

Research on Equipment Support Capability Evaluation Based on Meta-Evaluation Theory

Shuai Wang, Yabin Wang* and Jinguo Wang
*Shijiazhuang Campus, Army Engineering University of PLA,
Shijiazhuang 050003, China*

Keywords: Meta-Evaluation Theory, Equipment Support Capability, Evaluation Process.

Abstract: Equipment support capability evaluation is an important link to promote the construction and development of equipment factory support, and it is an important starting point to test the level of equipment factory support capability. The meta-evaluation of evaluation scheme, evaluation achievement and evaluation report can effectively improve the pertinence and reliability of the evaluation of security capability. In this paper, the meta-evaluation theory and the practice of equipment support capability evaluation are combined, and a set of relatively standard and integrated meta-evaluation process concept of equipment support capability evaluation is proposed, in order to promote the effectiveness of equipment support capability evaluation through the introduction of meta-evaluation.

1 INTRODUCTION

Equipment support capability is an important capability index of equipment factory. Equipment support capability evaluation is a scientific evaluation of the generation, maintenance and application of equipment support capability. It is a series of theoretical understanding and practical testing processes to draw objective and comprehensive conclusions on equipment support capability, and an important means to test the level of equipment support capability building.

With the increasing scientific and technological content of equipment and change of equipment support tasks, the evaluation of equipment support capability is facing new situations and tasks, among which the key task is to establish a unified equipment support capability evaluation system. However, due to the influence of objective factors, there will inevitably be errors and deviations in the process of equipment support capability evaluation, which need to be corrected and improved by monitoring and inspection. This makes it possible to apply meta-evaluation theory in equipment support capability evaluation. In addition, meta-evaluation can verify the correctness of equipment support capability

evaluation theory, correct and perfect the contradiction problems in the evaluation, and promote the formation of scientific equipment support capability evaluation theory through the analysis and inspection of evaluation scheme, evaluation process and evaluation results.

2 META-EVALUATION THEORY

Meta-evaluation theory was first introduced by Michael Scriven, an American expert on evaluation theory, in an article published in 1969 in response to the question of how to evaluate evaluation tools (Cai, Mu, Feng, et al 2021). The theory holds that systematic evaluation of the evaluation itself can provide the original evaluation with its own feasibility, correctness, accuracy and other related information, which helps to timely detect and solve the problems encountered in the evaluation process and ensure the quality and benefit of the evaluation activities.

* Corresponding author

2.1 Meta-Evaluation Rationale

Meta-evaluation is an evaluation activity that takes the original evaluation activity as the main evaluation object and re-evaluates the evaluation activity, evaluation system, evaluation system and evaluation mechanism. It is an evaluation activity that evaluates the scientific nature of the original evaluation activity itself and the behavior of the evaluation subject and object in order to improve the evaluation quality and effect. Meta-evaluation is an important means to strengthen the construction of evaluation system and perfect evaluation mechanism, and is the guarantee of scientific and rational evaluation work.

Taking meta evaluation as an important link in the equipment support capability evaluation process, re-evaluating important sub links in the equipment support capability evaluation process, giving play to the evaluation, monitoring and correction functions of meta evaluation, can standardize and measure the evaluation itself, improve the quality of equipment support capability evaluation, ensure the quality of evaluation, and form scientific and authoritative evaluation results, Realize the value goal of service equipment support capacity construction (Zhang 2020).

2.2 Meta-Evaluation Application Strategy of Equipment Support Capability Evaluation

The operation mode of meta-evaluation (Zhang, Chen 2017) is generally divided into two types. One is formative meta-evaluation carried out synchronously with the evaluation activities, emphasizing meta-evaluation at the connecting node in the evaluation so as to timely correct the problems in the evaluation process. The other is the summative meta-evaluation organized after the end of the evaluation activity, emphasizing the overall analysis and evaluation of the evaluation activity as a whole, with the goal of providing opinions and suggestions for the final decision. Meta-evaluation of equipment factory support capability evaluation can integrate the advantages of the two modes, and realize the control of evaluation activities by integrating meta-evaluation process into the node link of evaluation activities and taking meta-evaluation results as procedural normative documents of evaluation activities. Specifically, it is to establish an iterative process from the evaluation sub-process to the meta-evaluation process, and then from the meta-

evaluation process to the evaluation sub-process, so as to achieve the fit and integration of meta-evaluation in the evaluation process, and ensure that the evaluation implementation process is more scientific, standardized, accurate and objective.

