

Study of the Operation, Maintenance, and Repair System of the Bulgarian Armed Forces

Ivan Malamov

Vasil Levski National Military University

Veliko Tarnovo, Bulgaria

ivan_malamov@abv.bg

Abstract. Support of armaments and equipment is an integral part of the overall system for logistical support of the armed forces, which in turn represents a complex set of elements and interrelationships implementing the logistical functions to meet the emerging needs of the army and the fulfillment of the intended missions, goals and tasks. The main elements in this system are the management bodies and forces for the implementation of maintenance and repair activities, and the qualification and training of the latter is of essential importance for the timely restoration of damaged samples of armaments and equipment in the conditions of time deficit. The paper aims to examine the state of the operation, maintenance and repair system in the Armed Forces of the Republic of Bulgaria. Based on an empirical study with the armaments and equipment maintenance and repair specialists at different hierarchical levels, main problems arise from the supply of material resources for service and repair and the chain of their supply, the training and education of technical personnel and unclear allocation of responsibilities and activities regarding maintenance and repair.

Keywords: maintenance, repair, system, armed forces

I. INTRODUCTION

In the modern world, maintenance and repair of equipment are an integral part of its operation and life cycle. It would be hard to imagine the world without service centers, workshops and factories to ensure the unhindered use of technology. However, this fact is not a given, but behind it lies long-term efforts and hard work of the people involved in the design, development, and maintenance of these technical means. In military conditions, technology is just as widespread as in the civilian sphere, and historical facts indicate that the latest technologies and inventions enter the military sphere first, and then the civilian sphere. This imposes the requirement for the existence of a well-functioning system for maintenance and repair of the weapons and equipment used, which would guarantee their unimpeded and reliable use in any environmental conditions.

According to the Doctrine for Logistics, "The system for logistic support of the armed forces is a set of management bodies, forces and means for carrying out the activities of providing the troops, connected in a single network of interconnections." [2], and the overall logistic support is carried out through a unified and coordinated implementation of the logistics functions. If each of the logistics functions is considered as an element of the logistics system, then viewed through the prism of the systematic approach, the influence of each element of the system would lead to a change in the overall state of the system. For instance, if we look at operation, maintenance and repair and the influence of other logistics functions on this element we could identify the main variables that affect this functional area. The aim of the present study is to establish the main motives (factors) for choosing the officer profession and present their importance and interconnectedness.

The study aims to confirm or disprove previously identified problems in scientific studies [3] and/or discover existing problems in the state of the operation, maintenance, and repair system.

II. MATERIALS AND METHODS

The study of the operation, maintenance and repair system is based on a methodology developed specifically for the needs of the present study, based on data collection through a survey. The object of the research are three main target groups (categories) of military personnel from the Bulgarian Armed Forces. The three main categories are as follows:

- enlisted/civilian maintenance personnel;
- non-commissioned officers (NCOs);
- commissioned officers.

The scope of the research is the number of respondents by category:

- enlisted/civilian maintenance personnel – 241;

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- NCOs – 188;
- officers – 104;

To achieve the objectives of the empirical study, three types of questionnaires were developed, with identical and specific questions for each surveyed category. They include two main parts: the first part - passport and the second part - questions structured by groups to reflect the opinion of the interviewed persons.

The passport part includes general information about the respondents.

In the second part, respondents have to answer structured questions and the answers could be given in the form of a Likert scale.

The scale contains five grades as follows: 1 – very low; 2 – low; 3 – medium; 4 – relatively high; 5 – very high.

III.RESULTS AND DISCUSSION

The analysis of the results of the conducted survey is presented in individual or a group of questions from the survey card, taking into consideration the opinion of each of the categories.

Question 1 of the survey is identical for the enlisted/civilian personnel and NCOs and is identical with Question 2 of the commissioned officers survey, reading as follows:

"To what extent do you think the supply of material resources directly affects the quality and timely maintenance and repair of weapons and equipment (W & E)?"

The results for Question 1 are shown in fig.1.1, fig.1.2 and fig.1.3, with their analysis showing that a majority of about 59% of enlisted/civilian personnel and NCOs and 83% of the officers rate fairly high and very high the key role of material supply for the quality and timely maintenance and repair of W & E.

