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Justification of measures to improve the efficiency of engineering support for the use of troops (forces)

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Abstract. The relevance of the study is due to the need to increase the efficiency of engineering support for the use of troops (forces) of the Armed Forces of Ukraine in the modern armed conflict due to the high level of their losses in personnel, weapons and equipment, in particular on the enemy's minefields and from its firepower. In connection with the armed aggression of the Russian Federation against Ukraine, the question. The increase in the effectiveness of engineering support was further exacerbated by the massive use of mine weapons by the enemy and the rapid increase in these losses of our troops along the entire front line. The analysis of the use of our troops (forces) in the ongoing war showed the existence of a number of problematic issues of engineering support, which significantly reduce its effectiveness and lead to unjustifiably high levels of losses of troops (forces) in all types of combat. To eliminate these issues, it is considered expedient to determine the factors that most affect the efficiency of engineering support and determine the main measures to increase it to the appropriate level. The results of the study allowed to conclude that the main measures to improve the efficiency of engineering support the use of troops (forces) of the Armed Forces of Ukraine in the modern armed conflict is: improvement of the existing regulatory framework for engineering support of the Armed Forces of Ukraine, in particular to determine the required number of engineering units and subdivisions; improvement of organizational and staff structures of engineering units and subdivisions, as well as improvement of the existing management system of engineering support of the Armed Forces of Ukraine regarding the place of its command and control bodies in the general system of command and control bodies of the Armed Forces of Ukraine. The materials of the article are of practical value for the command-and-control bodies, which in modern operations (combat operations) of troops solve complex problems of early engineering preparation of the territory of the state for war and direct engineering support for the use of troops (forces).

Keywords: engineering support, efficiency, armed conflict.

Introduction

In connection with the armed aggression of the Russian Federation against Ukraine, the issue of the effectiveness of the use, provision and support of the Armed Forces of Ukraine, in particular engineering support, is considered an urgent issue of national security and defense of Ukraine (Zaluzhnyi, 2023). Analysis of the Anti-Terrorist Operation (hereinafter – ATO), the Joint Forces Operation (hereinafter referred to as JFO) and the Russian-Ukrainian war showed the important role of engineering support for the use of troops (forces) in achieving their success in combat operations. However, this analysis also showed that there are currently problems and questions engineering support, which significantly reduces its effectiveness and leads to unjustifiably high losses of our troops during hostilities along the entire front line (Calculation of the effectiveness of the use of engineering units in the ATO, 2015), (Analysis of the losses of the Armed Forces in the ATO from explosions on engineering barriers and recommendations for their reduction, 2018),

(Zaluzhnyi, Moisiuk, Shaptala, 2023). Experience shows that the main issue in a number of problematic issues of engineering support is the issue of the discrepancy between the capabilities of the existing composition of engineering units and subdivisions and the amount of engineering during the course that they need to perform in order to maintain mobility of their troops (forces), increasing their survivability and safety of use, as well as in order to limit the mobility of the enemy's forces and means (Voloschenko, 2016), (Order of the Chief of the General Staff – Commander-in-Chief of the Armed Forces of Ukraine, 2019), (Voloschenko, Chernykh, 2022), (Voloschenko, Kovalsky, 2023). To eliminate this problematic issue, it is considered necessary to determine the factors that most affect the effectiveness of engineering support for the use of troops (forces) and, taking them into account, to develop appropriate recommendations for raising it to the appropriate level (Voloshchenko, 2016).

Methodological Framework

The analysis of the organization of engineering support for the use of troops (forces) of the Armed Forces of Ukraine in recent operations and during the Russian-Ukrainian war shows that the main factors of negative impact on the effectiveness of engineering support are the combined nature of the use of troops (forces) during hostilities, as well as the relentless growth and the unprecedented use of minefields and engineering ammunition by the enemy to inflict losses on our troops (forces) (Matsko, 2020), (Kiziak, 2013), (Voloschenko, 2016). In modern conditions, in order to reduce the influence of these factors, it is considered expedient to expand the boundaries of research on problematic issues of engineering support in the following areas (Fig. 1).

