radioplane OQ-2, which is used extensively for target practice and training anti-aircraft gunners. During this period, they highlighted the growing interest in pilotless aviation, driven by the desire to reduce risks to human pilots and improve training capabilities.⁴

During the Cold War, the true potential ofUCAVs emerged when both the United States and the Soviet Union invested heavily in developing reconnaissance drones to gather intelligence in contested or hostile areas. The U.S. program on UAVs advanced with the Ryan Model 147, which was deployed during the Vietnam War. These drones had cameras and data-gathering equipment, providing critical intelligence without risking pilots' lives. Similarly, the Israeli Defense Forces (IDF) played a pioneering role in UAV development, with notable success in the 1982 Lebanon War, where UAVs were used to gather intelligence and provide real-time battlefield surveillance, allowing real-time information gathering and battlefield awareness.⁵

The 1990s and early 2000s marked a turning point in UAV technology, with significant improvements in miniaturisation, communication, and GPS navigation. The United States emerged as a leader in this domain, introducing the Predator drone, developed by General Atomics, which became synonymous withUCAV capabilities in modern warfare. The drone was first used for reconnaissance; later, it gained the ability to carry Hellfire missiles, transforming it into a potent platform for precision strikes. This dual capability for surveillance and targeted attacks established a new paradigm in military strategy, allowing for remote engagement with minimal collateral damage.⁶

The 21st century marked a transformative period for UAVs, expanding their role significantly in military operations. Initially used for surveillance, UAVs gained prominence during the U.S.-led war in Afghanistan in the early 2000s, where they were employed to launch precision strikes as part of counterterrorism efforts. This era saw the

³ Keane, John & Carr, Stephen. (2013). A Brief History of Early Unmanned Aircraft. Johns Hopkins Apl Technical Digest. 32. 558-571, <https://secwww.jhuapl.edu/techdigest/content/techdigest/pdf/V32-N03/32-03-Keane.pdf>, Access: 11.11.2024

⁴ Ibid.

⁵ Ibid.

⁶ Kumar, Shashank, A Brief Review on Unmanned Combat Aerial Vehicle (U.C.A.V) (May 5, 2020). Available at SSRN: <https://ssrn.com/abstract=3593220> or <http://dx.doi.org/10.2139/ssrn.3593220> , Access: 09.11.2024



rise of armed drones, such as the MQ-1 Predator, which demonstrated their effectiveness in eliminating high-value targets with minimal risk to operators.⁷

Over time, as the technology advanced and costs decreased, other countries began developing their own UAV capabilities. Türkiye, as a NATO member, emerged as a major producer alongside established powers like the U.S., Israel, and Russia, as well as new entrants like China and Iran. Today, drones cater to diverse needs, including surveillance, intelligence gathering, border security, and targeted attacks, allowing countries to conduct operations in remote or contested areas without the direct involvement of personnel. This proliferation has also introduced challenges, such as ethical concerns surrounding autonomous weapon systems and potential misuse in unregulated conflict zones.⁸

Despite their growing civilian uses, UAVs remain integral to modern military doctrine. Their role in asymmetrical warfare, counterinsurgency, and targeted operations has reshaped conflict dynamics in numerous regions. UCAVs provide armed forces with real-time intelligence, surveillance, and reconnaissance (ISR) capabilities, reducing the time between threat detection and response. Armed UAVs or UCAVs, such as the MQ-9 Reaper, have become central in counterterrorism operations, allowing for precision engagements in regions like the Middle East and Africa.⁹

International cooperation and regulatory frameworks have also influenced the evolution of UAVs and UCAVs. The Missile Technology Control Regime (MTCR), established in 1987, sought to regulate the proliferation of technologies that could deliver weapons of mass destruction, including certain types of UCAVs. Over time, as the civilian market for UAVs grew, international bodies such as the International Civil Aviation Organization (ICAO) have also established guidelines for safely integrating UAVs into civilian airspace.¹⁰

As UAVs have become more sophisticated, their impact on modern warfare and civilian areas continues to grow. The emergence of autonomous capabilities, such as drone swarm technology and artificial intelligence-driven decision-making, has further expanded the strategic applications of UAVs. Today, they are not only a tool for traditional state actors but are also employed by non-state actors, adding complexity to global security dynamics.¹¹ The expanding role of UAVs and UCAVs set a critical context for examining how their integration into defence strategies can shape international security frameworks

⁷ International Crisis Group, "Türkiye's Growing Drone Exports," 20.11.2023, <https://www.crisisgroup.org/europe-central-asia/western-europemediterranean/turkiye/turkiyes-growing-drone-exports>, Access: 11.11.2024

⁸ Ibid.

⁹ Ibid.

