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EQUIPMENT SYSTEM SUPPORTABILITY ANALYSIS

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Abstract: Following the idea of "system - system construction - system supportability", the system concept and its construction mechanism are analyzed in depth, and the concept of system supportability is defined; the current status of equipment system supportability research at home and abroad is analyzed, focusing on support A classified review was conducted on the research on task planning and scheduling, support resource demand determination and optimal allocation, and maintenance implementation and optimization. The research status of the two aspects of "index construction-intelligent decision-making" that address key needs in system supportability research was analyzed, pointed out the characteristics of the current research, and proposed possible technical solutions for the next step. It has certain guiding significance for subsequent research on equipment system supportability.
Keywords: Equipment system; Equipment support; System supportability; Weapons and equipment

1 INTRODUCTION

In information warfare, systematic combat has become the norm. With the development and evolution of war forms and science and technology, it has become more difficult for a single piece of equipment or equipment system to complete combat tasks. Equipment systems with certain structures and functions are often required to achieve combat goals. Systematic operations, systematic support, and systematic evaluation have become key issues in equipment system research.

Equipment support is an important part of the army's combat effectiveness. The guaranteeability of the equipment system has become a quality requirement as important as the performance of the equipment system. In particular, when performing combat training tasks, equipment support agencies often formulate equipment support plans based on past exercises and training support experience, and lack effective methods and means to verify the applicability and rationality of support plan generation and evaluation. Solving this problem is of great significance to promoting equipment to better meet combat use needs and promoting the improvement of the army's equipment support capabilities.

2 DEFINITION OF THE CONCEPT OF SYSTEM SECURITY

2.1 Guaranteeability

In GJB451A "Reliability and Maintainability Support Terms"[1], the definition of support is: "The design characteristics of equipment and the ability of planned support resources to meet the requirements of peacetime combat readiness and wartime utilization. " Supportability is the ability of equipment quality to meet usage requirements. The quality here is determined by two aspects: "design" and "planning". "Design characteristics" are attributes given to the system by designers, and "planned support resources" are equipment usage guarantees. material and human resources available. Equipment "use requirements" are usually converted from combat training tasks. Supportability is a comprehensive system characteristic in which equipment, resources, and combat training tasks match each other. Supportability is related to the design characteristics of the equipment, as well as subsequent support resources, and focuses on all support issues in the entire life cycle of the equipment.

2.2 System Guarantee

2.2.1 System concept

The idea of System of Systems was first proposed by Boulding, and the term System of Systems was first proposed by Berry in 1964. Later, Eisner proposed the concept and characteristics of system when studying multi-system integration [2-5]. Many scholars have discussed system-related issues based on their different research fields. The more representative ones are Russell[6], Shenhar[7], Kotov [8], Jamshidi [9] and others who have defined the connotation of the system concept; Jackson[10-11], Eisner[12-13], Halland[14], Aaron[15], Maier[16], Pei[17], Sage[18], Cook[19] and other studies on system methodology; Maier[20], Caffall[21], Curtis[22], Reckmeyer[23], Boardma[24], Kovacic[25-26], Andrew[27] on research on issues related to system engineering; Owens[28], Manthorpe[29], Maier[30], Kilicay[31], GAO[32]. have used system research to solve related problems in the fields of national defense and military. Judging from the situation abroad, system research is applied to various industries, especially the solution of complex time-varying multi-element problems in the military field.

Domestic research on systems started late, and relatively few papers on systems were published. Between 2005 and 2011, researchers conducted more discussions on system-related issues, and gradually clarified the conceptual connotation of systems. Representative ones are: the report of researcher Zhang Zuiliang[33-34] of the Academy of

