UDC 355.43:519.1

V. Batsamut

METHODOLOGY FOR DETERMINING KEY OBJECTS OF INFLUENCE TO VIOLATE THE STABILITY OF THE SYSTEM OF REGIME MEASURES OF THE DOMESTIC ENEMY DURING THE NEUTRALIZATION OF AN ARMED CONFLICT OF A NON-INTERNATIONAL NATURE

The article proposes a methodology for determining the list of objects for priority impact to disrupt the stability of the structure of the system of regime measures of the internal enemy during the neutralization of a non-international armed conflict by the law enforcement forces of the state. It develops and describes the methodology in terms of graph theory.

The author substantiates and develops the corresponding indicators and criteria for choosing a strategy of behavior of a person who makes a management decision on the procedure for installing search and strike forces in the crisis region of the country. They present the formulated methodology in a descriptive form. The researcher also shows the order of working by the methodology on a practical simplified example. The developed methodology is intended for use in the military command bodies of the National Guard of Ukraine when planning stabilization actions in the crisis-prone part of the country.

Keywords: *non-international armed conflict, internal enemy, system of regime measures, system stability, matrix, indicator, criterion, methodology.*

Statement of the problem. One of the tasks set out in Article 1 of the Law of Ukraine "On the National Guard of Ukraine" is "to cease terrorist activities, activities of illegal paramilitary or armed formations (groups), terrorist entities, organized groups, and criminal organizations" [1]. This objective is conditioned by the function of the National Guard of Ukraine (NGU), which is stated in Article 2 of the same law. Namely, it denotes "participation in special operations to neutralize armed criminals, to terminate the activities of paramilitary or armed formations (groups) not provided by law, as well as organized groups and criminal organizations on the territory of Ukraine, and in measures related to the suppression of terrorist actions." However, it should be emphasized that the performance of this function is going to be one of the most difficult for the NGU in the postwar period in the long-term perspective [2].

Analysis of military struggle in non-international armed conflicts (NIAC) makes it possible to view it (the struggle) as the interaction of two systems: the system of regime measures (SRM) of the internal enemy to control the territory under its control in the conflict area and a certain system of actions and approaches taken by the state to localize and neutralize NIAC [3–6]. In essence, the purposes of creating each of these organized entities are diametrically opposed: one goal is to establish control over the territory in order to achieve a specific political objective, which is pursued through the conflict escalation; the other is to restore lost control and ensure the normal (usual) functioning of public authorities, municipal self-government bodies, institutions, businesses, local communities, etc.

The actions of the authorities involve conducting a special operation (SO), such as an anti-terrorist operation [7], drawing on law enforcement and military groups. Depending on the degree of resistance shown by domestic opponents, the actions of the latter units may take the form of armed struggle, the conduct of which should be subject to certain restrictions, considering the concerns of the authorities. These include: 1) minimal damage to the civilian population and infrastructure of the region;

2) minimal waste of resources during SO; 3) effective destruction of internal enemy forces; 4) minimal losses of own forces and resources, etc.

Restrictions primarily affect the methods of conducting search and strike operations. Their essence is described in [8] and defined in terms of disrupting the stability of the internal enemy's regime measures.

A system is called stable when, upon being brought out of equilibrium by an external influence, it returns to it after the influence ceases [9]. The perfect way to mess up its stability is to affect all its components and objects, making it impossible to recover, because that totally breaks the connections between the objects and components of the system. However, this kind of influence requires a lot of effort and resources, which doesn't fit with the above-mentioned restriction to keep the costs of SO to a minimum.

The relevant military administration body usually develops a plan for future actions to be carried out in the form of an SO while performing the functions delegated to the NGU. This process is a complex task that can be understood as a set of techniques and mental operations performed by headquarters officials to generate possible solutions. It is known that this procedure involves determining the sequence, listing tactical techniques, and their order (means) for applying available forces and resources to fulfill assigned duties.

At the current stage of global military science development, the most reasonable decisions are those based on a regular analysis of the objectives of future war efforts, consideration of the operational situation, the capabilities and potential of friendly armies, and the character of enemy actions and potential, as well as other equally important factors. An example of such an approach is the concept being implemented in the US Armed Forces for SO planning and developing strategies: "Effects – Based Approach to Joint Operations" [10]. Its basis relies on modeling warfare and searching for interrelations between systems and their constituent elements and objects. They reflect certain characteristics, influencing which can help achieving the goal of warfare and special operations in general.

