UDC 351.86:355.4:356.35

K. Sporyshev

S. Bielai

MODEL OF THE FUNCTIONING OF A BATTALION TACTICAL GROUP OF THE NATIONAL GUARD OF UKRAINE IN A STABILIZATION OPERATIONS SCENARIO

The article develops a formal model of the functioning of the battalion tactical group of the National Guard of Ukraine for scenarios of stabilization actions. The authors emphasize that the existing approaches do not fully take into account the specifics of police functions and the need for long-term control of territories. The model formalizes the sequence of service-combat processes of stabilization actions as a finite automaton of states, a model of threats taking into account sabotage activity, criminogenic situation, informational and psychological influences and social tension. Particular attention is paid to taking into account the factors of resource depletion and the accumulation of physical and psychological fatigue of personnel. To assess effectiveness, an integral indicator has been introduced, combining the level of security, public trust and resource sustainability, which creates the basis for effective planning of operations.

Keywords: *state security, crisis area, stabilization actions, battalion tactical group, capability, combat potential, military decision-making process, National Guard of Ukraine.*

Statement of the problem. In the current conditions of armed aggression and operations to restore control over the liberated territories, stabilization actions performed by units of the National Guard of Ukraine (NGU) are of particular importance. The specificity of such actions lies in the combination of military, law enforcement and humanitarian functions, the duration of operations, the increased role of interaction with the civilian population and authorities, as well as the need to minimize losses and social tension.

Under these conditions, it is relevant to develop formalized models of the functioning of battalion tactical groups (BTGr) of the National Guard of Ukraine, which allow to systematically describe the structure of units, management and information processes, resource provision and threat dynamics in the stabilization scenario [1–4].

Analysis of recent research and publications. The analysis of scientific research in the field of military command and state security shows that the existing models of combat operations are mostly focused on classical offensive or defensive operations of the Armed Forces. At the same time, stabilization actions characteristic of the activities of the National Guard of Ukraine are considered fragmentary and without proper formalization of social and managerial factors.

The problems of using formations and units of the Defense Forces of Ukraine are revealed in the works of domestic scientists and specialists in the security sector. A significant contribution to the study of problematic issues of modeling combat operations, assessment of capabilities, optimization of the organizational and staff structure of military formations, as well as to the management of units in crisis situations was made by such scientists as: O. Y. Matsko, S. A. Mykus, V. G. Solonnikov, V. I. Tkachenko, E. B. Smirnov, V. P. Gorodnov, G. A. Drobakha, M. O. Yermoshin and others.

However, despite a significant number of scientific developments, the issue of determining the rational composition of BTGr for stabilization actions remains insufficiently developed. Most of the available models are focused on classic combat operations and do not take into account the specific nature of stabilization operations, which require significant differences in the structure of forces.

The following questions remain insufficiently researched:

- a systematic description of stabilization actions as a multifactorial process;
- taking into account the dynamics of threats and social tension;

- the impact of resource depletion and fatigue of personnel on the effectiveness of actions of the BTGr of the National Guard of Ukraine [1–4].

The purpose of the article at developing a formal model of the functioning of the battalion tactical group of the National Guard of Ukraine in the scenario of stabilization actions, which takes into account the organizational structure of units, information and command flows, the sequence of service and combat processes and resource constraints.

Summary of the main material. Let us consider the battalion tactical group of the National Guard of Ukraine as a hierarchical organizational and functional system, which includes:

- control bodies (commander, headquarters, control post);
- units for performing stabilization tasks (patrol, blocking, response reserve);
- support units (logistics, medical, engineering, communications);
- elements of interaction with other security entities and authorities.

The functioning of the BTGr takes place in a changing environment, characterized by the presence of residual threats, criminal activity, informational and psychological influences and social tension.

The BTG operating model is a formalized description of the interaction of units, management processes, resource support and service-combat operations in time and space in order to assess the effectiveness of combat (service-combat) tasks.

The model is designed for:

- analysis of management stability;
- assessment of the effectiveness of the BTGr structure;
- optimization of resource provision;
- forecasting the results of actions in different scenarios.

The structure of the BTGr operating model includes:

1. Model of the organizational structure of departments.

It is advisable to present the BTGr in the form of a hierarchical system of subsystems**.**

Level 1 – Management:

- commander of the BTGr;
- BTG headquarters (operational group, intelligence, communications, logistics).

