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Fast, cheap, deadly: the budget drone changing global warfare



The Bayraktar TB2 has made Turkey one of the world's top drone powers. It also heralds a disconcerting new era

Laura Pitel and Raya Jalabi 12 HOURS AGO

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About three months after Russia invaded Ukraine, Serhiy Prytula launched a counter-campaign from Kyiv. Prytula, a well-known Ukrainian TV personality with salt-and-pepper hair and small, piercing eyes, appeared in a YouTube video, asking for donations. “I invite you to join this noble cause,” the 41-year-old said solemnly over rousing music, referring to something he called “the People’s Bayraktar Project”. He wasn’t proposing to buy food or medical supplies; he was raising funds to buy three drones known as the Bayraktar TB2.

A sleek aircraft with a 12m wingspan and a relatively affordable, seven-figure price tag, the Bayraktar gained a reputation for blowing up Russian tanks and artillery in the first weeks of the invasion. (It’s pronounced “bye-rack-tar” and means “standard bearer” in Turkish.) In Ukraine, the drone’s effectiveness made Bayraktar a household name and inspired a hit song penned by soldier-songwriter Taras Borovok. “He turns Russian bandits into ghosts: Bayraktar,” goes one of the verses.

Money began flooding in to Prytula’s campaign from around the world. “Go go Bayraktars,” commented a supporter in Poland on Twitter. “Kick some ass!” an Australian donor tweeted, adding a GIF of boxing kangaroos. In less than three days, Prytula exceeded his \$15mn target. Then something unexpected happened: the Turkish defence firm that manufactures the TB2, Baykar Technology, announced it wouldn’t accept the money. Instead, it was giving the drones to the Ukrainian armed forces for free. The company repeated the stunt last month, gifting a drone to [Ukraine](#) instead of accepting cash raised by crowdfunders in Poland.

Savvy PR isn’t the only thing that distinguishes Baykar, which is run from Istanbul by two brothers, one of whom is married to president [Recep Tayyip Erdoğan](#)’s youngest daughter. The company conducted its first armed-strike test less than seven years ago. In 2021, it became Turkey’s top defence exporter, beating established industrial giants such as Aselsan and the state-owned Turkish Aerospace Industries by selling \$664mn worth of drones to foreign buyers, according to data from the Turkish Exporters’ Assembly. The Bayraktar TB2 is at the centre of this success. In addition to becoming a cultural icon in Turkey, it has proved popular with governments from Poland to Qatar. Aaron Stein, an American expert on Turkish foreign policy, has

dubbed the TB2 “the Toyota Corolla of drones”.



The TB2 embodies a new phase in the era of drone warfare in which lower-cost technology becomes increasingly accessible to regimes that cannot buy from the world's more-established arms producers © Illustration by Saratta Chuengsatiansup

The weapon has catapulted Turkey into the ranks of the world's top drone powers, along with the US, Israel, Iran and China, and is the most significant result of a two-decade drive by Erdoğan to foster a national defence industry. The Bayraktar brothers, who declined to be interviewed for this story, have achieved celebrity status at home. Selçuk Bayraktar, the second-born and the company's chief technology officer, has two million followers on both Twitter and Instagram. Each post he

publishes generates hundreds of adulatory responses from fans. Tens of thousands more turn out for Teknofest, an annual bash run by the government and a foundation with close ties to Baykar, at which the president, his children and grandchildren don red aviator jackets and join what has become a celebration of the Turkish defence industry. Even for some of Erdoğan's staunch political opponents, the company's success is a source of national pride.

Erdoğan, meanwhile, has used the weapon to help crush an insurgency at home and flex his country's military muscles abroad. Among eager buyers of Baykar technology are Ethiopia, where the government of Abiy Ahmed used them to beat back Tigrayan forces in a brutal civil war last year, and Azerbaijan, which used them to crush the Armenian military in 2020.

In addition to heralding Turkey's ascendancy in global defence, the TB2 embodies a new phase in the era of drone warfare in which lower-cost technology becomes increasingly accessible to regimes that cannot buy from the world's more-established arms producers.

The Bayraktar TB2 has a gently curved body, narrow wings and three small wheels. From a distance, the overwhelming impression to the inexperienced observer is one of lightness. Capable of staying in the air for up to 27 hours, the TB2 can fly to a height of 7,600m (25,000ft) to conduct intelligence and surveillance missions. An onboard laser can mark a target and hit it with one of four laser-guided micro missiles.

