How to help Ukraine win the drone war

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Following Russia's full-scale invasion, the Armed Forces of Ukraine (AFU) and the Ukrainian defence industry have had to rapidly adapt. They have been forced to reconceptualise existing weapons as well as develop new ones, often utilising civilian systems for military purposes. The country has become both a laboratory and live testing ground for the deployment of evolving military technologies. Nowhere is this clearer than for **drones and Unmanned Aerial Vehicles (UAVs).**

During the war, UAVs have been used extensively against Russian forces. Often these are small consumer drones used as projectiles with mounted munitions. A First Person View (FPV) drone costs on average $400 to make. A conventional projectile can easily cost 10 times that. FPV and other commercial drones are playing an important role filling the gap created by a shortage of artillery shells and precision weapons. Their ease-of-use and ability to carry heavy explosives has made them one of the most efficient means to destroy military equipment. However, the attrition rate is also high - Ukraine is losing approximately 1,500 drones per month, according to the State Special Forces of Ukraine. This amounts to around 50 drones per day.

While more primitive and limited in the number of systems available, Russia has progressively gained an edge both in the production and deployment of reconnaissance and strike drones. Combined with a long-standing edge in electronic warfare (EW), Ukraine faces the challenge of scaling up both the quality and quantity of its drone systems to respond to Russian superiority in drone warfare.

Domestic producers are trying to meet Ukraine's drone demand. According to Ukrainian Prime Minister Denys Shmyhal, Ukraine's domestic drone market consists of more than 200 manufacturers, including both private and state-owned enterprises. They produce systems ranging from low-cost FPV drones to long-range winged drones with the ability to conduct strikes deep inside Russian territory.

However, despite their best efforts, domestic producers meet only 10 percent of Kyiv's UAV needs, according to Maria Berlinska, Head of the Centre for Aerial Reconnaissance Support, a Ukrainian NGO. Local manufacturers are mainly operating with donations from businesses and civilians, which limit their ability to scale production. This creates a critical shortage on the front line with Ukrainian troops scrambling to buy and build homemade drones themselves.

Kyiv seeks to scale up its domestic weapons production, including especially drones, to meet its present war-needs, enhance its resilience and economy over the lang-haul, and minimise dependency on foreign suppliers.

Ukraine's three UAV challenges

Ukraine faces a range of challenges to sustain and build its UAV capabilities. The three most critical obstacles are:

1. BEATING RUSSIA'S QUANTITATIVE AND QUALITATIVE EDGE

Russia possesses significant electronic warfare capabilities. These are used to break Ukrainian command and control and block access to the electromagnetic spectrum, as well as for communication and weapons guidance. While gunfire from the ground accounts for some of the Ukrainian drone losses, EW is by far the biggest challenge and accounts the bulk of the losses. In effect, EW is used to scramble the drone's GPS navigation systems or jam the radio-control links to their distant operators. Without constant human guidance, the drones may crash into obstacles in the landscape, or simply hover in mid-air, awaiting new commands until the batteries run out.

When attacking targets on Russian soil, the largest challenge is to scuttle past the 60 kilometres of jamming stations on the border. About 35-40% of drones make it through to the general vicinity of their target.

On the front lines, Russia has equalised Ukraine's initial three-to-one advantage in tactical drones. The Russians have now achieved parity with the Ukrainians. Both sides are learning from each other, and reverse engineering is speeding up. Russia is devoting 60 billion rubles (USD 600 million) to boost domestic drone production, with the objective of producing more than 40 percent of all drones employed by Russian forces domestically by 2025.

> **What does it mean?**
> Ukrainian manufacturers are working on changing frequencies and tactics of use, combining both FPVs, large aircraft models and a number of other weapons. However, at this point in time, it is cheaper and easier for Ukraine to acquire large quantities of commercial off-the-shelf UAVs to replace lost drones than investing in technological upgrades. To cope with the challenge, Ukrainian manufacturers need Western know-how and technological support to develop and integrate anti-jamming systems in their UAVs.

