

Research on the Maintenance and Support System of Military-Civilian Integration Equipment based on Hall 3 D Structure

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Abstract. In order to improve the military and civilian integration equipment maintenance support ability and benefit, according to the military and the civilian equipment maintenance support power, using the method of hall 3 d structure, from the time dimension, element dimension, knowledge dimension three dimensions deeply analyzes the logic of civil-military integration equipment maintenance support main line, main elements, knowledge support, and put forward the military and civilian integration equipment maintenance support basic goal of two ways, formed the civil-military integration equipment maintenance security system framework. The research results have certain application value for improving the maintenance and support ability and benefit optimization of our military equipment.

Keywords: Hall Three-dimensional Structure; Military-civilian Integration; Equipment Maintenance and Support; System.

1. Introduction

Equipment maintenance and support is related to whether the troops can continue to fight. The maintenance and support ability not only has an important impact on the equipment itself, but also directly affects the continuous generation of combat effectiveness, which is of great significance to the victory of war. Military-civilian integration is a necessary requirement to solve the current problem of our military equipment support, and it is also a common measure taken by the armed forces around the world[1]. The maintenance and support of military-civilian integration equipment can give full play to the military and local resources, improve the military equipment maintenance and support capability, and maximize the overall efficiency.

In the research on the maintenance and support system of military and civilian integration equipment, domestic and foreign scholars have made continuous exploration. An Weilong et al[2]Focusing on the system support force, the research on the generation mechanism of the military-civilian integration equipment maintenance support system is conducted, and the flow map is constructed. Shu zhengping [3] The demand of equipment maintenance guarantee is pointed out, and the contents of equipment maintenance management system, technical system and supply system are mainly described in the system composition. Xiao Zhenhua et al [4] Based on the main body, organization and implementation of military-civilian integration equipment support, the ideal mode of equipment support for military-civilian integration is put forward. Yan Binbin et al[5]Considering the principle of combining peacetime and wartime, the needs and capabilities of military and civilian equipment maintenance are analyzed, and the military-led approach is adopted to gradually realize the maintenance of military-civilian integration equipment.J.Q.Zhao [6]This paper mainly compares the advantages and disadvantages of military and local resources, and proposes to realize the optimal allocation of resources and promote the military-civilian interconnection of equipment maintenance and support.

The maintenance support of military-civilian integration equipment is a complex system, involving the military, civilian and other multiple subjects. In order to design and scientific analysis of the military-civilian integration maintenance support system, it is necessary to use scientific methods for systematic analysis. Therefore, this paper adopts the Hall three-dimensional structure methodology to construct a three-dimensional framework of military-civilian integration equipment maintenance support system, which provides basis and reference for the design of equipment maintenance support system and top-level planning.

2. Basic Objectives of the Maintenance and Support of Military-Civilian Integration Equipment

The maintenance and support of military-civilian integration equipment refers to the support mode of coordinating the military-civilian equipment maintenance and support planning, resource allocation and force utilization in order to improve the equipment maintenance and support capacity and support benefits [7]. It can be seen that the basic objectives of military-civilian integration support include two aspects: one is to improve the equipment maintenance support capability, the other is to improve the efficiency of equipment maintenance support.

2.1 Improvement of Equipment Maintenance and Support Capability

Equipment maintenance and support shall be carried out through military-civilian integration, and the people's personnel, technology, information, material and other superior resources shall be incorporated into the equipment maintenance and support system, so as to improve the equipment maintenance and support capability. In the construction of the talent team, Through the combination of the army and the people and combining the army and the people, Integrate the civilian outstanding maintenance talent team into the army, And through joint training, contract training, entrusted training and other ways to quickly improve the maintenance ability of the organizational maintenance force, To comprehensively improve the ability and quality of the maintenance team; On the maintenance of technical updates, Through the military maintenance requirements, And the local advanced maintenance theory and technology to continue to introduce, Comprehensively improve the maintenance technology level; In the construction of information resources, In the form of installation training, contract agreement, special construction and so on, Effectively integrate the technical data, data information and management system required for equipment maintenance, The effect of improving the integrity and effectiveness of the equipment maintenance guarantee information is obvious; In the material resources, Include civil facilities and equipment into the equipment maintenance and mobilization system, To achieve shared military and civilian sharing, Overall use of spare parts for maintenance, Improve the utilization efficiency of maintenance resources, Enhance the level of material reserves for equipment maintenance.

