UDC 355.48

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THE CURRENT STATE AND CHALLENGES OF UKRAINE'S SECURITY AND DEFENSE SECTOR AMID THE RUSSIAN-UKRAINIAN WAR: A COMPARATIVE ANALYSIS OF EXISTING COMBAT REGULATIONS AND THE REALITIES OF THE MODERN BATTLEFIELD

The article analyzes the current status of Ukraine's security and defense sector in the context of the russian-ukrainian war. It focuses on the challenges caused by the widespread use of unmanned systems (in particular, FPV drones, multi-rotor copters) and the development of the concept of swarm intelligence (autonomous coordination of drone groups through artificial intelligence). The study compares the provisions of the combat regulations with the conditions of the modern battlefield. That is where traditional tactical approaches have lost their effectiveness as a result of technological changes.

The authors examine the crisis faced by infantry units, the impact of unmanned systems on the operational environment, and the prospects for introducing swarm intelligence as an alternative to outdated doctrines. Their investigation is based on the analysis of open-source data, combat experience, and scholarly works. They also propose a set of recommendations for adapting tactics and personnel training for the new circumstances, covering decentralization of command structures, integration of digital systems, and electronic warfare reinforcement.

Keywords: *russian-ukrainian war, unmanned systems, swarm intelligence, drones, infantry units, military art.*

Statement of the problem. The russian-ukrainian war, which started with the annexation of Crimea in 2014 and turned into a full-scale invasion in February 2022, has become a unique phenomenon in modern military history. The combination of hybrid and conventional methods of warfare was evident. It did not only shift the geopolitical landscape but even became a catalyst for the fundamental transformations in the military art. The large-scale use of unmanned systems (such as Mavic-type multi-rotor copters, FPV drones, sea and land remotely piloted vehicles), as well as the evolution of the swarm intelligence conception (autonomous interaction between the groups of drones with the help of artificial intelligence), have radically changed the character of combat actions. These technologies provided the opposing parties with the ability to conduct high-precision operations while minimizing human losses. However, the security and defense forces of Ukraine encountered new challenges.

Traditional tactical approaches established by the combat regulations of the Armed Forces of Ukraine and other armies of the world are based on the experience of the 20th century wars. They imply a clear battle formation, central control, and coordination between infantry, armored assets, and artillery. Nevertheless, the above doctrines have proved ineffective amid modern battlefield conditions. This is where the transparency of the operational environment and the firepower accuracy caused by the use of the latest aerial unmanned systems (UAS) make classical maneuvers and accumulation of forces impossible.

Infantry units, which have been the foundation of ground campaigns for decades, have encountered a new challenge – constant aerial surveillance and precise surgical strikes of the enemy. This has significantly complicated their ability to perform their key functions, namely retaining the frontiers, conducting direct firefights, and launching offensive measures as part of big organic units. For example, FPV drones

and kamikaze drones allowed the enemy to obliterate infantry lines with high accuracy in the battles for Bakhmut in 2022–2023, making it difficult to retain the positions.

With this in mind, the authors of the article have set out a goal to compare the provisions of the battlefield regulations with the realities of modern warfare. They aim to evaluate the impact of UAS on tactics and operational art as components of military art. The challenges posed by technological advances and the prospects for introducing swarm intelligence as an innovative solution were considered on the basis of open-source data and combat experience gained in the campaigns in the east and south of Ukraine. Special attention is paid to the emerging challenges of employing infantry formations, the transformation of the operational environment, and the necessity of adapting tactical doctrines to the settings of high-tech war.

Analysis of recent research and publications. The issue of modern technologies influence on military art is a topic of active survey in Ukraine and around the world. Domestic scholars in their works, notably [1–4], emphasize the need for transition to a technology-driven war. That is where unmanned systems and artificial intelligence determine the performance of the operations. Studies [5, 6] focus on the integration of uncrewed systems into tactical training and point out their impact on mission effectiveness.

Foreign researchers, such as P. Singer [7] and A. Krepinevich [8], draw attention to the global transformation of military art through unmanned platforms and the concept of swarm intelligence. The publications [9, 10, 11] investigate swarm technique and other models of troops and technology deployment in current and future conflicts. However, at the moment there are no records of studies comparing the regulatory standards with the dynamics of the current battlespace in the context of the russian-ukrainian war. All of which proves the relevance of the aforementioned problem.