Level 2 – combat units:

- motorized infantry (mechanized) companies;
- tank units;
- artillery battery;
- air defense units.

Level 3 – support units:

- engineering;
- medical;
- logistics;
- EW / ES.

It is advisable to describe the stabilization actions of the BTGr of the NGU as a sequence of interrelated processes that form the logic of the operation. The formalization of service and combat processes of stabilization actions is formed as a finite automaton of states:

$$S = \{S_0, S_1, S_2, S_3, S_4, S_5\}, \quad (1)$$

where: S_0 – entry of BTGr into the area of stabilization operations;
S_1 – carrying out actions to block the area of stabilization actions;
S_2 – filtration and counter-sabotage measures;
S_3 – implementation of measures for patrolling and controlling the territory;
S_4 – performing actions to respond to local incidents;
S_5 – actions to transfer control to state authorities.

The transition between states is determined by:

$$S_{k+1} = f(S_k, I_k, Z_k, R_k), \quad (2)$$

where: S_k – the current phase of stabilization actions;

I_k – information certainty of BTGr management processes;
Z_k – threat level;
R_k – resource provision.

Likewise, each of these processes can also be represented in the form of corresponding models.

Information certainty will be presented in a spiral model of reconnaissance conducted by BTG units. Such a model is shown in Figure 1. A sufficient amount of information required to make a decision on the stabilization actions of the BTGr is collected from intelligence sources, each source has a different degree of confidence in the information (sources are located as far as possible from the center). The bandwidth of the management system is determined by the speed of message delivery. The degree of importance of sources for obtaining information is indicated by color: from green – which means "unimportant", to red – "special attention".

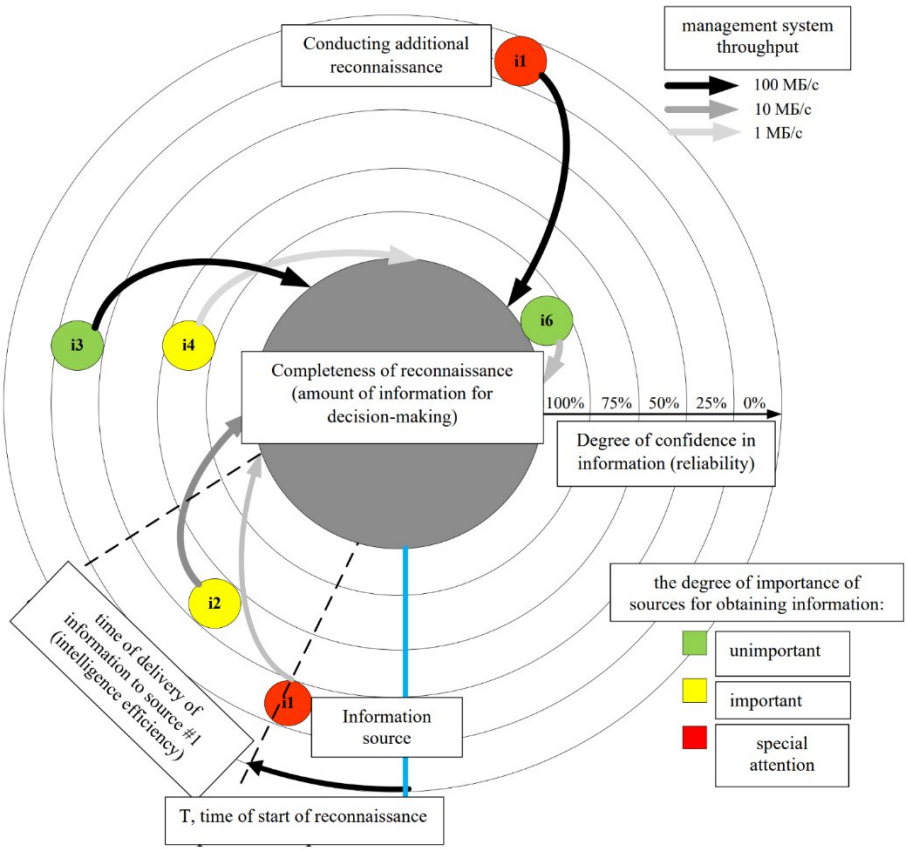

Figure 1 – Spiral model of BTG reconnaissance in stabilization actions

2. The threat model during stabilization tasks represents:

$$Z(t) = \{Z_1, Z_2, Z_3, Z_4\}, \quad (3)$$

where: Z_1 – sabotage activity;
Z_2 – the level of criminalization of the stabilization area;
Z_3 – informational and psychological influence;
Z_4 – social tension.