¹⁰ Keane, John & Carr, Stephen. (2013). A Brief History of Early Unmanned Aircraft. Johns Hopkins Apl Technical Digest. 32. 558-571, <https://secwww.jhuapl.edu/techdigest/content/techdigest/pdf/V32-N03/32-03-Keane.pdf>, Access: 11.11.2024

¹¹ Kumar, Shashank, A Brief Review on Unmanned Combat Aerial Vehicle (U.C.A.V) (May 5, 2020). Available at SSRN: <https://ssrn.com/abstract=3593220> or <http://dx.doi.org/10.2139/ssrn.3593220>, Access: 09.11.2024



as countries and regions evaluate their defence postures and seek new strategic partnerships.

Evolution of UCAV Technology in Türkiye

It can be claimed in confidence that Türkiye's path to becoming a global actor in UCAV technology began with a strategic shift towards defence industry self-sufficiency, prompted mainly by the U.S. arms embargo imposed after Türkiye's 1974 Cyprus Peace Operation. The embargo Türkiye faced has strengthened the risks of foreign dependency, pushing Türkiye to develop its indigenous defence sector. Over the following decades, Türkiye established major defence enterprises, including Aselsan, Havelsan, Turkish Aerospace Industries (TAI), and Roketsan, which laid the foundations for the country's defence production capacity. By 2011, Türkiye achieved 52% domestic production in defence equipment, which rose to 60% by 2014, reflecting a consistent growth in self-reliance.¹²

Initially, Türkiye's UAV capabilities depended heavily on foreign technology, particularly from Israel, with the Heron UAV providing Türkiye's primary aerial intelligence assets. However, strained diplomatic relations and limitations on purchasing American UAVs, such as the Predator, shifted Türkiye's focus towards developing a robust domestic UAV program. As the Turkish industry honed its technological capabilities, the government made significant investments to support research, production, and infrastructure related to UAVs. By the late 2000s, Türkiye began concentrating resources specifically on developing UCAV systems to create a niche strength in its defence portfolio.¹³

The turning point came in 2014 with the successful deployment of Baykar's Bayraktar TB2. This tactical drone introduced a new level of operational efficiency at a fraction of the cost of foreign models. The Bayraktar TB2 could stay airborne for up to 24 hours, carry a 150 kg payload, and operate at altitudes of up to 27,000 feet, combining endurance with precision strike capability.¹⁴ With its laser-guided MAM-L munitions developed by Roketsan, the TB2 demonstrated significant capability for surgical strikes, transforming Türkiye's counterterrorism and military operations. The Turkish Armed Forces deployed TB2 drones in counterterrorism operations against PKK targets within Türkiye and across borders, including operations in Syria and Iraq.¹⁵

Türkiye continued diversifying and upgrading its UAV portfolio with advanced models in the following years. Baykar's subsequent UAV, the Bayraktar AKINCI, represents a shift towards a High-Altitude, Long-Endurance (HALE) platform capable of carrying payloads up to 1,350 kg, including sophisticated weapons such as SOM-A missiles, precision-guided

¹² Rossiter, A. and Cannon, B. J. (2022) 'Turkey's rise as a drone power: trial by fire', *Defense & Security Analysis*, 38(2), pp. 210–229. doi: 10.1080/14751798.2022.2068562.

¹³ Rossiter, A. and Cannon, B. J. (2022) 'Turkey's rise as a drone power: trial by fire', *Defense & Security Analysis*, 38(2), pp. 210–229. doi: 10.1080/14751798.2022.2068562.

¹⁴ <https://baykartech.com/en/uav/bayraktar-tb2/>

¹⁵ Ibid.



munitions, and even air-to-air missiles. AKINCI, with a flight altitude ceiling of 40,000 feet and 24-hour endurance, marked Türkiye's entry into a highly advanced segment of UAV technology. Turkish Aerospace Industries (TAI) also developed the Anka series, with the Anka-B introduced in 2015, achieving 30,000 feet altitude and a range of over 200 km. By 2018, the Anka-S added satellite control features, enhancing Türkiye's long-range and high-autonomy operational capabilities.¹⁶

These innovations fuelled a thriving export market, with the Bayraktar TB2 and Anka drones seeing widespread international deployment. To date, Baykar's TB2 drones have been sold to over 30 countries, including strategic allies like Poland (making it the first NATO country to import Turkish drones), Qatar, and Ukraine. In the 2020 Nagorno-Karabakh conflict, Azerbaijan's use of Bayraktar TB2s provided a decisive advantage for Turkish UAVs on the global stage.