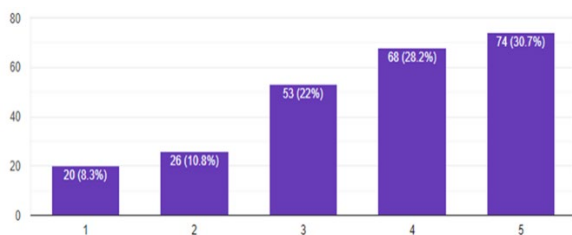


Fig. 1.1. Responses to Question 1 of the enlisted/civilian maintenance personnel.

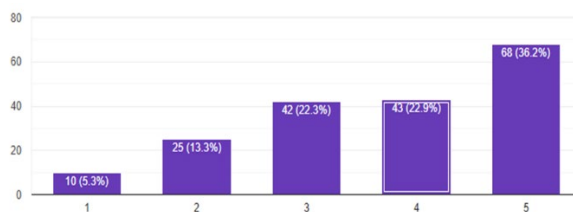


Fig. 1.2. Responses to Question 1 of the NCOs survey.

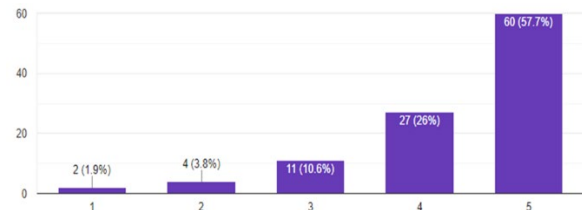


Fig. 1.3. Responses to Question 1 of the enlisted/civilian maintenance personnel.

Question 1 of the officers survey, specific to the interviewed category, is formulated as follows:

"To what extent do you think the other logistics functional areas influence the Operation, Maintenance and Repair functional area?"

This question is structured into eight sub-points containing the remaining eight functional areas of logistics and shows their interrelationship with operation, maintenance, and repair as part of the logistics system (Fig. 2). In this way, the respondents are given the opportunity to indicate what, in their opinion, is the degree of connectivity between the functional areas of logistics with operation, maintenance and repair.

The analysis of the results on this question shows that the officers indicate that the functional area Material Resource Supply plays the most significant role in performing maintenance and repair, followed by Movement and Transportation, Logistics Information Management and Providing Military Infrastructure.

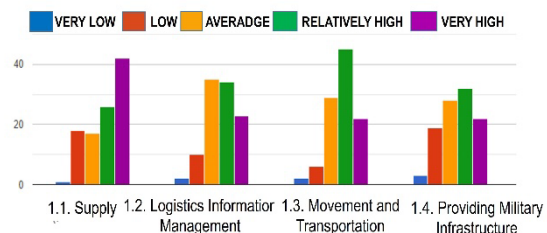


Fig. 2 Responses to Question 1 of the commissioned officers survey

Questions 2, 3, 4, and 5 of the enlisted/ civilian maintenance personnel and NCOs surveys are identical and match almost completely Questions 3, 4, 5, and 6 of the commissioned officers survey. They require the opinion of the respondents regarding stock availability, echeloning, provision of spare parts and the need to put into operation an effective information system that provides an up-to-date overview of stocks in real time and place.

Question 2 for enlisted/ civilian maintenance personnel and NCOs, and question No3 for officers: "To what extent do you think that depots in military units store enough parts for all weapons systems and types of equipment in order to perform the necessary maintenance and repairs?"

Question 3 for enlisted personnel and NCOs and Question 4 for officers: "To what extent do you think there is a clear echeloning of spare parts for carrying out repairs depending on the rights and competencies of the same by technical personnel at different levels?"

Question 4 for enlisted/civilian maintenance personnel: „To what extent do you think you have been supplied on time with spare parts and exploitation materials for the maintenance and repair activities you carry out?“

Question 4 for NCOs and Question 5 for officers: “To what extent do you think that the requests made by you for the allocation of spare parts and operational materials are provided (on time and in the required volume and quality)?”.

Question No. 5 for enlisted personnel and NCOs and question No. 6 for officers: "To what extent do you think it is absolutely imperative that an information system is installed in the units at all levels to provide up-to-date information on stock availability of spare parts, nodes and units and a tracking technical system for W&E throughout the whole life cycle?"

The results for the questions in Fig. 3.1., Fig. 3.2. and Fig. 3.3., indicate that the majority of the respondents (over 72% of the officers, 54% of the NCOs and 52% of the enlisted/civilian personnel) believe that they have not been provided the necessary spare parts to ensure the repairs. This slows down the repair process a lot and in many cases the equipment cannot be used for a long period of time and awaits public tender procedures or the delivery of a part.

