



Research on Performance Evaluation Index System of Public Welfare Mineral Geological Survey Project

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Abstract. Performance evaluation index is an important standard to reflect the effect of project implementation and the effectiveness of fund use. Based on the research of the relevant systems and measures of the Ministry of Finance to improve the performance of financial funds, the efficiency of financial resource allocation and the use efficiency, this paper expounds the necessity of performance evaluation of public welfare mineral resources exploration projects, studies the construction of first-level performance index, second-level performance index and third-level performance index, and empirically analyzes the application of performance evaluation index of public welfare mineral projects combined with the three-level index system, and draws relevant conclusions and suggestions. The performance evaluation index system of public welfare mineral resources survey project should be set in combination with the actual situation, highlighting the unique connotation of the industry and reflecting the characteristics of the public welfare of the project, so as to construct a reasonable performance evaluation index system.

Keywords: Performance evaluation index, public welfare, mineral resources exploration projects.

1 Introduction

Performance management, as a management concept and method to evaluate and improve government performance, has attracted more and more attention and practice from governments all over the world. Performance evaluation of government investment projects is an important part of government performance. There are three representative methods in foreign government performance evaluation: "3E" evaluation method[1], benchmarking management method[2] and balanced scorecard method[3]. They represent three different development stages of government performance evaluation, and the standards of performance evaluation are increasingly diversified.

Project performance evaluation refers to the objective and impartial measurement, analysis and judgment of the economy, efficiency, benefit and fairness of project expenditure according to the set performance objectives[4]. At the beginning of the 21st century, the Ministry of Finance of China began to lead and promote the performance evaluation of fiscal expenditure. In 2011, the Interim Measures for the Management of the Performance Evaluation of Fiscal Expenditure was issued. In April 2013, the

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Framework of Common Indicators System for Budget Performance Evaluation was formally issued[5]. In 2018, the Opinions on Implementing Budget Performance Management in an All-Round Way was issued, which put forward specific requirements for improving the performance of the use of financial funds and enhancing the efficiency of allocating and using financial resources. In 2020, the Measures for the Administration of Performance Evaluation of Project Expenditure were revised and issued to strengthen the management of fiscal expenditure, strengthen budget performance constraints, and enhance the expenditure responsibility and performance awareness of project undertakers and project leaders. At present, the central financial budget expenditure departments and units have established a performance evaluation system[6]. The overall expenditure evaluation index system has also made great progress in recent years[7]. In terms of geological work, there are few studies on the performance evaluation indexes of public welfare mineral geological survey projects [8]. It is urgent to strengthen the research on the performance evaluation indexes exclusive to mineral resources survey projects, and constantly enrich and improve the performance evaluation index system.

Public welfare mineral resources survey projects are fully appropriated by the central government, and mainly focus on the major economic and social needs of the country and the work of the natural resources center to carry out basic, public welfare and strategic mineral resources survey projects, which are specifically organized and implemented by the China Geological Survey.

The implementation of the mineral resources survey project is closely focused on the basic work orientation of "fully supporting the security of energy, minerals, water and other strategic resources, carefully serving the construction of ecological civilization and the work of the natural resources management center", with the core of supporting and serving the strategic action for breakthroughs in prospecting, and is committed to solving a number of major problems that restrict breakthroughs in prospecting. Give full play to the leading and driving role of public welfare geological survey work, strive to obtain a number of important new prospecting discoveries, and lay a solid foundation for improving the degree of security of important mineral resources.

The performance evaluation of project expenditure is to measure and judge the efficiency and effect of project expenditure on the basis of preset performance targets. The main purpose of implementing the performance evaluation of project expenditure is to improve the effectiveness of financial expenditure. Through the evaluation of performance indicators, the compliance of financial expenditure is supervised and the efficiency and effectiveness of project expenditure are comprehensively evaluated. Efficiency is the concrete embodiment of the requirements of the government and the public on the financial expenditure in the aspects of project decision-making, implementation progress, economic and social benefits; Effectiveness is the concrete embodiment of the final results achieved by fiscal expenditure, which needs to be measured by combining current benefits and long-term benefits.

The performance evaluation index is a variable that measures and reflects the status of the performance target, which has two kinds: quantitative and qualitative. The performance evaluation index is the core of the performance evaluation. Only by comprehensively reflecting the performance objective can the quality of the performance

evaluation be guaranteed. Through a comprehensive understanding of the project decision-making, management mechanism, management level, project implementation output and efficiency, the use of funds, sum up the project implementation management experience, find the problems and deficiencies in the project implementation, and put forward suggestions for improvement. Strengthen the management and supervision of the expenditure of financial funds, and then improve the efficiency of the use of financial funds.