Türkiye's Path to Become a Global UCAV Manufacturer

With the targeted R&D efforts, strategic investments, and supportive government policies, UAV technology in Türkiye has developed successfully over the last few decades. Türkiye's pursuit of "third-revolution" battlefield systems further supports this technological edge, as emphasised in the SSB's 2018–2022 Sectoral Strategy Document, which identifies autonomous weapon systems as critical to 21st-century warfare. This strategy aims for Türkiye to reach parity with leading global defence manufacturers by developing highly autonomous systems with multi-drone swarming and AI-based decision-making capabilities. On this track, popular Turkish UCAVs such as Baykar's Bayraktar TB2, Bayraktar Akıncı, and TAI's Anka models incorporated advanced technologies, including autonomous operation, high-resolution surveillance, and AI-driven target recognition capabilities.¹⁷

For instance, the most popular Turkish war drone, Bayraktar TB2, developed by Baykar for the Turkish Armed Forces, made its maiden flight in August 2014 before being incorporated into the military inventory. With an operational altitude of 5,500 meters, a maximum flight ceiling of 8,200 meters, and a top speed of 220 km/h, the TB2 can remain airborne for up to 27 hours.¹⁸ Its effectiveness in recent regional conflicts has solidified its reputation; during the Nagorno-Karabakh conflict, for example, Azerbaijani forces used TB2 drones to destroy numerous Armenian armoured vehicles and air defence systems.

In 2022, during the Russia-Ukraine war, Ukraine's use of the TB2 against Russian forces highlighted its effectiveness in asymmetric warfare, reinforcing Türkiye's standing as a major international UCAV exporter. By the end of 2022, Türkiye's UAV exports had

¹⁶ Kasapoğlu, Can & Sine Özkardeş (2022) Drone Warfare: Drone Wars, Defense Economics and Turkey's Way, EDAM, <https://edam.org.tr/en/foreign-policy-and-security/drone-warfare-drone-wars-defense-economics-and-turkey-s-way>, Access:10.11.2024

¹⁷ Koç, T. (2024). Türk İHA'larının Rönesansı:Türkiye'nin Güvenlik Anlayışı Nasıl Değişti? Turcology Research, 80, 339-351., <https://dergipark.org.tr/en/download/article-file/3949284>, Access:10.11.2024

¹⁸ Baykar Tech, "Yet Another Global First from Bayraktar TB2," 01.05.2024, <https://baykartech.com/en/press/yet-another-global-first-from-bayraktar-tb2/>, Access: 12.11.2024



exceeded \$600 million annually, reflecting the growing demand and competitive positioning of Turkish drones in the global market.¹⁹

In 2023, Türkiye's aviation industry achieved remarkable success with two national manufacturers, Turkish Aerospace Industries (TUSAŞ) and Baykar, ranking among the top 50 global aerospace companies. TUSAŞ secured the 38th position with \$2.674 billion in sales, while Baykar debuted at the 49th with \$1.805 billion in sales. Baykar's dominance in UCAV exports, including its Bayraktar TB2 and Akıncı models, significantly contributed to this milestone. Over 90% of Baykar's revenues now come from exports, with 97.5% of its contracts focused on international sales.²⁰ These financial successes further empower Baykar to advance platforms like Bayraktar TB3 and Kızılelma, solidifying Türkiye's global leadership in the drone industry.

The economic impact of Türkiye's UAV sector is equally notable. As of 2023, Türkiye has achieved around 75% domestic production in its defence industry, significantly reducing its reliance on foreign suppliers and ensuring greater resilience against potential export restrictions. In parallel Türkiye's defense exports grew from \$250 million in 2002 to \$5.5 billion in 2023.²¹ The UAV sector alone employs thousands across Türkiye in engineering, manufacturing, and research roles, with Baykar's and TAI's facilities representing the core of this industry. Government spending on UAV technology has been substantial, with the Secretariat of Defense Industries (*Savunma Sanayi Başkanlığı*, SSB) increasing allocations toward UCAV research.²²

Achievements of the Turkish UCAVs in Recent Military Conflicts

In recent years, Turkish drones with domestically produced systems have positioned themselves as global players in combat technology, with their achievements in several military conflicts. Perhaps the global fame of Turkish drones started with Baykar's introduction of the Bayraktar TB2 in 2014, quickly gaining recognition for its versatility and cost-effectiveness. This model has been used extensively in various conflicts, including the civil war in Libya, counterterrorism operations against PKK targets in southeastern Türkiye, and cross-border missions in Syria.²³

¹⁹ https://www.iletisim.gov.tr/english/dis_basinda_turkiye/detay/increase-in-global-sales-of-turkish-drones

²⁰ NTV, "TUSAŞ ve Baykar Havacılık Devleri Arasında," 11.11.2024, <https://www.ntv.com.tr/ntvpara/tusas-ve-baykar-havacilik-devleri-arasinda,cPgU-1fzJ023CnUMxZ5JDA>, Access: 14.11.2024

²¹ Anadolu Agency, "Türkiye's Defense Industry Makes Significant Gains for Economy," 15.07.2024, <https://www.aa.com.tr/en/economy/turkiye-s-defense-industry-makes-significant-gains-for-economy/3363158>, Access: 15.10.2024.

²² Koç, T. (2024). Türk İHA'larının Rönesansı:Türkiye'nin Güvenlik Anlayışı Nasıl Değişti?