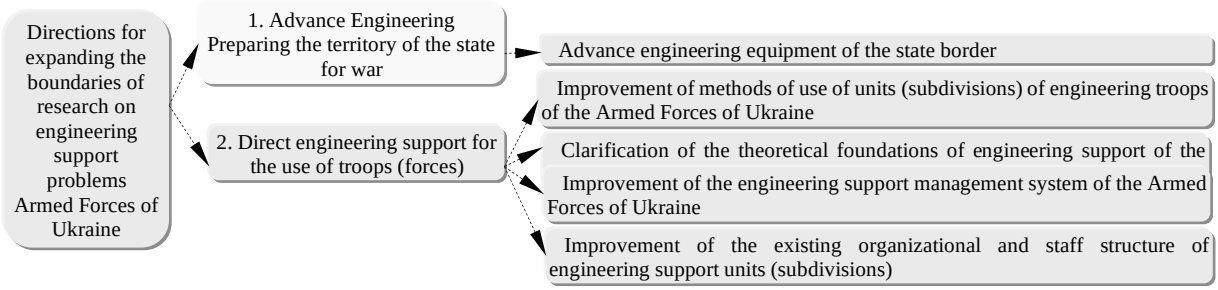


Figure 1. Possible directions to expand the boundaries of research on the most problematic issues of engineering support of the Armed Forces of Ukraine (option)

Results and Discussions

Let's take a closer look at the most important of these areas.

1. Advance engineering preparation of the territory of the state for war.

The need for early engineering preparation of the state's territory for war in the interests of increasing its defense capability is currently in no doubt (Voloschenko, 2016), (Zaluzhnyi, Moisiuk, Shaptala, 2022). However, in terms of scale, nature and scope of work, this preparation should be a clear answer at the moment It doesn't. The Armed Forces of Ukraine believe that the engineering preparation of the territory of the state for war should be carried out according to a single plan along the entire line of the state border to a depth of 150- 200 km (Doctrine of Engineering Support for the Use of Troops (Forces), 2020). The basis of this training should be engineering measures, which should be carried out in order to establish a system of field fortifications of troops (forces), preparation of a network of rockade and frontal roads, as well as the arrangement of a system of engineering barriers, which should be carried out by the engineering troops of the Armed Forces of Ukraine. Adherents of the other view, taking into account the large resource component of these measures, strongly reject such an approach and propose to act on the principle of "reasonable sufficiency", the

need for which is motivated by significant savings in resources (Peredrii, Khazanovich, Voloschenko, 2017). Taking into account the arguments of the parties, an expedient option is to determine the most problematic sections of the state border of Ukraine and the implementation of engineering measures in these areas by engineering units and subdivisions of the Armed Forces of Ukraine in cooperation with enterprises of the local economy in accordance with the plans for the mobilization deployment of troops and operational equipment of the territory of Ukraine.

2. Improvement of existing methods of use of units (subdivisions) of engineering troops of the Armed Forces of Ukraine in the modern armed conflict.

The need to improve the existing methods of using units (subdivisions) of the engineering troops of the Armed Forces of Ukraine in the current armed conflict is due to the experience gained in combat operations of our troops, primarily in the Russian-Ukrainian war (Moisyuk, Shaptala, 2022). In addition to the existing methods, in the author's opinion, it is necessary to consider the following options for the use of engineering units and subdivisions as military units and subdivisions that perform combat missions on a par with combined arms (Voloschenko, 2016) (Fig. 2).

