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DOI: [https://doi.org/1034169/2414-0651.2019.1\(21\).9-14](https://doi.org/1034169/2414-0651.2019.1(21).9-14)**O.V. DOKUCHAEV,***Office of the Security Service of Ukraine in the Kharkiv region***O.O. SVERGUNOV,** *National Institute for Strategic Studies of Ukraine***V.V. ZUBAREV,** *Doctor of Technical Sciences, Professor***I.B. CHEPKOV,** *Doctor of Technical Sciences, Professor, Honored Worker of Science and Technology, Laureate of the State Prize of Ukraine in the field of science and technology of Ukraine**(Central Scientific Research Institute of Armament and Military Equipment of Armed Forces of Ukraine)*

Evaluation method of realization the policy of military-technical cooperation (mtc) of Ukraine

Наведено підхід щодо формування методики проведення оцінки стану реалізації оборонно-промислової складової воєнно-технічної політики. Матеріали статті можуть бути корисними для фахівців оборонної галузі України на первинних етапах оцінювання рівню воєнної безпеки держави

Ключові слова: воєнна безпека держави, воєнно-технічна політика, експертна оцінка.

The policy of the MTC as part of the military-technical policy of Ukraine is the process of establishing and applying a set of scientific and organizational grounds, principles, criteria, methods, rules and norms aimed at defining the policy on exports, imports, international cooperation on development, production, modernization and repair of armaments and military equipment (AME). That is, the policy of the MTC as part of the MTP includes that part which is directly related to international transfers of AME, services and production of AME.

Taking into account the objectives of the study, the methodology for assessing the status of the implementation of the MTC policy as part of the MTP of Ukraine is projected.

It is necessary to choose a criterion and apply it to assess the policy of the MTC from the standpoint of the methods of system analysis. The MTC system is an organizational and economic system, which is a collection of state authorities, organizations and enterprises that are in charge of the management of the MTC process, the production and export of military goods (MG), spare parts and services, their interactions and relationships, as well as information links.

Many of the changing factors, such as the global environment, political, economic, military, social and other factors, affect the functioning of the MTC system. The choice of the correct criterion determines the results of evaluating various decision options.

State regulation in the field of military-technical cooperation means the definition of the main areas of activity in accordance with the political, economic and military interests of the state. State authorities within their powers need clear coordination and control of MTC. Every year, the importance of licensing activities for the development, manufacture, modernization, implementation, repair and disposal of MTC, weapons and armament is increasing. State authorities should be more rigorous to impose prohibitions or restrictions on international transfers of MG in accordance with Ukraine's international obligations in order to ensure transparency and protection of the political, economic and military interests of the state. In this, the Stockholm International Institute for Peace Studies often focuses on its expert reports. The Cabinet of Ministers, in the event of various situations in the world market, should provide state guarantees for the implementation of international transfers of MG. In the economic aspect, enterprises of the defense and industrial complex (DIC) should create conditions for preventing competition between the domestic subjects of the MTC on the foreign market.

In order to increase the efficiency of the MTP of Ukraine, it is necessary to clearly outline the powers of state authorities on issues of national security policy and policy of the MTC.

The task of developing a methodology

Appointment of the methodology – an assessment of the status of formation and implementation of the MTC policy as part of the MTP of Ukraine by the determined indicators and criteria.

Taking into account that the assessment of the status of formation and implementation of the MTC policy as part of the MTP of Ukraine is multicriteria with a large number of uncertainties and contradictions, then the methodology development will be carried out on the basis of statistical and system analysis using expert methods and conceptual approaches used in the work [1].

Many factors contribute to the formation and implementation of the MTC policy as part of the MTP [8-12]. Therefore, we will evaluate the MTC policy as a part of the MTP on the basis of multifactorial analysis [3, 4].

On the basis of statistical, normative-legal, scientific, and research information necessary for the proper preparation of methodological and analytical materials in the field of state MTP, the problem will be analyzed in three planes:

- military aspects of the MTC policy as part of the MTP;
- political aspects of the MTC to ensure the MTC policy as part of the MTP;
- economic aspects of the policy of the MTC as part of the problems of the formation and implementation of the MTP.

To develop a methodology for assessing the condition of implementation of the MTC policy as a component of the MTP of Ukraine, we use the mathematical apparatus presented in the paper [1].

Evaluation algorithm

Evaluate the state of formation and implementation of the MTC policy as part of the MTP of Ukraine is proposed by the algorithm formulated and used in the work [1].

The main features of the application of this algorithm in relation to the assessment of the state of formation and implementation of the MTC policy as part of the MTP are:

- definition of indicators for assessing the formation and implementation of the MTC policy as a component of the MTP;
- the formation of questionnaires taking into account all the features of the task of assessing the MTC policy as part of the MTP.

Expert evaluation is carried out according to the steps defined in [1, 2].