Turcology Research, 80, 339-351., <https://dergipark.org.tr/en/download/article-file/3949284>, Access:10.11.2024

²³ Düz, Sibel. "The Ascension of Turkey as a Drone Power History, Strategy, and Geopolitical Implications." *SETA Analysis*, Sayı: 65, 2020. <https://www.setav.org/en/assets/uploads/2020/07/A65En.pdf>, Access: 07.11.2024.



Achievements of Turkish drones started with their significant impact on counterterrorism operations against the PKK terrorist organisation within Türkiye's borders; however, they later extended to regional conflicts around the world, showcasing their effectiveness and adaptability in diverse combat scenarios. These UAVs have severely limited the operational capabilities of the PKK, delivering critical blows to the organisation. The success is attributed mainly to Türkiye's defence modernisation efforts, which enhanced the development and deployment of drones like the Bayraktar TB2 and Anka UAVs. Alongside advancements in air-to-ground munitions, these drones have allowed the Turkish Armed Forces to monitor and neutralise terrorist threats with precision strikes effectively. Their operational effectiveness was particularly evident during the Euphrates Shield operation in 2016–2017 and the Olive Branch operation in 2018. These campaigns not only disrupted PKK activities but also showcased Türkiye's growing dominance in the medium-altitude long-endurance (MALE) and tactical drone segments on a global scale.²⁴

Notably, in the Libyan conflict, Turkish drones played a transformative role in the battle for Tripoli. Beginning with their decisive deployment in 2019, Bayraktar TB2s were used to halt the advance of Khalifa Haftar's Libyan National Army (LNA) towards the capital. These UAVs, supported by advanced electronic warfare systems such as KORAL, effectively neutralised Haftar's armoured vehicles, supply convoys, and forward airbases, marking a turning point in the conflict. The intervention, supported by precision air strikes, enabled pro-GNA forces to regain lost territories and stabilise their defensive positions. By conducting over 1,000 successful strikes, Turkish drones were instrumental in what has been described as 'the largest drone war in the world,' showcasing their efficiency in asymmetric warfare.²⁵

Beyond Libya, these systems have demonstrated their efficacy in Syria's Idlib region in 2020, targeting Syrian regime elements in coordinated operations involving Anka-S drones. Their international reputation was further solidified during the 2020 Nagorno-Karabakh conflict, where Azerbaijan's effective use of Bayraktar TB2s played a critical role in altering the battlefield dynamics.²⁶ Türkiye's Anka UAV, developed by Turkish Aerospace Industries (TAI), has also contributed to these capabilities since its introduction in 2010. It offers advanced surveillance and reconnaissance capabilities.

The success of these UCAVs in both military and humanitarian missions has allowed Türkiye to become a major exporter of drone technology, with clients including Poland, Qatar, and Ukraine. Notably, during the 2022 Russia-Ukraine war, Ukrainian forces utilised

²⁴ EDAM. "Drone Saldırıları ve Türkiye'nin Milli Güvenliği." Şubat 2019. https://edam.org.tr/wp-content/uploads/2019/02/EDAM_Drone-Sald%C4%B1r%C4%B1lar%C4%B1-ve-T%C3%BCrkiyenin-Milli-G%C3%BCvenli%C4%9Fi.pdf, Access: 15.11.2024.

²⁵ Aljazeera. "Largest Drone War in the World: How Airpower Saved Tripoli." Aljazeera News, 28.05.2020. <https://www.aljazeera.com/news/2020/5/28/largest-drone-war-in-the-world-how-airpower-saved-tripoli>. Access: 15.11.2024.

²⁶ Dorian Jones, "Turkish Drone Power Displayed in Nagorno-Karabakh Conflict", Voice of America, 13 October 2020. https://www.voanews.com/a/middle-east_turkish-drone-power-displayed-nagorno-karabakh-conflict/6197080.html, Access: 04.11.2024



the Bayraktar TB2 to significant strategic effect, drawing global attention to the impact of Turkish UAVs in modern conflict scenarios. In October 2024, Turkish President Recep Tayyip Erdoğan approved the Free Trade Agreement (FTA) between Türkiye and Ukraine initiated in 2022.²⁷ The FTA includes measures on the defence industry, such as battle-tested drone production.²⁸ Most recently, Baykar, producer of the Bayraktar drones, has furthered its presence in Ukraine by constructing a drone manufacturing plant. As Baykar, announced, the factory, slated for completion within 12 months, will proceed without interruption despite the ongoing conflict with Russia. The facility, which is planned to manufacture both the famous TB2 and the new Bayraktar TB3 model, aims to strengthen Turkish-Ukrainian defence cooperation, continuing the partnership established in 2019 despite setbacks caused by the war.²⁹

Türkiye as a Global UCAV Exporter

By the end of 2023, Türkiye had exported over 500 UCAVs to more than 30 countries, marking a successful phase in its defence industry. Baykar's famous Bayraktar TB2 was the most exported model, and Bayraktar Akıncı followed it. Enhancing its appeal is the TB2's relatively low cost, with an estimated price of 5 million euros per unit on the international market. While Baykar exported only six TB2s in 2019, the post-Nagorno-Karabakh demand spurred exponential growth, culminating in exports exceeding 500 units to more than 30 countries by 2023.³⁰ In September 2022, the United Arab Emirates placed a substantial order for 120 TB2s, and the drones are now actively used by the armed forces of Poland, Iraq, Qatar, the UAE, and Azerbaijan.³¹

More recently, Saudi Arabia joined Qatar and Kuwait in signing an agreement to purchase the TB2 UAV from Türkiye, underscoring the growing global demand for Turkish drones. Owing to their exceptional performance in actual combat scenarios and impressive cost-effectiveness, sales of TB2 drones have surged significantly in recent years.