2. REFORMING PROCUREMENT AND SCALING UP PRODUCTION

The fact that domestic drone manufacturers can meet only 10% of the drone demand leads to critical shortages of all drone types on the front line. Domestic manufacturers are highly dependent on donations from businesses and civilians, which limits their ability to scale and increase production.

Furthermore, the AFU lacks tactical drones, which are used at the platoon, company, and battalion level. These drones are essential to reconnaissance operations and optimisation of target acquisition capabilities of Ukrainian ground units and artillery.

The Ukrainian government is implementing the Army of Drones initiative, seeking to remove red tape and procurement obstacles to speed up the deployment of UAVs to the battlefield. The programme is overseen by Minister of Digital Transformation, Mykhailo Fedorov, and the government has already trained more than 10,000 new drone pilots in 2023. Since March, at least eight new Ukrainian companies building explosive drones have been created. The government's draft budget for 2024 includes 48 billion hryvnias (USD 1.32 billion) earmarked for upgrading drone-fighting capabilities.

In addition, the lack of service centres and availability of spare parts make the maintenance process too slow to be sustainable. This is further complicated by logistical bottlenecks, for example when spare parts are located in the Western part of Ukraine or abroad, resulting in increased waiting times for repaires to be carried out. When it comes to drones, Ukraine not only needs to build mass but also efficient management and maintenance solutions.

The fragmentation of customers and providers has impeded optimisation of employed systems and made it difficult to achieve economies of scale. With the Army of Drones and Brave1, the government's coordination platform for the defence tech industry, Ukraine is seeking to streamline financing and remove red tape for private contractors, as well as clarifying requirements and procurement process. Nevertheless, bureaucracy, corruption, and vested interests in the Ukrainian arms industry, and especially state-owned enterprises, continue to inhibit development.

What does it mean?
Ukrainian authorities are open to support initiatives that allow the armed forces to regain their quantitative UAV superiority over Russia. For this reason, long-term engagement plans of Western manufacturers with local production are given priority by the Ukrainian authorities. This presents an opportunity for Western contractors willing to engage in the country.

3. REDUCING DEPENDENCY ON CHINESE DRONES AND CRITICAL COMPONENTS

While Turkey produces large, military-grade drones used by Ukraine, the cheap consumer drones used by both Russia and Ukraine come largely from China. China is the world's largest producer of cheap consumer drones, and the large-scale employment of these on the battlefield has given Beijing a hidden influence in the war. DJI, China's biggest drone producer, commands more than 90 percent of the global consumer drone market, according to DroneAnalyst, a research group.

Direct drone shipments by Chinese companies to Ukraine totalled just over USD 200,000 in 2023 through June, according to the New York Times. In that same period, Russia received at least USD 14.5 million in direct drone shipments from Chinese trading companies. Ukraine still obtained millions in Chinese-made drones and components, but most came from European intermediaries. Chinese drone components used by the Ukrainian Armed Forces include optics, sensors, microchips, and motors (see figure 1 and 2, pp. 7-8).

On September 1 2023, new Chinese restrictions on drone export entered into force. In particular, China restricts the export of drones capable of controlled flight beyond the operator's line of sight for more than 30 minutes and whose maximum weight exceeds 7 kg. It also refers to drones capable of transporting cargo for the purpose of dropping it and equipped with infrared cameras and laser range-measuring modules. This constitutes a problem for Ukraine, as it bars the country from acquiring certain types of cheap consumer drones used in the war effort.

> **What does it mean?**
> Ukraine is not just in immediate need of ready-made UAVs but also of critical components. While China remains a key supplier for Ukraine, the dependency poses an increasing logistical and political problem. It is therefore important for Ukraine to diversify its supply chains with a focus on NATO-standard suppliers. The EU could play a leading role in bringing together providers to facilitate the flow of components, scale up production, and minimise supply flows to Russia.

Ukraine – Europe's future military hub?