In a similar way, but less categorically, 35% of the NCOs, 34% of the enlisted/civilian personnel, but categorically more than 51% of the officers, state that there is no clear allocation of the parts for the repairs in the units depending on their abilities to perform the types of repairs. This leads to the lack of certain parts in the units performing certain repairs and the availability of such parts for repairs in units that cannot perform those repairs and vice versa. In addition, it is unequivocally stated by almost all surveyed categories that the spare parts request forms are not provided within the specified period and volume. Over 55% of non-commissioned officers and enlisted/civilian personnel and over 63% of officers say it is imperative to integrate a functioning information system within the repair production process that provides real-time information about the availability of resources.

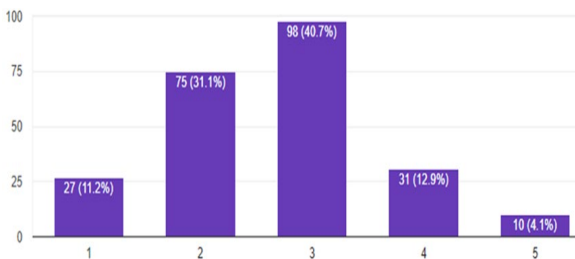


Fig. 3.1. Responses to Question 4 for enlisted/civilian maintenance personnel.

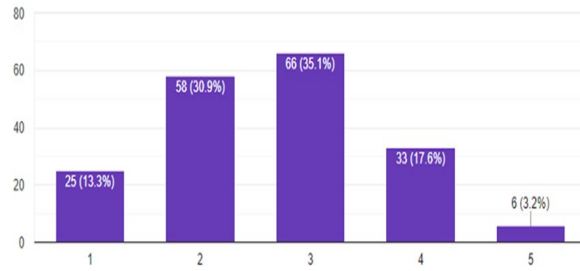


Fig. 3.2. Responses to Question 4 for NCOs.

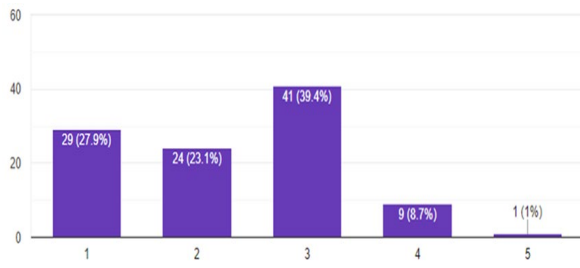


Fig. 3.3. Responses to Question 5 for officers..

Question 6 for enlisted/civilian personnel and NCOs and Question 7 of the commissioned officers survey reads as follows: “To what extent do you believe that logistics supply through contracts has a direct impact on the quality and timely maintenance and repair of W &E?”

The analysis of the responses this question shows that more than 50% of the enlisted personnel, 40% of the NCOs and 60% of the officers state that the relationship between the contracts for logistics supply of resources and services and the performance of quality and timely maintenance and repair is extremely important. Without the provision of a constant flow of spare parts provided by the contracts, it is not possible to carry out timely repair activities. A significant number of the public procurement tender procedures without direct negotiation takes an extremely long time, and in some cases the requested spare parts are simply not supplied by the contractor because the price initially provided is unrealistically low in order to win the contract. These parts are not supplied and a minimal penalty is paid for doing so. In other cases, public tenders fail due to a lack of candidates, or after being won, those who failed the procedure appeal and thus stop its implementation for a long time. An appropriate solution to these problems is to provide the unit commanders with more legal opportunities for direct negotiation, and not only legal entities of budgetary support, but also the low tactical levels. This would give greater freedom to make decisions that are critical to maintaining military capabilities.

Questions 7, 8, and 9 of the enlisted/civilian personnel and NCO surveys are identical to Questions 8, 9, and 10 for officers referring to the provision, condition, and modernization of the facilities, depots and technological equipment with the performance of quality and timely maintenance and repair and read as follows:

Question 7 for enlisted personnel and NCOs and Question 8 for officers: "To what extent do you think that the provision of adequate infrastructure and appropriate technological equipment has a direct impact on the quality and timely maintenance and repair of W&E?"

Question 8 for enlisted personnel and NCOs and Question 9 for officers: "To what extent do you think modernization of the facilities/depots and technological equipment is needed?"

Question 9 for enlisted personnel and NCOs and Question 10 for officers: "To what extent do you think that the warehouses for storing armoured vehicles and artillery armament meet the storage requirements for new W and E?"

