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A method for determining the required number of workable samples of weapons and military equipment to ensure a given level of combat capability of a military formation

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Abstract. The relevance of the problem under study is determined by the necessity to improve the methodological apparatus for justifying the required number of workable weapons and military equipment (WME) to ensure the required level of combat capability of military formations. The article aims to disclose a method for determining the required number of workable samples of

weapons and military equipment to ensure a given level of combat capability of a military formation. The article is focused on the possibility of using a nonlinear function to determine the number of workable samples of weapons and military equipment. A workable sample of weapons and military equipment is a state of the sample when it can perform all the required functions. A required function of a sample is a function or set of functions of the sample, the performance of which is considered a necessary condition for the compliance of the sample with its intended purpose. When planning the staffing of military formations with workable samples of weapons and military equipment, the state's ability to allocate the necessary funds to equip the Armed Forces of Ukraine with workable samples should be considered. This process should be based on accurate calculations and in-depth and wide-ranging economic analysis and decisions should be scientifically based, motivated and optimal. The article considers the preventable damage to a military formation when determining the required number of workable samples of weapons and military equipment. According to the proposed method, it is possible to assess the sufficiency of the allocated funds to maintain the combat capability of military formations by providing workable samples of weapons and military equipment at a level not lower than the given one. The article uses a nonlinear function to determine the required number of workable samples to ensure a given level of combat capability of a military formation. The example provided in the article on justification of the procedure for providing troops (forces) with the required number of workable samples of weapons and military equipment allows to ensure the required level of combat capability of military formations, to assess the sufficiency of the allocated funds for providing troops with the required number of samples in the case of nonlinear dependence of the coefficient of preserving the effectiveness of combat use of troops in terms of the level of provision of them with workable weapons and military equipment on the allocated funds. After drawing a graph of the above dependence, determining a military formation’s level of combat capability with known allocated funds for purchasing, maintaining and using WME samples is quite simple.

Keywords: combat capability, sample of weapon and military equipment, funds, function.

Introduction

The experience of the anti-terrorist operation and the Joint Forces Operation in Donetsk and Luhansk regions shows that the ability of the logistics support system of the Armed Forces of Ukraine to solve problems does not meet the current requirements for the complete, uninterrupted and timely supply of troops with weapons and military equipment (WME), missiles, ammunition, and other material and technical assets (MTA). The success of an operation (combat actions), according to the practice of using troops (forces), primarily depends on the timely and complete supply of troops with material and technical assets (weapons, missiles and ammunition), fuels and grease, military equipment, food, etc. Nowadays, one of the main issues of further development of the Armed Forces of Ukraine is the quality and completeness of military-technical policy, the degree of implementation of which directly affects the state and technical equipment of the Armed Forces and depends on various components that have both positive and negative impact on the state and further development of the Armed Forces. A vital role in this process is financing the demand in the required amount and scientific substantiation of mid-term and long-term plans for the development of the Armed Forces of Ukraine’s WME. On the one hand, such a development should be based on ensuring the required level of defence demands and the state’s economic opportunities. On the other hand, it should be based on the combat and technical characteristics of WME. The level of funding for defence needs directly depends on the accomplishment of the task of equipping the Armed Forces with WME. This raises the task of finding the most optimal (reasonable) way to provide the Armed Forces of Ukraine with samples of WME from a military and economic point of view. Today, we can no longer rely on intuition and experience alone, so it is to improve the mechanisms for making justified decisions on the development of the Armed Forces of Ukraine, where reserves of material and financial resources

are hidden. This process should be based on accurate calculations and in-depth and wide-ranging economic analysis, and decisions should be scientifically grounded, motivated and optimal. Studies show that during the combat use of troops, a several problematic issues may arise regarding their provision with the required number of workable WMEs and consumable MTA, which affects the level of combat capability of formations (units). It is necessary to have an appropriate methodological apparatus for justifying the required number of workable WMEs and consumable MTA to ensure the necessary level of combat capability of military formations. Hence, the necessity to identify logistical support measures that would supply the formations (units) with the required number of technically ready WME to maintain the combat capability of troops (forces) at a given level, taking into account the allocated financial resource, is an important task.