Military Sciences at the 269th Academic Symposium of the Xiangshan Science Conference in 2005, and the "System Development Rules and Scientific Approaches" published in the China Science Foundation Journal in 2006 This article discusses the concept and characteristics of the system, the importance of system development research, the difficulties and challenges faced, and the key issues that need to be paid attention to when researching system development. In 2006, Li Zenghui [35] published "System Development Laws and Scientific Approaches-A Review of the Academic Symposium of Xiangshan Science Conference", which also gave the concept of system and the research status related to system development. Dr. Wang Yuanfang [36] of Shanghai Jiao Tong University published the "Review of 'Systems of Systems'", which summarized and organized the definition, characteristics, classification system, construction principles, and research and practical development prospects of "systems of systems". "Simulation Analysis and Experiments of War Complex Systems" by Professor Hu Xiaofeng [37] of the National Defense University gives the basic concept of the system and the systems and their characteristics in the war system. "Systems in the Information Age - Concepts and Definitions" published by Dr. Yang Dongsheng [38] of the University of Defense Technology and others summarized relevant domestic and foreign research on system concepts and definitions, and provided an understanding of the hierarchical division of the comprehensive definition of systems in the information age, comparatively analyzes the essential differences between systems, artificial systems and complex system concepts. Professor Zhang Weiming of the University of Defense Technology and others published "Systems Engineering Theory and Methods" in 2010, which systematically summarized the cutting-edge research on systems and system engineering, proposed the basic concepts, principles and methods of systems and system engineering, and constructed a system engineering system. The theoretical and methodological system has high academic research value. Professor Jin Weixin [39] of the National Defense University published "Modeling and Simulation of Systems Against Complex Networks" in 2010, which gave the definition of the system and conducted in-depth research on the modeling and simulation of systems against complex networks. Researcher You Guangrong [40] of the Beijing Institute of Systems Engineering published "Some Understandings and Thoughts on Systems and System Engineering", which discussed the concept of systems, analyzed the characteristics of systems, and analyzed new problems faced by system development, management and application. After thinking, the concepts, methods and key technologies of system engineering were studied, and the concept of weapons and equipment system engineering was proposed. Professor Tan Yuejin [41] from the National University of Defense Technology published "Research and Development of Systems Engineering", which discussed the concepts of systems and system engineering, proposed a research framework for systems engineering, and systematically summarized weapons and equipment using system requirements as an example. The process of system requirements analysis.

By around 2011, the domestic understanding of the connotation of the concept of system became increasingly clear. Although there is no unified definition of the system concept, researchers and scholars have a basic consensus on the connotation of the system, which can also provide a certain basis for subsequent research on related specific issues. Concepts are forms of thinking that reflect the essential attributes of things. Forms of thinking are the thinking framework for humans to understand and face the complex and disordered world. It is worth mentioning that models and methodologies also have this role to a certain extent. It is not difficult to understand why many scholars describe it as "method", "model", "structure". from time to time in the process of defining the system. Etc, these studies provide certain help for us to understand the system from different perspectives. In order to better grasp the essence of systems in the field of aviation equipment and facilitate the development of subsequent support research work, this article selects and gives a typical definition of systems and systems based on comprehensive analysis: System of Systems (SoS) is composed of consistent goals A complex material or abstract system with certain capabilities and completing certain tasks composed of a functionally coordinated and autonomously managed system. System research is generally summarized as systems science, which is the comprehensive study of large-scale complex systems by systems science [42]. System of Systems Architecture (SoSA) is the relationship between the systems that make up the system. This relationship includes hierarchical relationships, functional relationships, information relationships, substitution relationships. The generation of the structure serves the system operating mechanism [43]. System effectiveness (System of Systems Effectiveness, SoSE) refers to the degree of effectiveness of the equipment system in achieving specific mission objectives, that is, a measurement of the effectiveness of the equipment system in completing combat missions under given threats, conditions, environments and combat plans. It is a holistic and dynamic The concepts of sex and antagonism [44].

2.2.2 System construction

The system generally has open boundaries. As the environment and input change, the system continuously adapts to such changes within an acceptable range, with the ultimate goal of completing the system's mission. System construction is the core issue of system research. System construction is based on mission requirements, with capability requirements as the core, and system units as the basis. It usually follows the principle of combining "top-down" qualitative analysis (goal decomposition - task modeling - system construction) and "bottom-up" quantitative comprehensive integration (system development - functional integration - capability aggregation), with "capabilities" as the The link connects the “top-down” decomposition work and the “bottom-up” comprehensive integration work, and ultimately forms a system that matches the mission [44]. System construction is a complex activity that integrates management processes and technical processes. The system construction mechanism can be refined into one body, two cores, three layers, four rings, and five elements. As shown in Figure 1, the integrated system is an adaptable and emergent whole composed of system coupling interactions. Two-core refers to the capability-based system requirement development and the multi-view-based architecture design method. Capability-based requirement development is currently the most important method for system requirement research. The multi-view-based architecture design can more efficiently design the system. Description, design and development. The three layers refer to the user demand layer, system capability layer and system function layer. The four rings refer to the concept development ring, requirements development ring, system development ring, system integration ring and system engineering ring. The concept development ring outputs the goals and constraints of the system by analyzing the system mission; the requirements development ring outputs system requirements, capability requirements and functions. requirements and the mapping relationships between them; the system development ring describes the system and constructs the system structure from three perspectives: global view, system view and technical view; the system synthesis ring analyzes existing systems, designs new systems, and analyzes these systems Integration; the system engineering loop is the classic closed-loop process of traditional systems engineering, which completes the design, development and implementation of the system through system units, common platforms and infrastructure. The five elements refer to the mission, capabilities, structure, mechanisms and units of the system.