²⁷ AA, "Türkiye-Ukraine Free Trade Deal Approved by Turkish President," 01.12.2024, <https://www.aa.com.tr/en/europe/turkiye-ukraine-free-trade-deal-approved-by-turkish-president/3351797>. Accessed on 15.11.2024.

²⁸ Daily Sabah, "Turkey, Ukraine Ink FTA Deal, Agree on Battle-Tested Drone Production," 03.02.2022, <https://www.dailysabah.com/business/economy/turkey-ukraine-ink-fta-deal-agree-on-battle-tested-drone-production>. Accessed on 15.11.2024.

²⁹ Al-Monitor, "Turkey's Manufacturer of Bayraktar Drones Building Plant in Ukraine," 07.02.2024, <https://www.al-monitor.com/originals/2024/02/turkeys-manufacturer-bayraktar-drones-building-plant-ukraine>. Access: 15.11.2024.

³⁰ İletişim Başkanlığı. "Türk Dronlarının Küresel Satışlarında Artış." 02 Mart 2024. https://www.iletisim.gov.tr/turkce/dis_basinda_turkiye/detay/turk-dronlarinin-kuresel-satislarinda-artis. Access: 15.11.2024.

³¹ Middle East Eye, "Bayraktar TB2: UAE in Talks with Turkey to Buy Large Number of Drones," 08.09.2024, <https://www.middleeasteye.net/news/bayraktar-tb2-uae-turkey-talks-buy-large-number-drones>. Access: 25.11.2024.



Poland became the first EU Member State to purchase Türkiye's UAVs and integrate them into its national defence system in 2022. This milestone was achieved through an agreement with Baykar, delivering 24 Bayraktar TB2 drones. The deliveries were completed in four phases: the first batch in October 2022, followed by the second in April 2023, the third in October 2023, and the final batch in November 2024. These UAVs now actively contribute to Poland's defence capabilities, showcasing the growing cooperation between Türkiye and EU member states.³² Likewise, Romania has received the first Bayraktar TB2 in June 2024, part of a contract signed in April 2023 to procure three systems comprising six drones each, alongside ammunition and training support, for \$321 million.³³ On March 2, 2024, Türkiye delivered three Bayraktar TB2 drones to Albania as part of a modernisation program for the Albanian Armed Forces. Albanian Defense Minister Niko Peleshi announced the completion of the assembly and infrastructure setup for the drones at the Kuçova military base, a NATO tactical airbase refurbished with NATO funding. In October 2024, Albania announced that Turkish kamikaze war drones would be purchased shortly.³⁴

As of September 2024, the company that produces Bayraktar UCAVs, Baykar, announced that six NATO member states and four EU member states have included Turkish UCAVs in their defence inventories.³⁵

Most recently, Croatia also announced the purchase of six Bayraktar TB2 drones from Türkiye for 86 million euros. The deal includes electro-optical surveillance systems, full initial ammunition, and pilot training. The Croatian government highlighted that these tactical UAVs would enhance NATO member Croatia's ability to respond to contemporary threats effectively.³⁶ This drift strengthens Türkiye's defence export portfolio and positions it to expand its market beyond existing trade partners like Qatar, the UAE, and Azerbaijan to new European buyers. Apart from Poland, and Romania, among other EU

³² Anadolu Agency, "Turkish Aviation Firm Delivers Combat Drones to Poland," 17.05.2024, <https://www.aa.com.tr/en/europe/turkish-aviation-firm-delivers-combat-drones-to-poland/3222852#>, Access: 13.11.2024.

³³ BaykarTech, "Romania Receives First Bayraktar Drone System," 20.05.2024, <https://baykartech.com/en/press/romania-receives-first-bayraktar-drone-system/>, Access: 15.11.2024.

³⁴ İletişim Başkanlığı, "Arnavutluk, Türkiye'den Kamikaze İHA Satın Alacağını Açıkladı," t.y., https://www.iletisim.gov.tr/turkce/dis_basinda_turkiye/detay/arnavutluk-turkiyeden-kamikaze-ih-satin-alacagini-acikladi, Access: 17.11.2024.