Methodological Framework

The most important task in creating a modern logistics support system for the Armed Forces of Ukraine is to build this system from a unified methodological, particularly theoretical, perspective. One of the reasons for the unjustified variety of the logistics support system in the types of Armed Forces, as well as in the branches of the armed forces and special forces, is the lack of a single modern methodological apparatus for substantiating the requirements for the capabilities of such important functional components of this system as the systems for supplying troops with WME and MTA. The point is not about the peculiarities of the functioning of these support systems in a particular type of Armed Forces, a branch of the armed forces, or special forces. Such peculiarities do exist, but they are not manifested at the level of the methodological apparatus for substantiating the requirements for the capabilities of these systems because, in general, their functioning is subject to almost identical patterns. The reason for this is that the development of logistics support systems and theoretical provisions for logistics support tasks that are essentially the same in nature was carried out from a departmental, not always advanced, perspective. A workable sample of WME is a state of the sample in which the values of all the main parameters characterising the ability of the sample to perform the specified functions meet the requirements of the technical documentation. If a workable WME sample has a set service life, is refuelled, equipped with spare tools, supplies and proper ammunition, and is prepared to perform its tasks, it becomes technically ready. In other words, we should not only talk about providing troops (forces) with samples of WME but also about providing these samples with the necessary amount of MTA, primarily ammunition and fuel. It is clear that the required amount of supplies of missiles and ammunition, fuel and grease, for example, before the start of an operation (battle), should be aligned with their planned expenses and projected losses in the performance of further combat missions by troops, as well as with the expected number of combat-ready WME samples. Obviously, all this is not conducive to building a rational logistics system. The development of new methods and techniques that describe the process of functioning of the logistics support system is a contribution to the methodology of substantiating the logistics support system for troops (forces). They clarify and develop certain theoretical provisions on the logistics support system and develop a modern methodological apparatus that can be used to justify requirements for support systems, for example, for weapons, missiles and ammunition and other MTA, functioning in the interests of certain types of the Armed Forces, branches of the Armed Forces, special forces and the Armed Forces as a whole. The issue of supplying troops with weapons and other MTA is being resolved with the emergence of military structures. Many researches, studies and training programmes are devoted to these issues. Thus, the issue of providing troops with WME and MTA was considered in [8], [9], [24]. These studies developed the theoretical foundations for providing the armed forces with the required number of samples of WME and MTA. These issues were also considered in [3], [8], [17]. These publications addressed the issue of supplying troops with both WME and MTA samples. Article s were conducted on the supply of units (subunits) with WME and MTA and the supply of military formations [13]. A several studies have been analysed on the provision of troops (forces)

with the required number of MTA [18], [19], [20], the creation of their reserves [21] and their echeloning [22]. Provision of the troops (forces) with WME is also carried out by creating reserves. In preparation for this article, the sources on this issue were analysed [4], [5]. The supply of WME and expendable MTA is provided not only to formations (units, subunits) but also to other military formations. The article analyses the issue of supplying the territorial defence forces [7]. Since the article dealt with the cost of purchasing, maintaining and using a sample of WME, this issue was also studied [6]. Troops are provided with workable samples of WME to achieve a certain level of combat capability. A significant number of publications are devoted to the issue of ensuring the combat capability of troops, such as [25]. As we can see, the researchers pay considerable attention to the issue studied in the article. Therefore, an analysis of recent studies and publications aimed at substantiating recommendations for ensuring the required level of combat capability of troops has shown that there are currently significant methods and techniques for calculating demand for workable WME. However, the dependence of the level of combat capability of troops on the manning of military formations with WME is usually considered a linear function. Considering the allocated financial resources, the methodological apparatus for substantiating logistics support measures to maintain the required level of combat capability of troops (forces) for the manning of WME should be based on scientific approaches using modern mathematical models.

