Evolution and Insight of Project Management Mechanism of Geological Survey in China

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Abstract. Since the founding of New China, geological work has been highly valued by the Party and the State, with remarkable achievements in geological exploration and scientific research, and has made important contributions to economic and social development. Geological survey project management system also with the national economic system, management policies continue to adjust changes in the corresponding evolution. This paper elaborates the evolution of the geological survey project management system, reviews the relevant geological survey project management documents, and sorts out and analyzes the shortcomings of geological survey project management. On this basis, four suggestions are made to improve and optimize geological survey project management, with a view to providing theoretical guidance and reference for the improvement of geological survey project management system.

Keywords: Geological survey project · management system · evolution history · information technology tools

1 Introduction

Geological survey project management system is the basis for ensuring the smooth implementation of geological survey projects, and is a prerequisite to ensure that geological survey projects produce bright results and innovative results. Since its establishment, the China Geological Survey (hereinafter referred to as "CGS") has always attached great importance to the construction of a project management system for geological surveys. In 1999, when the Bureau was first established, it began to build a national system for the management of basic, public welfare and strategic geological surveys.

This paper summarizes the evolution of geological survey project management mechanism, reviews relevant geological survey project management documents, and puts forward relevant considerations and suggestions for the improvement and optimization of geological survey project management system in view of the new demands of the Party

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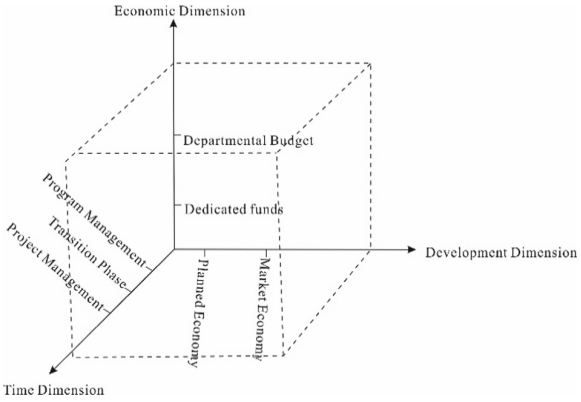

Fig. 1. Evolution of the project management mechanism of geological survey in a three-dimensional perspective

and the State for geological survey work in the new era, with a view to providing theoretical guidance and methodological reference for geological survey project management in the new era.

2 Evolution of Geological Survey Project Management Mechanism

According to the changes in the economic system and management policies since the founding of the country, combined with the development rules and characteristics of geological survey work, the author compares and analyzes the evolution of the project management mechanism of geological survey in three dimensions: time, economy and development [1]t (as Fig. 1).

Among them, from the perspective of time dimension, the main performance from program management to project management, including the implementation of program management, program management to project management transition and full implementation of project management stage. From the economic dimension, the main performance is the transformation from special fund management to departmental budget project management, including special fund management and departmental budget project management stages. From the development dimension, the main manifestation is the change from project management to career management, including project management under the planned economy system and market economy system, as shown in Table 1.

Table 1. Analysis of the evolution of project management mechanism of geological survey in China

Dimensionality	Performance characteristics	Development Stage	Main content
Time Dimension	Shift from program management to project management	Program Management (1949–1978)	Annual implementation of the plan management, by the central turnkey, unified annual preparation of work plans, allocation of work tasks.
		Transition from program management to project management (1979–late 20th century)	Started to implement pilot contracting for related geological survey work and pilot bidding for regional geological projects.
		Project Management (late 20th century–present)	Deployment and organization of the implementation by the Bureau of Land Survey, the funds required by the central government.
Economic Dimension	Shift from special fund management to departmental budget project management	Earmarked Funds Management (1999–2015)	Establishing a national geological survey project management mechanism
		Departmental Budget Project Management (2016–present))	Geological survey project management began to fully implement the departmental budget project management.
Development Dimension	Shift from project management to career management	Planned economic system (1949–1978)	The centralized turnkey system will prepare work plans and assign work tasks on an annual basis.
		After the reform and opening up (1978–present)	Explore the pilot project management, determine the work unit according to the conditions of geological article, human, material and financial resources, package it into a project, and manage the geological survey project as an independent geological survey unit.

3 Review of Relevant Geological Survey Project Management Documents

With the development of the times and the progress of society, in order to better meet the development needs of the geological survey business under the new situation, the Bureau of Geological Survey has so far revised the project management system for three times and simplified and optimized it for one time. Especially since 2014, the new bureau party group has implemented a series of reform initiatives, vigorously promoted the strategic restructuring of geological survey, and established a project management system for geological survey in the new era with six aspects of project management, budget management, business promotion management, result talent evaluation management, integrity management, and fund management. The specific contents are shown in Table 2.