Question 10 for enlisted/civilian maintenance personnel is specific to the respondent category: "To what extent do you feel that you are provided with the equipment (in the appropriate operation condition and sufficient quantities) necessary for your maintenance and repair activities?"

The analysis of the responses to the above questions shows that more than 57% of the enlisted/civilian personnel, 63% of the NCOs and 77% of the officers share the opinion that the infrastructure development and the provision of the appropriate technological equipment are of key importance for carrying out quality maintenance and repair. The enlisted/civilian personnel who answered Question 10 believe that they do not have enough operational equipment to be able to fully perform the activities required for performing quality maintenance and repair. The experience of the leading armies in the Alliance shows that quality maintenance and repair go hand in hand with the development of the infrastructure and the provision of adequate equipment. This means that swift action is to be taken so that the infrastructure and supplies necessary for carrying out maintenance and repair of the equipment and armament in the Bulgarian Armed Forces are provided.

The respondents unanimously agree about the need for modernization of the facilities and equipment. The results of the questions are shown in Fig. 4.1., Fig. 4.2. and Fig. 4.3. Over 79% of enlisted/civilian personnel, 86% of NCOs, and 92% of officers believe that the modernization, which has been long overdue, is imperative. The modern realities dictated by changes in the security environment show the need to acquire new capabilities not only in terms of equipment and weapons, but also in terms of facilities and technological equipment where maintenance and repairs are carried out. Another important aspect is the development of mobile technical support modules equipped with the appropriate apparatus for on-site diagnostics and repair.

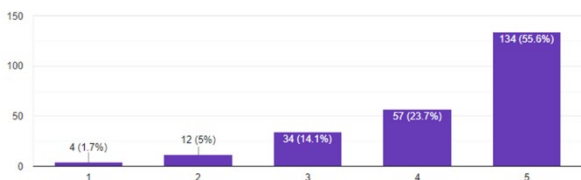


Fig. 4.1. Responses to Question 8 for enlisted/civilian maintenance personnel.

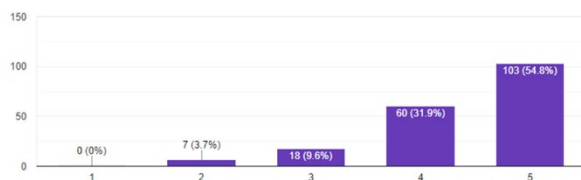


Fig. 4.2. Responses to Question 8 for NCOs

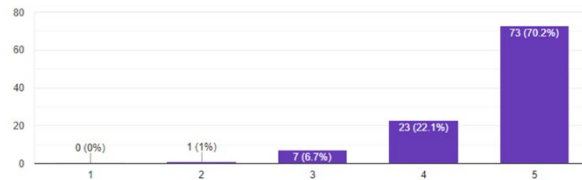


Fig. 4.3. Responses to Question 9 for officers

An important aspect of the maintenance and repair system is the stock availability of spare parts, nodes, units, and operating materials needed for maintenance and repair. The answers of the respondents regarding the condition of the storage facilities for armored vehicles and artillery armament indicate that in reality these facilities do not fully comply with the requirements for the newer models of W and E.

Questions 11 to 16 of the enlisted/civilian personnel survey, Questions 10 to 14 of the NCOs survey, and Questions 11 to 15 of the commissioned officers survey focus on the organization of the technological process of maintenance, the correspondence between the repairs and the hierarchical level of the repair structure, as well as the provision of the necessary technical documentation. Part of the answers to these questions are shown in Fig. 5.1., 5.2., and 5.3.

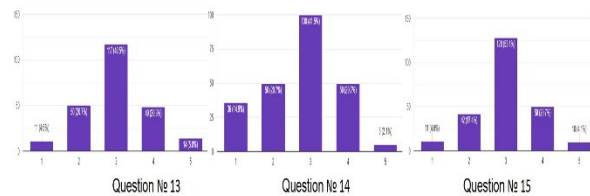


Fig. 5.1. Responses to Questions 13, 14, and 15 for enlisted/civilian maintenance personnel

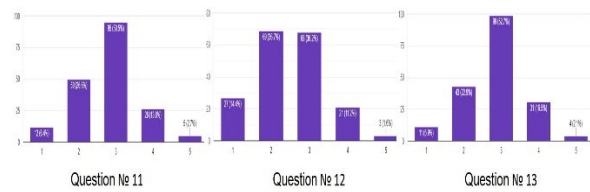


Fig. 5.2. Responses to Questions 11, 12, and 13 for NCOs

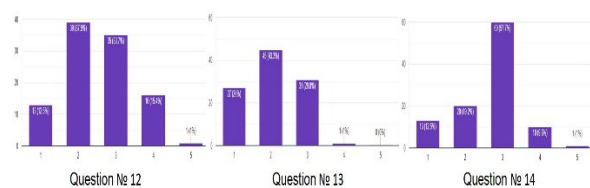


Fig. 5.3. Responses to Questions 12, 13, and 14 for officers.