Criteria and indicators for assessing the MTC

The content of the MTC of Ukraine with foreign countries is the activities of authorized state authorities, organizations and enterprises, public and private companies and companies involved in the development, production, sale or purchase of military products, as well as with the planning, coordination and services of the military appointment. In theory, the PTS of Ukraine should pursue the following main goals:

in the military sphere – to ensure or balance the development of the combat capabilities of their own Armed Forces on the basis of the scientific and technological achievements of the national defense-industrial complex (DIC), as well as the use of scientific and technological achievements of foreign countries in their own interests;

in the political sphere – conquest (retention) and strengthening of political leadership in Ukraine’s vital national interests in countries and regions of the world; ensuring the ability, through the PTS, to influence the political, economic or military situation at the global or regional levels;

in the economic sphere – the receipt of currency funds for state needs (primarily for financial assistance to defense industries, restructuring of military production, utilization of weapons and equipment, etc.), increasing the competitiveness of Ukraine’s military products on the world market of armaments and, thus, its share in the world economy.

In determining the criteria, expert assessments are used with all their disadvantage, although for many systemic analysis tasks that are difficult to formalize, this is the only way to construct a criterion.

In determining the integral criterion for evaluate the state of formation and implementation of the MTC policy as part of the MTP of Ukraine and the complex indicators (factors), the approaches presented in [1, 5, 6, 7] were used. As an integral criterion for evaluate the state of formation and implementation of the MTC policy of Ukraine, we will determine the effectiveness of the policy on a set of complex indicators (factors), which determine the overall assessment of the MTC policy as a component of the MTP. The effectiveness of the MTC policy as a component of the MTP E will be defined as follows:

$$E = \sum_{i=1}^n k_i K_{if} \text{ , ,} \tag{1}$$

where k_i – weighted coefficients of complex factors; K_{if} – value i -th complex factor; n – is the number of complex factors.

Weight factors of complex factors are determined on an expert level. In the presence of a group of experts, the value of complex factors are found is an average.

Define the scale of the evaluation MTC policy as a component of the MTP in the form of interval values as shown in Table. 1

Table 1
Scale for evaluating the PTS performance indicator

MTC policy as part MTP	The value of the indicator E
Very effective	$E \geq 0.8$
Effective	$0.8 > E > 0.6$
Insufficiently effective	$0.6 > E > 0.4$
Ineffective	$0.2 < E \leq 0.4$
Very ineffective	$E \leq 0.2$

Substantiation of indicators in the political, economic and military spheres characterizing the effectiveness of the operation of the MTC

The content of the MTC of Ukraine with foreign states is the export-import activity of the executive authorities of the state, organizations and enterprises that are involved in the development, production, sale or purchase of military products, as well as with planning, coordination and

military services. The MTC of Ukraine has both an export component and an imported one. In recent years, the import of AME has a number of problematic aspects, namely:

military aspects of technical equipment of the Armed Forces and other military formations of Ukraine: ensuring strategic stability, strengthening Ukraine’s military-political positions, etc.;

political aspects of international cooperation Ukrainian defense industrial complex for the production of weapon systems. First of all, it is the provision of access to scientific and technological achievements of foreign countries for the purpose of their further use by the national defense industrial complex to create effective AME systems;

direct procurement of foreign AME for the needs of the military organization of the country (MOC), economic item of AME disposal, etc.

Based on the foregoing, **complex indicators (factors) that significantly affect the policy of the MTC as a component of the MTP, are:**

assessment of military aspects of the formation of the MTC policy as a component of the MTP (indicator in the military sphere);

assessment of political aspects of the MTC policy as a component of the MTP (indicator in the political sphere);

assessment of the economic aspects of the MTC policy as a problem of formation and implementation of the MTP (indicator in the economic sphere).

Characteristics of complex indicators

The military aspects of the formation of the MTC policy as a component of the MTP, we will evaluate on factors (indicators):

E ess – the level of ensuring strategic stability and security in the regions of the world vital for Ukraine’s national interests;

E mpp – the level of strengthening of Ukraine’s military-political positions in the regions of the world vital to Ukraine’s national interests;

E imp – indicator of support at sufficient level of Ukrainian military potential.

The political aspects of the MTC policy as a component of the MTP, we will evaluate on indicators:

E rpl – the level of conquest (retention) and strengthening of political leadership in the regions of the world vital for Ukraine’s national interests;

E pir – the level of ensuring the possibility of political influence at the global and regional levels of the world;

E psp – the level of provision of social protection of personnel of enterprises developing and producing military purpose goods (MPG).

