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ADAPTATION OF HUMANITARIAN CRISIS RESPONSE MECHANISMS IN UKRAINE'S CIVIL PROTECTION SYSTEM: INNOVATIVE APPROACHES UNDER ARMED CONFLICT CONDITIONS

The article is devoted to the study of the transformation of humanitarian crisis response mechanisms in Ukraine's civil protection system under conditions of protracted armed conflict and hybrid warfare. The research analyzes how traditional civil protection approaches have evolved to address unprecedented challenges caused by full-scale military aggression, including mass population displacement, critical infrastructure destruction, and complex humanitarian emergencies requiring innovative solutions.

The adaptation of institutional frameworks, implementation of technological innovations, and improvement of coordination mechanisms between state bodies, international organizations, and non-governmental structures are examined. Particular attention is paid to analyzing normative-legal changes in the Civil Protection Code of Ukraine, development of new civil protection basic measures plans for 2024-2025, and implementation of digital technologies for optimizing humanitarian response.

Key innovative approaches have been identified, including the use of artificial intelligence for crisis situation forecasting, application of drones for humanitarian aid

delivery to inaccessible areas, implementation of mobile applications for population evacuation coordination, and development of automated alert systems. International experience in applying advanced technologies in the humanitarian sphere and possibilities for its adaptation to Ukrainian conditions are analyzed. The necessity of further development of public-private partnerships, strengthening inter-agency coordination, and integration of innovative solutions into the civil protection system to enhance humanitarian response effectiveness under armed conflict conditions and ensure national security resilience is substantiated.

Keywords: *civil protection, humanitarian crises, response mechanisms, innovative approaches, armed conflict, adaptation, public administration, emergency situations, coordination, technological innovations.*

Problem Statement and Its Connection with Relevant Scientific and Practical Tasks. Contemporary humanitarian crises are characterized by growing complexity, multifactoriality, and unpredictability, requiring fundamentally new approaches to organizing the civil protection system. The transformation of emergency situation nature from local incidents to complex multilevel crises actualizes issues of adaptability and innovativeness of state response mechanisms. The problem's substantiation is based on the conceptual gap between traditional emergency management paradigms formed under peacetime conditions and real needs for humanitarian activity coordination under conditions of protracted armed conflicts. Classical civil protection models, developed according to the linear logic of "threat-response-recovery," reveal their limitations when simultaneously managing multiple crises of different nature and scale.

The research relevance is determined by the necessity of developing adaptive public administration theory under uncertainty conditions and developing conceptual foundations for integrating innovative technologies into the national security system. The problem's interdisciplinary character requires synthesis of approaches from management theory, conflict studies, technological innovations, and international humanitarian law.

Analysis of Recent Domestic and Foreign Research. Contemporary research on adaptation of humanitarian response mechanisms is characterized by fragmented approaches

and insufficient coverage of civil protection system functioning specifics under conditions of protracted armed conflicts. International experts A. Beduschi and colleagues in their comprehensive study of artificial intelligence in humanitarian action emphasize the potential of technological innovations for transforming traditional crisis response approaches, yet their analysis focuses primarily on the global level without accounting for national civil protection system particularities.

Research by RAND Corporation, conducted by P. Paillé and an international team of experts, presents a comprehensive analysis of emerging technologies in the humanitarian sector through 2030, identifying five key areas: advanced manufacturing systems, early warning systems, camp monitoring systems, coordination platforms, and privacy protection technologies. However, their research does not examine specific mechanisms for integrating these technologies into national civil protection systems, especially in the context of countries in a state of active armed conflict.

Meanwhile, analysis of scientific literature reveals significant gaps in studying specific mechanisms of national civil protection system adaptation to hybrid threat conditions and protracted armed conflicts. Questions of institutional transformation of state administration bodies in the civil protection sphere, coordination mechanisms between state and non-state humanitarian activity actors under conditions of limited access to certain territories, and specifics of implementing digital innovations in the context of ensuring humanitarian operation cybersecurity remain insufficiently studied. Particularly relevant is research on adaptive management models ensuring effective civil protection system functioning under conditions of simultaneous emergence of multiple crisis situations of different nature and geographic coverage.

The purpose of the article is to analyze the transformation of humanitarian crisis response mechanisms in Ukraine's civil protection system and substantiate conceptual foundations for implementing innovative approaches under armed conflict conditions. The research is aimed at developing theoretical and methodological recommendations for adapting the national civil protection system to contemporary humanitarian crisis challenges.