2.2 Improvement of Equipment Maintenance and Guarantee Efficiency

By efficiently integrating the forces, resources, tasks and other elements of the military and the sides in the maintenance support, the equipment maintenance support efficiency is effectively improved, the equipment maintenance support cost is reduced, and the improvement of equipment maintenance support benefit is achieved. Through force raising, optimize the equipment maintenance support force system, and mobilize civil equipment maintenance support resources to prepare the equipment maintenance resources; conduct functional integration and intensive construction of the existing support equipment to realize "one input and two output", improve the utilization rate of equipment maintenance support resources. Through the task planning, scientifically allocate the equipment maintenance support tasks, give play to the advantages of the military and civilian parties in different periods to improve the equipment maintenance support level.

3. Architecture Framework for the Maintenance and Support of Military-Civilian Integration Equipment based on Hall 3 D Structure

Hall 3 D structure is a methodology proposed by Hall, which can decompose complex problems and enable people to have a clearer understanding of complex system problems [8]. The maintenance and support of military-civilian integration equipment is a complex system engineering. Using Hall three-dimensional structure methodology, the problem is divided according to time stage, constituent elements and logical procedure for problem solving problems, so as to form a system framework for the maintenance and support research of military-civilian integration equipment, as shown in Figure 1.

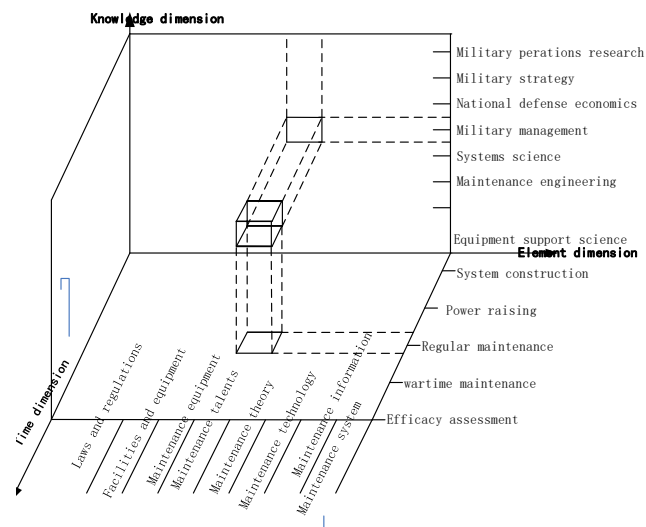


Figure 1. Framework of maintenance support system for military-civilian integration equipment based on Hall three-dimensional structure

The time dimension defines the main time stage involved in the maintenance and support of military-civilian integration equipment. The maintenance time maintenance of military-civilian integration equipment includes system construction, force raising, peacetime maintenance, wartime maintenance, efficiency evaluation and other stages.

Element dimension is divided on the basis of time dimension and according to the elements involved in the maintenance support of military-civilian integration equipment. Mainly includes maintenance theory, maintenance personnel, maintenance technology, facilities and equipment, maintenance equipment, maintenance information, maintenance system, operation mechanism, laws and regulations.

Knowledge maintenance includes the knowledge and technology required for the maintenance and support task of military-civilian integration equipment. The content involves the knowledge and technology of military operations research, military strategy, national defense economics, military management, system science, maintenance engineering, equipment support science and so on.

3.1 Time Dimension

(1) System construction. The system construction mainly carries out the leading organization and force composition design for the maintenance and support of military-civilian integration equipment. The leadership of the maintenance support of military-civilian integration equipment includes the Central Military-civilian Integration Development Commission, the State Council, the relevant functional organs of the military commission and the military and arms, local governments and the military-owned military enterprises and private enterprises. The military and the contractor constitute the supply and demand subject of the equipment guarantee, the weapons and equipment receiving the maintenance support, and the object of the maintenance facilities and equipment and the maintenance

equipment constitute the equipment support tools [9]. The optimal design of the system construction can effectively coordinate the force deployment between different departments, and promote the completion of the maintenance and support task of military-civilian integration equipment. In order to improve the level of system construction, we should make full use of the existing maintenance support force and enrich the high-quality civilian force to realize the healthy operation of the maintenance guarantee of military-civilian integration equipment.