To carry out the research on the performance evaluation index system of mineral resources survey projects, the index setting should be combined with the actual situation on the whole, which can not only reflect the characteristics of the public welfare of the project, but also highlight the unique connotation of the industry, in order to help improve the efficiency of the use of financial funds and lay the foundation for the performance evaluation of the project. Through the performance evaluation index system, a comprehensive understanding of the project decision-making and management mechanism, management level, project implementation outputs and benefits, and the use of funds, an objective evaluation of project performance, problems and deficiencies in the implementation, further strengthening the expenditure responsibility of budget units, providing suggestions for the sustained and effective implementation of mineral resources survey projects, strengthening the management and supervision of financial funds, And improve the efficiency of the use of financial funds.

2 Method

In July 2020, on the basis of revising the Interim Measures for the Administration of the Performance Evaluation of Fiscal Expenditures, the Ministry of Finance formulated the Measures for the Administration of the Performance Evaluation of Project Expenditures, improving the performance evaluation indicator system, and making decisions on the setting and implementation of the performance evaluation indicator framework.

The first-level evaluation indicators of the four dimensions of process, output and benefit, the 10 second-level indicators such as project initiation and performance objectives, and the third-level indicators such as the adequacy of project initiation basis and procedural standardization are detailed in the aforementioned management measures issued by Ministry of Finance[9].Based on these requirements and the characteristics of mineral resources survey projects, the performance evaluation index system of mineral resources survey projects is established, as shown in Table 1.

The first-level indicators are divided into four aspects: decision, process, output and effect of the project. The first is decision making. It mainly evaluates the adequacy of project establishment basis, the compliance of project establishment procedure, the rationality of project design, the rationality of performance objectives, the clarity of performance indicators, the matching of funds and the rationality of fund allocation. The second is the process. It mainly evaluates the implementation rate of the project budget, the compliance of the use of funds, the effectiveness of financial monitoring, the comprehensiveness of safeguard measures, the soundness of the

management system, and the effectiveness of the system implementation. Third, output. It mainly evaluates the amount of work completed in accordance with the plan and the expected results delivered. Specific includes output quantity (actual completion rate), output quality (quality up to standard rate), output timeliness (timely completion), output cost (cost saving rate). Fourth, benefit. The main evaluation of project results is the expected effect after the use of service objects. Specifically, it includes the benefits generated by the implementation of the project (social benefits, economic benefits, ecological benefits, sustainable impact, etc.), and the satisfaction degree of the public or the service objects with the implementation effects of the project.

The Secondary-level indicators include project initiation, performance objectives, financial management, organization and implementation, output quantity, output quality, output timeliness, output cost, benefit, social benefit, economic benefit, ecological benefit, sustainable impact and satisfaction level [10], among which the **output indicators** are:

(1) Quantity index. The quantity that reflects the expected result.

The quantity index of various geological survey projects is different. For example, the ore transfer project mainly refers to the expected basic mineral geological map, prospecting target area, newly discovered ore area, and new technology developed by carrying out the main physical workload such as mineral geological survey during the project implementation.

(2) Quality index: reflect the standard, level and effect of the expected results. The quality indicator should correspond to the "quantity indicator" as far as possible. Such as prospecting target area XX class $\geq 60\%$, field quality acceptance rate $\geq 90\%$, project results qualified rate $\geq 90\%$, results on time completion rate $\geq 90\%$, scientific research paper (journal) grade and other aspects of quantitative assessment.

(3) Time index: reflect the timeliness and efficiency of the delivery of expected results. Such as "Field acceptance", "map submission", "database acceptance" "outcome report "timely rate.

(4) Cost index: refers to the annual central financial input of the fund index.

Among the **benefit indicators**:

(1) Social benefit indicators: reflect the contribution and impact of the expected results on social economic development. For example, new geological prospecting discoveries are obtained through the implementation of the project, and to support national and local development

(2) Indicators of economic benefit. Reflects the impact and effect of expected results on economic development. Such as "Solve major resource problems to achieve the expected results"

(3) Ecological benefit index: reflects the impact and effect of the expected results on the natural environment. For example, In the process of project implementation, new technologies for efficient utilization of mineral resources will be innovated to promote green exploration and development of mineral resources.