Results and Discussions

The effectiveness of the system of providing troops with workable weapons and military equipment (WME) is determined by several indicators. A generalised indicator that characterises the achievable level of provision of troops with workable WME in a given period of operation is the coefficient of preserving the effectiveness of combat employments' troops by the level of provision of their workable WME ($K_{зе\ o}$), which is calculated as the ratio of the current number N of workable WME samples in a certain time to the number N_o of such samples created at the beginning of the operation (battle).

For troops to successfully perform their combat missions, knowing how much WME they need during an operation which is lasting T days is necessary. Obviously, the performance of these tasks by combat military formations is determined, by their firepower on the enemy, which reduces its combat potential by destroying its military assets. It decreases our troops' average daily relative loss of WME from the projected β'_o to the permissible $\beta_{\text{П}} \le \beta'_o$. The difference between $\beta'_o - \beta_{\text{П}}$ characterises the required value of the so-called prevented damage of our troops for the successful completion of their combat missions - the fulfilment of the condition: $K_{зе\ o} \ge K^{вим}_{зе\ o}$, where $K^{вим}_{зе\ o}$ is the specified (required) value of the coefficient of preserving the effectiveness of combat use of troops by the level of their provision with WME. The experience of troops equipped with WME in the number of N_o units shows that this condition can be violated within a few days of an operation, as well as in modern combat operations. It cannot be met throughout the entire operation, lasting T days.

For more active fire impact on the enemy, in order to achieve more significant preventable damage to own troops before the start of the combat actions, you need to have a larger amount of WME $N^{вим}_o$

The ratio of the current number of WMEs in the military formation to the number of WME at the beginning of the operation (the authorized number of WMEs) will be equal to the ratio of the corresponding costs of their acquisition, maintenance and use.

The level of combat capability of military formation, depending on its WME, is determined by

the following formula:

$$K_{зео} = \frac{N}{N_o} = \frac{N_o \cdot (1 - \beta'_o \cdot T)}{N_o} = \frac{C}{C_o} = \frac{c_{пр} \cdot N_o \cdot (1 - \beta'_o \cdot T)}{c_{пр} \cdot N_o} \geq$$

$$\geq K_{зеос}^{вим} = \frac{C_o^{вим}}{C_o} - \beta'_o T, \quad (1)$$

where β'_o – average daily relative costs of WME;

T – duration of the operation;

C – costs of acquiring, maintaining and using the current number of workable WME;

C_o – costs of acquiring, maintaining and using the current number of staffed WMEs;

$c_{пр}$ – the cost of one functional sample of WME

$K_{зеос}^{вим}$ – the specified (required) value of the coefficient of preserving the effectiveness of combat employment of troops in terms of the level of provision of their workable WME, taking into account costs (expenditure of financial resources)

$C_o^{вим}$ – costs of acquiring, maintaining and using the $N_o^{вим}$ WME.

It is possible to reach a certain level of troops provision with WME by increasing the number of WME samples, meaning to increase the ratio $C_o^{вим} / C_o$, associated with the funds available for this purpose.

The dependence chart (1) is linear – a straight line.

In practice, the level of combat capability of the military formation depends on the ratio of the current number of WME of the military formation to the number of WME at the beginning of the operation (the ratio of the costs of their acquisition, maintenance and use), which is usually non-linear.

In this article, we will consider the case when a non-linear S-shaped function describes the dependence:

$$K_{зеос}^{вим} = \frac{N_\delta}{N_o^{вим}} = 1 - e^{-\lambda \cdot (\frac{C_o^{вим}}{C_o})^{\kappa}}, \quad (2)$$

where N_δ – current number of military formation`s WME considering prevented damage;

$N_o^{вим}$ – needed (required) number of military formation`s WME before the start of the combat operations, taking into account prevented damage;

which has concave and convex sections of the curve depending on the ratio $\frac{C_o^{вим}}{C_o}$.