President Volodymyr Zelenskyy has recently stated that he seeks to turn Ukraine's defence industry into a "large military hub". This would be possible by partnering with Western weapons manufacturers to increase arms supplies for Kyiv's counteroffensive. Several leading defence manufacturers, including Germany's Rheinmetall and UK-based BAE Systems, have already announced plans to team up with local Ukrainian producers.

As part of its localisation efforts in the defence area, the government of Ukraine hosted the International Defence Industries Forum in late September 2023 with industry stakeholders from more than 35 countries and 250 defence firms. Following the conference, the government issued the *Ukraine Defence Industry Compact* for companies to support "Ukraine's efforts to build a strong domestic defence industry integrated into the security framework of the EU and NATO." The Ministry of Foreign Affairs noted that local producers signed about 20 contracts, letters of intent, and memoranda of understanding with foreign partners for joint production, exchange of technology and supply of components to make drones, armoured vehicles, and ammunition.

Priority will be given to companies willing to engage in local production, servicing, maintenance, and training in Ukraine as well as technological integration with Ukrainian suppliers. Thus, many international drone producers – particularly Small and Medium sized Enterprises (SMEs)– are currently scoping the market to exploit opportunities.

Three key steps for foreign drone producers

With an office in Kyiv, extensive experience in the defence sector, a unique network, and a seasoned team of national security and public policy professionals, Rasmussen Global assists foreign companies who seek to enter the Ukrainian market and invest in Ukraine's reconstruction.

Entering the Ukrainian drone market requires close engagement with local stakeholders and a strategic approach to market entry. Below, Rasmussen Global lists three key steps for any foreign drone producer that wishes to engage in long-term donations, localise parts of its operations or in any other way enter the Ukrainian market:

| Step	Important action points
Step 1	To secure an order from the Ukrainian Armed Forces, both foreign and Ukrainian UAVs are first tested on the battlefield or a polygone that replicates real battlefield conditions: ➢ Among other requirements, drones should be robust when exposed to EW attacks. ➢ In addition, drones should be NATO-certified. Without certification, they will need to go through a separate Ukrainian certification process.
Step 2	Once the UAV is tested, the information collected is transferred to the General Staff which, upon a thorough analyses, decides whether the product is needed and can be integrated into Ukraine's military: ➢ In cases where the AFU requests direct delivery of foreign products, the Ministry of Defence transfers the request to the Ministry of Foreign Affairs. ➢ In proposals that contain a domestic production component, other ministries and stakeholders, including the Ministry for Digital Transformation and the Ministry for Strategic Industries, play an important role in any engagement strategy.
Step 3	When preparing for market entry, foreign companies seeking to enter the Ukrainian drone and components market must: ➢ Develop a project proposal that meets local production requirements and standards and lays out a comprehensive plan for market entry. ➢ Engage closely with the General Staff and secure buy-in from both the General Staff and political stakeholders. ➢ Position themselves in a tough competitive landscape that is not just permeated by other suppliers but also vested interest.

Ukraine's UAV classification system

UAVs are divided according to the level of need and importance of the task they perform. They differ in range of flight, inspection and damage. Below are listed four main categorisation classes:

| UAV classification	Specifications
Class 1	Micro drones that are usually used in civilian life. During the war, these have been augmented at mass scale and deployed for use in combat with mounted munitions. In Ukraine, the most popular models of this class are produced by the Chinese company DJI.
Class 2	Medium-range drones that conduct reconnaissance at the tactical level. Specially designed for military purposes, these devices can operate on average for three hours.
Class 3	Operational-tactical drones can fly continuously for up to 10 hours, have an increased range, and are used to monitor the enemy and plan military operations. The Ukrainian-made UAVs PD-2 and Raybird-3 fit into this category.
Class 4	Strategic UAVs, or attack UAVs. The Turkish Bayraktar TB-2 falls within this category. In addition to conducting reconnaissance and carrying guided munitions, Class 4 drones can stay in the air for 24 hours.