The same idea is shared by native researchers in their work [11], who suggest targeting key objects and elements of the SRM, since the stability of the whole system depends on them. That way, the overall costs of resources and time spent on localizing and neutralizing NIAC are significantly reduced. The identification of such critical objects and the gradual (or immediate) impact on them enables the creation of separate substructures within the initial SRM network, with significantly lower capacity to resist government forces. Subsequently, each of these substructures is neutralized independently.

Determining the set of items and components that, when affected, result in the creation of the above-mentioned isolated sub-configurations, as well as determining the criteria for such selection and developing the appropriate scientific and methodological apparatus for justifying administrative decisions, is a difficult issue. It is currently resolved through heuristic methods using the personal experience, knowledge (intuition) of the commander (superior) who makes the decision. Addressing this challenge with heuristic methods will always go wrong (contain errors) for network structures with a high density of objects and links among them. In some cases, such errors can be quite significant. Therefore, the academic task of developing a methodology for identifying critical points of influence for disrupting the stability of the regime measures of the internal enemy during the neutralization of NIAC is now relevant.

Analysis of recent research and publications. Many scientific works by foreign and domestic scholars analyze the results of special operations to localize and neutralize internal armed conflicts. Some researchers have presented important theoretical and methodological aspects, as well as practical recommendations and techniques for identifying the importance of strike targets (elements) of the combat formations and infrastructure of the opponent [11]. The problem of functional resistance of complex technical and organizational systems is examined in a scientific work [12]. The results of the study of the composite setup are given in [13]. The author of the article [14] has developed indicators and criteria for evaluating the effectiveness of the deployment of the NGU unit to localize areas of non-international armed conflict. The established indicators and criteria taken together enable an adequate assessment of the efficiency of the NGU's deployment. They can be applied in the practical activities of commanders and staff for mission planning, as well as for the timely and reasonable

adjustment of adopted decisions and developed plans.

At the same time, no research papers were found that would explore methodological aspects of disrupting the stability of SRM caused by an internal enemy seeking to control the territory of the NIAC.

The purpose of the article is to develop a procedure for determining the list of facilities that could be targeted to destabilize the system of regime measures of internal opponents while countering a non-international armed conflict (domestic armed conflict).

Summary of the main material. Suppose that the quantity and location of the objects of the internal enemy within a certain territory have been identified thanks to intelligence data. All functional links between such objects, which ensure their combat, information, and resource support, are also known. It's a hierarchical structure where info from lower-level elements, like observation posts, patrols, checkpoints, and strongholds, is sent to higher-level elements, which check out the situation, assess fighting capabilities, arrange target distribution, make managerial decisions, and so on. In turn, higher-level elements send command instructions and resources for specific types of support to lower-level elements. Then such a system can be defined as a combat one, which represents a set of functionally connected military formations (units), means, and objects of various purposes, which are used for a single concept and plan under a single command to perform the assigned tasks.

Combat units are covered by military systems theory, which includes the theory of battle capability. Battle capability [15] is a generalized characteristic of the combat capabilities (firepower, striking power, and maneuverability) of a military formation (union, corps, unit, or subdivision) or a model of military equipment and armor in a specific type of military operation (offensive, defensive, etc.), which is calculated mathematically and indicated by a number.

If that's the case, then a model of such a distributed and hierarchical structure can be shown as an undirected weighted graph *G = (V, E)*, the vertices $V = \{v_i\}$ of which modulate SRM objects, and the edges of which $E = \{e_{ij}\}$ constitute lines of information, warfare, and/or resource support, where $i, j = \overline{1,n}$ (n – number of vertices of the graph). Each edge e_{ij} is attributed a certain weight coefficient w_{ij}, which designates the combat potential of the government forces necessary to disrupt the corresponding connection between particular objects of the SRM of the internal enemy.

When the SRM network is represented by a graph *G = (V, E),* it is necessary to find a subset of vertices $\overline{V} \in \{v_i\}$, by iterating through the options for disabling its individual entities and elements, removing which from the scheme of the initial graph *G = (V, E)* results in *m* unconnected (isolated) substructures $\overline{G_k} = (\overline{V}, \overline{E})$, where $k = \overline{1,m}$. At the same time, the following condition must be met for each such sublattice

$$\overline{G_k}: \quad \frac{B}{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}^{k} / 2} \geq 3, \qquad (1)$$

where $\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}^{k} / 2$ is the total military capacity needed to break all the links in the substructure $\overline{G_k}$; *B* is the fighting potential of a military unit from the state's search and strike forces.