3 APPLICATION OF META-EVALUATION IN EQUIPMENT SUPPORT CAPABILITY EVALUATION

Meta-evaluation of equipment support ability evaluation process is the essence of evaluation activities and results for the object, to evaluate the whole process of internal system evaluation plan formulation, evaluation result evaluation and evaluation reports etc, is synchronized with the whole evaluation process, after the evaluation of the link, can effectively improve the efficiency of the evaluation of the quality of the work.

3.1 Evaluation Scheme Meta-Evaluation

According to the meta-evaluation theory, the expert group of evaluation should submit the evaluation plan to the evaluation leadership group after completing the evaluation plan of equipment support capability, and the evaluation leadership group will review and confirm the evaluation plan. The evaluation leadership group shall review the content of the evaluation scheme according to the evaluation purpose, the evaluation plan and the relevant work requirements, review the procedure of the evaluation scheme according to the work arrangement of the evaluated unit, point out the existing problems, put forward suggestions for improvement and determine the evaluate conclusion. According to the evaluation conclusions, the evaluation expert group shall reformulate the evaluation plan or make targeted modifications and improvements until a more scientific, standardized and feasible evaluation plan is formed.

3.2 Evaluation Results Meta-Evaluation

Meta-evaluation of evaluation results is the analysis and verification of evaluation results and their generation process. The results of equipment support

capability evaluation information data obtained through model calculation need to be analyzed and verified to be convincing and authoritative evaluation results can be formed. In equipment support ability evaluation practice, due to the information in the process of data collection, model building and calculation, the concrete numerical error in the processing, the acquisition of information data and evaluation index system and evaluation model of demand, different evaluation methods to evaluate the same object results may also be inconsistent, can lead to inaccurate evaluation data results. Therefore, qualitative and quantitative analysis, data scores and system simulation verification methods are needed for analysis and verification, which focuses on verification and analysis of pertinence, authenticity, objectivity, timeliness and accuracy of data sources, acquisition process, data classification, calculation process and other links. If it fails to pass the verification, the analysis and verification results should be fed back to the relevant links for supplementary verification, modification, re-collection, calculation, etc., to ensure the accuracy and reliability of the evaluation results.

3.3 Meta-Evaluation of Evaluation Report

Meta-evaluation of the evaluation report is the evaluation and confirmation of the equipment support capability evaluation report, which is an important step in the end of the evaluation. It is divided into two parts: formal review and substantive review. Formal review mainly refers to the review of whether the content and form of the evaluation report are standardized and complete, and the review of the effectiveness of the evaluation report. Substantive review is to examine whether the core content and data of the evaluation report are comprehensive, true and accurate, and to examine the reliability of the evaluation report. If the evaluation report fails to pass the evaluation, the relevant situation should be fed back to information collection, data processing, grade generation, report writing and other links that may have problems, and targeted measures should be taken to correct, supplement or re-evaluate, and then the evaluation should be carried out again until it passes. After the evaluation report passes the evaluation, the evaluation leadership group will officially confirm the evaluation report and submit it to the evaluation initiator, who will organize the feedback and application of the evaluation results.

4 EQUIPMENT SUPPORT CAPABILITY EVALUATION PROCESS BASED ON META-EVALUATION

Combined with the evaluation of application, on the basis of evaluation practice and the related literature research, this article explores to build a set of more scientific and standardized evaluation process, to evaluate the implementation of the whole process of the equipment support by will involve activities analysis integration, clear and complete description in the form of framework, which provides the standard basis for the evaluation practice. At the same time, this paper discusses and studies the evaluation indicators and standards, evaluation data collection, evaluation normative documents and feedback application that are widely concerned in evaluation organization and implementation.

4.1 Evaluation Process Framework

According to the organization and implementation of the evaluation, the equipment support capability evaluation process can be divided into three stages: evaluation preparation, evaluation implementation and evaluation summary, including the following steps: (1) clarifying the evaluation objects, objectives and boundaries; (2) Establish evaluation institutions and clarify the responsibilities of each organization; (3) Formulating the evaluation program, which mainly includes establishing the evaluation index system, selecting the evaluation method, establishing the evaluation model, and verifying the evaluation model; (4) Review and confirmation of the evaluation scheme; (5) Evaluation personnel training; (6) Evaluation information data collection; (7) Evaluation of information data processing; (8) Generation of evaluation results; (9) Analysis and verification of evaluation results; (10) Writing evaluation reports; (11) Evaluation and confirmation of the evaluation report; (12) The feedback and application of the evaluation results. The basic flow is shown in Figure 1.