Critical drone components: data

Disclaimer: The below figures are non-exhaustive and based on a data pool compiled by Rasmussen Global from open-source information. It includes a sample of 158 companies that produce drones and/or critical components for drones. Rasmussen Global is continuously updating the database to increase the sample size and finetune categories. For more information about the database please contact Policy Advisor Celine Emma la Cour on cec@rasmussenglobal.com

FIGURE 1: COUNTRY OF ORIGIN OF COMPANIES THAT MANUFACTURE CRITICAL COMPONENTS FOUND IN UKRAINIAN DRONES
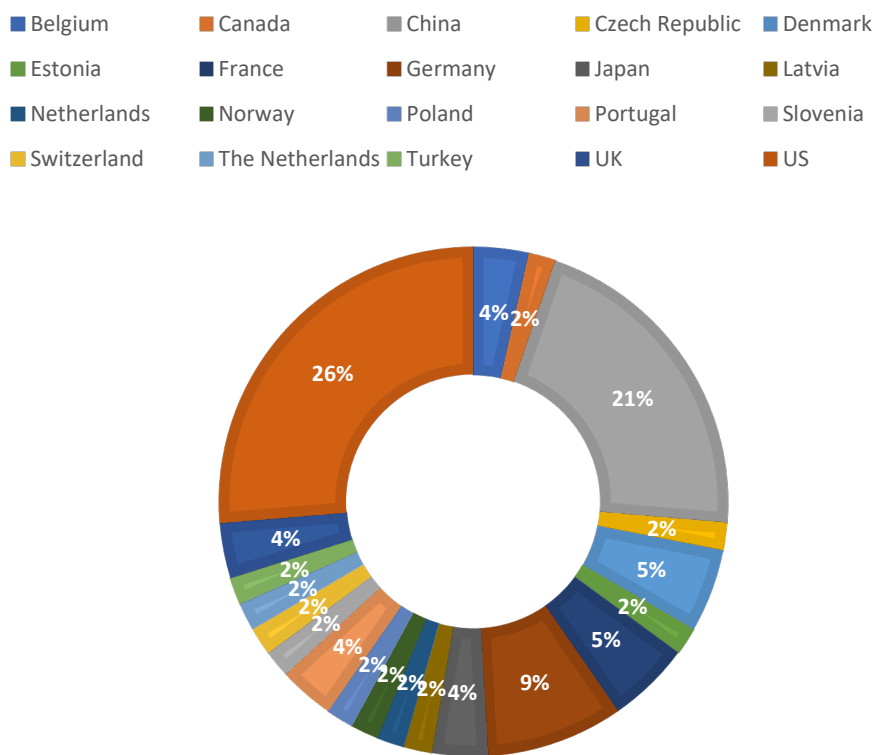
*Note that this figure is based on the number of companies and their country of origin. The figure does not reflect market share or amount of products delivered/sold to Ukraine.