³⁵ Baykar Tech, "Göreve Başlayan İlk Bayraktar TB2 İHA Emekli Oldu," 11.10.2024, <https://baykartech.com/tr/haberler/goreve-baslayan-ilk-bayraktar-tb2-ih-emekli-oldu/>, Access: 14.11.2024

³⁶İletişim Başkanlığı. "Türk Dronlarının Küresel Satışlarında Artış." 02 Mart 2024. https://www.iletisim.gov.tr/turkce/dis_basinda_turkiye/detay/turk-dronlarinin-kuresel-satislarinda-artis. Access: 15.11.2024.



Member States, Latvia and Croatia are also interested in adding Turkish drones to their defence inventories.^{37 38}

Following the achievements of TB2 in global exports, Türkiye is advancing the TB3, an upgraded version of the TB2. Having completed its maiden flight on October 27, the TB3 boasts a payload capacity of approximately 280 kilograms and a range exceeding 1,800 kilometres. With its short take-off and landing capabilities, the TB3 is suited for ship-based operations. It is expected to enter serial production in 2024 to operate alongside the TCG Anadolu amphibious assault ship.³⁹ Furthermore, Baykar plans to begin serial production of the Kızılelma unmanned combat aircraft, a next-generation combat drone capable of engaging ground and aerial targets. Kızılelma drone will be equipped to carry precision-guided munitions and air-to-air missiles, expanding Türkiye's UCAV capabilities.⁴⁰

Looking ahead, Türkiye aims to leverage UCAV exports to achieve two strategic objectives. First, it increased its arms export volume, which reached 4.4 billion dollars in 2022 and 5.6 billion dollars in 2023.⁴¹ Türkiye seeks to enhance its autonomy in military equipment. Through investments in research and development and local production capabilities, Türkiye has significantly reduced its reliance on foreign-controlled advanced technologies, reinforcing its position as a leading global drone producer.

UAV Technology in Evolving European Defence Concept

The evolving European defence landscape has prioritized cooperation through frameworks like Permanent Structured Cooperation (PESCO), which fosters collaboration among 26 EU Member States to develop joint military capabilities. By integrating initiatives such as the European Defence Fund and aligning with PESCO's structured approach, the EU aims to create a coherent capability landscape that enhances strategic autonomy and readiness for demanding security missions.

³⁷ Oryx, "An International Export Success: The Global Proliferation of Turkey's Bayraktar TB2," 02.09.2022, <https://www.oryxspioenkop.com/2021/09/an-international-export-success-global.html>,

³⁸ Baykar Tech, "Letonya, Türkiye'den İHA Satın Alan İkinci NATO Müttefiki Olmaya Hazırlanıyor," t.y., <https://www.baykartech.com/tr/press/latvia-hints-becoming-second-nato-ally-buy-turkish/>, Access: 07.06.2021

³⁹ İletişim Başkanlığı, "Türkiye, Savunma Fuarında Bayraktar TB3 ve Deniz Avcı İHA'sı ile Gücünü Sergiliyor," 25.10.2024, https://www.iletisim.gov.tr/turkce/dis_basinda_turkiye/detay/turkiye-savunma-fuarinda-bayraktar-tb3-ve-deniz-avci-ihasi-ile-gucunu-sergiliyor, Access: 14.11.2024

⁴⁰ İletişim Başkanlığı, "One of NATO's Strongest Countries Reveals the Fighter of the Future: It Is More Than an UAV," 24.07.2024, https://www.iletisim.gov.tr/turkce/dis_basinda_turkiye/detay/one-of-natos-strongest-countries-reveals-the-fighter-of-the-future-it-is-more-than-an-uav, Access: 15.11.2024

⁴¹ Daily Sabah. "Turkish Defense Industry Sets New Record with \$5.5B in 2023 Exports." 2023. <https://www.dailysabah.com/business/defense/turkish-defense-industry-sets-new-record-with-55b-in-2023-exports>. Access: 15.11.2024.



In parallel, the EU views UAS as critical to enhancing strategic autonomy and advancing its broader Action Plan on Autonomous Systems (APAS).⁴² By integrating UAS into intelligence, surveillance, reconnaissance, logistics, and precision strikes, the EU emphasises the strategic importance of UAVs in achieving both military and civilian contexts. This multifaceted strategy aims to strengthen the EU's defence capabilities and ensures alignment with ethical standards and sustainability goals in deploying advanced drone technologies. Consequently, the EU's regulatory framework and initiatives on UAVs are listed below:

- **Unified Regulatory Framework and U-Space Program:** The EU Aviation Safety Agency (EASA) has led the establishment of a unified regulatory framework for drones, addressing operational safety and airspace integration. Key initiatives include remote pilot licensing, drone categorisation, and the "U-Space" program. U-Space represents a transformative effort to coordinate drone traffic in lower airspace, leveraging real-time data and automated systems for safe operations, particularly in urban environments.⁴³
- **Categorisation and Operation Requirements:** EASA's structured approach categorises drones into three risk-based groups: Open, Specific, and Certified. This system aligns safety measures, operational restrictions, and pilot training requirements, ensuring a high standard of safety and flexibility across Member States.⁴⁴
- **Single European Sky Policy:** The European Commission integrates UAV development within the broader European Single Sky policy. The Single European Sky ATM Research (SESAR) program enhances drone traffic management and airspace integration, supporting the EU's vision for widespread commercial and public UAV applications. Additionally, SESAR aids in automating systems for scalable drone operations, which is vital for Europe's airspace management.⁴⁵
- **Strategic Autonomy:** The EU's approach highlights the integration of UAS into defence strategies through the European Defence Fund (EDF) and initiatives by the European Defence Agency (EDA). These programs aim to validate UAV systems in operational environments, focusing on modularity and scalability. Counter-UAS

⁴² European Defence Agency, "EDA Action Plan on Autonomous Systems," <https://eda.europa.eu/publications-and-data/publications/eda-action-plan-on-autonomous-systems>, Access: 20.11.2024.

⁴³ European Commission, "U-Space: A Set of Services for Drone Operations Beyond Visual Line of Sight," <https://interoperable-europe.ec.europa.eu/collection/rolling-plan-ict-standardisation/u-space#:~:text=U%2Dspace%20is%20a%20set,beyond%20visual%20line%20of%20sight>, Access: 20.11.2024.

⁴⁴ European Union Aviation Safety Agency (EASA), "FAQs: Drones (UAS)," <https://www.easa.europa.eu/en/the-agency/faqs/drones-uas>. Access: 20.11.2024.

⁴⁵ European Commission, "Single European Sky," t.y., https://transport.ec.europa.eu/transport-modes/air/single-european-sky_en. Access: 19.11.2024.



technologies are also being developed to mitigate threats from low-speed and low-visibility drones, drawing lessons from conflicts such as the war in Ukraine.

- **EU Platform for Autonomous Systems:** The proposed EU Platform for Autonomous Systems (AS) provides a cohesive ecosystem for testing, validation, and certification of UAS. This initiative ensures interoperability and harmonised standards across Member States, accelerating the adoption of cutting-edge drone technologies.⁴⁶

The EU's dynamic approach to UAVs and UCAVs addresses technological and operational challenges while fostering collaboration between civil and defence sectors. Ongoing investment through Horizon Europe and alignment with international regulatory frameworks ensure the EU remains a leader in global drone governance. By prioritising innovation, ethical compliance, and strategic autonomy, the EU is poised to adapt to emerging challenges in this fast-evolving sector, maintaining its commitment to sustainability, security, and technological advancement.

When it comes to the ongoing UCAV projects, several EU member states, notably France, Germany, Italy, Spain, and Poland, have established capabilities in manufacturing UCAVs. Through companies like Dassault Aviation, France produces the nEUROn UCAV, an experimental stealth combat drone developed collaboratively with other European countries.⁴⁷ Germany participates in the Eurodrone MALE RPAS project, a joint initiative with France, Italy, and Spain, to develop a medium-altitude, long-endurance drone for intelligence, surveillance, and reconnaissance missions.⁴⁸ With manufacturers like Leonardo S.p.A., Italy produces drones such as the Falco series for surveillance and reconnaissance purposes. Spain contributes to the Eurodrone project and has developed UAVs like the SIVA system for aerial surveillance. Poland manufactures systems like the Warmate loitering munition and FlyEye mini-UAV through companies like the WB Group.⁴⁹ These efforts, often supported by collaborative projects like the Eurodrone MALE RPAS and nEUROn, aim to strengthen Europe's defence industry and technological expertise in unmanned systems.

Most recently, in November 2024, EU countries committed to jointly developing drones, missiles, and warships, marking a significant advancement in collaborative defence efforts. Defence ministers from up to 17 member states are expected to sign letters of intent to develop common military capabilities, including integrated air and missile

⁴⁶ European Defence Agency, "Autonomous Systems," <https://eda.europa.eu/what-we-do/eu-policies/autonomous-systems>, Access: 25.11.2024.

⁴⁷ Dassault Aviation, "nEUROn: Introduction," <https://www.dassault-aviation.com/en/defense/neuron/introduction/>, Access: 20.11.2024.

⁴⁸ PESCO, "European Medium Altitude Long Endurance Remotely Piloted Aircraft Systems (MALE RPAS) – Eurodrone," <https://www.pesco.europa.eu/project/european-medium-altitude-long-endurance-remotely-piloted-aircraft-systems-male-rpas-eurodrone/>, Access: 20.11.2024.

⁴⁹ European Security & Defence, "UAV Programmes: A Focus on the EU," 03.08.2023, <https://euro-sd.com/2023/08/articles/32890/uav-programmes-a-focus-on-the-eu/>, Access: 25.11.2024.



defence systems, electronic warfare capabilities, loitering munitions, and next-generation combat ships.⁵⁰

These initiatives, supported by the EDA, aim to enhance the EU's strategic autonomy and readiness for high-intensity warfare scenarios. The collaborative projects focus on procuring counter-unmanned aerial systems (C-UAS), ground-based air defence (GBAD), and munitions, bolstering the EU's ability to independently conduct intelligence, surveillance, reconnaissance, and combat operations.