(2) Power raising. The power raising stage mainly aims at the access audit and mobilization incentive of private enterprises to join the army. A reasonable and effective incentive mechanism can effectively stimulate the enthusiasm of private enterprises to participate in the maintenance of weapons and equipment. Appropriate access audit can ensure the entry of high-quality private enterprises, which is conducive to avoiding the risk of equipment guarantee. The use of the civilian support force is of great significance to the equipment maintenance support. In peacetime, the equipment maintenance support of the military should win the support of the civilian maintenance force, while in wartime, the contract agreement must be fulfilled or the local forces must be mobilized to participate in the support.

(3) Regular maintenance. As the daily work of equipment maintenance support, maintenance plays a vital role in the performance of equipment. In order to improve the level of peacetime maintenance and support, we should strengthen the development concept of equipment maintenance and support, give full play to the basic role of resource allocation, strengthen the training of equipment support personnel, improve the equipment support laws and regulations, increase the supervision and guarantee funds, improve the efficiency of equipment support funds, and improve the peacetime maintenance and support ability [10].

(4) wartime maintenance. As a necessary requirement of equipment maintenance guarantee, wartime maintenance is an important guarantee for comprehensively responding to various security threats and better completing diversified military tasks. To improve the ability of wartime maintenance support, should through increasing investment in equipment maintenance support power construction, improve the wartime equipment maintenance support command organization, rational allocation of resources, clear wartime maintenance support task division and responsibilities, battlefield maintenance as far as possible, solve the problem of equipment maintenance support as soon as possible, cannot solve should be timely evacuation, to quickly repair and put into use again, improve the battlefield win ability.

(5) Efficacy assessment. The evaluation of the maintenance support efficiency of military-civilian integration equipment refers to the degree to which the equipment can play an effective role in completing the maintenance support task under the condition of military-civilian integration. It is of great significance for measuring the level of equipment maintenance support and the evaluation of the maintenance support capability. Implement the equipment guarantee regulations and standards, review the preparation and implementation of the plan, and check the handling of major problems in the plan management, so as to achieve the purpose of generating combat effectiveness and support force.

3.2 Element Dimension

The maintenance support of military-civilian integration equipment mainly consists of the following nine elements:

(1) Laws and regulations. Laws and regulations provide institutional guarantee for equipment maintenance guarantee, The maintenance and guarantee of military-civilian integration equipment should be guaranteed in accordance with the law, By establishing and improving the legal system for supporting the maintenance of military-civilian integration equipment, Standardize the maintenance and guarantee behavior of enterprises, Improve the equipment maintenance and support capability, To promote national legislation on the maintenance and support of military-civilian integration equipment, Continuous improvement of the relevant military policies, At the same time, improve the qualification examination of local maintenance support forces, quality construction, quality work

maintenance, supervision award and evaluation, Should be guided by the needs of weapons and equipment, Eliminate the barriers to entry, Establish an access coordination mechanism, Lower the barriers to entry, Simplify the working procedures, Relevant laws and regulations that do not meet the maintenance and support requirements of military-civilian integration equipment, In accordance with regulations, To request the original making and issuing authority to revise or abolish it.

(2) Facilities and equipment. The maintenance and support facilities and equipment provide hardware support for the construction of equipment support. By increasing the investment of new facilities and equipment, the establishment and improvement of facilities and equipment support means can comprehensively improve the efficiency and efficiency of equipment support.

(3) Maintenance equipment. Maintenance equipment provides the hardware foundation for equipment maintenance support. The management of maintenance equipment involves planning and raising, production inspection, supply, storage management, combat readiness support, fund management, treatment and utilization of waste maintenance equipment, information management, etc. Through the use of scientific methods and advanced means, the maintenance equipment to ensure the implementation of full life management, with the variety of maintenance equipment, appropriate quantity, good quality to ensure that the troops to complete combat, training, duty and other tasks.

(4) Maintenance talents. Maintenance talents provide an active basis for equipment maintenance support. Through the establishment and improvement of the talent training system, the knowledge structure of maintenance talents is updated, the management mechanism of equipment maintenance support personnel is improved, and the maintenance support ability is improved.

(5) Maintenance theory. Maintenance theory provides a theoretical guide for equipment maintenance support. Through the use of scientific methods, it actively explores the characteristics and laws of equipment maintenance support, and forms a complete scientific theory system to guide the practice of equipment maintenance and support.

(6) Maintenance technology. Maintenance technology provides technical support for equipment maintenance support. Through continuous improvement of technical means, technical innovation, the technical communication between the military and the local military is strengthened, the overall technical level is improved and the efficiency of maintenance support is improved.