2.2.3 System guarantee

Through the above analysis, the definition of system supportability is given: System supportability is a number of mutually independent and cooperative equipment under the guidance of certain combat training tasks, or the equipment system construction characteristics and planning support system composed of equipment systems meet the requirements of combat training mission indicators. Ability. System supportability is the ability of the equipment system to meet usage requirements, which is determined by three aspects: system construction, environmental disturbance and support operation. Among them, system construction is the initial attribute assigned to the system by combat commanders and support commanders based on combat training tasks; Environmental disturbance is the dynamic impact of changes in external conditions on the system during system operation; support operation refers to the support materials and personnel available and their operation management during the equipment system's mission. System supportability is the capability characteristic of combat training tasks, equipment systems, and support systems that work together around system goals. In the actual operation process, the support system can also be analyzed as a system most of the time, and the system support can be regarded as the support sub-system of the equipment system.

3 CURRENT STATUS OF RESEARCH ON EQUIPMENT SYSTEM SUPPORTABILITY

Supportability is the comprehensive system characteristic of equipment, resources, and combat training tasks matching each other. Supportability model construction is the use of different methods and technologies to establish mathematical or logical models of equipment, resources, and combat training tasks. It is sorted out from five aspects: support task planning and scheduling, support resource demand determination and optimal allocation, maintenance implementation and optimization, system supportability index construction and system supportability simulation technology.

3.1 Support Task Planning and Scheduling

Gao Long et al. [45] constructed a multi-Agent-based distributed equipment support system task allocation framework, and proposed a distributed equipment support task allocation model centered on mission success rate. The support tasks originate from when the equipment system performs combat or training tasks. The research focus on the equipment support requirements generated is focused on the allocation of support tasks. Luo LZ et al. [46] designed a multi-robot group task allocation algorithm under certain process priority constraints; Zuo Wenbo et al. [47] established a task allocation modeling for air defense and anti-missile equipment; Wang Jianhao et al. [48-49] constructed an equipment The mathematical model and method of ensuring group collaborative task planning can solve large-scale complex task allocation plans. Proposed a hybrid mission planning method based on multi-dimensional dynamic list planning and chaotic bat algorithm; Ma Haiying et al [50] based on the support force being set up in a support base during regional operations, studied the mathematical model and solution algorithm of its support task allocation; Zhao Tian et al [51] Taking equipment support tasks as the object, they explored the equipment support task planning mechanism from three aspects: task flow, information flow, and process control; decomposition, support and coordination strategies, and based on this, the mission robustness index of the equipment support system was established. Li Kang et al. [53] studied the task modeling factors, task mode and execution process in the simulation evaluation of equipment support effectiveness from the perspective of simulation modeling. Song TL et al. [54] proposed the concepts of operational characteristics and support characteristics from the perspective of system mission requirements, analyzed the relationship between the two, and further studied the definition, composition, content and requirements of system support objectives, and introduced A method for determining system security objectives.

In the research on support task planning and allocation, most of the research focuses on equipment support tasks, and there are few studies that consider combat training tasks, or in most cases the combat tasks are simplified; the measurement indicators of planning and scheduling are mostly support tasks or single equipment. mission success indicators, less consideration is given to system-level indicators of multiple types and large quantities of equipment under modern combat conditions; in a certain support task, the planning and allocation of a single support task is often taken as the research object, and less consideration is given to actual complex tasks and their multiple Multi-type and multi-process support task planning under stage transformation conditions; no comprehensive system-level support evaluation indicators have been proposed from the perspective of the equipment system supporting combat tasks, and the corresponding maintenance support tasks and dispatching have been carried out across all elements and processes, the whole process of research.