‘Question 11 of the enlisted/civilian personnel and officers surveys and Question 10 of the NCOs survey are identical and read as follows:

"To what extent do you think the technological process of the repairs is properly organized in terms of type and complexity?"

The analysis of the answers to the question shows a hesitation in all the surveyed categories, who cannot clearly express an opinion on the matter.

Question 12 of the enlisted/civilian personnel survey is specific to the category and reads as follows:

"To what extent do you feel you are familiar with the overall process of acceptance, repair and delivery of W&E?"

A review of the responses to this question indicates that most enlisted/civilian personnel surveyed are familiar with the W&E delivery and repair process. However, about 15% state that they have little knowledge of the entire recovery process, which necessitates the appropriate training and courses in order for such omissions to be eliminated.

Question 13 of the enlisted/civilian maintenance personnel survey, Question 11 of the NCO survey, and Question 12 of the commissioned officers survey are identical and read as follows:

"To what extent do you think the level of production equipment matches the level of the repair structure (platoon, company, battalion, regiment/base)?"

The answers to the questions show that the enlisted/civilian maintenance personnel cannot express a clear opinion about the conformity of the technological equipment with the level of the repair structure. However, the higher we rise in the hierarchy of the military profession, the more clearly the respondents tend to express their opinion about this discrepancy. Thus, we arrive at the opinion of the officers, of which more than 50% strongly believe that the production equipment does not correspond to the level of the specific repair structure and that it is imperative for it to be reviewed and minimized in order to clearly define the repair activities at the relevant levels in accordance with the available equipment and repair parts.

Question 14 of the enlisted/civilian repair personnel survey, Question 12 of the NCO survey, and Question 13 of the commissioned officers survey are identical and read as follows:

"To what extent do you think that there is sufficient technical documentation, calibers and spare parts for the maintenance and repair of the new W & E models commissioned in recent years?"

Question 15 of the enlisted/civilian repair personnel survey, Question 13 of the NCO survey, and Question 14 of the commissioned officers survey are identical and read as follows:

"To what extent do you think that the regulatory documents and procedures for maintenance and repair are properly echeloned at the different levels (appropriate design of the technological process and equipment depending on the repairs being carried out)?"

The analyzed responses to this question show a similar linear correlation between the forthrightness of the negative opinion of the respondents and the climbing up the pyramid of military hierarchy. Thus, if the percentage of enlisted/civilian maintenance personnel who expressed their opinion that there is a shortage of documentation and spare parts is 35, then for NCOs this percentage increases to 50, and for officers it soars to 75. This trend clearly shows that the higher up the ladder of the military maintenance and repair hierarchy a person stands, the

more clearly they see the overall picture the general trends in the development of the maintenance and repair system in the armed forces.

Analogous, but not so clearly expressed, are the answers given to the question related to the appropriate design of the technological process and equipment depending on the repairs being carried out. The respondents indicate, although not so categorically, the inconsistency in the structuring of the technological process depending on the performed repair activities.

Question 16 of the enlisted/civilian repair personnel survey, Question 14 of the NCO survey, and Question 15 of the commissioned officers survey are identical and read as follows:

"To what extent do you think that you have been provided with the necessary technical documentation for the activities you perform/ that you have been provided with the necessary documentation supporting maintenance and repair (e.g. technology maps)?"

A careful examination of the responses to the question under consideration shows that while the enlisted/civilian repair personnel think that they have the necessary documentation for the repair work they carry out, the NCOs and officers believe the opposite, expressing the opinion that there is a significant lack of such documentation. Their disagreement is probably due to the fact that they are the ones who seek out and provide the necessary technical documentation for the enlisted/civilians to carry out the repair activities. The process of modernization of our armed forces should also include the acquisition of maintenance and repair capabilities of the newly commissioned W & E models, while at the same time acquiring the necessary technical documentation related to them.