The current system of geological survey project management realizes the operation mode of standardized project management and orderly business promotion, which provides scientific and reasonable, operational and feasible management methods for the

Table 2. Overview of the main document content information

Category	Time	Main Documents	Role meaning
Project Management	2016	Geological survey project management interim measures	Standardize project management processes, links, clear management responsibilities at all levels, geological survey project management on the road to standardization, standardization, unified management
	2017	Geological Survey Project Establishment and Continuation Evaluation Implementation Rules and other 5 implementation rules	
	2019	Notice on the simplification and optimization of geological survey project management	
Budget Management	2017	Interim Measures for Geological Survey Project Budget Management	A budget-centered financial management system has been established, and a more complete budget standard system for geological survey projects has been built to comprehensively promote scientific and refined management of departmental budgets and continuously improve the performance of the use of financial funds.
	2017	Geological survey project performance index system framework	
	2020	Notice of Project Expenditure Performance Management Approach	

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Table 2. (*continued*)

Category	Time	Main Documents	Role meaning
	2017	Geological survey project entrusted business settlement methods	
	2014	Interim Measures for Project Contract Management	
	2018	Guide to government procurement standards and government procurement workflow for commissioned geological survey projects	
	2020	Interim regulations for strengthening the management of government procurement for commissioned geological survey projects	
	2020	Notice on further strengthening contract management of commissioned geological survey projects	
Business Development Management	2015	Program Coordinator Engineering Lead Specialist Interim Regulations on Responsibilities and Rights of Project Leaders (for trial implementation)	The division of responsibilities was clarified, the three-level business promotion system of "plan-engineering-project" was standardized, and the management of project quality, technology, results and talent team was strengthened.
	2017	Program coordinator, chief engineering expert, project leader, and geological and scientific talent assessment methods	
Results Talent Evaluation	2015	Guidance on strengthening the evaluation of geological survey results (for trial implementation)	Constructed the evaluation criteria for public interest geological investigation results and talents in the new era, shifted to focus on solving major resource and environmental problems, promoting scientific and technological progress and growth of talents, and effectively solving geological problems urgently needed for economic and social development
	2020	Guidance on strengthening the construction of geological and scientific personnel	
	2020	Geological survey project expert management approach (for trial implementation)	

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Category	Time	Main Documents	Role meaning
Integrity Management	2018	Several Opinions on Strengthening the Construction of Scientific Research Integrity (for Trial Implementation)	Strengthen the promotion of scientific research integrity system, standardize the conduct of geological surveys and scientific research projects integrity behavior, strengthen the organizational leadership and supervision and inspection of project integrity construction
	2020	Geological survey and scientific research project integrity "blacklist" management approach (for trial implementation)	
Funds and Other Management	2016	China Geological Survey Project Bank Management Measures	Further improve the system of geological survey project management, strengthen risk prevention and control, guarantee the operation of financial work with evidence, standardized and orderly operation, open and transparent important matters, to ensure the efficient and smooth management of geological survey projects, and the safe operation of budget funds.
	2018	Quality Management Measures for Geological Survey Projects of the China Geological Survey (Trial Implementation)	
	2020	Interim Measures of the China Geological Survey Budget Execution Assessment, Rewards and Punishments	
	2020	Budget Management Measures of China Geological Survey	
	2020	Geological survey project funds management implementation rules	
	2020	Notice of Certain Provisions to Improve the Quality of Budgeting for Geological Survey Projects	
	2021	Reserve management methods	

quality management of 9 stages, including the establishment of annual project plan proposal, project report preparation and demonstration, implementation plan preparation and approval, project implementation and supervision, field acceptance, annual assessment, result evaluation, data remittance, funding acceptance and performance evaluation, which guarantees the orderly and effective operation of project organization and quality management, and provides basic institutional guarantee for a series of influential, innovative and breakthrough geological results. During the 13th Five-Year Plan period, the Bureau of Geological Survey made major breakthroughs in two rounds of seawater gas hydrate test mining key technologies, achieving two world firsts in terms of total gas output and gas production cycle. Six important advances in terrestrial energy investigations, including shale gas in the Yangtze River Economic Zone, shale oil in the Songliao Basin, uranium in northern sandstone, and dry heat rocks in the Qinghai Republican Basin. To protect the coordinated development of Beijing, Tianjin and Hebei, the development of the Yangtze River Economic Belt, the Xiong'an New Area and the Guangdong, Hong

Kong and Macao Bay Area and other major national development strategy areas of engineering construction. Support services for the national fight against poverty and other 22 projects of major achievements, the formation of a significant impact at home and abroad social, economic, ecological, sustainable and other expected benefits, caused the Party Central Committee and State Council attached great importance to significantly enhance China's international status and the influence of society as a whole [4].

4 Deficiencies in Geological Survey Project Management

4.1 The Current Project Management System Needs to Keep up with the Times and be Revised and Improved

After the Bureau of Geological Survey was upgraded from a second-tier budget unit to a first-tier budget unit, it timely carried out project declaration and budget management in accordance with the latest requirements of first-tier budget unit management. At the same time, combined with the central government's "decentralization" requirements, the "China Geological Survey Notice on Simplifying and Optimizing Geological Survey Project Management" proposes "six simplifications, three decentralizations, two clarifications, three enhancements" specific measures [2]. However, the current system of "Interim Measures for Geological Survey Project Management", "Implementation Rules for Project Establishment and Continuation Evaluation", "Implementation Rules for Project Implementation Plan Preparation and Review", "Implementation Rules for Project Field Acceptance" and other systems have not been systematically revised and improved according to the latest policies, and still maintain the requirements of secondary project management under the first-level project of the original budget of the Ministry of Land and Resources, which is not compatible with the management requirements of the first-level budget unit of the central government. At the same time, the deepening of the implementation of the "management and service" requirements in the project management-related systems need to further refine the implementation.