The point $\frac{C_o^{вим}}{C_o} = (\frac{C_o^{вим}}{C_o})_0$, that separates the convex part of a continuous line $f(K_{зео\ c}^{вим} = f \cdot \frac{C_o^{вим}}{C_o})$ from the concave part is called an inflection point, which can have different meanings depending on the function's behaviour $K_{зео\ c}^{вим} = f \cdot \frac{C_o^{вим}}{C_o}$.

The presence of an inflection point $(\frac{C_o^{вим}}{C_o})_o$ is detected by changing the sign of the second derivative $f''(\frac{C_o^{вим}}{C_o})$ when passing through the value $\frac{C_o^{вим}}{C_o} = (\frac{C_o^{вим}}{C_o})_0 = x = x_O$, where $x = \frac{C_o^{вим}}{C_o}$.

In particular, for the function

$$K_{зео\ c}^{вим} = \frac{N_\delta}{N_o^{вим}} = 1 - e^{-\lambda \cdot (\frac{C_o^{вим}}{C_o})^\kappa} = 1 - e^{-\lambda \cdot x^\kappa} = K_{зео\ c}^{вим}(x)$$

taking into account that its first derivative, based on the type of adopted function, must be positive:

$$\frac{d\ K_{зео\ c}^{вим}(x)}{d\ x} = K_{зео\ c}^{вим\prime}(x) = (1 - e^{-\lambda \cdot x^\kappa})' = (1 - e^{-\lambda \cdot X})' = \lambda \cdot e^{-\lambda \cdot X} \cdot (x^\kappa)' =$$

$$= \lambda \cdot \kappa \cdot x^{\kappa - 1} \cdot e^{-\lambda \cdot x^\kappa} > 0,$$

the coordinates of the inflection point, at which the second derivative must be equal to zero, are found from the equation of the second derivative of the function $K_{зео\ c}^{вим}(x)$:

$$\frac{d}{d\ x}\left[\frac{d\ K_{зео\ c}^{вим}(x)}{d\ x}\right] = \frac{d^2\ K_{зео\ c}^{вим}(x)}{d\ x^2} = K_{зео\ c}^{вим\prime\prime}(x) =$$

$$= \lambda \cdot \kappa \cdot (\kappa - 1) \cdot x^{\kappa - 2} \cdot e^{-\lambda \cdot x^\kappa} - \lambda \cdot \kappa \cdot x^{\kappa - 1} \cdot \lambda \cdot \kappa \cdot x^{\kappa - 1} \cdot e^{-\lambda \cdot x^\kappa} =$$

$$= \lambda \cdot \kappa \cdot x^{\kappa - 1} \cdot e^{-\lambda \cdot x^\kappa} \cdot \left[(\kappa - 1) \cdot \frac{x^{\kappa - 2}}{x^{\kappa - 1}} - \lambda \cdot \kappa \cdot x^{\kappa - 1}\right] = 0$$

or

$$\left[(\kappa - 1) \cdot \frac{x^{\kappa - 2}}{x^{\kappa - 1}} - \lambda \cdot \kappa \cdot x^{\kappa - 1}\right] = 0,$$

this implies that

$$x^{\kappa} = \frac{\kappa - 1}{\kappa \cdot \lambda},$$

this means that the abscissa of the inflection point is:

$$x = x_O = \frac{C_O^{вим}}{C_O} = \left(\frac{C_O^{вим}}{C_O}\right)_0 = \sqrt[\kappa]{\frac{\kappa - 1}{\kappa \cdot \lambda}} = \left(\frac{\kappa - 1}{\kappa \cdot \lambda}\right)^{\frac{1}{\kappa}}. \quad (3)$$