The purpose of the article is to compare traditional approaches to combat operations with the realities of the modern battlefield. It concentrates on developing recommendations for adapting tactics, military training, and the normative framework to the new technological conditions. The methods of the comparative, systems, and conceptual analysis, as well as the combat experience review, were used in the course of the research.

Summary of the main material. The russian-ukrainian war combines hybrid and conventional techniques, which was evident during its three stages:

1) hybrid warfare (2014–2022): annexation of Crimea, ATO/JFO, informational and economic pressure from the russian side;

2) full-scale invasion (from February 2022): an attempt to seize Ukraine by force;

3) stationary war (from November 2022): depletion of resources, switching to positional battles with extensive use of technologies.

Traditional tactical approaches, established by combat regulations, are based on the experience of the wars of the 20th century and assume:

– organized troop movement with a clear fighting formation and logistical support;

– accommodation in the assigned areas with responsibility zones;

– an offensive with a disruption of the defense, fire preparation, and support of the armored assets;

– defense involving engineering facilities for positions and secure rear area.

Those methods were efficient at the time of the 20th century hostilities. They have mostly lost their relevance in the 21th century due to the widespread adoption of unmanned systems. The modern battlefield is "transparent": the zone within a radius of 5–10 km (and beyond) from the line of contact is constantly monitored by drones with thermal imagers and high-resolution cameras.

For instance, DJI Mavic-3 quadcopters were used for adjusting artillery fire in the battle for Kherson in 2022, enabling Ukrainian forces to hit enemy positions with accuracy. FPV drones and aerial drops ensure target strikes in a matter of minutes, making traditional footholds vulnerable. An infantryman made to hide in shelters loses the ability to actively engage in a firefight. Meanwhile, the attacking actions of mechanized units become ineffective because of the marching columns' detection and extermination. An example of a comparative analysis of classic requirements and present-day realities is shown in Table 1.

Table 1 – Traditional provisions comparison with the realities of modern combat

Aspect	Traditional provisions	Realities of modern fight	Proposed changes
Order of battle	Clear frontiers, footholds, field entrenchments, central control	Transparent battlefield, footholds' vulnerability, need for decentralization and covertness	Decentralized management, digital reporting systems
Maneuver	Accumulation of forces, defense disruption, armored assets support	Impossible accumulations because of drones, small groups maneuver, smoke cover	Small unit tactics, EW, smoke screen
Assault	Fire preparation, infantry attack, artillery support	Pointed strikes with FPV drones, increasing artillery replacement with drones, limited role of infantry	Massive usage of FPV drones and swarm intelligence
Coordination	Coordination through the radio touch, headquarters	Digital systems of situational awareness, mesh networks, coordination across drone pilots	Mesh networks, artificial intelligence integration for the sake of coordination
Support	Rear as a safe zone, CBR (chemical, biological, radiological) defense, medical evacuation	Rear vulnerability, EW devices demand, evacuation by land drones	Unmanned logistics, decentralized command structures
Infantry role	Retaining frontiers, offensive, firefight	Passive role, coverage from drones, transition to the small unit tactics	Small unit tactics, supply of drones and EW

New challenges for the infantry formations arise from the loss of the "safe rear" and the "gray zone." Drones have replaced the equipment used for reconnaissance, targeting, and fire adjustment, while swarm intelligence opens up opportunities for autonomous operations. The proposals to overcome these issues are next:

– further transition to decentralized management with the use of mesh networks [a type of network in which each device (node) is directly connected to several other devices] and digital systems ("Kropyva", DELTA, etc.);

– seeking to refine the tactics of deploying small infantry teams (5-7 people) that act in a dispersed manner, minimizing injuries;

– increasing application of hybrid units, where infantry, drones, artillery, and EW function coherently, and, for example, each group must have a drone pilot (Table 2);

– improving the tactics of widespread use of FPV drones and swarm intelligence to defeat the enemy.