Potential Contributions of the Turkish UCAVs to European Security

The EU's approach to UAVs and UCAVs aligns with its broader innovation, security, and sustainable development goals. Enhanced cooperation with international regulatory bodies and continued investment in drone technology through initiatives like Horizon Europe solidify the EU's ambitions to play a proactive role in global drone governance. Furthermore, the EC's upcoming proposals to revise drone laws highlight its attentive stance in this fast-evolving sector.

Achievements of Turkish drones in recent conflicts have enhanced Türkiye's defence capabilities and made it a sought-after partner in global defence collaborations, providing a foundation for alignment with European defence frameworks. Türkiye's evolution into a UCAV power reflects its commitment to defence autonomy and successful Indigenous innovation. The ability to produce and export advanced UCAV systems has bolstered Türkiye's defence capabilities and strategic positioning in the ongoing conflicts like Russia and Ukraine. As European countries seek to enhance their own defence capabilities, Türkiye's expertise in UAV technology positions it as a potential partner in the emerging European defence landscape.

In May 2024, Statewatch and Informationsstelle Militarisierung (IMI) claimed that EU funds helped finance Israeli drone technology used in Gaza. Xtend, a manufacturer supporting the Israeli Defence Force (IDF), received €50,000 from Horizon Europe, and other Israeli companies reportedly received millions in EU funding. Projects like ResponDrone and UnderSec have raised concerns about military applications, prompting calls to suspend Israel's participation in EU programs due to potential human rights violations.⁵¹

However, Türkiye's advancements in UCAV technology, particularly systems like the Bayraktar drones, offer significant potential for European security. Collaborating with Türkiye could enhance the EU's intelligence, surveillance, reconnaissance, and combat capabilities while filling capability gaps and strengthening strategic autonomy. Such cooperation would foster closer defence ties and promote mutual security interests.

⁵⁰ Euronews, "EU Countries Commit to Joint Drone, Missile, and Warship Development," 19.11.2024, <https://www.euronews.com/my-europe/2024/11/19/eu-countries-commit-to-joint-drone-missile-and-warship-development>, Access: 21.11.2024.

⁵¹ Euronews, "EU Funding Drone Technology Used by Israel in Gaza War, Claims Monitor," 23.03.2024, <https://www.euronews.com/2024/03/23/eu-funding-drone-technology-used-by-israel-in-gaza-war-claims-monitor>, Access: 15.11.2024.



A notable example of Türkiye's drone diplomacy is its collaboration with Ukraine during the Russia-Ukraine war. The success of Bayraktar TB2 drones highlighted their strategic value, drawing global attention to Turkish UAVs' effectiveness. Moreover, the effective role played by Bayraktar drones in shaping the course of the war proved Türkiye's critical position as a defence partner in the region.⁵² Building on this cooperation, Türkiye and Ukraine signed a Free Trade Agreement (FTA) in 2024, including provisions for defence collaboration. Baykar is also constructing a drone plant in Ukraine to produce Bayraktar TB2 and TB3 models, demonstrating resilience in defence cooperation despite ongoing conflict. This partnership between Türkiye and Ukraine serves as a model for potential EU collaborations. Leveraging Türkiye's cost-effective and battle-tested UCAVs could enhance European defence capabilities while supporting shared security objectives in a rapidly evolving global landscape.

In short, Türkiye's rise as a major manufacturer of UCAV technology has transformed its defence industry into a global player in modern warfare, marked by achievements in conflicts such as Libya, Syria, and Nagorno-Karabakh. Through its domestically developed systems, Türkiye has demonstrated military success and positioned itself as a major international exporter of cost-effective, reliable, and battle-tested drones like the Bayraktar TB2 and Akıncı. The country's increasing exports to over 30 nations, including EU member states like Poland, Romania and NATO allies, underline its strategic significance in the global defence market.

The EU's evolving defence concept has emphasised innovation and strategic autonomy, with drones playing a critical role in its security and military strategies. Initiatives like the U-Space Program, SESAR, and the European Defence Fund align with the broader goals of integrating advanced drone technologies into European defence capabilities. Looking forward, Türkiye's advanced UCAV technologies can offer substantial contributions to the EU's defence framework. Collaborative efforts between Türkiye and the EU could enhance operational capabilities in intelligence, surveillance, reconnaissance, and combat operations. Additionally, Türkiye's expertise in cost-efficient drone production could fill gaps in the EU's evolving defence posture while supporting its aim for strategic autonomy.

⁵² Nas, Çiğdem (2023), İKV, "Davut ve Golyat'ın Mücadelesi: Ukrayna Savaşı Bir Yılını Doldurdu," <https://www.ikv.org.tr/ikv.asp?id=8651>, Access: 15.11.2024