Presentation of Main Research Material with Full Justification of Obtained Scientific Results. The contemporary transformation of Ukraine's civil protection system under

conditions of full-scale war occurs not merely through mechanical resource accumulation but primarily through changing the logic of humanitarian crisis management. The Civil Protection Code of Ukraine in its current 2025 edition enshrines a risk-oriented approach, a multi-level management system, and expands the powers of security assurance subjects at the local level [2]. This creates a regulatory foundation for transitioning from a reactive model of "consequence liquidation" to an adaptive model combining forecasting, prevention, response, and recovery in a unified management circuit.

Within the research framework, it is proposed to consider Ukraine's civil protection system as a complex adaptive network where humanitarian response mechanisms are formed at the intersection of three interconnected dimensions: (1) institutional, (2) technological, and (3) procedural. Such interpretation allows viewing humanitarian response not as a set of isolated measures but as a dynamic configuration of actors, tools, and processes that changes under the influence of armed conflict and hybrid threats. The institutional dimension of transformation is related to changing roles and powers of key humanitarian response subjects. On one hand, the updated normative-legal framework (Civil Protection Code, subordinate acts, basic civil protection measures plan for 2025) strengthens the coordinating role of central executive authorities and the State Emergency Service of Ukraine in planning, monitoring, and information consolidation regarding threats and emergency situations [2; 6]. On the other hand, Cabinet of Ministers of Ukraine Resolution No. 1313-r dated 24.12.2024 emphasizes the responsibility of regional and local authorities for practical implementation of civil protection measures, including creating conditions for deploying temporary accommodation points for internally displaced persons, ensuring critical infrastructure resilience, and organizing local alert systems [6].

In this context, institutional interaction between state bodies and international humanitarian structures acquires particular weight. Reporting materials of the International Committee of the Red Cross regarding activities in Ukraine in 2024 demonstrate a transition from episodic humanitarian interventions to long-term programs integrated into the national environment—medical infrastructure support, physical rehabilitation projects, civilian population protection measures [7]. This indicates that the civil protection system effectively functions not in a "state" format but as an open network including international and national

non-governmental actors, to which national coordination mechanisms must be adapted.

An institutional model of multi-level humanitarian response coordination is proposed, which includes: strategic level (Cabinet of Ministers of Ukraine, central executive authorities, UN Humanitarian Country Team), operational-tactical level (regional and oblast emergency commissions, oblast humanitarian aid coordination centers), and local level (local self-government bodies, communities, local humanitarian clusters, volunteer initiatives). Such an approach allows specifying each level's functions, reducing authority duplication and "institutional gaps" during crisis response. The civil protection system's technological adaptation occurs primarily through integrating digital solutions, data analysis systems, and autonomous platforms into humanitarian operations practice. Global discourse on artificial intelligence use in humanitarian activity, outlined in A. Beduschi's work [1], emphasizes AI's dual character as both a powerful decision optimization tool and simultaneously a source of ethical and legal risks. For the Ukrainian context, this means the need to combine technological innovations with strict adherence to personal data protection principles, non-discrimination, and algorithm transparency.

Based on RAND Corporation's approaches to emerging technologies in the humanitarian sector, the research proposes a structured typology of technological innovations relevant for Ukraine's civil protection system modernization. The first direction concerns early warning systems and predictive analytics, which provide the possibility of advance identification of humanitarian crisis development trends. Using big data-based models allows forecasting internal population displacement dynamics, identifying potential humanitarian tension "hotspots," and assessing critical infrastructure risk levels. These capabilities are enhanced through integrating information from the State Emergency Service, local self-government bodies, international humanitarian organizations, and UN structures into a unified analytical circuit, creating prerequisites for timely management decision-making.

The second innovation direction is related to spatial monitoring systems and remote operations development. Unmanned aerial vehicle use significantly expands capabilities for assessing destruction scale in territories complicated for rescue services access, and also ensures operational monitoring of transport corridors and the possibility of delivering small humanitarian cargo batches to remote areas. Complementing this are geoinformation

platforms that increase evacuation route planning efficiency, internally displaced persons flow management, and humanitarian aid point deployment optimization. The third component of the innovation typology consists of digital coordination platforms and mobile applications ensuring integrated humanitarian operations management. Unified digital platforms allow consolidating community needs, coordinating various humanitarian clusters' activities, and tracking actual aid provision in real time. Meanwhile, mobile applications serve as a tool for direct interaction with the population, ensuring operational information about threats, available resources, aid distribution points, and complaint submission procedures.