(4) Indicators of sustainable impact:

Reflect the contribution and impact of the expected results on the development of the industry. Such as promoting metallogenic theory innovation, exploration methods

and technology progress and professional personnel growth, as well as mineral survey data and map products continue to provide social services.

(5) Satisfaction index

Reflect the customer's recognition of the expected results. Customer satisfaction is the user's satisfaction with mineral survey data and the effect of supporting services. Among them, users are the service objects of the project implementation and the results achieved by the project, including government departments at all levels, industrial geological prospecting units, social enterprises, teachers and students of colleges and universities. The needs of users include the demand for the results, products and services of the survey and evaluation of public welfare mineral resources.

The three-level index is the specific decomposition of the two-level index, such as: the project approval index can be decomposed into the adequacy of the project basis and the standardization of the project procedure; The performance target indicator can be decomposed into the rationality of the performance target, the clarity of the performance indicator, and the rationality of the budget preparation; Financial management indicators can be decomposed into budget implementation rate, fund use compliance, financial monitoring effectiveness; Some three-level indicators are set according to the actual situation of various professional fields(See Table 1 for details). For example:

Table 1.Three-level Performance Evaluation Index of Mineral Resources Survey Project.

Performance indicator	Level 1 indicators	Secondary indicators	Tertiary indicators	Index values	
	Output indicators	Quantity indicators		map of mineral geological survey	≥X maps
Quantitative indicators			Delineation of prospecting targets	Location X	
Quantity indicator			Academic monographs	X Division	
Quantity indicator			Academic paper	X papers	
Quantitative Indicators			Newly discovered mineral areas	Place X	
Quantity indicator			New technology for comprehensive utilization of mineral resources	≥X items	
Quality indicators			Secondary project results pass rate	90% or higher	
Quality indicators			Prospecting target area XX class	60% or higher	
Quality indicators			Research paper (journal) grade	Core and above	
Quality indicators			Field quality acceptance rate	90% or higher	
Time limit			On-time completion rate of results	90% or higher	
Benefit indicators		Social benefit index		To provide basic support for mineral resource exploration	To promote the construction of mineral resource base
		Ecological benefit index		To carry out comprehensive surveys and evaluations of resource bases and promote green exploration and development of mineral resources	To support progress in green exploration and development of mineral resources
	Indicators of sustainable impact		Promote metallogenic theory innovation, exploration method technology progress and professional personnel growth	A number of new understanding of metallogenic theory has been obtained.	

			and the number of high-level talents has been increased
	Indicators of sustainable impact	Mineral survey data and map products continue to provide social services	Provide a batch of geological maps and data
Indicators of satisfaction	Customer satisfaction index	Users' satisfaction with mineral survey data and supporting service capabilities	90% or higher

(1) Quantitative indicators: mainly refer to the basic mineral geological maps, prospecting target areas, newly discovered ore areas, new technologies developed and other achievement indicators expected to be submitted by carrying out mineral geological survey and other major physical workload in a certain scale during the project implementation.

(2) Quality index: refers to the quantitative assessment of field construction, achievement report recognition level, paper (journal) level and other aspects during the project implementation.

(3) Social benefit indicators: including new geological prospecting discoveries obtained through project implementation, basic support for mineral resource exploration, including indicators such as promoting the formation of a large resource base.

(4) Ecological benefit index: refers to the innovative demonstration and comprehensive investigation and evaluation of green exploration methods carried out during the implementation of the project, and the index to promote the green exploration and development of mineral resources.

(5) Sustainable impact indicators: indicators that can have a medium and long-term impact on economic and social development through the implementation of the project, including promoting the innovation of metallogenic theory, the progress of exploration methods and technology and the growth of professional talents, as well as the continuous provision of social services by mineral survey data and map products.

3 Results

The performance evaluation index system of mineral geological survey projects should be set in accordance with the actual situation, which can not only reflect the characteristics of the public welfare of the project, but also highlight the unique connotation of the industry. Through the performance evaluation index system, we can fully understand the project decision-making management mechanism, management level, project implementation output and benefits, and fund utilization, have an objective evaluation of project performance, find the problems and shortcomings in the implementation, further strengthen the expenditure responsibility of budget units, and provide suggestions for the sustained and effective implementation of mineral geological survey projects. Strengthen the management and supervision of financial funds, and improve the efficiency of the use of financial funds.