The next group of questions by categories of technical specialists examines the state of their training and its impact on the performance of quality maintenance and repair.

Question 17 of the enlisted/civilian repair personnel survey, Question 15 of the NCO survey, and Question 16 of the commissioned officers survey are identical and concern the level of training of technical personnel (Fig. 6), reading as follows:

"To what extent do you think that the training of technical specialists affects the quality of the maintenance and repair of W & E?"

The responses to the question show an absolute consolidation between the different categories of respondents around the opinion that the quality of the performed maintenance and repair activities are directly proportional to the training of the personnel who perform them. Preparation is the cornerstone of any endeavor, especially when it comes to handling and maintenance of B&T.

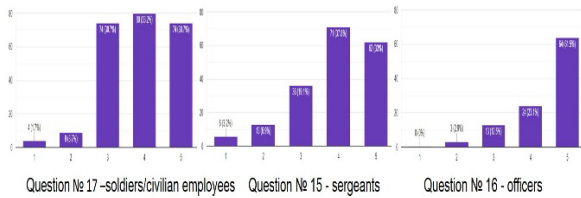


Fig. 6.. Responses to Question 17 of the enlisted/civilian repair personnel survey, Question 15 of the NCO survey, and Question 16 of the commissioned officers survey

Question 18 of the enlisted/civilian repair personnel survey, Question 16 of the NCO survey, and Question 17 of the commissioned officers survey (Fig. 7) are identical and refer to the respondents' opinion regarding the standardization of training of technical personnel, reading as follows:

"To what extent do you think the training of technicians should be standardized since it affects the quality of W & E maintenance and repair?"

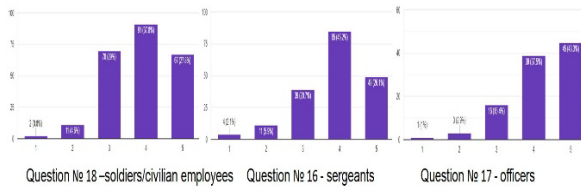


Fig. 7.. Responses to Question 18 of the enlisted/civilian repair personnel survey, Question 16 of the NCO survey, and Question 17 of the commissioned officers survey.

The analysis of the results on the examined issue clearly shows again the unanimous opinion of the respondents. Over 65% of enlisted/civilian personnel surveyed, 71% of NCOs and 80% of officers believe that it is imperative to standardize the training of technicians in order to standardize the level knowledge and skills they acquire for the operation, maintenance and repair of W & E in accordance with the current educational requirements and the requirements of stakeholders. In the years of reforms in the armed forces, the military education system was inevitably affected, which led to a difference in the level of training of the various categories of technical specialists, especially enlisted personnel and NCOs. The differences in the training requirements for technical specialists in the individual units led to significant challenges when implementing uniform educational standards and difficulties in carrying out maintenance and repair, especially of the new W & E models. This necessitates the standardization of the training of the individual categories of technical specialists which is to be achieved by conducting it in one location, by applying the same criteria and by ensuring of acquired knowledge and skills are on the same level.

Question 19 of the enlisted/civilian repair personnel survey, Question 17 of the NCO survey, and Question 18 of the commissioned officers survey identically refer to the training of depot personnel and read as follows:

"To what extent do you think that the depot personnel/depot managers have sufficient technical training?"

The analysis of the responses to this question indicates that more than half of all categories surveyed (51% of enlisted/civilian maintenance personnel, 69% of NCOs

and 50% of officers) believe that depot personnel possess the necessary technical qualifications to perform their official duties.

Question 20 of the enlisted/civilian repair personnel survey, Question 18 of the NCOs survey, and Question 19 of the commissioned officers survey refer to the specific competences of the maintenance and repair specialists read as follows:

Question 20 of the enlisted/civilian maintenance personnel: "To what extent do you think you have the necessary special training for the activities you perform as technical specialist for the repair/maintenance of...?"

Question 18 of the NCOs survey and Question 19 of the commissioned officers survey: "To what extent do you think that operating, maintenance and repair personnel have undergone the necessary specialized training?"

The responses to those questions make it clear that more than 53% of the operating and maintenance staff are of the opinion that they have obtained the necessary knowledge and skills for the activities they perform. The same opinion is supported by their commanders and superiors - more than 53% of the NCOs and 58% of the officers believe that their subordinates possess the necessary specialized competencies.