The economic aspects of the MTC policy as a problem of formation and implementation of the MTP will be assessed by the indicators:

E soe – the total amount of exports of MPG per year;

E pso – growth of the total amount of exports for the year compared to the previous year;

E aop – the amount of the export orders portfolio of the MPG;

E iop – increase in the amount of the orders portfolio for export of MPG;

E eee – amount of foreign exchange earnings from exports per year;

E iee – increase the amount of foreign exchange earnings from exports per year;

E psd – the level of the share of payment at the expense of the state debt in the total amount of export of MPG per year;

E bso – the level of the balance of the structure of orders;

E dfm – the amount of purchases of MPG and dual use (DU) of foreign manufacture;

E ofei – the cost of offset contracts for the export and import of MPG and DU.

Indicators for the monitoring of the MTC of Ukraine with foreign countries are given in Table. 2

Table 2
Indicators for evaluating the status of the MTC

№	Name of indicator	Conditional abbreviated designation
1	Indicators in the political sphere	
1.1	The level of conquest (retention) and strengthening of political leadership in the regions of the world vital for Ukraine’s national interests	<i>E rpl</i>
1.2	The level of ensuring the possibility of political influence at the global and regional levels of the world	<i>E pir</i>
1.3	the level of provision of social protection of personnel of enterprises developing and producing military purpose goods MPG and DU	<i>E psp</i>
2	Indicators in the economic sphere	
2.1	The total amount of exports of MPG and DU per year	<i>E soe</i>
2.2	Growth of the total amount of exports for the year compared to the previous year	<i>E pso</i>
2.3	the amount of the export orders portfolio of the MPG and DU	<i>E aop</i>
2.4	Increase in the amount of the orders portfolio for export of MPG and DU	<i>E iop</i>
2.5	Amount of foreign exchange earnings from exports per year	<i>E eee</i>
2.6	Increase the amount of foreign exchange earnings from exports per year	<i>E iee</i>
2.7	The level of the share of payment at the expense of the state debt in the total amount of export of MPG and DU per year	<i>E psd</i>
2.8	The level of the balance of the structure of orders	<i>E bso</i>
2.9	The amount of purchases of MPG and dual use (DU) of foreign manufacture	<i>E dfm</i>
2.10	The cost of offset contracts for the export and import of MPG and DU	<i>E ofei</i>
3	Indicators in the military sphere	

№	Name of indicator	Conditional abbreviated designation
3.1	The level of ensuring strategic stability and security in the regions of the world vital for Ukraine's national interests	<i>E_{ess}</i>
3.2	The level of strengthening of Ukraine's military-political positions in the regions of the world vital to Ukraine's national interests	<i>E_{mpp}</i>
3.3	Indicator of support at sufficient level of Ukrainian military potential	<i>E_{imp}</i>

The general positions of this assessment are reduced to the fact that the effectiveness of the MTC is estimated for each sphere (political, economic, military) according to the relevant indicators.

Military sphere. The total efficiency rate of MTC in the military sphere E_B can be represented as follows:

$$E_B = \sum_{l=1}^L r_l \times Y_l,$$

(2)

where L – the number of indicators of the MTC's effectiveness in the military sphere; r_l – weight coefficient, determined by expert method; Y_l – the significance of the indicators of the MTC's effectiveness in the military sphere.

Using conditional abbreviations in Table 2, Table 3 shows the values of the weighting coefficients r_l , which correspond to the values of the MTC performance indicators in the military sphere.

Table 3

Weighting coefficients of indicators of the MTC's effectiveness in the military sphere

Designation of the factor and its components	Conditional abbreviated designation of the indicator (factor) of influence BTC	Marking of the weight coefficient of influence	The value of the weight coefficient of influence
Y_1	<i>E_{ess}</i>	r_1	0,3
Y_2	<i>E_{mpp}</i>	r_2	0,3
Y_3	<i>E_{imp}</i>	r_3	0,4

Political sphere. The total efficiency rate of MTC in the political sphere can be represented as follows:

$$E_{II} = \sum_{i=1}^M r_i \times Y_i,$$

(3)

where M – is the number of indicators of the MTC's effectiveness in the political sphere; r_i – weighted coefficient, determined by expert method; Y_i – the significance of the indicators of the PTS's effectiveness in the political sphere.

Using conditional abbreviations in Table 2, Table 4 shows the weighting coefficients r_i , which correspond to the value of the indicators of the MTC performance indicators in the political sphere.

Table 4

Weighting coefficients of indicators of the MTC's effectiveness in the political sphere

Designation of the factor and its components	Conditional abbreviated designation of the indicator (factor) of influence BTC	Marking of the weight coefficient of influence	The value of the weight coefficient of influence
Y_1	<i>E_{rpl}</i>	r_1	0,4
Y_2	<i>E_{pir}</i>	r_2	0,3
Y_3	<i>E_{psp}</i>	r_3	0,3

Economic sphere. The total efficiency rate of MTC in the economic sphere can be represented as follows:

$$E_E = \sum_{j=1}^Q r_j \times Y_j,$$

(4)

where Q – is the number of indicators of the MTC's effectiveness in the economic sphere; r_j – weight coefficient determined by the expert method; Y_j – the significance of the indicators of the PTS's effectiveness in the economic sphere.