3.2 Determine and Optimize Allocation of Security Resource Requirements

Yu Fengzhu et al. [55] started from the support task and constructed a support resource optimization allocation model based on task priority; Wang Tiening et al. [56] took the armored equipment group performing multi-stage combat missions as the research object and constructed an armored equipment group carrying spare parts. Configuration optimization model to achieve targeted allocation of portable spare parts resources; Hu Wenjing [57] through research on support analysis methods, proposed a process and method suitable for supporting the development of support resources in equipment research and development enterprises; Li Ding [58]] studied the construction method of simulation optimization model of basic combat units using support resources based on Petri net and improved genetic algorithm. Shengwang et al. [59] analyzed the reliability of the use support tasks of basic combat units and constructed an optimization model for the configuration of support equipment for a single job based on queuing theory. They also used analytical methods to solve the model and optimize the configuration of the use support equipment. plan. Li L et al. [60] studied the robust resource allocation problem with uncertain task time with the goal of minimizing the completion time; Wang Rui et al. [61] established a system that considers wartime dynamic tasks, natural equipment failures and battle damage failures, and spare parts. The ship formation mission success evaluation model under the wartime spare parts maintenance and supply support mode based on factors such as scrapping and procurement; Sheng Jingyu [62] constructed a coordination and supporting evaluation index system for the use of support resources for basic combat units; Hooks et al. [63] The use of OSA (Open System Architecture) method to unify and standardize avionics system resources is studied to reduce factory costs and life cycle costs.

Research on the determination and optimal allocation of support resource requirements mostly takes support tasks or equipment units as the entry point to study the optimal allocation of support equipment or spare parts for a single resource or a single operation; the measurement of resource allocation efficiency is mostly based on support processes or The degree of completion of the behavior itself is a measurement index, and rarely involves the evaluation of the impact on the completion of the final combat training task; the allocation of support resources is mostly oriented to certain types of equipment or basic combat units, and less to the needs and optimization of equipment systems of combat units or combat groups. . There is no research on the overall application of all elements of support resources by equipment systems and their tasks.

3.3 Maintenance Implementation and Optimization

Han Zizi et al. [64] studied the task reliability evaluation method of functional units under the condition of "incomplete maintenance" and the task maintenance degree evaluation method of repairable unit combinations during maintenance during the mission, and further evaluated the success of the equipment mission; Wang Kailiang et al. [65] established a method for estimating the amount of ordnance equipment maintenance tasks for stability maintenance operations based on the Lanchester equation; Liu Wenbao et al. [66] aimed at the characteristics of equipment maintenance task planning, constructed a maintenance task planning strategy based on genetic algorithms, and established an operation-based maintenance task planning strategy. A mathematical model for maintenance support task planning with the shortest total maintenance man-hour as the objective function. Cao Lijun[67] proposed a maintenance strategy centered on mission success. Taking a certain type of self-propelled artillery as an example, we will establish an evaluation index system that reflects the success of its mission. Guo Linhan et al. [68] described the preventive maintenance process of basic combat units and proposed the fault occurrence mechanism. Based on the production ratio, replacement ratio and scrap ratio parameters, a simulation model was established, and a simulation algorithm was given based on the Monte Carlo simulation principle; Qi Hailong et al. [69] determined the equipment maintenance support maintenance task volume model, and further used the task scheduling model to provide Methods to deal with the two situations when the number of tasks exceeds the number of maintenance personnel and the maintenance time is limited; Liu Bin [70] proposed a method to evaluate the effectiveness of the ship maintenance support system based on ship mission availability, aiming at optimizing support resources and optimizing maintenance strategies for equipment support The impact of system efficiency was analyzed and studied; Tian San et al. [71] established a mathematical model for equipment emergency repair task allocation problems, taking the shortest overall equipment repair time as the objective function, and proposed the application of genetic algorithms to solve this type of problem; Zhang Tao [72]] Based on the analysis of the mission requirements characteristics of equipment in peacetime and wartime, the maintenance support capability evaluation indicators during the equipment use stage were studied. Using availability and mission success probability as the main evaluation indicators, a corresponding model and its solution algorithm were established. .