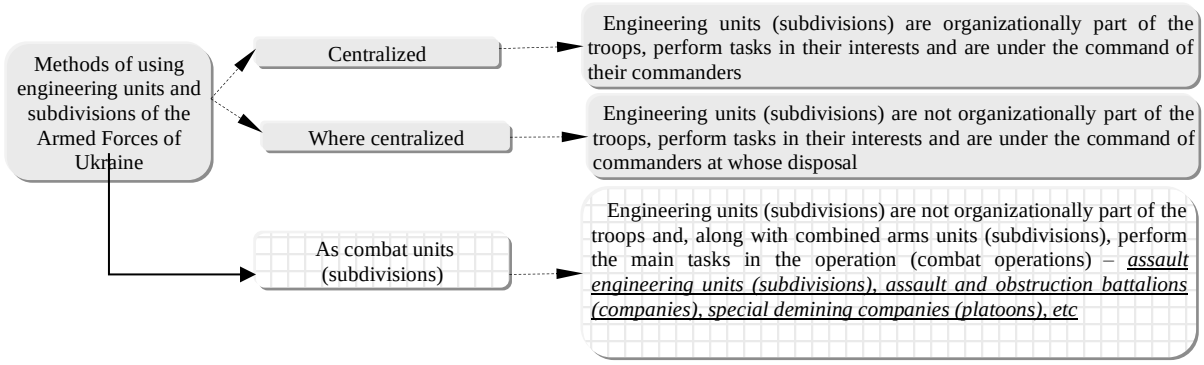


Figure 2. Methods of using engineering units and subdivisions of the Armed Forces of Ukraine in the modern armed conflict, which are proposed
(option)

3. Clarification of the theoretical foundations of engineering support of the Armed Forces of Ukraine.

Clarification of the theoretical foundations of engineering support of the Armed Forces of Ukraine (National Defense University of Ukraine named after Ivan Chernyakhovskyi, 2015) primarily concerns the definition of engineering support as one of the types of support for the use of troops (forces) and the need to determine groups of its measures or individual measures for comprehensive implementation in order to support mobility of its troops (forces), increasing their survivability and safety of use in operations (combat operations), as well as in order to limit the mobility of the enemy's forces and means. The variant of grouping in the course of engineering support of the Armed Forces of Ukraine, as proposed, is shown in Figure 3.

Analysis of information sources on the need to increase the effectiveness of engineering support for the use of troops (forces) in modern wars and armed conflicts (Matsko, 2020), (Kiziak, 2013), (Voloschenko, 2014), (Peredrii, Khazanovych, Voloschenko, 2017) indicates that the recommendations developed in this area are consideredin a scattered and unsystematic manner. Taking into account the above, the main measures to increase the effectiveness of engineering support for the use of troops (forces) of the Armed Forces of Ukraine in the modern armed conflict should be considered as those shown in Figure4.

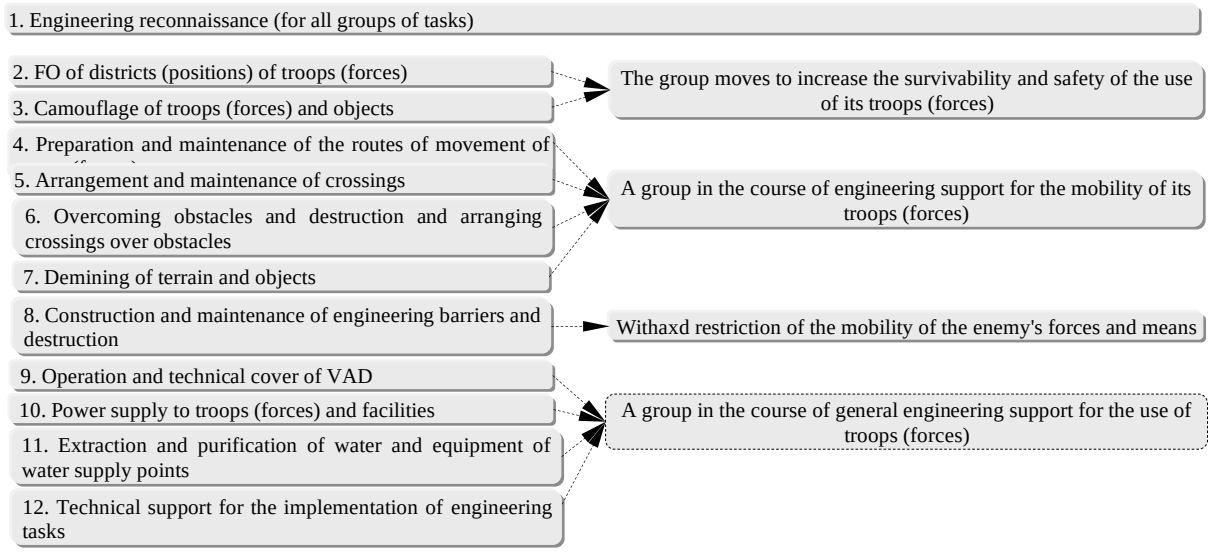


Figure 3. Grouping in the course of engineering support of the Armed Forces of Ukraine, which is proposed (option)