It can't fly as far or carry as heavy a load as higher-spec drones such as the US-made \$32mn Reaper. But the TB2 has a unique advantage: its cost, which is likely about \$5mn per aircraft, according to analysts. Military experts agree that the TB2 strikes a unique balance between price and performance. "It incorporates Nato-standard design and performance characteristics," says Arda Mevlütoğlu, an Ankara-based defence analyst. "It is combat-proven in various conflicts and operations and is relatively cheap."





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The drone’s origins can be traced to Akçay, a village on the edge of a scrubby mountain range in south-east Turkey. In the early 2000s, an engineer and amateur pilot named Özdemir Bayraktar visited the area with a local military commander. He “showed us the blood of the martyrs”, Bayraktar told the Turkish newspaper *Milliyet* in 2010, speaking metaphorically about the Turkish soldiers killed fighting the Kurdistan Workers’ party (PKK), a leftwing group that embraces Kurdish nationalism and has been fighting a violent campaign against the state since 1984. Bayraktar, who died last year at the age of 72, added: “I said we would do what we could to help.” Soon his company pivoted from making car parts to building weapons.

Turkey bought its first unarmed drones from the UK and US in the late 1980s and 1990s. In the years that followed, Ankara was told it could not acquire lethal drones, which were much more tightly controlled, because western allies were worried about how they would be used, particularly in the conflict with the PKK. “Turkey is a proud nation, and it [was] really insulting for us to hear that,” says İsmail Demir, head of Turkey’s defence procurement and export agency, which is also responsible for fostering domestic production. Demir’s Ankara office is filled with models of Turkish-made planes, helicopters and tanks.

By the mid-2000s, unmanned aircraft had become a key component of international military conflict, border control and surveillance. Turkish companies began producing prototypes and jostling for position as the state sought to kick-start a homegrown defence industry. The Bayraktar family stood out with its up-by-the-bootstraps story and flair for self-promotion. In a 2005 video, a baby-faced Selçuk stands on a strip of tarmac, his sleeves rolled up, addressing a group of military officers and officials after a demonstration of a mini drone. He tells them: “If this project and others like it get support, then within five years we could be number one in the world.” Because it is a private business, the company’s finances are not publicly available. But the number of people it employs — about 2,500 today, up from 800 two

years ago — offers an indication of its recent growth.

After studying at Istanbul Technical University, Selçuk received a scholarship to pursue a master's at the University of Pennsylvania and then at MIT, where he investigated control systems for pilotless helicopters. At the same time, he was experimenting with prototype unmanned aerial vehicles (UAVs) for the family firm. The first big breakthrough came in 2006, after the company won a government competition for the best small, hand-launched drone. "It was very clear that they were actually ahead of the game, compared to the others," says the former official, who helped run the contest. Selçuk embarked on a PhD at Georgia Tech but quit in 2007 to return to Turkey and work as Baykar's CTO. His older brother Haluk, an industrial engineer, would become CEO.

In 2014, the company delivered the first, unarmed TB2 to the Turkish armed forces on contract. Within two years, Turkey's state-run news agency was publishing videos, taken by the drones' inbuilt cameras, showing strikes against PKK members. One of the earliest shows a vertiginous rock face on the border with Iraq before cutting to a puff of smoke. This was the moment that six PKK fighters were "neutralised", the state news agency said. The release of drone footage was a tactic that would be deployed repeatedly in the years to come. Videos of Russian or Armenian military targets being locked in a Bayraktar's crosshairs and then blown up became a propaganda tool for Turkey's armed forces and an advertisement to Baykar's international customers.

The emergence of the Bayraktar TB2 coincided with a particularly dark episode in Turkey's conflict with the PKK, which has claimed an estimated 40,000 lives over the past four decades, most of them Kurdish. Erdoğan, who had pursued a peace process with the militant group in the late 2000s and early 2010s, presided over its collapse, as domestic politics and the war in neighbouring Syria changed his calculations. The PKK is loathed by the majority of the public in Turkey. After the breakdown of a ceasefire in 2015, cities in the south-east of the country were engulfed in violent clashes between armed youths affiliated with the PKK and state security services. The group, which is classified by the US and the EU as a terrorist organisation, responded with a wave of bombings across the country, killing police officers, soldiers and dozens of civilians.