Table 2 – Structure of a "hybrid" unit

Component	Function	Equipment
Infantry unit (5-7 people)	Maneuvers, holding positions, firefights	Assault rifles, thermal imagers, anti-drone guns
Drone pilot	Reconnaissance, targeting, and fire adjustment	FPV drones, Mavic 3, tablet with "Kropyva"
EW specialist	Enemy drones control channel jamming, communications protection	Portable EW ("Buk-2"), spoofing systems
Artillery support	Pointed strikes according to drone footage	Mortars, howitzers with digital guidance

A non-standard attitude to the tactical employment of the detachments increases the maneuvering combat effectiveness that is technologically reinforced. This is achieved by integrating drone pilots and EW specialists into infantry units.

Conclusions

The conducted analysis has confirmed that the traditional approaches to warfare established by combat regulations do not correspond to the realities of modern battle. The reason for that is the widespread use of UAS and the transparency of the operational environment. New challenges associated with the deployment of infantry formations, the vulnerability of the rearguard, and the demand for rapid adaptation to the technological changes encourage further improvement of tactics and personnel training. Proposed recommendations, such as decentralization of command structures, integration of drones and artificial intelligence, and strengthening of electronic warfare, will help to increase the fighting capacity of the defense forces and effectively confront current threats. The practical value of the study comes from the possibility of applying the proposed models of hybrid units. It involves implementing new tactical approaches in real-world operations, as evidenced, for instance, during the Kherson region counteroffensive.

Perspective directions for future research could be the integration of artificial intelligence into military administration for predicting enemy actions. Another area may include the use of EW systems and cybersecurity to protect personnel from drones and cyberattacks.

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The article was submitted to the editorial office on 14 May 2025

УДК 355.48

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СУЧАСНИЙ СТАН І ВИКЛИКИ СЕКТОРУ БЕЗПЕКИ І ОБОРОНИ УКРАЇНИ В УМОВАХ РОСІЙСЬКО-УКРАЇНСЬКОЇ ВІЙНИ: НА ОСНОВІ ПОРІВНЯННЯ ПОЛОЖЕНЬ ЧИННИХ БОЙОВИХ СТАТУТІВ ІЗ РЕАЛІЯМИ СУЧАСНОГО ПОЛЯ БОЮ

У статті здійснено комплексний аналіз сучасного стану сектору безпеки і оборони України в контексті російсько-української війни з особливим акцентом на трансформацію оперативного середовища під впливом масового використання безпілотних авіаційних систем. Досліджено ключові виклики, пов'язані з поширенням використання безпілотних систем та концепції ройового інтелекту, яка базується на автономній координації груп даних систем за допомогою штучного інтелекту. На основі порівняння положень чинних бойових статутів із реаліями сучасного поля бою встановлено, що традиційні тактичні підходи значною мірою втратили ефективність через швидкий розвиток технологій і зміну характеру бойових дій.

Автори провели аналіз відкритих джерел, бойового досвіду Сил безпеки і оборони України, а також сучасних наукових праць, щоб оцінити кризу піхотних підрозділів, спричинену домінуванням безпілотних систем, та їхній вплив на тактичні й оперативні процеси. Особливу увагу приділено потенціалу ройового інтелекту як інноваційного інструменту, що може замінити застарілі військові доктрини, підвищивши адаптивність і ефективність підрозділів.

У результаті дослідження запропоновано низку практичних рекомендацій щодо адаптації тактичних підходів і підготовки військ до нових умов ведення війни. Зокрема, наголошено на необхідності децентралізації управління, інтеграції цифрових систем управління боєм, удосконалення підготовки особового складу для роботи з передовими технологіями, а також посилення засобів радіоелектронної боротьби для протидії ворожим безпілотним системам. Окремо розглянуто перспективи оновлення нормативної бази, яка б відповідала вимогам гібридної війни та технологічної переваги противника.

Стаття може становити інтерес для науковців, військових експертів і практиків, які займаються питаннями модернізації сектору оборони. Авторами запропоновано науково обґрунтований підхід до формування нової парадигми ведення бойових дій в умовах технологічно насиченого конфлікту.

Ключові слова: *російсько-українська війна, безпілотні системи, ройовий інтелект, дрони, піхотні формування, воєнне мистецтво.*

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