It is clear that the function

$$K_{зео\,c}^{вим}(x) = 1 - e^{-\lambda \cdot x^{\kappa}} = 1 - e^{-\lambda \cdot \left(\frac{C_O^{вим}}{C_O}\right)^{\kappa}}$$

has only one inflection point

$$x_O = \left(\frac{C_O^{вим}}{C_O}\right)_0 = \sqrt[\kappa]{\frac{\kappa - 1}{\kappa \cdot \lambda}} = \left(\frac{\kappa - 1}{\kappa \cdot \lambda}\right)^{\frac{1}{\kappa}}.$$

The value of the function under consideration at the inflection point

$$K_{зео\,c}^{вим}(x = x_O) = 1 - e^{-\lambda \cdot x_O^{\kappa}} = 1 - e^{-\frac{\kappa - 1}{\kappa}},$$

doesn't depend on the value of the parameter λ, but is determined only by the value of the exponent κ.

The selected value of the parameter κ determines the ordinate $K_{зео\,c}^{вим}(x = x_O)$ to the inflection point $x_O = \left(\frac{C_O^{вим}}{C_O}\right)_0$ of the curve $K_{зео\,c}^{вим}(x = x_O)$, as well as the achievable level of combat effectiveness $K_{зео\,c}^{вим}(x = x_O)$ depending on the ratio $\frac{C_O^{вим}}{C_O}$.

Moreover, as the parameter κ increases, the value $K_{зео\,c}^{вим}(x = x_O) = 1 - e^{-\frac{\kappa - 1}{\kappa}} = 1 - \frac{1}{e^{\frac{\kappa - 1}{\kappa}}}$ at the inflection point grows and vice versa.

Then, on the known value of κ, and also $x = x_O = \frac{C_O^{вим}}{C_O} = \left(\frac{C_O^{вим}}{C_O}\right)_0$, can be calculated the second parameter of the function $K_{зео\,c}^{вим}(x)$:

$$\lambda = \frac{\kappa - 1}{\kappa \cdot x_O^{\kappa}} = \frac{\kappa - 1}{\kappa \cdot \left(\frac{C_O^{вим}}{C_O}\right)_O^{\kappa}}. \quad (4)$$

Thus, the selected value of the parameter λ affects the position of abscissa $x = x_o$ of the inflection point.

For a given κ with an increase in the parameter λ, the abscissa of the inflection point $x_O = (\frac{C_O^{вим}}{C_O})_0 = \sqrt[\kappa]{\frac{\kappa - 1}{\kappa \cdot \lambda}} = (\frac{\kappa - 1}{\kappa \cdot \lambda})^{\frac{1}{\kappa}}$ decreases and vice versa, this point and the curve $K_{зео\ c}^{вим}(x)$ shift to the left and the graph of the function $K_{зео\ c}^{вим}(x = x_O) = 1 - e^{-\lambda \cdot x_O^{\kappa}} = 1 - e^{-\frac{\kappa - 1}{\kappa}}$ with an increase in the parameter λ is pressed against the axis of ordinates $K_{зео\ c}^{вим}(x)$, keeping the value of κ at this point $(x = x_o)$, which is natural.

On the other hand, when changing the abscissa $x_O = (\frac{C_O^{вим}}{C_O})_0 = \sqrt[\kappa]{\frac{\kappa - 1}{\kappa \cdot \lambda}} = (\frac{\kappa - 1}{\kappa \cdot \lambda})^{\frac{1}{\kappa}}$ of the inflection point, hence when the parameter λ is changed, the value of the function $x_O = (\frac{C_O^{вим}}{C_O})_0 = \sqrt[\kappa]{\frac{\kappa - 1}{\kappa \cdot \lambda}} = (\frac{\kappa - 1}{\kappa \cdot \lambda})^{\frac{1}{\kappa}}$ in the inflection point doesn't change.