The threefold excess of the level of combat potential of search and strike forces in equation (1) is explained by the fact that search and strike operations are essentially offensive by nature, and the Field Manual of the Ukrainian Ground Forces requires at least a triple advantage in forces and resources over the enemy during an offensive.

Thus, equation (1) describes the conditions (criterion) for the destabilization of a certain isolated substructure $\overline{G_k}$. To the initial composition of the SRM, modeled by an undirected weighted graph *G = (V, E)*, the equation (1) will look next:

$$G: \quad \frac{B}{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij} / 2} \geq 3, \qquad (2)$$

where $\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij} / 2$ is the total fighting capability needed to break all the links in the *G* arrangement.

Indeed, if the SRM set-up of a domestic enemy is divided into a specific number of isolated substructures, each with a certain level of combat potential that does not exceed a critical (mandatory) value (3*B*), the main objective of search and strike operations will be achieved – disrupting the stability of the SRM of an internal opponent in an internal armed conflict.

The proposed methodology focuses on the consistent fragmentation of the initial structure of the SRM of the internal enemy and has six steps.

Step 1. Show (build a model of) the system of internal enemy regime measures as an undirected weighted graph *G = (V, E)*. Compile an adjacency matrix S_G for this graph. Each object of the SRM is not self-related, and therefore such a matrix will get a null diagonal, i.e., the elements $w_{11}, w_{22}, w_{33}, ...w_{nn} = 0$:

$$S_G = \begin{array}{c|cccccc} & v_1 & v_2 & \dots & v_j & \dots & v_n \\ \hline v_1 & 0 & w_{12} & \dots & w_{1j} & \dots & w_{1n} \\ v_2 & w_{21} & 0 & \dots & w_{2j} & \dots & w_{2n} \\ \dots & \dots & \dots & 0 & \dots & \dots & \dots \\ v_i & w_{i1} & w_{i2} & \dots & 0 & \dots & w_{in} \\ \dots & \dots & \dots & \dots & \dots & 0 & \dots \\ v_n & w_{n1} & w_{n2} & \dots & w_{nj} & \dots & 0 \end{array} \quad (3)$$

Step 2. Each vertex v_i of the adjacency matrix S_G is characterized by a certain degree C_i, which means the number of connections – edges, incident to this vertex. In addition, each vertex v_i is defined by the total weight of its incident edges $W_i = \sum_{j=1}^{n} w_{ij}$, where $i, j = \overline{1,n}$ (*n* – number of vertices in the graph). Find the parameters C_i and *Wi* for every vertex v_i.

Step 3. Determine the coherence of the structure by building a transitive closure matrix $R_G = \|r_{ij}\|_{n\times n}$, where

$$r_{ij} = \begin{cases} 1 - \text{if } \rightleftarrows \text{ a connection } \rightleftarrows \text{ exists;} \\ 0 - \text{if there is no connection} \end{cases},$$

value the coherence of the structure.

A fast algorithm for constructing a matrix $R_G = \|r_{ij}\|_{n\times n}$ based on the adjacency matrix $S_G = \|s_{ij}\|_{n\times n}$ is provided in [16].

For any connected undirected graph, its R_G matrix is symmetric with respect to the main diagonal and forms an identity matrix:

$$R_G = \begin{array}{c|cccccc} & v_1 & v_2 & \dots & v_j & \dots & v_n \\ \hline v_1 & 1 & 1 & \dots & 1 & \dots & 1 \\ v_2 & 1 & 1 & \dots & 1 & \dots & 1 \\ \dots & \dots & \dots & 1 & \dots & \dots & \dots \\ v_i & 1 & 1 & \dots & 1 & \dots & 1 \\ \dots & \dots & \dots & \dots & \dots & 1 & \dots \\ v_n & 1 & 1 & \dots & 1 & \dots & 1 \end{array} \quad (4)$$

In the case of a disconnected, unoriented graph (the initial structure split into several separate substructures), several unit blocks can be identified on the main diagonal in the R_G matrix by pulling identical rows and columns toward the higher orders. Let's call this matrix $R_G^б$.