(7) Maintenance information. Maintenance information provides demand traction for equipment maintenance support. Through unimpeded command and management channels, the information resources of both military and civilian governments are shared, the construction of information means is strengthened, the information release mechanism is improved, and the information acquisition ability of equipment maintenance and support units is enhanced.

(8) Maintenance system. The maintenance system provides the organizational guarantee for the equipment maintenance guarantee. Through the establishment of a maintenance system combining military repair with local repair, factory repair and military repair, the daily management ability of equipment can be improved.

(9) Operating mechanism. The operation mechanism has clarified the development direction and path for equipment maintenance support. Through the introduction of appropriate competition mechanism, it can create a fair competition environment, improve the supervision and inspection mechanism, and ensure a good operating environment for equipment maintenance support.

3.3 Knowledge Dimension

Knowledge maintenance of military-civilian integration equipment maintenance support is the knowledge and technology needed for equipment maintenance support to solve different problems in different time stages and in different factor subjects. The typical problems that can be solved by various knowledge are as follows:

Military operations research is a study of the theory and method of decision optimization and quantitative analysis of military problems. Mathematical model, quantitative analysis and computer technology are mainly used to analyze the function, structure and operation rules of various military

systems. It can be used to solve problems such as equipment maintenance support resource allocation, and provide technical support for military-civilian integration equipment maintenance support.

Military strategy is a discipline that studies the overall problems and laws of war, national defense and military construction. The contents include the basic theory of strategy and the theories of war preparation and implementation, national defense construction and development, and the construction and application of armed forces. It can be used to solve the problems of equipment maintenance and support target and direction determination, and provide direction guidance for the maintenance and support of military-civilian integration equipment.

National defense economics is a discipline that studies national defense economy and its laws. The content includes the basic theory of national defense economics and national defense economic system, the allocation of military economic resources, economic preparation, mobilization and guarantee of war, and the production and procurement of military goods. It can be used to solve the problems of funding operation and optimization in equipment maintenance support, and provide theoretical guidance for the maintenance support of military-civilian integration equipment.

Military management is a discipline that studies military management activities and its laws. The contents include the basic theories of military management and strategic management, combat management, national defense mobilization management, military human resources management, equipment management, logistics management, military management and other theories. It can be used to solve the problems of planning, organization, command, coordination and control in the equipment maintenance support, and provides management technology and means for the maintenance support of military-civilian integration equipment.

Systems science is a discipline that studies the relationships and properties of various systems. The content includes system theory, information theory, cybernetics, dissipative structure theory, synergism, mutation theory and so on. It can be used to solve the analysis of group elements in equipment maintenance support, divide and solve complex problems, and provide method guidance for equipment maintenance support.

Maintenance engineering is a study of military equipment and equipment repair activities and its rules. The content includes maintenance engineering, reliability theory, equipment battlefield repair, maintenance determination and optimization of resources, etc. It can be used to solve the quantitative requirements of equipment maintenance support to determine and provide maintenance plan, to provide technical reference for equipment maintenance support.

Equipment support science is a discipline that studies the laws and characteristics of our military equipment support. The content includes the basic theory, historical theory, construction theory and application theory of our military equipment support, and reveals the basic law of equipment support. It can be used to solve the key problems in equipment maintenance support, and provide theoretical basis and macro guidance for equipment maintenance support.

4. Conclusion

This paper analyzes the maintenance of military-civilian integration equipment by using the Hall 3 D structure, analyzes the work of the maintenance and guarantee of military-civilian integration equipment from 5 stages of time dimension, analyzes the main elements involved in the maintenance of military-civilian integration equipment from 9 aspects of element dimension, and analyzes the knowledge and technical support of the maintenance and guarantee of military-civilian integration equipment from 7 knowledge disciplines of knowledge dimension. Established based on hall 3 d structure of civil-military integration of equipment maintenance support system as improve our equipment maintenance support ability and benefit of powerful tools, through the civil-military integration equipment maintenance guarantee the complex system is divided into three dimensions, from each dimension, easy to solve complex problems, can meet the requirements of equipment maintenance support theory, to form and improve the ability of military and civilian integration equipment maintenance support has very important practical significance.

However, the maintenance of military-civilian integration equipment is a complex system engineering problem, and this paper has only conducted a preliminary exploration. In the future, all factors will be fully taken into consideration for more in-depth and systematic analysis. The level and structure proposed in this paper also need to be improved, which need to be further studied.

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