Acceptable values of the parameters κ and λ of the function $K_{зео\ c}^{вим}(x) = f(\frac{C_O^{вим}}{C_O}) = 1 - e^{-\lambda \cdot (\frac{C_O^{вим}}{C_O})^{\kappa}}$ can be chosen according to the following considerations:

if observations have shown that the abscissa of the inflection point $x = x_O = (\frac{C_O^{вим}}{C_O})_0$, equal to 1, corresponds, for example to the ordinate $K_{зео\ c}^{вим} = 0,4$ (these figures can be specified), hence from the previously given level to the inflection point

we have: $$K_{зео\ c}^{вим}(x = x_O) = 1 - e^{-\lambda \cdot x_O^{\kappa}} = 1 - e^{-\frac{\kappa - 1}{\kappa}} = 0,4 ,$$

$$\kappa = 2,04 , \quad (5)$$

that is accepted as valid for all current values of $x = (\frac{C_O^{вим}}{C_O})_0$;

then, at $x = x_O = \frac{C_O^{вим}}{C_O} = 1$ in accordance with the obtained expression $\lambda = \frac{\kappa - 1}{\kappa \cdot x_O^{\kappa}} = \frac{\kappa - 1}{\kappa \cdot (\frac{C_O^{вим}}{C_O})_O^{\kappa}}$

(4)

we have: $$\lambda = \frac{\kappa - 1}{\kappa \cdot x_O^{\kappa}} = \frac{\kappa - 1}{\kappa} = 0,51, \quad (6)$$

that is also valid for all current values of $x = \frac{C_o^{вим}}{C_o}$.

The value $K_{зео\,с}^{вим} = \frac{N_\delta}{N_o^{вим}} = 1 - e^{-\lambda \cdot (\frac{C_o^{вим}}{C_o})^{\kappa}}$ with the obtained κ = 2,04, λ = 0,51 and different $\frac{C_o^{вим}}{C_o}$ are listed in Table 1 and Figure 1.

Table 1. The value of $K_{зе\,о\,с}^{вим}$ (κ = 2,04, λ = 0,51 and different $\frac{C_o^{вим}}{C_o}$)

Indicator	Possible values of $C_o^{вим} / C_o$								
	0,8	1,0	1,2	1,4	1,6	1,8	2,0	2,2	2,4
$K_{зе\,о\,с}^{вим}$	0,28	0,40	0,52	0,64	0,74	0,82	0,87	0,92	0,95

Thus, for each fixed value of κ and λ, a separate dependence curve (2) will be plotted.

Knowing the current staffing number of WME (corresponding costs of their acquisition, maintenance and use), it is possible to determine the troops' achievable level of combat capability using a graph. As we can see, acceptable values of this level can occur when the ratio $C_o^{вим}/C_o$ is greater than one. This is because the calculations considered a certain number of samples of WME necessary to ensure a given level of prevented damage to a military unit and that they are added to its staffing number of WME.

If the military formation is supplied with WME at the level of staffing number, its combat capability per operation will be 0,4.

To achieve the level of combat capability of a military formation per operation lasting *T* days, for example, 0.74, the ratio $C_o^{вим} / C_o$ must be 1,6.

Suppose certain funds are allocated to provide a military formation with WME. In that case, the graph can be used to determine what funds are needed to ensure a certain level of combat capability of the troops. Hence, if $C_o^{вим} = C_o$, a military formation's level of combat capability at the end of the operation lasting *T* days will be 0,4.

Also, there is a way to determine which level of combat capability of a military formation can be achieved, knowing the amount of allocated funds. If $C_o^{вим} = 1,4 C_o$, then the achievable level of combat capability of the military formation at the end of the operation will be 0,64.

In Figure 1, the dashed line for comparison shows a straight line that is obtained from a linear dependence between $K_{зе\,о\,с}^{вим}$ and $C_o^{вим} / C_o$.

The analysis of studies and publications on the provision of troops with WME and MTA to maintain the combat capability of troops at a level not lower than specified shows that the logistics system is complex [2]. Several indicators were used in the research: the required number of WME samples, the required number of consumable MTA, the purchasing cost, maintaining and using WME samples, the level of combat capability of the troops, and others. In other words, multi-criteria are

used to find solutions to the supply of WME to the troops. In this regard, several sources [1], [15], [16] on the use of multi-criteria methods for decision-making were analysed. The works of the researcher, M. Potemkin, are devoted to the issue [10], [11], [12].