The number of such blocks indicates the quantity of connectivity components (separate substructures), and the vertices that make up each block represent the quantitative and index composition of each component (isolated substructure). If there is a singular block in the matrix $R_G^б$ that has a unique vertex, this means that it (the vertex) is isolated in the graph structure.

Step 4. When there is one connectivity component in the graph, it is necessary to check it for compliance with equation (2); when there is more than one such component, it is necessary to check each of them against formula (1). If the terms are met, then the SRM structure is unstable – this is the end of the procedure. Otherwise, the SRM composition is stable, and therefore, the following decision must be made regarding the removal of a node v_i – the future object of influence modeled by this node.

Step 5. To select the target in the adjacency matrix S_G (3), pick the row with the highest degree of the vertex C_i and the lowest total value of the weight coefficients of the incident edges – W_i The comprehensive criterion for selecting a vertex (the object of the subsequent impact) will be as follows:

$$v_i : \ C_i \to \max, \ W_i \to \min . \qquad (5)$$

In case several vertices meet criterion (5), any of them may be chosen. Applying this criterion will ensure that the vertex with the largest number of incident connections is removed from the structure at each step. That is most likely to disrupt the cohesion of the scheme, which means disrupting the stability of the SRM. At the same time, each such operation (a step toward removing the vertex) will consume a minimum amount of combat potential of the search and strike forces. Thus, the strategy of "maximum impact at minimum cost" will be implemented at every stage.

Step 6. By removing the corresponding row and column of the vertex v_i, modify the adjacency matrix S_G. Proceed to step 2.

Sample solution to a practical problem.

Suppose that the structure of the SRM of an internal enemy is described by an undirected weighted graph *G = (V, E)*, where the vertices are objects and elements of the structure. Also, the weight coefficients of the edges reflect the battle potential of search and strike forces, which, when used, disrupt the corresponding connection (Figure 1). Let the fighting capability of a standard unit of the state's search and strike forces be 60 units. Assume that the search and strike forces consist of one standard unit.

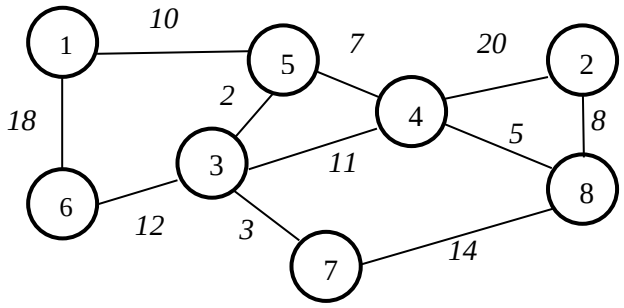

Figure1 – Unoriented weighted graph *G* representing a certain structure of the system of regime measures of the internal enemy

In accordance with the methodology described above, the following actions are performed.

Action 1. Make an adjacency matrix S_G for the undirected graph *G = (V, E)*, shown in Figure 1.

Action 2. Degree (C_i) and total value of weight indexes (*Wi*) for the edges incident to this vertex are calculated for each vertex v_i. That gives:

$S_G =$

	v_1	v_2	v_3	v_4	v_5	v_6	v_7	v_8	C_i	W_i
v_1	0	0	0	0	10	18	0	0	2	28
v_2	0	0	0	20	0	0	0	8	2	28
v_3	0	0	0	11	2	12	3	0	4	28
v_4	0	20	11	0	7	0	0	5	4	43
v_5	10	0	2	7	0	0	0	0	3	19
v_6	18	0	12	0	0	0	0	0	2	30
v_7	0	0	3	0	0	0	0	14	2	17
v_8	0	8	0	5	0	0	14	0	3	27

(6)

Action 3. A transitive closure matrix $R_G = \|r_{ij}\|_{n\times n}$ is built; it is singular and indicates that the structure is coherent and consists of a single connectivity component.

Action 4. The validity of condition (2) is checked. The result is: $\frac{60}{110} < 3$.

Condition (2) is not met; therefore, the structure is stable. Thus, the decision is made to remove a certain vertex v_i from the network.