The following Question 21 of the enlisted/civilian maintenance personnel survey, Question 17 of the NCOs survey, and Question 18 of the commissioned officers survey are identical for all categories and read as follows:

"To what extent do you think that the damage to the weaponry and equipment is the result of the incorrect operation and incomplete maintenance?"

In the answers to this question, the enlisted/civilian maintenance personnel could not express a clear opinion, while the NCOs (more than 34%) and officers (more than 55%) have arrived at the conclusion that the damage to W & E is a consequence of the deficiencies in its maintenance.

Question 22 of the enlisted/civilian maintenance personnel survey, Question 20 of the NCOs survey, and Question 21 of the commissioned officers survey are identical for all surveyed categories and reflect the opinion of the respondents regarding the availability of courses for technical specialists and read as follows:

"To what extent do you think there are sufficient qualification courses for technical specialists?"

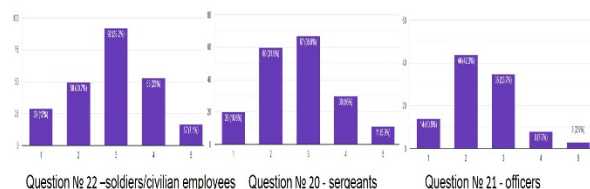


Fig. 8.. Responses to Question 22 of the enlisted/civilian maintenance personnel survey, Question 20 of the NCOs survey, and Question 21 of the commissioned officers survey.

In their responses to this question, the interviewed categories share the opinion that the courses for technical specialists are not enough and it is necessary to provide more opportunities for increasing the qualification, not only for the maintenance and repair of the old W & E, but

also for what to be commissioned in the Bulgarian Armed Forces in the future. When preparing the plans for the modernization of the armed forces, it is necessary to take into account not only the one-time act of acquiring W & E, but the entire life cycle of their use, including the training of maintenance and repair technical specialists and operating personnel, as well as the construction of infrastructure and technological equipment for maintenance and repair activities. In addition, it is necessary that these plans provide for samples of the newly acquired equipment, training labs, simulators and documentation to be mandatorily provided for the military educational institutions so that the future officers and NCOs have the opportunity to acquire the necessary knowledge and skills for the operation, maintenance and repair of new the samples. Thus, they will be able get to know it and handle it skillfully, as well as manage the overall processes of conducting all relevant activities. The experience of concluding similar contracts, such as the acquisition of transport equipment from the Mercedes brand, can serv as a lesson learned on how such contracts should not be concluded as far as maintenance and repair are concerned. This shows the need for taking the necessary measures to minimize such errors and for paying particular attention to the training of technical specialists through a sufficient number and variety of courses that cover the entire spectrum of W & E in exploitation by the BAF.

Question 21 of the NCOs survey is identical to Question 22 of the commissioned officers survey and reads as follows:

"To what extent do you think your subordinates have the necessary competencies for the maintenance and repair activities they perform?"

The analysis of the answers to the above question shows that over 44% of the NCOs and 56% of the officers express to a relatively high and very high degree the opinion that the personnel at their disposal has the necessary knowledge and skills to perform their official duties.

Question 23 of the enlisted/civilian maintenance personnel survey is identical to Question 22 of the NCOs survey and Question 23 of the commissioned officers survey and reads as follows:

"To what extent do you think there is a clear distribution of activities for the types of W & E repairs at the different hierarchical levels?"

Almost half of all respondents cannot formulate a clear opinion on this question. However, 34% of enlisted/civilian maintenance personnel claim that they believe that the distribution of maintenance activities across hierarchical levels is clearly structured, compared to 26% of noncommissioned officers and only 21% of officers. This raises the issue of revising and clearly differentiating the activities pertaining to the several types of military repairs at the different hierarchical levels together with the technological equipment and spare parts for their performance. This will allow for reducing not only the number of uncharacteristic activities when carrying out simple repairs at the upper levels or complex

ones at the lower levels, but also the use of spare parts stored in the warehouses of the repair structures that are not capable or required to carry out repairs using them.

The following question is the same for all categories surveyed (Question 24 for the enlisted/civilian maintenance personnel, Question 23 for NCOs, and Question 24 for officers) and is related to the previous question, reading as follows:

"To what extent do you think the repair needs correspond to the level of the repair structure (platoon, company, battalion, regiment/base)?"

The results of the answers to this question are similar to the previous one. The percentage of undecidedness in the opinion of the interviewees is high; however, while among the enlisted/civilian maintenance personnel the prevailing opinion is that the repair needs correspond to the level of the structure, the opinion of the officers is the polar opposite. Officers have a view of the overall repair process while enlisted personnel do not have this perspective, which is why it is necessary to reassess the need for repair in line with the structure level.