Thus, after analysing the procedure for providing troops with samples of WME, the methodological apparatus for justifying the required number of WME to ensure a certain level of combat capability of military formation, the article proposes a method for determining the required number of workable samples of WME to ensure a certain level or combat capability of military formation based on the use of nonlinear dependence of the current number of WME at the beginning of the operation (or the ratio of their costs).

Using nonlinear dependence allows to get more specific values of the calculations performed than those performed using a linear dependence. The graph (Fig. 1) allows us to determine the level of combat capability of the troops, depending on the funds allocated for the purchase, maintenance and use of WME, which significantly speeds up the calculations.

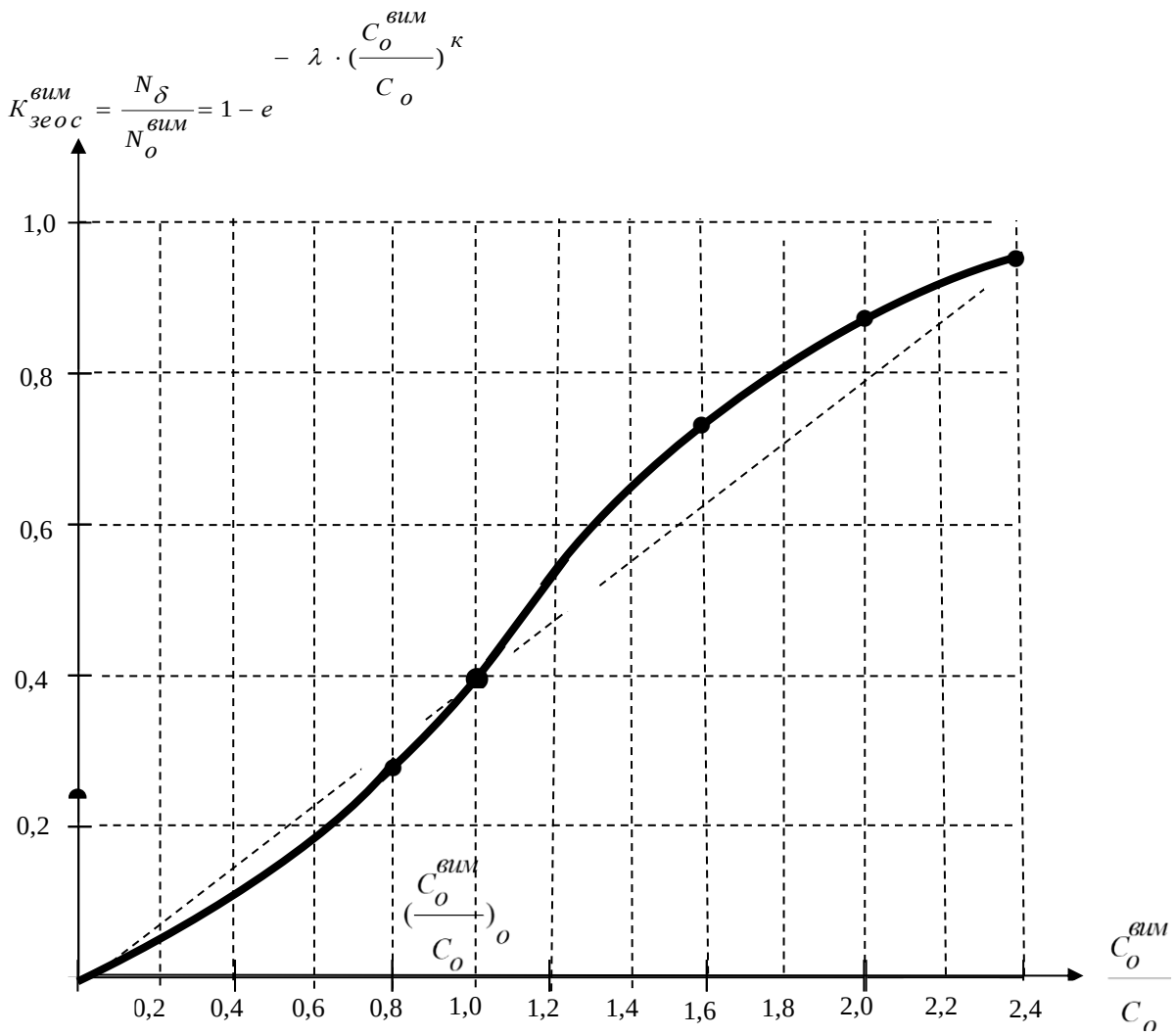


Figure 1. Dependency graph $K_{зеос}^{вим} = \frac{N_{\delta}}{N_{o}^{вим}} = 1 - e^{-\lambda \cdot (\frac{C_o^{вим}}{C_o})^{\kappa}}$

Conclusion

This method of determining the required number of workable samples of WME of a military formation allows to ensure the required level of combat capability of this formation and assess the sufficiency of the allocated funds to provide troops with the required number of WME in case of non-linear dependence of the coefficient $K_{зе}^{вим}{}_{о\ с}$ on the allocated funds.

Prospects for further research are to improve the methodological apparatus for substantiating the necessary volumes of consumable MTA for providing WME to maintain a given level of combat capability of a military formation.

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Анотація. Актуальність досліджуваної проблеми зумовлена необхідністю удосконалення методичного апарату для обґрунтування потрібної кількості працездатних зразків озброєння та військової техніки для забезпечення потрібного рівня боєздатності військових формувань. Метою статті є оприлюднення способу визначення необхідної кількості працездатних зразків ОВТ для забезпечення заданого рівня боєздатності військового формування. Стаття спрямована на дослідження можливості використання нелінійної функції для визначення кількості працездатних зразків озброєння та військової техніки. Працездатний зразок озброєння та військової техніки – це стан зразка, коли він здатний виконувати всі