Action 5. The vertex that satisfies condition (5) is selected from among all vertices of the graph in equation (6). That vertex is v_3. Then the resulting structure will appear as shown in Figure 2, and the corresponding adjacency matrix with revised values C_i and *Wi* will be provided by equation (7):

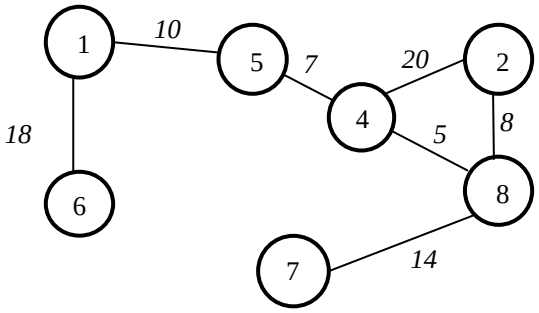

Figure 2 – Undirected graph G_1 after removing vertex v_3 out of structure G

	v_1	v_2	v_4	v_5	v_6	v_7	v_8	C_i	W_i
v_1	0	0	0	10	18	0	0	2	28
v_2	0	0	20	0	0	0	8	2	28
v_4	0	20	0	7	0	0	5	3	32
$S_{G1}=v_5$	10	0	7	0	0	0	0	2	17
v_6	18	0	0	0	0	0	0	1	18
v_7	0	0	0	0	0	0	14	1	14
v_8	0	8	5	0	0	14	0	3	27

(7)

Since graph G_1 is connected, the transitive matrix $R^{б}_{G1}$ will not change for it and will be singular. Condition (2) is also not met for this structure, which means that the structure is still stable. A solution is made to proceed with the further removal of a certain vertex v_i from the scheme.

Action 6. Among all vertices of graph G_1 in equation (7), the vertex that meets condition (5) is selected. That vertex is v_8. Then the resulting structure will be as shown in Figure 3, and the corresponding adjacency matrix with corrected values C_i and Wi will be given by expression (8):

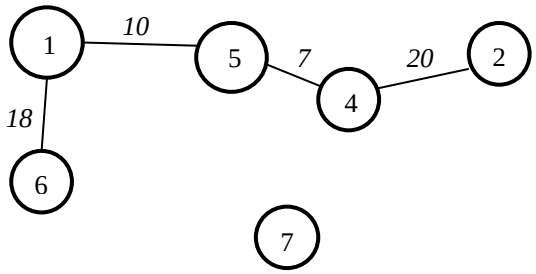

Figure 3 – Undirected graph G_2 after removing vertex v_8 out of structure G_1

	v_1	v_2	v_4	v_5	v_6	v_7	C_i	W_i
v_1	0	0	0	10	18	0	2	28
v_2	0	0	20	0	0	0	2	20
v_4	0	20	0	7	0	0	2	27
$S_{G2}=v_5$	10	0	7	0	0	0	2	17
v_6	18	0	0	0	0	0	1	18
v_7	0	0	0	0	0	0	0	0

(8)

The transitive closure matrix for graph G_2 will be expressed by equation (9):

	v_1	v_2	v_4	v_5	v_6	v_7
v_1	1	1	1	1	1	0
v_2	1	1	1	1	1	0
v_4	1	1	1	1	1	0
$R^{б}_{G2}=v_5$	1	1	1	1	1	0
v_6	1	1	1	1	1	0
v_7	0	0	0	0	0	1

(9)

Action 7. The matrix $R^{б}_{G2}$ is analyzed. It shows that graph G_2 is disjoint and consists of two substructures $\{G_k\}$ $(k=\overline{1,m}, m=2)$: $\overline{G_1}=\{v_1,v_2,v_4,v_5,v_6\}, \overline{G_2}=\{v_7\}$.

Action 8. The validity of condition (2) is checked for each of the identified substructures $\overline{G_1}=\{v_1,v_2,v_4,v_5,v_6\}, \overline{G_2}=\{v_7\}$. The result: for $\overline{G_1}$: $\frac{60}{55}<3$; for $\overline{G_2}$ condition (2) is not tested, since $C_7=0$.

Condition (2) is not fulfilled for substructure $\overline{G_1}=\{v_1,v_2,v_4,v_5,v_6\}$; therefore, it is still stable. A decision is made to further remove a certain vertex v_i from its set.