According to the relevant requirements of the Ministry of Finance and the Bureau of Regional Transport on the performance management of project expenditure, the performance evaluation index system of mineral geological survey projects shall be

established, and the indicators shall be refined and the score set. The rating standard of the performance evaluation results is determined according to the "Project Expenditure Performance evaluation Management Measures" (Finance Budget (2020) No. 10), the total score is set to 100 points, and the grades are divided into four grades: the comprehensive score of 90 (inclusive) -100 is divided into excellent, 80 (inclusive) -90 is divided into good, 60 (inclusive) -80 is divided into medium, and below 60 points is poor. The empirical analysis here is that the public welfare mineral geological survey project is a first-level project, which has several second-level projects [11]. See table 2 for details.

Table 2. Analysis of performance evaluation index system of public welfare mineral geological survey projects.

First-level index	Secondary indicators	Tertiary indicators	Score	Points scored
Decisions (20 points)	Project initiation (10 points)	Adequacy of project basis	4	4
		Project design rationality	6	5
	Performance objectives (6 points)	Rationality of performance objectives	3	2.5
		Clarity in performance indicators	3	2
Money invested (4 points)	Budgeting reasonableness	4	2	
Process (20 points)	Financial management (10 points)	Budget implementation rate	2	2
		Fund use compliance	5	5
		Financial monitoring Effectiveness	3	1.5
	Organization Implementation (10 points)	Management system soundness	3	2
		Effectiveness of system implementation	5	4
Organizational soundness	2	2		
Output (30 points)	Quantity index (10 points)	Area of basic geological survey	2	2
		Delineation of prospecting targets	2	1
		Regional comprehensive geological and mineral map	2	1.5
		Results report	2	2
		Database	2	2
	Quality index (10 points)	Delineation of prospecting targets	2	2
		Field acceptance rate	2	2
		Quality acceptance excellent rate	2	2
		Rationality of block evaluation standard	2	1.5
		Research paper (journal) grade and patent type	2	2
	Time index (6 points)	Field acceptance and database acceptance timely rate	3	3
		Timely acceptance rate of results report	3	3
	Cost index (4 points)	Cost control effectiveness	4	2.5
Benefit (30 points)	Service to national mineral strategy (12 points)	Support national mineral development decisions	6	4
		Increase national mineral security reserves	6	5

	Leading enterprises in exploration and development (6 points)	Put exploration resources into exploitation and application	3	2.5
		Stimulate enterprise investment intention	3	2.5
	Scientific and technological innovation achievements (6 points)	Research and development of geological exploration technology	2	2
		Academic theory and talent team construction	4	4
	Sustainability (6 points)	Strengthening innovation in the mineral exploration and development mechanism	6	4.5
TOTAL				83.5

Part One. Analysis of project decision indicators

(1) Project initiation analysis. This project matches the national mineral exploration development plan and strategy demand, and has formulated the corresponding stage planning and implementation objectives according to the implementation situation. The overall project approval has sufficient basis and complies with the procedures. However, the task division of the top level of the project is not reasonable, and the implementation content of some sub-level projects is repetitive. "Rationality of project design" deducts 1 point.

(2) Analysis of performance objectives. The matching degree between the indicators set by some projects and the key points of project implementation is not high. For example, some projects take "number of published papers" and "number of personnel trainings" as the main assessment indicators of output efficiency, which is difficult to effectively reflect the key points of project implementation. 1 point is deducted for "clarity of performance indicators". The annual performance goal does not match the overall goal well. 0.5 points are deducted for "reasonableness of performance objectives".

(3) Analysis of capital investment. The overall cost calculation of each secondary project of this project is reasonable, and the declaration content is basically matched with the project implementation content. However, the budget preparation of some project personnel funds cannot be accurately matched with the specific annual tasks, and a small number of projects' overseas expenses and domestic travel expenses are declared repeatedly, and the budget content exceeds the scope of the project expenditure. 2 points will be deducted for "reasonableness of budget preparation".

Part Two. Project process index analysis

(1) Financial management analysis. In terms of budget execution, the project budget execution rate was 95%, and the overall budget execution was good. No major risks in the use of funds were found. In terms of financial monitoring, the project undertaking units' expenditure was monitored online, reported monthly and supervised rectification, to ensure the standardization, legality and compliance of all kinds of fund expenditures. However, on-site investigation found that the secondary sub-item undertaking units generally had basic expenditures that squeezed the project funds and expenses irrelevant to the project. "Compliance in the use of funds" was deducted 1.5 points.