After the Turkish state quashed the urban conflict, fighting moved to rural areas, especially the rugged border with Iraq. For decades, it had been difficult for the armed forces to root out PKK guerrillas from the region's cave-riddled mountains. Weaponised drones were a game-changer, helping to push the group out of Turkey

and into neighbouring Iraq. The impact on the PKK has burnished the weapon's heroic image in Turkey, as well as that of Erdoğan. "No longer are we beggars at the door," he declared in a speech to military recruits last year, praising the drones. "Quite the opposite: everyone is asking for them from us."



Some in Washington question whether the US should loosen its ultra-stringent drone-export rules to gain leverage by selling its own weapons. Many nations might still prefer to skip the intense scrutiny and cost that come with buying American © Illustration by Saratta Chuengsatiansup

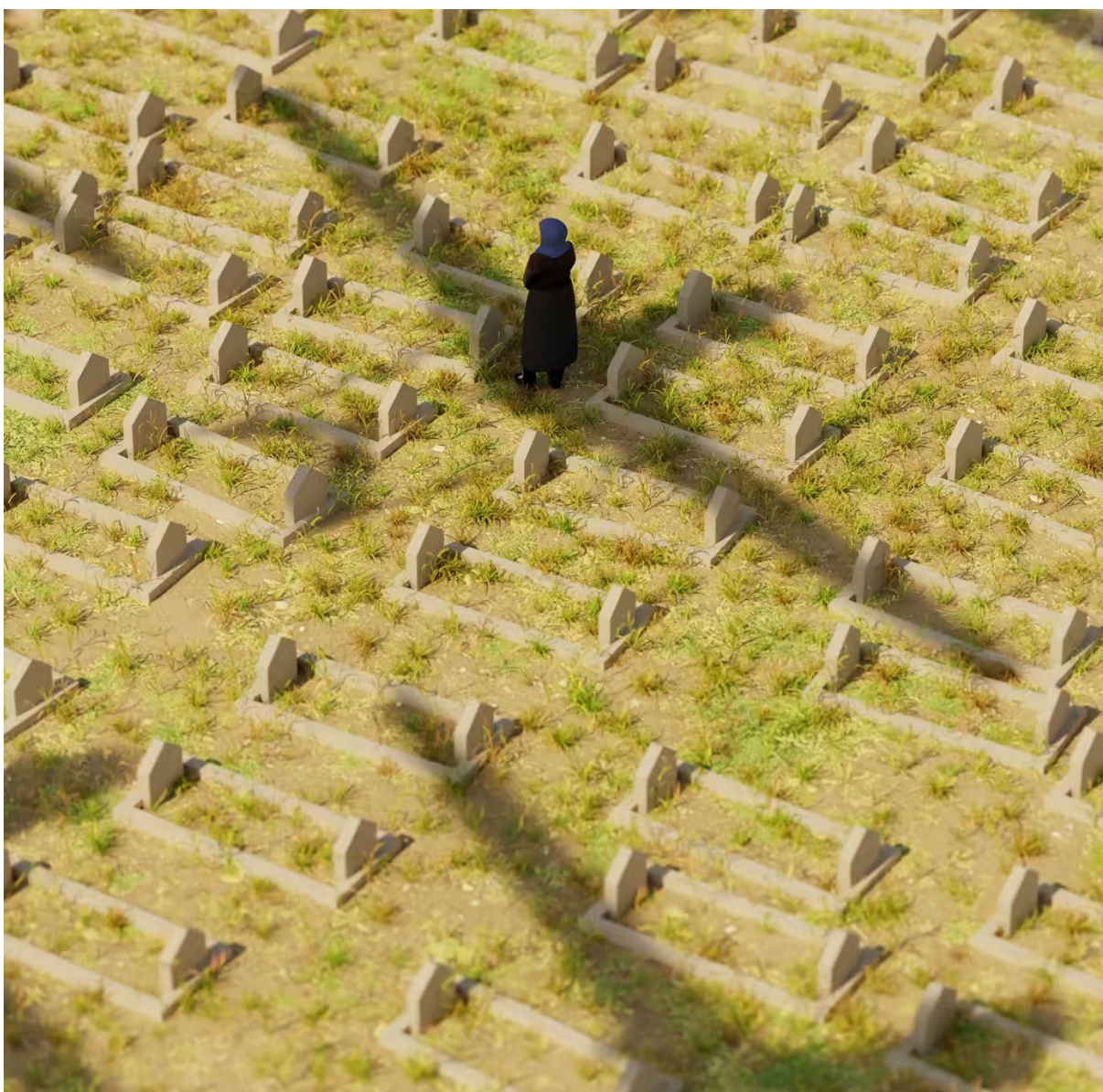
It was a hot June day in 2020, and Azad was bored. A shepherd from the northern Iraqi town of Shiladze, the 26-year-old decided to spend the day at a nearby picnic spot with two friends. The idea had made his mother nervous because there had been a series of drone strikes in the area over the preceding few months. Still, Azad got up early to meet his friends, careful not to wake the rest of his family, who slept together in one large room.