Action 9. Among all vertices of the graph from equation (8), the vertex that meets condition (5) is selected. The vertex is v_5. Then the resulting framework will have the form shown in Figure 4, and the associated adjacency matrix with modified values C_i and Wi will be represented by equation (10):

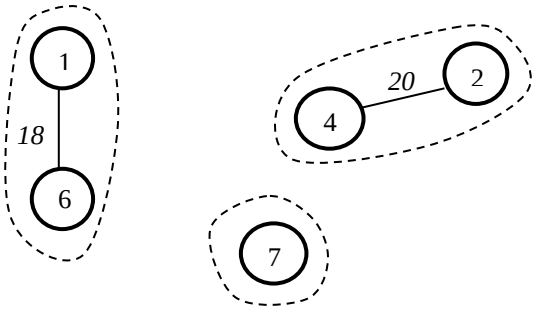

Figure 4 – Undirected graph G_3 after removing vertex v_5 out of structure G_2

$$S_{G_3} = \begin{array}{c|ccccc|cc} & v_1 & v_2 & v_4 & v_6 & v_7 & C_i & W_i \\ \hline v_1 & 0 & 0 & 0 & 18 & 0 & 1 & 18 \\ v_2 & 0 & 0 & 20 & 0 & 0 & 1 & 20 \\ v_4 & 0 & 20 & 0 & 0 & 0 & 1 & 20 \\ v_6 & 18 & 0 & 0 & 0 & 0 & 1 & 18 \\ v_7 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array} \quad (10)$$

The transitive matrix for the given graph will look like this:

$$R^{б}_{G3} = \begin{array}{c|ccccc} & v_1 & v_6 & v_2 & v_4 & v_7 \\ \hline v_1 & 1 & 1 & 0 & 0 & 0 \\ v_6 & 1 & 1 & 0 & 0 & 0 \\ v_2 & 0 & 0 & 1 & 1 & 0 \\ v_4 & 0 & 0 & 1 & 1 & 0 \\ v_7 & 0 & 0 & 0 & 0 & 1 \end{array} \quad (11)$$

Action 10. The matrix $R^{б}_{G3}$ is checked. Hence, graph G_3 contains three substructures $\{G_k\}\left(k=\overline{1,m}, m=3\right)$:

$\overline{G_1}=\{v_1,v_6\}, \overline{G_2}=\{v_2,v_4\}, \overline{G_3}=\{v_7\}$.

Action 11. The validity of condition (2) is checked for each substructure. As a result: for $\overline{G_1}$: $\frac{60}{18}>3$; for $\overline{G_2}$: $\frac{60}{20}=3$; for $\overline{G_3}$ condition (2) is not tested, since $C_7 = 0$. Therefore, condition (2) is true for all substructures of graph G_3, and the SRM composition is unstable – this concludes the methodology.

To sum up, it should be noted that in order to shift the initial structure of the SRM from a stable state to an unstable one, it is necessary to consecutively (or simultaneously) influence three objects of the internal enemy, which are modeled by vertices: v_3, v_8, v_5. These sites are crucial – primary targets for attack during search and strike operations. Meanwhile, the combat potential of search and strike forces must be at least 72 units to ensure the guaranteed disruption of the SRM stability of the internal enemy. That's why the initial battle capability of search and strike forces should be increased by 12 units (compared to the initial value). That aspect should be considered when planning future operations.

Conclusions

The developed methodology is intended to be used for planning search and strike operations of military command bodies of the National Guard of Ukraine carried out within the framework of special operations to localize and neutralize non-international armed conflicts. The proposed options, generated using this methodology, contain a list of key objects in the system of regime measures of the internal enemy, which must be the primary targets for influence (destruction) by government forces in the course of resolving the aforementioned conflicts. The methodology also provides an estimation of the minimum sufficient combat abilities of native troops to disrupt the stability of the SRM of a domestic enemy.

The universal nature of the methodology is explained by the application of the mathematical apparatus of graph theory. With its help, it is possible to model any network object (SRM of internal enemy) with a distributed structure of any density and complexity.

The following initial data are required to implement the methodology of the NGU military administration: the network of the internal enemy's SRM in the crisis region; quantitative evaluation of the combat potential required to disrupt each existing (identified) communication line (logistical, informational, etc.) in the combination of regime measures of the internal enemy.

Automation of that method for the environment of a specific geographic information system will increase the operational efficiency of producing effective variants of the plan for future search and strike actions of the NGU unit.

Further scientific research will be focused on developing a scientific and methodological toolkit

that can help determine key objects of influence for disrupting the stability of the opponent's defense during hostilities.