3. The dynamics of threats is presented as follows:

$$\frac{dZ_i}{dt} = \varphi_i\left(R_{\text{НГУ}}, A_{\text{цив}}, I_{\text{інф}}\right), \quad (4)$$

where: R_{NGU} – resource and operational potential of units of the National Guard of Ukraine;
A_{civ} – the level of activity and involvement of the civilian population in stabilization processes;
I_{inf} – information impact and state of the information environment in the area of stabilization actions.

4. The resources of BTGr in stabilization actions will be presented as a resource vector:

$$R_i(t) = \{P_i, E_i, M_i, L_i\}, \quad (5)$$

where: P_i – combat capability of personnel;
E_i – physical and psychological exhaustion;
M_i – medical losses;
L_i – logistics support.

$$\frac{dE_i(t)}{dt} = \alpha \cdot T_{\text{черг}} - \beta \cdot T_{\text{відн}}, \quad (6)$$

To assess the effectiveness of the functioning of the BTGr of the National Guard of Ukraine, it is proposed to use an integral performance indicator, which includes:

- the level of security of the area;
- prompt response;
- the level of trust of the civilian population;
- degree of resource depletion.

5. The generalized criterion can be presented as:

$$K_{stab} = \sum_{i=1}^{n} \omega_i \cdot K_i, \quad (7)$$

where: K_i – partial exponents;
ω_i – weight factors;
n – the number of criteria that characterize the capacity of the unit.

Conclusions

The article develops a formal model of the functioning of the battalion tactical group of the National Guard of Ukraine in the scenario of stabilization actions, which allows a comprehensive description of the interaction of units, management processes, resource provision and the external environment in a crisis area.

A structured description of service and combat processes of stabilization actions in the form of a sequence of interrelated phases is proposed, reflecting the logic of transition from the introduction of units into the area to the transfer of control to state authorities. This approach provides formalization of management decisions and creates the basis for the analysis of alternative scenarios for the use of BTGr of the NGU.

The threat model of the stabilization scenario is formalized, which takes into account not only military factors, but also the criminogenic situation, information and psychological influences, and social tension. This allows us to adequately reflect the complex nature of threats inherent in post-conflict and unstable territories.

A resource model of the functioning of the battalion tactical group of the National Guard of Ukraine has been developed, taking into account the combat capability of personnel, logistical support, medical losses and the processes of accumulation of physical and psychological fatigue. It has been shown that the fatigue factor is one of the key limitations of the effectiveness of stabilization actions in long-term operations.

An integral indicator of the effectiveness of stabilization actions is proposed, which combines the indicators of area security, prompt response, level of trust of the civilian population and resource stability of units. The use of such an indicator provides an opportunity to quantitatively compare different options for the organization and application of the BTGr of the National Guard of Ukraine.

The obtained scientific results can be used for scientifically grounded planning of stabilization actions of units of the National Guard of Ukraine, improvement of the training system for commanders and staffs, as well as for further research in the field of public administration and security related to post-conflict stabilization and restoration of control over territories.

References

1. *Zakon Ukrainy "Pro Natsionalnu hvardiiu Ukrainy" vid 13 berezna 2014 roku № 876-VII* [Law of Ukraine about the National Guard of Ukrain no. 876-VII]. (2014, March 13). *Ofitsiinyi portal Verkhovnoi Rady Ukrainy*. Retrieved from: https://zakon.rada.gov.ua/laws/show/876-18#Text (accessed 12.01.2026) [in Ukrainian].

2. Matsko O. Y., Mykus S. A., Solonnikov V. H. (2021). *Zastosuvannia suchasnykh informatsiinykh tekhnolohii u naukovii diialnosti* [Application of modern information technologies in scientific activity]. Kyiv: *NUOU im. I. Cherniakhovskoho*, 340 p. [in Ukrainian].