FIGURE 2: COMPONENTS MANUFACTURED BY TOP 10 COUNTRIES (BASED ON NUMBER OF COMPANIES IN THE COUNTRY)
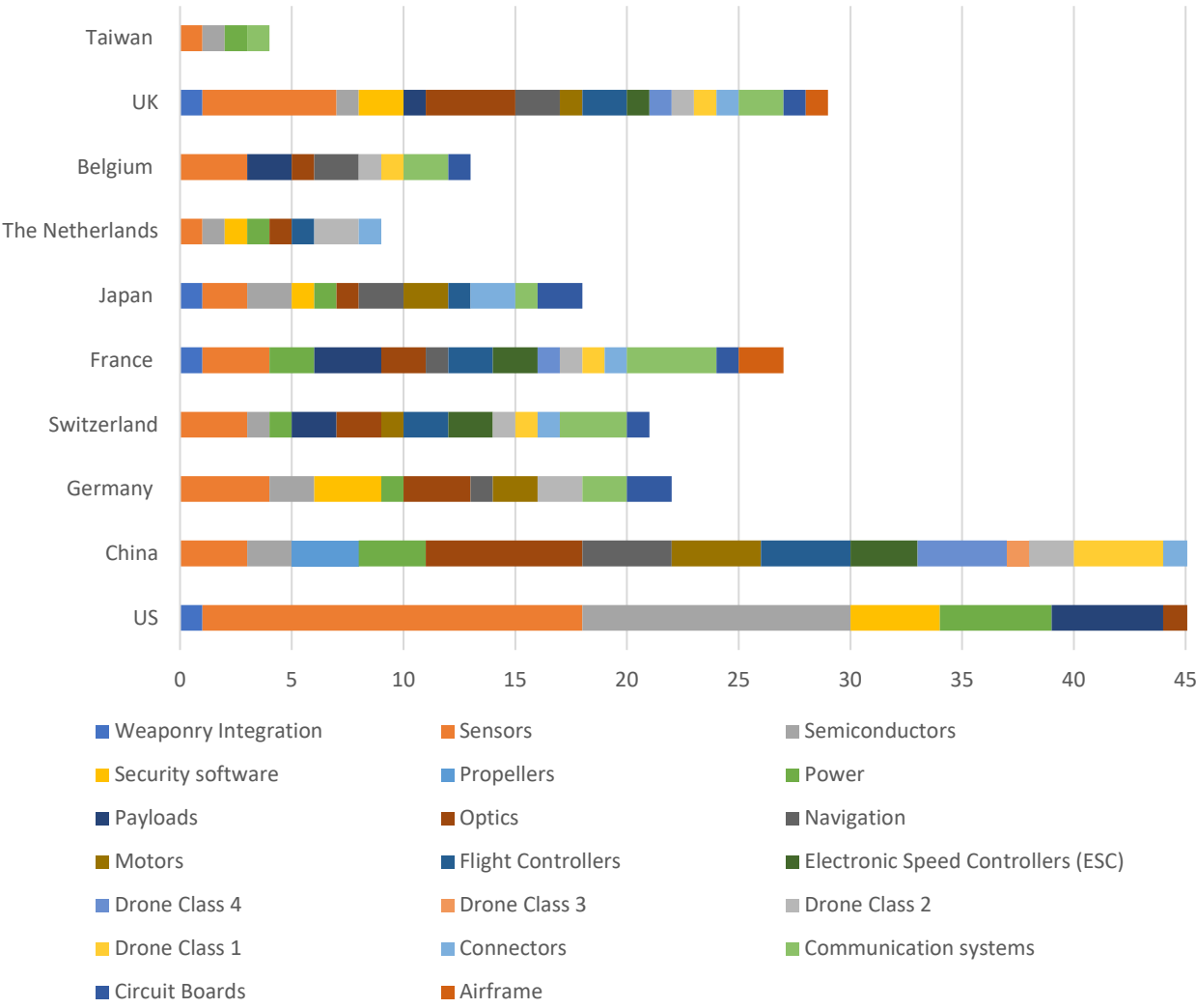
*Note that this figure is based on the number of companies in each country and the component-category is coded as a binary variable per company. The figure does not reflect market shares or the number of components manufactured in each country.

About the authors

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About Rasmussen Global

Founded by Anders Fogh Rasmussen after his term as NATO Secretary General in 2014, and with a presence in Berlin, Brussels, Copenhagen, and Kyiv, Rasmussen Global is a firm with a purpose: we advise and support democratic governments and multinational companies in navigating geopolitical trends and major public policy developments. We have worked closely with, in, and on Ukraine for the past seven years.

Since July 2022, Rasmussen Global has been working pro-bono with the Ukrainian President's Office on Ukraine's long-term security. This work resulted in the Kyiv Security Compact, co-authored by Anders Fogh Rasmussen and Andriy Yermak. Rasmussen Global is expanding its services to help international companies better understand the dynamics of the war and reconstruction in Ukraine, as well as supporting Ukrainian entities to mobilise support and resources abroad. For more information, please contact our Geopolitics Director, Harry Nedelcu, at hne@rasmussenglobal.com or visit www.rasmussenglobal.com.