References

1. *Zakon Ukrainy "Pro Natsionalnu hvardiiu Ukrainy" № 876-VII* [Law of Ukraine about the National Guard activity no. 876-VII]. (2014, March 13). Retrieved from: https://surl.li/mzyjbr (accessed 23 January 2025) [in Ukrainian].

2. Morkvin D. A., Batsamut V. M., Gokh I. M. (2024). *Prohnozovani vyklyky, shcho stoiatymut pered derzhavoiu u pisliavoiennyi period: zavdannia NHU iz zabezpechennia derzhavnoi bezpeky ta vykonannia pravookhoronnykh funktsii* [Predicted challenges facing the state in the post-war period: tasks of the National Security Service to ensure state security and perform law enforcement functions]. *Bezpeka derzhavy*, no. 1, pp. 90–98 [in Ukrainian].

3. Moia osvita (2014). *Zbroini konflikty v suchasnomu sviti* [Armed conflicts in the modern world]. Retrieved from: https://surl.li/xuhvto (accessed 10 March 2025) [in Ukrainian].

4. Mernyk A. M. (2017). *Mizhnarodnyi dosvid pravovoho vrehuliuvannia vnutrishnikh zbroinykh konfliktiv* [International experience in legal settlement of internal armed conflicts]. *Yurydychnyi naukovyi elektronnyi zhurnal*, no. 6, pp. 382–385 [in Ukrainian].

5. Hodlevskyi S. O. (2019). *Metodyka obgruntuvannia ratsionalnoho boiovoho skladu uhrupovannia Natsionalnoi hvardii Ukrainy dlia lokalizatsii raionu zbroinoho konfliktu nemizhnarodnoho kharakteru* [Methodology for substantiating the rational combat composition of the National Guard of Ukraine group for the localization of the area of an armed conflict of a non-international nature]. *Chest i zakon*, no. 3, pp. 21–33 [in Ukrainian].

6. Hodlevskyi S. O. (2019). *Pokaznyky ta kryterii otsiniuvannia efektyvnosti zastosuvannia uhrupovannia Natsionalnoi hvardii Ukrainy dlia lokalizatsii raionu zbroinoho konfliktu nemizhnarodnoho kharakteru* [Indicators and criteria for assessing the effectiveness of the use of the National Guard of Ukraine group to localize the area of an armed conflict of a non-international nature]. *Nauka i tekhnika Povitrianykh Syl Zbroinykh Syl Ukrainy*, no. 4, pp. 122–131 [in Ukrainian].

7. *Zakon Ukrainy "Pro tymchasovi zakhody na period provedennia antyterorystychnoi operatsii" № 1669-VII* [Law of Ukraine On temporary measures for the period of the anti-terrorist operation activity no. 1669-VII]. (2014, September 2). Retrieved from: https://zakon.rada.gov.ua/laws/show/1669-18# Text (accessed 23 January 2025) [in Ukrainian].

8. Sutiushev T. A., Pistriak P. V. (2009). *Sutnist, zavdannia, pryntsypy ta pobudova poshukovo-udarnykh dii vnutrishnikh viisk u spetsialnii operatsii z lokalizatsii ta neitralizatsii vnutrishnoho zbroinoho konfliktu* [The essence, tasks, principles, and structure of search and strike actions of internal troops in a special operation to localize and neutralize the internal armed conflict]. *Systemy ozbroiennia i viiskova tekhnika*, no. 4 (20), pp. 17–21 [in Ukrainian].

9. Barabash O. V., Zuiko V. V. (2009). *Metodyka otsinky stiikosti struktury systemy kosmichnoi rozvidky v umovakh vplyvu protyvnyka* [Methodology for assessing the stability of the structure of a space intelligence system under enemy influence]. *Systemy ozbroiennia i viiskova tekhnika*, no. 4 (20), pp. 2–7 [in Ukrainian].

10. Bilchuk V. M., Adamenko A. A. (2009). *Modeliuvannia mety operatsii pry planuvanni vohnevoho urazhennia obiektiv protyvnyka v suchasnykh umovakh vedennia zbroinoi borotby* [Modeling the goal of operations when planning fire destruction of enemy objects in modern conditions of armed conflict]. *Systemy ozbroiennia i viiskova tekhnika*, no. 4 (20), pp. 79–82 [in Ukrainian].