Using conditional abbreviations in Table 2, Table 5 shows the weighting coefficients r_j , which correspond to the value of the indicators of the MTC performance indicators in the economic sphere.

Table 5

Weighting coefficients of indicators of the MTC's effectiveness in the economic sphere

Designation of the factor and its components	Conditional abbreviated designation of the indicator (factor) of influence BTC	Marking of the weight coefficient of influence	The value of the weight coefficient of influence
Y_1	<i>E_{soe}</i>	r_1	0,2
Y_2	<i>E_{pso}</i>	r_2	0,1
Y_3	<i>E_{aop}</i>	r_3	0,1
Y_4	<i>E_{iop}</i>	r_4	0,2
Y_5	<i>E_{eee}</i>	r_5	0,1
Y_6	<i>E_{iee}</i>	r_6	0,05
Y_7	<i>E_{psd}</i>	r_7	0,1
Y_8	<i>E_{bsso}</i>	r_8	0,05
Y_9	<i>E_{d fm}</i>	r_9	0,05
Y_{10}	<i>E_{ofei}</i>	r_{10}	0,05

Taking into account the following as an integral indicator of the efficiency of the MTC of Ukraine, the following equation can be used:

$$E = p_1 E_{II} + p_2 E_E + p_3 E_B = p_1 \sum_{i=1}^M r_i Y_i + p_2 \sum_{j=1}^Q r_j Y_j + p_3 \sum_{l=1}^L r_l Y_l,$$

(5)

where p_1, p_2, p_3 – weighted coefficients (determined by the expert method).

Method for evaluation of formation of the MTC policy as a component of the MTP, proceeding from the military (military sphere) aspects

On the basis of the expert estimation method, we will present an approach to the analysis of the efficiency of the MTP in terms of the effectiveness of the formation of the MTC policy as a component of the MTP.

The policy of the subsystems of the MTC directly affects both the MTP in general and the military-political stand (MPP). Therefore, it is important to develop a methodical apparatus for assessing the impact of military factors on the policy of the MTC as a component of the MTP, and in the future, the development of recommendations for the improvement of the MTP.

Taking into account the analysis and designation in the Table 2, the expert evaluation of the complex coefficient (assessment of the formation of the policy of the MTC as part of the MTP, based on military aspects), can be calculated by the formula

$$E_B = \sum_{i=1}^L r_i \times Y_i, \quad (6)$$

where r_i and y_i – weighted coefficients determined by the expert method. They take into account the levels of:

ensuring strategic stability and security in the regions of the world vital for Ukraine's national interests;

strengthening of Ukraine's military-political positions in the regions of the world vital to Ukraine's national interests;

support at sufficient level of Ukrainian military potential.

Method for evaluation of formation of the MTC policy based on political aspects

In this section, based on the method of expert evaluations, describes a methodological approach to analyzing the effectiveness of the MTC policy in terms of evaluation the political aspects of the formation and realization of this policy.

Various institutions of power (the President of Ukraine, the National Security and Defense Council of Ukraine, the Cabinet of Ministers, the Verkhovna Rada, etc.) are influenced by decisions of strategic importance in formation of the MTC policy.

Based on the institutional system (structure), the formation and organization policies MTC and MTP affected by the following factors:

political leadership of Ukraine in the international arena;
the distribution of powers of the state authorities regarding the formation and realization of the MTC in the state;
creation of the regulatory and legal base of the MTC;
creation of the MTC system in the state.

Relevant for Ukraine is the legal framework within MTC participation of Ukrainian entities in international associations created for projects of research, development, production, modernization and disposal of AME. To date, there are not defined rights (including the results of intellectual activity) of entities in the processes of the creation of AME with the use of domestic and foreign investors, not worked

out normative documents on the management of DIC in the performance of the tasks of ensuring the defense sufficiency of the state, including institutions of various forms property.

Therefore, it is important to develop a methodical apparatus for evaluating the policy of the MTC, and in the future to develop recommendations for the improvement of this policy from the point of view of the political system (structure) of the state.

Taking into account the analysis and designation in the table 2, the expert value of the complex coefficient of evaluation of political aspects of the policy of the MTC as a component of the MTP can be calculated by the formula

$$E_{II} = \sum_{i=1}^M r_i \times Y_i, \quad (7)$$

where r_i and y_i – weighted coefficients determined by the expert method. They take into account the levels of:

conquest (retention) and strengthening of political leadership in the regions of the world vital for Ukraine's national interests;

ensuring the possibility of political influence at the global and regional levels of the world;

provision of social protection of personnel of enterprises developing and producing military purpose goods MPG.

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