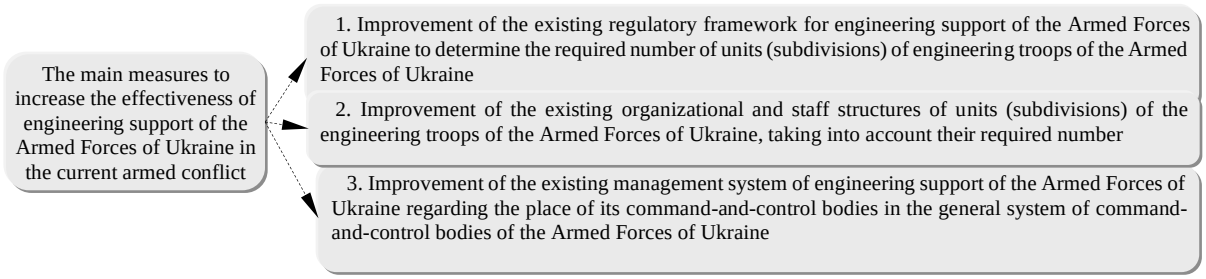


Figure 4. The main measures to increase the efficiency of engineering support for the use of troops (forces) of the Armed Forces of Ukraine in the modern armed conflict (option)

In the author's opinion, the most important measure in this list is the improvement of the existing regulatory framework for engineering support of the Armed Forces of Ukraine, in particular, regarding the determination of the required number of engineering units and subdivisions of the Armed Forces of Ukraine. And the importance of this issue is due to the lack of provisions in the current governing documents of the Armed Forces of Ukraine, how they determine the necessary the ratio of the total number of these units and subdivisions to the total number of troops (forces) that they support in engineering terms in the operation (combat operations) (Voloschenko, 2016). As an example, Figure5 shows a diagram that clearly demonstrates the existing ratio of the number of engineering units and subdivisions in the ground forces of the armed forces of the countries of the world and the Armed Forces of Ukraine to the total number of troops (forces) supported by them.

Figure 5 shows that the average number of engineering units and subdivisions is 5.5% of the total number of troops (forces). Taking into account this value, the number of engineering units and subdivisions of the Armed Forces of Ukraine should be approximately within 6%. As an example, the total number of engineering units of a separate mechanized brigade (SMB) of the Armed Forces of Ukraine is 3.5% of the total number of this brigade, which is 1% less than the total number of engineering units of a separate motorized rifle brigade of the Russian Federation (Table 1).