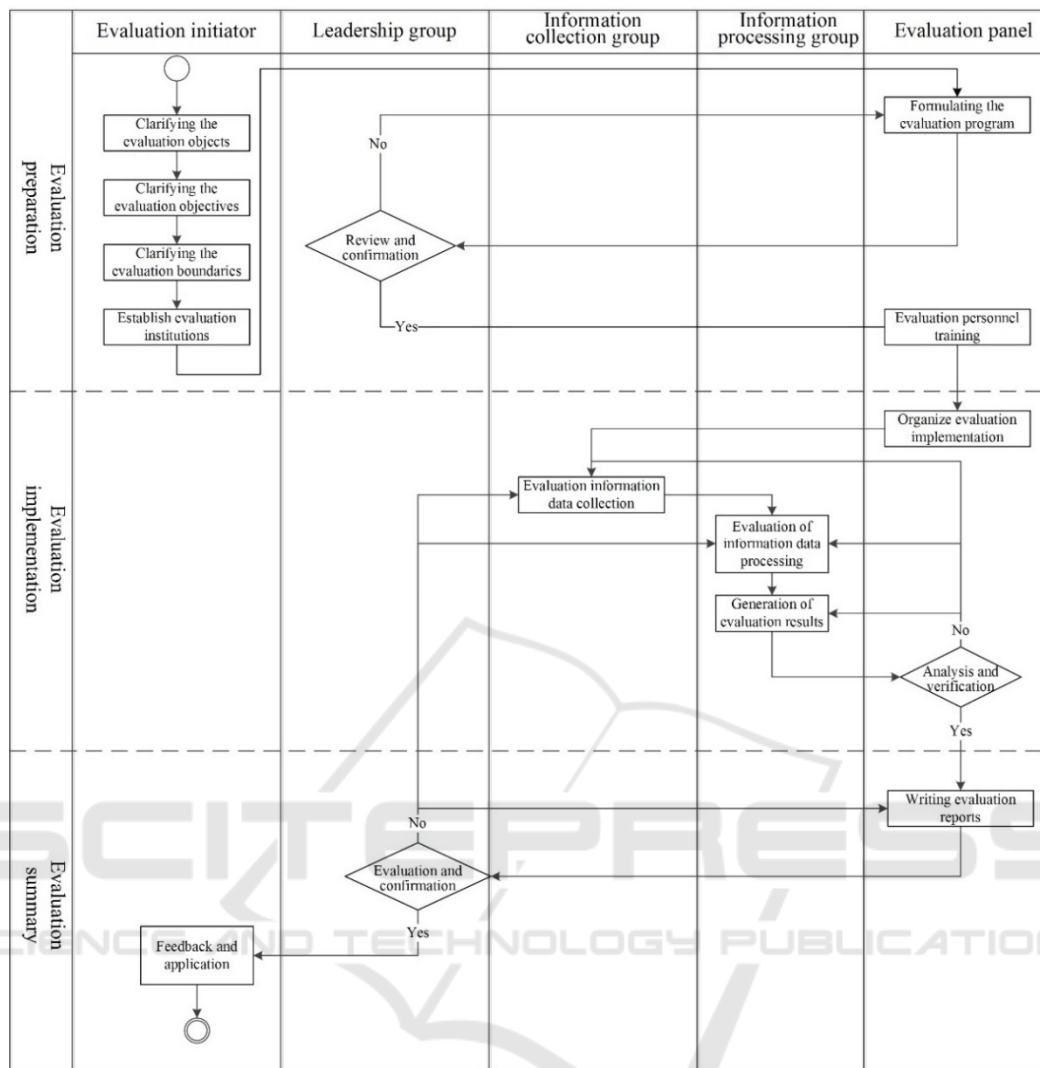


Figure 1: Process model of equipment support capability evaluation.