потрібні функції. Потрібна функція зразка – це функція чи сукупність функцій зразка, виконання якої (яких) розглядають як необхідну умову відповідності зразка його призначенню. Під час планування укомплектованості військових формувань працездатними зразками озброєння та військової техніки повинні враховуватися можливості держави з виділення необхідних коштів на виконання завдань із оснащення Збройних Сил України працездатними зразками. Цей процес має ґрунтуватися на точних розрахунках, глибокому та всебічному економічному аналізі, а рішення повинні бути науково обґрунтованими, мотивованими, оптимальними. Під час визначення потрібної кількості працездатних зразків озброєння та військової техніки у статті береться до уваги запобіжний збиток військового формування. Запропонований спосіб дозволяє оцінити достатність виділених коштів для підтримання боєздатності військових формувань щодо забезпеченості працездатними зразками озброєння та військової техніки на рівні не нижче заданого. Для визначення необхідної кількості працездатних зразків з метою забезпечення заданого рівня боєздатності військового формування у статті використовується нелінійна функція. Наведений приклад щодо обґрунтування порядку забезпечення військ (сил) необхідною кількістю працездатних зразків озброєння та військової техніки дозволяє забезпечити потрібний рівень боєздатності військових формувань, оцінити достатність виділених коштів для забезпечення військ необхідною кількістю зразків у випадку нелінійної залежності коефіцієнта збереження ефективності бойового застосування військ за рівнем забезпеченості їх працездатними озброєнням та військовою технікою від виділених коштів. Після побудови графіка зазначеної залежності визначення рівня боєздатності військового формування при відомих виділених коштах на закупівлю, обслуговування та застосування зразків ОВТ є досить простим.

Ключові слова: боєздатність, зразок озброєння та військової техніки, кошти, функція.