Maintenance implementation and optimization research focuses on maintenance task planning, allocation and maintenance capability assessment of single equipment or basic combat units; for equipment functional units, the evaluation method of task maintainability is considered; for a certain type of equipment, the effectiveness evaluation of the maintenance support system is studied. The impact of resources and maintenance on the effectiveness of the support system has been studied; some scholars have established computer model descriptions of certain maintenance processes, and established corresponding evaluation indicators and simulation algorithms; research from combat training tasks to

maintenance support implementation and optimization has been relatively There are few maintenance-related elements and process optimizations at the mission-oriented equipment system level.
From the above literature analysis, it can be seen that current support research has conducted relatively in-depth research in three aspects: support mission planning and scheduling, support resource demand determination and optimal allocation, and maintenance implementation and optimization. These research results are mission-oriented equipment systems. Support research provides a certain technical foundation. On the other hand, there are few studies on establishing a scientific and complete computer description model for equipment system supportability, constructing system-level indicators to evaluate supportability based on combat training tasks, and establishing intelligent decision-making simulation models for equipment support command, especially the "indicators" There has not been any research on comprehensive connectivity of "Construction-Intelligent Decision-making" and system implementation and case verification.

3.4 Construction of System Security Indicators

As a new research field, the construction of system supportability indicators has gradually developed from the supportability parameters of model equipment and the supportability indicators of equipment systems, and has accumulated certain accumulation in theory and methods. Guan Nan [73] proposed a mathematical analysis method for equipment supportability evaluation based on gray theory, which solved the qualitative analysis of qualitative and quantitative indicators in support engineering and used it to evaluate the decision-making quality of support projects. Jin Rong [74] proposed a supportability evaluation method for a certain type of aircraft based on entropy-weighted multi-objective decision-making, and its evaluation indicators and evaluation objects are oriented to single-type equipment. Li Junliang et al. [75] established a system availability equation in which failure time and maintenance time obey a general distribution through the update process theory, and gave and proved a general method for solving system availability. The system is defined as a military aircraft and its subsystems and components. Guo Xiaowei et al. [76] established a planning model based on the multi-stage mission characteristics of equipment groups with the goal of maximizing mission availability, and proposed an improved algorithm to solve the model. However, its maintenance activities were assumed to be within the mission interval, and continuous missions were not considered. Simultaneous with maintenance. Wei Yong et al. [77] established a mission success rate simulation model through the definition of mission success rate, and applied the principle model to the multi-stage mission training simulation of a certain ship. Lu Kai et al. [78] established a parameter system for equipment system maintenance and support capabilities, which is helpful for maintenance and support capability modeling and simulation. The parameter system is established based on the usual support process. Claude M. Bolton Jr [79] proposed two key performance index parameters related to logistics support in the future combat system FCS, namely the transportation and deployment index KPP4 and the support and reliability index KPP5. Through the optimization of FCS system support related technologies, we can achieve the goal of improving logistics support efficiency and reducing combat costs. Mohammad Asjad et al. [80] established a conceptual framework to obtain the supportability characteristics of mechanical systems. Through research, they found that availability and life cycle costs are feasible indicators to quantitatively describe supportability from the user's perspective. Through further research, Mohammad Asjad [81] et al. gave the definition of system availability, established a system availability model of mechanical systems based on use and maintenance support, and analyzed the impact of RMS parameters on mechanical system availability. Chang Y et al. [82] analyzed the mission reliability of the fault redundant multi-stage mission system FTMPS, and established an analytical calculation method with random stage duration, non-exponential distribution of maintenance activities, and different maintenance strategies, using the spacecraft to perform near-Earth operations. Flight missions and distributed computer systems completing long-term scientific experiments are demonstrated as examples.
It can be seen that the current research on supportability indicators is mostly oriented to single equipment and its components, focusing on influencing the design, manufacturing process and cost control of equipment through supportability analysis modeling. There is relatively little research on the completion of combat readiness and wartime use tasks of equipment systems, on the one hand, it highlights that supportability research is not completely compatible with the characteristics of combat tasks under modern conditions, on the other hand, it also reflects that there are still many deficiencies in the construction of equipment system supportability indicators. It can be considered to establish the supportability index system of the equipment system by clarifying the concept of supportability of the equipment system and on the basis of analyzing the supportability logic control mechanism of the equipment system, and providing clear definitions and calculation formulas of each supportability index in some form. Lay the foundation for subsequent system security evaluation and decision-making.

3.5 System Support Simulation Technology

System modeling refers to describing the structure, function, and input-output relationship of an actual system using digital models, logical models, and using the research on the model to reflect the research on the actual system [83]. With the system model and the help of computers, the system and functions can be simulated. This is system simulation, which is equivalent to conducting experiments on the system in the laboratory, that is, systematic experimental research. A system is a large-scale system integration. In a general sense, a system belongs to a special type of system. When solving system problems, it should be regarded as a "new field of system engineering development " [84].