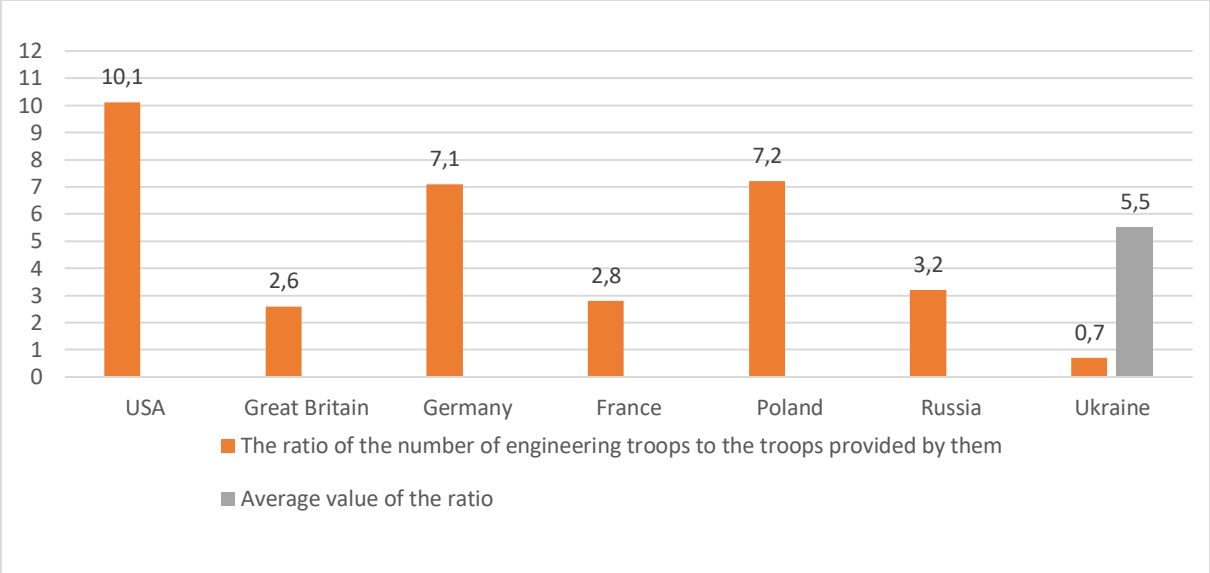


Figure 5. The existing ratio of the number of engineering units and subdivisions in the ground forces of the armed forces of the countries of the world and the Armed Forces of Ukraine to the total number of troops (forces) supported by them

Table 1. Comparative table of the number of engineering units of the *Separate Mechanized Brigade* of the Armed Forces of Ukraine and the *Motorized Rifle Brigade* of the Russian Federation

Motorized Rifle Brigade **(BMP) of the Russian Armed Forces**	***Mechanized Brigade*** **(on BMP) of the Armed Forces of Ukraine**
The number of *motorized rifle brigades* is 5885 people. Number of engineering units *Motorized Rifle Brigade* (5 engineering companies) – 276 people. 4,6 %	The number of *mechanized brigades* is 5044 people. Number of engineering units *Giz Mechanized Brigade* (2 engineering companies) – 179 people. 3,5 %

Thus, to achieve the average indicator (6%), the number of engineering units in a separate mechanized brigade, a separate tank brigade and a separate motorized infantry brigade of the Armed Forces of Ukraine should be increased by at least 2%, because of which this number will increase in: a separate motorized infantry brigade for 101 people. and will be 277 people; a separate motorized infantry brigade for 120 people. and will be 296 people; a separate tank brigade for 55 people. and will be 231 people. Such an increase in the number of engineering units will further form a separate mechanized brigade, a separate motorized infantry brigade and a separate tank brigade of the Armed Forces of Ukraine at least two engineering companies and instead of the engineering support group 2 company personnel of 179 people. have in these brigades an engineering and engineer battalion of 5 company personnel of approximately 250-300 people.

As part of this battalion, it is recommended to have: an engineering and engineer company as part of an engineering and engineer platoon and platoons of disfigurement and controlled mining; engineering and technical company consisting of 2 engineering and technical platoons and platoon of control room equipment; engineering and road company as part of a platoon of mechanized bridges and engineering and road platoon; engineering-positional company consisting of 3 engineering-positional platoons and a pontoon company consisting of 2 pontoon platoons and a coastal platoon. The proposed organizational structure of engineering units of a separate mechanized brigade, a separate motorized infantry brigade and a separate tank brigade of the Armed Forces of Ukraine will increase the overall level of their engineering support activities for these brigades approximately in 2,5 times, which will cover the whole range of engineering support measures and timely implement

them in order to increase mobility, survivability and safety of the use of units of these brigades, as well as effectively limit the mobility of enemy forces and means in their area of responsibility (Voloshchenko, 2023).

Conclusions

The carried out research allowed to conclude that the main measures to increase the efficiency of engineering support of the Armed Forces of Ukraine in the current armed conflict are: improvement of the existing regulatory framework for engineering support of the Armed Forces of Ukraine on the required number of engineering units and subdivisions of the Armed Forces of Ukraine; improvement of the existing organizational and staff structures of engineering units and subdivisions of the Armed Forces of Ukraine, taking into account their required number, as well as improvement of the existing system of management of engineering support of the Armed Forces of Ukraine on the issues of determining the place of engineering support management bodies in the general management system of the Armed Forces of Ukraine.

Recommendations

The materials of the article are of practical value for the governing bodies, which, when planning the use of troops (forces), solve the problem of early engineering preparation of the territory of the state for war and direct engineering support for the use of troops (forces) in operations (combat operations).

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