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DEVELOPMENT OF DEFENCE TECHNOLOGY IN UKRAINE

Hmyria Viktoriia Petrivna[1], Panchenko Anton Viktorovych[2], Kostiuk Olexandr Oleksandrovych[3]

1. PhD, Associate Professor, leading research scientist
State Scientific Research Institute of Armament and Military Equipment Testing and Certification, UKRAINE

2. research assistant
State Scientific Research Institute of Armament and Military Equipment Testing and Certification, UKRAINE

3. PhD in Engineering, Director of the Information and Computing Centre
National University of Kyiv-Mohyla Academy, UKRAINE

The effectiveness of the Armed Forces of Ukraine depends not only on the availability of the latest weapons and equipment, but also on the ability of troops to respond quickly to challenges, which is ensured by modern command and control systems.

Monitoring of innovations and new technologies in the military sphere is a key element of ensuring national and global security. This allows not only to predict the development of future conflicts, but also to prepare adequate strategies to counter new threats. [1]

The development of Ukrainian military technologies and the attraction of international support are crucial for strengthening the country's defence capabilities, especially in times of war. The key aspects of such technological development with the help of international partners are:

1. Technology transfer and joint development

Ukraine's international partners, in particular NATO countries, promote the introduction of advanced technologies in the defence sector:

– Cooperation with leading companies in the development of unmanned aerial vehicles, electronic warfare (EW) systems and intelligence assets.

– Transfer of dual-use technologies used in both the military and civilian sectors (e.g., communication technologies, drones).

– Production of modern artillery systems and ammunition in cooperation with international partners.

2. Modernisation of existing weapons

– Considerable attention is paid to improving Soviet equipment with modern components: thermal imagers, fire control systems, digital navigation aids.

– Modernization of air defence systems, including integration with modern Western technologies.

3. Military training and experience exchange

– Joint exercises of the Armed Forces of Ukraine with NATO forces improve the level of qualification of personnel.

– Instruction in the operation of the latest weapons (HIMARS, IRIS-T, Patriot systems).

– Transfer of tactical and strategic knowledge accumulated by Western armies.

4. Attracting international assistance

– Supply of modern weapons systems, such as Leopard 2 tanks, Caesar artillery systems, NASAMS air defence systems.

– Funding for development through international funds and grant programmers.

5. Dual-use technologies

– Ukrainian companies are actively developing technologies that can be used for both military and civilian purposes. For example, software for drones or communication systems.

– The use of artificial intelligence technologies for data analysis, intelligence and logistics.

6. The role of volunteers and the private sector

Volunteer organizations and tech start-ups in Ukraine are also making a significant contribution to the development of equipment and technology:

– Drone control systems developed based on open platforms.

Experimental means of combating enemy UAVs. [2]

The signing of agreements between Ukraine and leading international defence companies such as Rheinmetall and BAE Systems was an important step in strengthening Ukraine's defence capabilities and building up its military-industrial complex. This decision has a significant impact not only on the current state of the army, but also on the long-term development of the country's defence infrastructure. Key aspects of this cooperation:

1. Cooperation with Rheinmetall

– Tank repair. The joint venture is already repairing armoured vehicles, including tanks supplied by international partners. This significantly reduces the time and logistical costs of vehicle maintenance.

– Potential tank production in Ukraine. Rheinmetall CEO Armin Papperger's statement about the possibility of launching tank production is a strategic step that could help reduce dependence on foreign supplies of finished vehicles.

– Ammunition and air defence systems. Negotiations on the localisation of ammunition and air defence production are critical to supplying the Armed Forces in the face of exhausting hostilities.

2. Agreements with BAE Systems

– Localisation of production. The agreements provide for the deployment of modern weapons production directly in Ukraine, which is not only economically beneficial but also increases the country's defence independence.

– L119 howitzer. This light artillery system is already successfully used by the Armed Forces of Ukraine. The possibility of localising its production in Ukraine will speed up the supply and repair of this critical equipment.

– Expanding cooperation. The conclusion of framework agreements paves the way for the production of other weapons, including armoured vehicles and precision-guided systems.