Around 11am, Azad and his friends parked by the side of a craggy mountain and got out. Soon after, a drone strike hit the car. Then another strike killed the three young men 20m from where they'd parked. On the carpeted floor of the family's modest home, Azad's younger brother Osama says he still doesn't understand how the trio became targets. "Maybe the Turks thought they were PKK," he says. "It's like that around here. If you go to certain areas . . . they just kill you for no reason."

Shiladze lies between two mountain ranges in Iraqi Kurdistan's northernmost Dohuk province. Its hills are revered in local folk tales, the scenes of legendary battles in Kurdish history. Since the early 1990s, there have been clashes here between Turkish troops and the PKK, which has long made the Qandil mountains on the Iraqi side of the border its headquarters. But the conflict has intensified since Erdoğan launched a series of operations three years ago to root out militants, part of a shift towards an increasingly militaristic foreign policy by the Turkish leader, who also launched operations in Syria and Libya.

The number of civilian casualties from drone strikes has risen. In the absence of public Iraqi records on civilian deaths, a local official in Shiladze tries to keep count. At least 47 people have been killed in the Shiladze area in the past 15 years or so, he says. Although seven of those were killed by the PKK, "most were killed in the past three or four years and most by Turkish drones", he says. "We can't go anywhere without fearing our lives will be cut short by an air strike," says Nusret Mohammad, Azad's mother. Like many other residents, she now rarely leaves the house: "The only place I can go is the graveyard to visit my son every day." The local official corroborates the family's account to the FT, saying Azad Mehdi Mem was a "pure civilian, with absolutely no ties to the PKK".





The number of civilian casualties from drone strikes has risen. In the absence of public Iraqi records on civilian deaths, a local official in Shiladze tries to keep count © Illustration by Saratta Chuengsatiansup

There are even more clear-cut cases of Turkish drones killing people without links to the Kurdish militant group. A strike that assassinated a regional PKK commander in 2020 also killed Zubair Tajeddine Hali Bradosti, a commander in Iraq's federal border force. Bradosti and the PKK commander had negotiated a temporary truce between their forces and were travelling in the same car, a giant Iraqi flag adorned on the roof. "Turkey has said because a PKK commander was in the car, that my father was a fair target," says Bradosti's son Ardawan, adding that he learned this from conversations with political figures and through his own job with the border guards. He says the family have waited two years for an official explanation. "He wasn't out there on a personal mission, it was a mission for Iraq. Why did they bomb him?"

As well as conducting surveillance and reconnaissance work in Iraq, the Turkish military and intelligence services use drones, including Bayraktar TB2s, for "high-value counter-terrorism operations", according to Can Kasapoğlu, director of the

security and defence studies programme at the Istanbul think-tank Edam. In Shiladze, drones have successfully pushed back most PKK fighters, who locals say now come to town only in winter, when the snow gives them cover from the weapons overhead.

But they have wreaked havoc on the area. Famed for the beauty of its rivers and valleys, it used to be popular with tourists. The drones now keep them away. Real estate prices have dropped by two-thirds. Locals speak of the psychological toll their entrapment is having. Many of the thousands of migrants who attempted to reach the EU via Belarus last summer were “young men from Shiladze, fleeing the drones”, the local official says. He also noted an uptick in suicides in the past two years: “People here feel forgotten by their government, by the world.”

Senior political figures in both Baghdad and Erbil, the semi-autonomous Kurdistan Regional Government’s capital, decry Turkey’s expanding military footprint and lament their inability to do anything about it. Turkey rarely gives Iraq a heads-up before most air strikes, according to senior officials in Baghdad and Erbil. There are currently 33 Turkish military and intelligence bases in Iraq, with about 4,000 soldiers at last count, Iraq’s foreign minister Fuad Hussein says. “It’s a delicate dance we’re doing with Ankara,” says another senior government official in Baghdad. “But our chaotic political dynamics and Turkey’s growing influence mean they’re able to stomp all over Iraqi sovereignty and we can’t say a damned thing.”