(2) Organizing and implementing analysis. The classification standards of exploration achievements are not unified, and the quality control of achievements is not rigorous. 1 point is deducted from "soundness of management system". The implementation content of part of the project is adjusted to other projects, but the cost is still listed in the original project cost, and the attribution of project cost is not reasonable. 1 point is deducted from "effectiveness of system implementation".

Part Three. Analysis of project output indicators

(1) Basic exploration and analysis of resource potential. In terms of the area of basic geological survey, the planned completion rate was 102.36%. For key resource exploration tasks, the task completion rate is 60 percent. 1 point is deducted for "delineation of prospecting targets". In terms of the task of regional comprehensive geological and mineral map, the three-year planning map have not yet been formed. "The regional comprehensive geological and mineral map" is deducted 0.5 points.

(2) Analysis of the quantity index. Results report and database were actually submitted, and the task completion rate was 100%.

(3) Quality acceptance analysis of ground survey results. In terms of project quality acceptance, the rate of excellent results was 98%; The field acceptance rate was 98%. In terms of block evaluation standards, there are differences in the division standards of prospective areas, favorable areas and target areas among survey centers, and the quality control level of results needs to be further improved. The "reasonableness of block evaluation standards" is deducted 0.5 points.

(4) Cost control management analysis. The actual execution cost of the project basically matched the budgeted amount. However, the setting of the project lacks effective overall planning and integration, and some project implementation contents and working methods are overlapping, and 1.5 points are deducted for "cost control effectiveness".

Part Four. Project benefit index analysis

(1) Serving national mineral strategy analysis. The project is based on the needs of national mineral strategic development. In terms of supporting national mineral development decisions, relevant basic survey outputs have not been summarized into regional and systematic refined achievements, and the decision support effect needs to be further improved. "Supporting national mineral development decisions" deducts 2 points. The role of national mineral security is not obvious. "Increasing national mineral security reserves" deducts 1 point.

(2) Leading enterprises in exploration and development analysis. The number of exploration blocks that have been put into exploitation at this stage is relatively low, and 0.5 points will be deducted from "exploration resources put into exploitation and application". The target of stimulating social investment has not been achieved. "Stimulating the investment intention of enterprises" is deducted 0.5 points.

(3) Analysis of scientific and creative achievements of geological survey. During the implementation of the project, the scientific and creative achievements of geological survey were outstanding. XX items of provincial and ministerial scientific and technological achievements of geological survey technology patents and software were obtained, XX provincial and ministerial talents were trained.

(4) Analysis of sustainable development. The project has not yet established and perfected the comprehensive exploration and development mechanism of multiple resources, "exploration mechanism innovation" minus 1.5 points.

4 Conclusions

The performance evaluation index system of public welfare mineral resources survey project should be set up in combination with the actual situation, highlighting the unique connotation of the industry and reflecting the characteristics of the public welfare of the project. Only in this way can the performance evaluation index system be constructed reasonably, the project decision-making management mechanism, management level, project implementation output and benefits, and the use of funds be fully understood, the project performance be objectively evaluated, the problems and deficiencies in the implementation be found, the management and supervision of the financial funds be strengthened, and the use efficiency of the financial funds be improved.

From the problems found in the project performance evaluation in recent years, firstly, there are certain deficiencies in the systematic and rational setting of individual project budget performance objectives and indicators; Second, the understanding and expression of the project benefit index are not deep enough; Third, the completion of the project performance evaluation mechanism is not perfect key, major projects after the acceptance of the completion, the performance tracking evaluation has not been carried out, resulting in the performance evaluation of "reward the good and punish the bad" guiding role has not been fully played.

Take budget performance management as the main line, coordinate all kinds of inspection, assessment and other activities related to project management, and incorporate the inspection results, problems found and rectification into budget performance management, and pay attention to the application of these results in the project performance evaluation. Through the budget performance management system with pre-demonstration and post-evaluation, an efficient budget performance supervision system will be established to improve the efficiency of financial expenditure. First, in combination with national policies and development plans, fully demonstrate the necessity of project setting, review the rationality of performance targets, and strengthen the preliminary demonstration work of projects; Second, the results of performance inspection are the foothold of budget performance supervision. The results of the performance inspection of key projects should be submitted to the competent authorities as a basis for next year's budget application and policy adjustment, so as to reduce budget arrangements for unqualified projects, supervise performance targets from the source, and ensure the smooth implementation of projects, especially major projects.

1st Authors' Introduction: Long-term engaged in geological and mineral economic research. Theoretical and practical expertise in project performance evaluation has been extensively accumulated.

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