3. Tkachenko V. I., Smirnov E. B., Drobakha G. A., Bilchuk V. M., & Tristan A. V. (2008). *Teoriia pryiniattia rishen orhanamy viiskovoho upravlinnia* [The theory of decision-making by military administration bodies]. Kharkiv: *KhU PS* [in Ukrainian], 542 p. [in Ukrainian].

4. Gorodnov V. P., Drobakha G. A., Yermoshin M. O., Smirnov E. B., Tkachenko V. I. (2004). *Modeliuvannia boiovykh dii viisk (syl) protypovitrianoi oborony ta informatsiine zabezpechennia protsesiv upravlinnia nymy (teoriia, praktyka, istoriia rozvytku*) [Modeling of combat operations of air defense troops (forces) and information support of their management processes (theory, practice, history of development)]. Kharkiv: *KhVU*, 410 p. [in Ukrainian].

The article was submitted to the editorial office on 3 November 2025

УДК 351.86:355.4:356.35

К. О. Споришев, С. В. Бєлай

МОДЕЛЬ ФУНКЦІОНУВАННЯ БАТАЛЬЙОННОЇ ТАКТИЧНОЇ ГРУПИ НАЦІОНАЛЬНОЇ ГВАРДІЇ УКРАЇНИ У СЦЕНАРІЇ СТАБІЛІЗАЦІЙНИХ ДІЙ

У статті розроблено формальну модель функціонування батальйонної тактичної групи Національної гвардії України у сценарії стабілізаційних дій, спрямовану на обґрунтування управлінських рішень щодо складу, структури та порядку застосування підрозділів у кризових районах. Актуальність дослідження зумовлена зростанням ролі стабілізаційних операцій у сучасних умовах збройної агресії, гібридних загроз і тривалого постконфліктного управління територіями, що потребує поєднання військових, правоохоронних та гуманітарних функцій сил безпеки.

Показано, що підходи до моделювання діяльності батальйонних тактичних груп, які існують, здебільшого орієнтовані на класичні бойові дії та не повною мірою враховують специфіку стабілізаційних завдань, зокрема необхідність тривалого контролю території, охорони об'єктів критичної інфраструктури, патрулювання, проведення фільтраційних і контрдиверсійних заходів, а також взаємодії з цивільним населенням і органами державної влади.

Запропонована модель базується на системному представленні батальйонної тактичної групи НГУ як ієрархічної організаційно-функціональної системи, що функціонує в умовах змінної оперативної обстановки. У моделі формалізовано послідовність службово-бойових процесів стабілізаційних дій як скінченний автомат станів, модель загроз із урахуванням диверсійної активності, криміногенної ситуації, інформаційно-психологічних впливів та соціальної напруги, а також ресурсну модель, що відображає боєздатність, втому, медичні втрати та логістичне забезпечення підрозділів.

Особливу увагу приділено врахуванню факторів ресурсного виснаження та накопичення фізичної й психологічної втоми особового складу, які істотно впливають на ефективність стабілізаційних дій у довготривалій перспективі. Для оцінювання результативності функціонування БТГр НГУ запропоновано інтегральний показник ефективності, що поєднує рівень безпеки району, оперативність реагування, рівень довіри цивільного населення та ступінь ресурсного виснаження.

Практичне значення отриманих результатів полягає у можливості використання запропонованої моделі як науково-методичної основи для планування стабілізаційних дій, обґрунтування раціонального складу батальйонних тактичних груп НГУ, а також підвищення якості підготовки командирів і штабів у системі професійної військової освіти.

Ключові слова: *державна безпека, кризовий район, стабілізаційні дії, батальйонна тактична група, спроможність, бойовий потенціал, процес прийняття військового рішення, Національна гвардія України.*

Kostiyantyn Sporyshev – Doctor of Science in Public Administration, Associate Professor, Deputy Head of the Educational and Scientific Institute for Training of Managerial Personnel for Scientific Work – Head of the Research Laboratory of Construction and Operational Application of the National Guard of Ukraine, National Academy of the National Guard of Ukraine
https://orcid.org/ 0000-0003-4737-9698

Serhii Bielai – Doctor of Sciences in Public Administration, Professor, Head of the Center for Organization and Coordination of Scientific and Innovative Activities, National Academy of the National Guard of Ukraine
https://orcid.org/0000-0002-0841-9522