In response, Turkey’s defence ministry said it respected the territorial integrity and sovereignty of its neighbours and that its armed forces acted “with great sensitivity” to ensure they did not harm civilians. It said the allegations of civilian deaths in Iraq outlined by the FT were “untrue and are the product of propaganda” by the PKK and its affiliates.

After the Bayraktars’ initial success in Ukraine, Vladimir Putin’s armed forces changed tactics. “The Russians went after them with ground-based air defences primarily,” says Jack Watling, a research fellow at the Royal United Services Institute think-tank in London. “Today [the TB2s] are mainly being held in reserve or used by the Ukrainian navy for patrolling the coast.” Kyiv also lost drones because they were being used to perform operations that would be too dangerous for manned aircraft, Watling adds. “These are objects that you take risks with, and they get shot up.”

But their role in the Ukrainian campaign against Russia has been a coup for Baykar.

Many of the foreign buyers the company is courting lack sophisticated air forces of their own or are interested in using drones against adversaries without advanced air defences. “Drones allow states that don’t necessarily have the resources to buy advanced fighter jets to have that capability,” says Erik Lin-Greenberg, an expert on emerging military technology at MIT. “A TB2 isn’t going to substitute for a fighter jet. [But] many states view drones as allowing them to leapfrog generations of tech.”

The intense use of Bayraktars, both in Turkey and abroad, means the aircraft has racked up 400,000 flight-hours in its short lifetime. That real-world, battlefield data is vital to honing and improving the product, Haluk Bayraktar explained in a 2020 interview with the FT. “You need a lot of feedback to develop the system according to the needs of the arena,” the CEO said. “Because we fly a lot, Turkey gained a lot of operational experience.”

The marriage of Erdoğan’s youngest daughter, Sümeyye, to Haluk’s brother Selçuk in 2016 created the appearance of a symbiotic relationship between the president’s foreign military adventures and the success of the company. Turkish officials have become de facto sales agents for Bayraktar drones, pushing them in conversations with foreign governments as part of a drive to boost exports at a time when a chronic trade imbalance has contributed to a succession of currency crises. “We will sell them to whoever wants them,” says one senior Turkish diplomat. Demir, the Turkish official, bristles at that suggestion. He insists there is a “very strict export-control process” and that some potential buyers have been turned down, though he declines to name them. Today, Baykar has export contracts with at least 22 countries, including Morocco, Niger and Djibouti. The company is producing about 240 TB2s a year as it races to clear a three-year order backlog. It is also in the process of launching the Akıncı, a bigger, more sophisticated drone that can carry a much heavier payload.

Not all Turkish citizens are enthused about Baykar’s rapidly growing status. Dirayet Dilan Taşdemir, a member of parliament with the opposition Peoples’ Democratic party, says that UAVs have contributed to a climate of fear in the Kurdish-majority provinces where her party draws much of its support. PKK members “didn’t come from outer space”, Taşdemir says, but rather from angry and disillusioned families who have sympathy for the group’s claim to be fighting for their rights. “I wish that, instead of praising the great weapons we made, we’d say, ‘Look at the great things we have done in literature, culture, art,’” she says. “I’m not someone who feels very proud of technological weapons.” A prominent human rights defender in the country, who agreed to talk on the condition of anonymity, concurred but has decided not to campaign publicly on the issue of drones because of the deluge of criminal

investigations that might result.

Turkey's apparent willingness to sell drones to any foreign government that wants them is also a source of alarm for western powers who used to have a near-monopoly on drone power. Last year, the US expressed "profound humanitarian concerns" about Ankara's sale of armed drones to Ethiopia. It also responded angrily to Turkey's use of the drones against Kurdish militias in northern Syria that are affiliated with the PKK but were backed, armed and trained by Washington in its campaign against Isis. The US, which has faced questions of its own about civilians killed in American drone strikes, could now find itself in a "very difficult position" over Turkish drones, says Lin-Greenberg. "On one hand you have this asset that is making a difference, that most western powers would like to see continue to be exported to Ukraine," he says. On the other, there are the questionable human rights implications.

Some in Washington question whether the US should loosen its ultra-stringent drone-export rules to gain leverage by selling its own weapons. Many nations might still prefer to skip the intense scrutiny and cost that come with buying American. "If you're a country that faces an existential — or perceived existential — threat, are you willing to wait several years for US export approval?" says Lin-Greenberg. "Or are you going to just turn to suppliers in Turkey?"

Laura Pitel is the FT's Turkey correspondent. Raya Jalabi is the FT's Middle East correspondent

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