4.2 Evaluation Index System and Standards

The evaluation index system of equipment support capability should be based on the standard of equipment support capability construction, combined with the reality of equipment support task, guided by capacity demand, and constructed around the key points and difficulties of equipment support capability and core keys. Based on the equipment support tasks, the methods of mission capability decomposition, hierarchical analysis, extraction ability factor, the method of architecture design, can build cover the command and control ability, maintenance support ability, supply (allocate) support capability and data support ability of equipment support ability evaluation index system of (Zhang, Ruan, Li 2021).

Evaluation standard and evaluation index system complement each other, without standard index does not have scientific nature. However, the current evaluation standards have not yet formed a unified standard version. In the evaluation practice, relevant standards and specifications need to be queried according to the selection of evaluation indicators. Equipment support ability is an important component of the system operational capability, so the equipment support ability evaluation criteria and related professional post standard and construction standards are consistent, should be combined with characteristics of equipment support tasks at the same time, learn professional post level standard, establish a scientific system of rating standard system, so as to realize more scientific and careful evaluation of equipment support capability evaluation.

4.3 Evaluation Data Collection

Evaluation data collection not only confined to the static inspection, on-site examination or the combat exercises using traditional methods in the process, still need to strengthen the consciousness of data mining and extend to the big data systems to data, more memory data information to fully explore and intelligent equipment information, rational utilization of equipment support data monitoring system, forming a complete coverage of evaluation information data acquisition, Ensure the objectivity, accuracy and integration of the evaluation data.

The collection and processing of evaluation data is mainly carried out by the evaluator team. Due to we have not yet present train formation evaluation personnel team, also did not establish a third party evaluation mechanism of the specialized institutions, so in after confirmation of the evaluation scheme, need to organize relevant evaluation staff professional training organization, training contents include the evaluation theory, evaluation implementation, evaluation process, evaluation method, etc., In order to make the evaluator clear evaluation content, evaluation index system, information data collection method and processing

requirements, ensure the smooth evaluation process and accurate and authoritative evaluation results.

4.4 Evaluation Normative Documents and Feedback Applications

Normative documents in the implementation of the evaluation mainly refer to the process documents generated by the evaluation functional groups in the process of performing their duties. It mainly includes evaluation plan, evaluation implementation plan, evaluation implementation plan review report, evaluation personnel training plan, information collection plan, data processing plan, information collection form, comprehensive assurance plan, information data summary report, evaluation results analysis and verification report, evaluation report, evaluation report review conclusion, final evaluation opinions, etc. The generation time in the evaluation process is shown in Figure 2. In the normative documents, the evaluation implementation plan review report, the evaluation result analysis and verification report, and the evaluation report review conclusion are the process documents of meta evaluation integration in the evaluation activities.

	Evaluation initiator	Leadership group	Evaluation panel	Information processing group	Information collection group	Comprehensive assurance group
Evaluation preparation	Evaluation plan	Evaluation implementation plan review report	Evaluation implementation plan Evaluation personnel training plan	Data processing plan	Information collection plan Information collection form	Comprehensive assurance plan
Evaluation implementation			Evaluation results analysis and verification report	Evaluation results	Information data summary report	
Evaluation summary	Final evaluation opinions	Evaluation report review conclusion	Evaluation report			

Figure 2: Normative document of equipment support capability evaluation.

The feedback and application of evaluation report are the real realization of evaluation work value. After the evaluation report is confirmed, the relevant units or departments should be fed back in time, and the communication with the evaluated units should be strengthened to promote the application of the evaluation results, so as to achieve the practical significance of "promoting construction by evaluation and combining construction with evaluation". At the same time, the evaluation results should be used as an

important basis for task preparation, unit evaluation and excellence, and personnel evaluation and appointment, so as to stimulate the endogenous power of equipment support capacity construction.

5 CONCLUSION

In this paper, blend in meta evaluation of equipment support ability evaluation work, through the review

of evaluation scheme, the analysis of the evaluation result verification and evaluation of reliability evaluation of existing evaluation activities and effectiveness evaluation, giving play to the role of internal supervision, realize the monitoring of the evaluation process, to ensure that the evaluation of the scientific, standardized, accurate and objective. On this basis, the evaluation process of equipment support capability is standardized, and the methods to modify and improve the evaluation practice are put forward. The follow-up work needs to conduct systematic research on the evaluation operation mechanism, innovate and optimize the data collection methods, standardize and integrate the standards and rules, and form a scientific and perfect equipment support capability evaluation specification to provide a basis for equipment factory construction.

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