The fundamental purpose of weapon and equipment system research is to optimize the weapon and equipment system, and the core is comparison and selection [85]. The goals of optimization selection can be the maximum cost-effectiveness, maximum adaptability to mission tasks, maximum robustness to task changes, and superior information acquisition and decision-making [86]. The optimization object of system supportability research is mainly the maintenance support capability of the equipment system. According to the form of expression of maintenance support capability, it can be divided into assessment through actual operations and assessment without actual operations. Category 1 includes actual combat (exercises)) evaluation, test evaluation, actual military exercise evaluation. ; the second category is mainly modeling and simulation methods [87]. The modeling and simulation method overcomes the shortcomings of actual combat, weapon equipment testing and actual military exercises, and does not require the actual use of equipment. By establishing an equipment system activity and evolution model, repeated calculations and evaluations are carried out under various external input conditions. It is economical, simple, flexible, and versatile. Therefore, it has become the most commonly used and important method to evaluate equipment effectiveness under non -actual combat conditions. .

In recent years, as the issue of equipment support throughout its life cycle, especially combat use, has become more prominent, equipment support modeling and simulation research has gradually attracted the attention of scholars. Pan Xing et al. [88] proposed an equipment system RMS demonstration framework based on the system engineering (SoSE) requirements development process and equipment system characteristics; Luo Xiangyong et al. [89] proposed DoDAF-based equipment support task modeling and analysis for complex equipment support tasks. Simulation verification method; Mi Qiaoli et al. [90] modeled and simulated the naval gun maintenance support process based on ExtendSim; Yin Lili et al. [91] conducted distributed modeling and simulation of the equipment support system based on multi-agent; Kou Li [92] studied the key technologies of equipment support system simulation based on multi-agent, built a prototype system and conducted a case analysis; Mahulkar et al. [93] conducted a system modeling of the daily maintenance process of naval combatants based on intelligent agents. and simulation analysis; Yang LB et al. [94] conducted research on multi-source data integration based on intelligent agents to solve the problem of highway signal system maintenance decision support; Cao Y et al. [95] constructed equipment support process based on multi-agent systems. The model was studied; Panteleev et al. [96] established an equipment maintenance support process model based on the intelligent agent method to solve the optimization of corresponding services provided by maintenance service companies; Du XM et al. [97] established an equipment maintenance process model based on intelligent agents. To ensure the command framework, the communication mechanism of each intelligent agent is designed.

The above literature has conducted in-depth research on issues related to equipment support system modeling and simulation. The areas that need improvement are mainly concentrated in three aspects. First, there is a lack of comprehensive modeling, evaluation, and simulation from the perspective of completing the equipment system tasks. Research on solutions for verification and optimization; secondly, in the process of building the model, the scientific mathematical and logical description of the guarantee system elements needs to be improved, mainly in the representation and control of system adaptability and emergence; thirdly, due to the model design Due to the complexity of development, many simulations pay more attention to the design, development and operation of the model, and do not pay enough attention to experimental design and experimental analysis methods, resulting in a lack of depth in the research of the problem. On the other hand, there is still little research on equipment support systems under certain mission conditions. Considering the advantages of multi-Agent technology in solving emergent and evolutionary problems in the field of complex system simulation, we can consider proposing a multi-Agent simulation development process for the equipment support system based on multi-Agent simulation modeling technology, and establishing a multi-Agent model that constitutes the simulation of the equipment support system. . From the perspective of completing the equipment system tasks, establish a relatively comprehensive and complete support modeling and simulation technology solution to support decision-making analysis and solution optimization for improving equipment support capabilities.

4 CONCLUSION

The use of combat forces in information-based warfare shows obvious systematic development characteristics, and equipment support has become an important part of the military's combat effectiveness. This article provides an in-depth analysis of the system concept and its construction mechanism, and defines the concept of system guarantees. The current status of equipment system supportability research at home and abroad is further analyzed. Finally, the current research status of the two aspects of "index construction-intelligent decision-making" in mission-oriented equipment system supportability research is analyzed. The next step should be to strengthen theoretical and technical research in the aspects of mission planning, support resource determination, and maintenance implementation of the equipment system, especially the study of support evaluation indicators and simulation technology methods of support problems, which play an important role in solving system support problems. The research in this paper has certain guiding significance for the subsequent work on mission-oriented equipment system support modeling and simulation evaluation.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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