3. Strategic benefits for Ukraine

– Technological development. The transfer of expertise and training of Ukrainian specialists creates conditions for the development of national expertise in the defence sector.

– Economic effect. Localisation of production contributes to job creation, investment and strengthening of the defence industry.

– Reducing dependence on imports. The deployment of domestic production reduces the risks of logistical delays and dependence on international supplies.

The conclusion of these agreements demonstrates the high level of confidence in Ukraine on the part of leading defence corporations. This demonstrates the recognition of Ukraine's strategic importance in global security and support for its sovereignty. [3]

The issue of accelerating the development and deployment of modern combat systems is relevant for many armies around the world, and learning from international experience can be very useful for Ukraine. Here are some key approaches used by other countries to address this issue:

1. *Agile Development*. The United States actively uses Agile principles to develop software and command and control systems for its troops. This allows them to adapt to rapid changes in technology and ensure the release of intermediate results that can be immediately tested in the field.

For example, the DARPA programme often uses short development cycles for innovative solutions.

2. *Fast-track procurement programmers*. NATO countries have programmes such as Rapid Acquisition Programmes, which allow for the rapid procurement of technologies based on existing developments, reducing the time for formal procedures.

The UK actively uses this approach to acquire reconnaissance drones and electronic warfare systems.

3. *Partnerships with private companies*. Successful examples of partnerships with the private sector can be seen in Israel (e.g., Elbit Systems, Rafael). They develop robotic platforms, defence systems (such as the Iron Dome) and control systems in close cooperation with the military.

In the United States, the DIUx (Defence Innovation Unit) programme was created specifically to integrate innovative technologies from start-ups into the military sphere.

4. *Military incubators and accelerators*. Many countries are creating technology incubators that support start-ups working on solutions for the army. For example, France's DefInvest invests in technology companies that develop artificial intelligence systems, cybersecurity, autonomous platforms, etc.

5. *Open innovation*. Open competition programmes where developers can offer their solutions and receive funding or orders. For example, the European EDIDP programme promotes the involvement of small and medium-sized enterprises in military projects.

Ukraine should consider these approaches, adapting them to its own conditions:

Integration with the IT sector: active involvement of Ukrainian IT companies in software development, artificial intelligence, and cyber defence.

Development of modular systems: creation of platforms that are easily updated, allowing for rapid adaptation of technologies to new challenges.

Simplification of procurement procedures: providing transparent but accelerated mechanisms for the implementation of existing technologies.

The use of these tools can accelerate the development of Ukraine's defence capabilities in times of war and rapid technological development.

Cyberspace and outer space have indeed become the new theatres of modern conflict, where technology plays a crucial role. Lieutenant General James Richard Hockenhull rightly emphasised that despite the emergence of innovative tools, traditional threats and methods remain relevant.

The expansion of conflict zones into cyberspace and outer space, combined with the use of AI and innovative technologies, is fundamentally changing the nature of modern warfare. Ukraine, which is facing hybrid aggression, is already demonstrating the importance of adapting to these changes by actively

implementing the latest solutions in cyber defence and the use of unmanned systems.

Technology plays a key role not only in ensuring Ukraine's defence capability, but also in building its economic future after the war. Military innovations often become drivers of civilian sector development, and their use in various sectors of the economy contributes to its modernization.

Driving innovation in a rapidly changing environment poses challenges for militaries, governments and the private sector. Understanding the laws and logic of this process is critical to effectively exploiting new opportunities and avoiding resource mistakes.

Military technologies will not only help Ukraine win the war, but will also become the basis for creating an innovative economy. The key task is to ensure the transfer of these technologies to the civilian sector, which will help preserve defence potential and at the same time create high-tech jobs, increase Ukraine's productivity and competitiveness on the global stage.

Collaboration between the state, the private sector and international partners is a key factor in creating effective solutions to overcome today's challenges. It allows for the pooling of resources, knowledge and experience, which makes it possible to adapt to changes more quickly and ensure Ukraine's competitiveness on the global stage.

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