11. Pistriak P. V., Sutiushev T. A. (2010). *Pidkhody do rozroblennia metodyky vyznachennia kliuchovykh elementiv struktury systemy rezhymnykh zakhodiv protylezhnoi storony u vnutrishnomu zbroinomu konflikti* [Approaches to developing a methodology for determining key elements of the structure of the system of regime measures of the opposing side in an internal armed conflict]. *Chest i zakon*, no. 4, pp. 3–6 [in Ukrainian].

12. Barabash O. V. (2004). *Pobudova funktsionalno stiikykh rozpodilenykh informatsiinykh system* [Construction of functionally stable distributed information systems]. Kyiv : NAOU [in Ukrainian].

13. Zahorka O. M., Mosov S. P., Sbytniev A. I., Stuzhuk P. I. (2005). *Elementy doslidzhennia skladnykh system viiskovoho pryznachennia*

[Elements of research of complex military systems]. Kyiv : NAOU [in Ukrainian].

14. Hodlevskyi S. O. (2019). *Pokaznyky ta kryterii otsiniuvannia efektyvnosti zastosuvannia uhrupovannia Natsionalnoi hvardii Ukrainy dlia lokalizatsii raionu zbroinoho konfliktu nemizhnarodnoho kharakteru* [Indicators and criteria for assessing the effectiveness of the use of the National Guard of Ukraine group to localize the area of an armed conflict of a non-international nature]. *Nauka i tekhnika Povitrianykh Syl Zbroinykh Syl Ukrainy*, no. 4, pp. 122–131 [in Ukrainian].

15. Pechorin O. M. (2016). *Osoblyvist taktyky zastosuvannia viiskovykh chastyn v umovakh vedennia hibrydnoi viiny* [Feature of tactics of application of military units in the conditions of conducting hybrid war]. *Suchasni informatsiini tekhnolohii u sferi bezpeky ta oborony*, no. 3 (27), pp. 161–166 [in Ukrainian].

16. Batsamut V., Manzura S., Kosiak O., Harmash V., Kukharets D. (2021). Fast Algorithm for Calculating Transitive Closures of Binary Relations in the Structure of a Network Object. *International Journal of Computing*, no. 4 (20), pp. 560–566. DOI: https://doi.org/10.47839/ijc.20.4.2444 [in English].

The article was submitted to the editorial office on 1 May 2025

УДК 355.43:519.1

В. М. Бацамут

МЕТОДИКА ВИЗНАЧЕННЯ КЛЮЧОВИХ ОБ'ЄКТІВ ВПЛИВУ ДЛЯ ПОРУШЕННЯ СТІЙКОСТІ СИСТЕМИ РЕЖИМНИХ ЗАХОДІВ ВНУТРІШНЬОГО ПРОТИВНИКА У ХОДІ НЕЙТРАЛІЗАЦІЇ ЗБРОЙНОГО КОНФЛІКТУ НЕМІЖНАРОДНОГО ХАРАКТЕРУ

Запропоновано методику визначення переліку об'єктів для першочергового впливу з метою порушення стійкості структури системи режимних заходів внутрішнього противника під час нейтралізації правоохоронними силами держави збройного конфлікту неміжнародного характеру. Методику розроблено й описано в термінах теорії графів.

В основу методики покладені міркування структурної цілісності мережевого об'єкта, яким моделюється певна структура режимних заходів внутрішнього противника в такому конфлікті. У методиці застосовано ідею динамічного програмування, що полягає у послідовному дробленні початкової структури системи режимних заходів внутрішнього противника на окремі непов'язані підструктури, контроль над якими потребує меншого бойового потенціалу створюваного угруповання правоохоронних сил держави. Дроблення структури триває доти, поки не буде виконано певну директивну умову. Обґрунтовано і розроблено відповідні показники та критерії вибору стратегії поведінки особи, яка приймає управлінське рішення щодо порядку проведення пошуково-ударних сил у кризовому регіоні країни. Розроблену методику подано в описовому вигляді. Порядок роботи за методикою показано на практичному спрощеному прикладі. Запропонована методика призначена для застосування в органах військового управління Національної гвардії України під час планування стабілізаційних дій у кризовому регіоні країни.

Ключові слова: *збройний конфлікт неміжнародного характеру, внутрішній противник, система режимних заходів, стійкість системи, матриця, показник, критерій, методика.*

Batsamut Volodymyr – Doctor of Military Sciences, Professor, Head of the Research Center for Service and Combat Activities, National Academy of the National Guard of Ukraine
https://orcid.org/0000-0003-2182-6891