The final Question 25 is specific only for enlisted/civilian maintenance personnel, as it concerns the equitable division of labor:

"To what extent do you think that the maintenance and repair tasks performed are properly/evenly distributed among the technicians?"

More than 40% of the respondents to this question are of the prevailing opinion that the distribution of activities between technical specialists is fair. This issue is important because if this rule is not followed according to Adams' theory of justice [1], negative injustice will occur, which will lead to tension and even anger in the team performing the repair activities. This, in turn, can lead to a decrease of performance efficiency when carrying out their duties. For this reason, immediate superiors need to strive for an even distribution of maintenance and repair activities among technicians.

IV. CONCLUSIONS

The following conclusions can be drawn from the study of the operation, maintenance and repair system in the Armed Forces of the Republic of Bulgaria, the analysis of the results obtained during its carrying out, as well as the results from previous research:

The first conclusion is that all surveyed categories unanimously indicate the supply of material resources as a factor of key importance in performing quality and timely maintenance and repair of W & E. In addition, this functional area of logistics together with Movement and Transportation, Management of Logistics Information and Military Infrastructure Provision are the cornerstones of W & E maintenance. The spare parts and operational materials are of particular importance for timely maintenance and repair. However, these are often unavailable or not delivered on time due to problems arising during the public procurement procedures or the conclusion and execution of contracts. The analyzed results of the study indicate that it is the supply of material

resources, as an element of the studied operation, maintenance and repair system, that plays a primary role on the overall condition of this system, which requires improvement of supply procedures and optimization of the connections between the two functional areas - supply and repair.

The second conclusion is related to the training of the technical personnel.

The analysis of the results on the relevant issues shows a thesis presented in previous studies [4] that standardization is a key factor for improving the training of technical specialists. All categories of respondents share the opinion that the quality of maintenance and repair activities is inextricably linked to the training of the personnel who perform them. The differences in the level of training carried out in the individual units lead to significant difficulties in meeting uniform educational criteria and this is the rationale behind the need for standardization. This standardization is to be achieved by centralizing and conducting training in the military education institutions as well as by subjecting the trainees to the same training criteria in order for them to acquire knowledge and skills that are on the same level. All the interviewed categories unanimously uphold that personnel should be provided with more opportunities to increase their qualification through attending various courses. The scope of those courses should include not only the maintenance and repair of the old W & E, but also W & E that is to be acquired and implemented by the Bulgarian Armed Forces in the future. Samples of the new equipment should be provided complete with the necessary technical documentation and training labs to the military educational institutions, which provide the fundamentals of training in the armed forces.

The third conclusion of the conducted research shows an unclear echeloning of the production equipment, as well as of the spare parts for carrying out the repair activities in the units of the individual levels in accordance with their capabilities to carry out the various types of repairs. Ensuring the appropriate design of the overall technological process in accordance with the level of the repair structure and the duties relating to the specific type of repairs, together with the necessary spare parts, will lead to an increase in the effectiveness and efficiency of the maintenance and repair system by avoiding duplication of efforts and reducing unnecessary stock surplus.

The issues related to the maintenance and repair of weaponry and equipment are reflected annually in the reports on the state of defence, [5], [6], [7], [8] and in the scientific works of various researchers. However, there is still no correct formula for resolving these issues, and their solutions continue to be deferred. It is necessary to apply a unified radical approach to all elements of the entire logistics system while taking into account all the interdependencies and correlations between them as listed in the above conclusions.

The operation, maintenance and repair system is a subsystem of the overall logistics system, and not merely a functional area within it. If the overall system for logistics support, built up from its elements that perform the various logistics functions (the functional areas of logistics), is viewed through the prism of the system approach, then the change in the state of each element of the system would lead to a change in the state of the entire system.

The research conducted examined the influence of the remaining logistics functions on operation, maintenance and repair as elements of one system. The analysis of the results of the conducted research led to the above-mentioned main conclusions, on the basis of which it can be said that maintenance and repair are clearly dependent on the supply function, on the training of technical specialists and on the structure of the technological process of maintenance and repair, as well as on the structure and responsibilities of the technical staff of the various hierarchical levels. What stands out prominently is the need to improve the current system for the maintenance and repair of W & E by taking urgent measures to eliminate the identified problems in order to optimize the overall system for logistics provision.

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