The next important block comprises humanitarian supply logistics management technologies. The World Food Programme's experience demonstrates that digital optimization tools, particularly the SCOUT system, can significantly reduce response time and decrease costs during large humanitarian operations implementation [8]. Adapting such solutions to the Ukrainian context can increase food, construction materials, medicines, and necessities delivery efficiency under conditions of constantly changing frontline situations and significant transport infrastructure damage. The proposed typology's concluding element consists of confidentiality protection and data management technologies. Humanitarian activity involves working with sensitive information, therefore secure data exchange is critically important. Approaches presented by OCHA and RAND focus on ensuring data encryption, personal information pseudonymization, and minimizing data volumes transferred between organizations [5]. Applying such technologies allows balancing the need for coordinating a wide circle of humanitarian response participants with requirements for ethical and secure information work.

Within the work framework, a conceptual model for integrating technological innovations into the humanitarian response circuit is proposed, consisting of three sequential modules: (1) data collection and integration (monitoring systems, field reports, satellite and drone data); (2) analytics and decision-making support (AI-based models, scenario analysis); (3) operational implementation (logistics, population communication, feedback). This model can be used as a methodological framework for modernizing information-analytical centers in Ukraine's civil protection structure. OCHA's Global Humanitarian Overview for 2025 records stable needs growth with limited resources and emphasizes the necessity of stricter

prioritization and expanded cash assistance and voucher use [3]. For Ukraine, this is reflected in the Humanitarian Needs and Response Plan for 2025, which indicates that humanitarian partners plan to assist approximately 6 million war-affected people under conditions of significant funding deficit [4]. Under such conditions, coordination mechanisms must ensure not only action consistency but also rational resource distribution between regions and vulnerable population categories.

Based on analyzing cluster system and national coordination structures functioning, an adaptive humanitarian response coordination model is formed, based on the following elements: unified humanitarian operations information space consolidating information about needs, provided assistance, coverage gaps; joint planning mechanisms between state bodies and humanitarian clusters allowing formation of coordinated priorities and avoiding duplication; flexible financing instruments including humanitarian funds and rapid resource allocations based on updated needs analysis [3; 4]. World Economic Forum materials emphasize that the private sector can act not only as a donor but as a full participant in humanitarian supply chains, a partner in infrastructure development and technological platforms [9]. The research proposes a "humanitarian-oriented public-private partnership" concept, whose key components are: creating a centralized interaction platform for state, humanitarian organizations, and business during crises; standardizing business participation formats (logistics services, warehouse capacity provision, IT solutions, critical facility energy support); introducing business incentives (tax, reputational, regulatory) encouraging long-term participation in the humanitarian response system. Thus, the obtained scientific results allow transitioning from general declarations about "strengthening coordination" to specified models of institutional, technological, and coordination adaptation of humanitarian crisis response mechanisms in Ukraine's civil protection system.

Conclusions. The conducted analysis confirmed that adaptation of humanitarian crisis response mechanisms in Ukraine's civil protection system is a multidimensional process combining normative-legal changes, institutional transformation, and technological modernization. Based on analysis of the current Civil Protection Code and the updated basic civil protection measures plan for 2025, the transition from a linear emergency management model to an adaptive network model is substantiated, enabling response to multiple threats

of different nature and scale [2; 6]. It is proposed to consider the civil protection system as a complex adaptive network in which humanitarian response is formed by interconnected institutional, technological, and procedural mechanisms. In this context, the scientific result is development of an institutional model of multi-level humanitarian activity coordination that delineates functions of strategic, operational-tactical, and local levels, and integrates activities of state bodies, international humanitarian structures, and non-governmental organizations [4; 7].

A typology of technological innovations for Ukraine's civil protection system has been formed, including early warning systems, spatial monitoring, coordination platforms, logistics optimization tools, and data protection technologies. Based on international experience (AI solutions, RAND technological trends, WFP practices), a conceptual model for integrating digital technologies into the humanitarian response circuit is proposed, combining data collection, analytics, and operational implementation of humanitarian decisions [1; 5; 8]. It is separately substantiated that under resource constraints recorded in the Global Humanitarian Overview and Ukraine's Humanitarian Needs and Response Plan for 2025, the key effectiveness factor becomes quality of humanitarian operations coordination and prioritization [3; 4]. In this context, the concept of humanitarian-oriented public-private partnership is developed, which considers business as an active participant in humanitarian supply chains and technological modernization of the response system [9].

The obtained results have both theoretical and practical significance. Theoretically, they deepen understanding of adaptive humanitarian crisis management models under conditions of protracted armed conflict. Practically, they can be used in: clarifying basic civil protection measures plans; modernizing information-analytical centers and early warning systems; developing regional humanitarian response programs and public-private partnership documents in the security sphere. Further research should be directed toward empirical verification of proposed models through analysis of specific humanitarian operations, as well as developing indicators for assessing innovative response mechanisms' effectiveness in Ukraine's civil protection system.

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