4.2 Project Management and Business Promotion Responsibilities at all Levels Need to be Further Defined

The Interim Measures for Geological Survey Project Management reflects the two contents of project management system and business promotion system in "Chapter 2: Project Management and Business Promotion Responsibilities". In the project management system, the Bureau of the General Engineering Office, Finance Department, the regional project office of the project management function, the main responsibility for the implementation of the project undertaken by the project unit. In terms of the business promotion system, the business promotion responsibilities of the program coordinator, the chief engineering expert, and the project leader have been strengthened [3]. The Bureau's business department responsibilities are significantly weaker, and only support the program coordinator to promote the organization and implementation of the program. However, during the planning, engineering and project organization and implementation, the business department is required to undertake the work related to project management and business promotion, and the boundaries of the related division of responsibilities are unclear.

4.3 The Integrity and Comprehensiveness of the Project Management System Needs to be Supplemented and Improved

Since 2016, in accordance with the latest national situation, the Bureau of Geological Survey has issued more than 20 geological survey project management documents, but the relevant documents are similar to "patching, fixing loopholes", fragmentation, fragmentation, system documents have not been integrated, lack of comprehensiveness, systemic and holistic. In addition, the Interim Measures for Geological Survey Project Management and the Interim Measures for Geological Survey Project Budget Management are being implemented in parallel, and the integration and unification of the two management measures have not been realized [5, 6].

5 Suggestions for Optimizing the Project Management System of Geological Survey

5.1 Modify and Improve the Management of Geological Survey Projects According to the Latest National Policy Requirements

Actively study new concepts, technologies, methods and models inside and outside the industry, and combine the characteristics and laws of geological survey work to make scientific, reasonable and comprehensive adjustments to the existing geological survey project management methods to ensure that the content is always new. In accordance with the requirements of the first-level budget unit, the central government's "Management and Administration" and the "Notice of the China Geological Survey on Simplifying and Optimizing the Management of Geological Survey Projects", the "Geological Survey Project Management Measures" and the "Implementation Rules of Geological Survey Project Establishment and Continuation Evaluation" and other five implementation rules were further revised, and the "Interim Measures of Geological Survey Project Budget Management" and the "Framework of Geological Survey Project Performance Index System" were integrated into the Geological Survey Project Management Measures to form a unified management system that integrates project and budget management.

5.2 Optimize and Improve the System of Geological Survey Project Management

Improve and perfect the management system of business promotion, result talent evaluation, integrity management, funds, etc., and form a project management system in line with the characteristics of geological survey work. In terms of business promotion management, we have revised and improved 2 management systems, namely, "Regulations on the Management of Responsibilities and Rights of Program Coordinators, Project Lead Experts, Project Leaders and Geoscience Talents". In terms of evaluation of achievements and talents, we continue to implement 1 management system of "Notice of the Party Group of the Communist Party of China Geological Survey on Issuing Guidance on Strengthening the Construction of Geological and Scientific Talents" and revise 2 management systems of "Guidance on Strengthening the Evaluation of Geological Survey Results (for Trial Implementation)" and "Management Measures for Geological Survey Project Experts". In terms of integrity management, we revised the "Opinions

on Strengthening the Integrity of Scientific Research" and the "Blacklist" management method for geological survey and scientific research projects. In terms of fund and other management, one management system, "Quality Management Measures for Geological Survey Projects of China Geological Survey (for Trial Implementation)", was revised, and six management systems, "Management Measures for Project Pool of China Geological Survey", "Interim Measures for Reward and Punishment of Budget Execution Assessment of China Geological Survey", "Measures for Budget Management of China Geological Survey", "Implementation Rules for Geological Survey Project Funds Management", "Notice on Several Provisions for Improving the Quality of Geological Survey Project Budget Preparation", and "Management Measures for Reserve Funds", were continued to be implemented.

5.3 Clarify the Responsibilities and Tasks at Each Level of Geological Survey Project Management and Business Promotion

Geological survey project management at different levels, the focus and management of different ways, reflecting the diversity of policies, to clarify specific responsibilities and tasks to ensure that the management authority of each level does not overlap, the content of the linkage, full coverage of the project cycle management. At the level of the business department of the Bureau, it should focus on the overall regulation and planning of the project, and do a good job of top-level design and guidance of geological survey project management. At the project undertaking unit level, it should focus on the day-to-day supervision and technical guidance of the project, coordinate the interaction between the Bureau's business departments, project implementation units, project teams and other groups, establish contact mechanisms, and implement a good system of legal person responsibility. At the project team level, they should organize project implementation operations and results output in a solid manner, and fully fulfill the responsibilities related to the project leader accountability system. By strengthening the three levels of project management mechanism to improve, clarify the responsibilities and key points of each management level, play a synergy to ensure efficient and smooth operation and management of geological investigation projects.

5.4 Make Full Use of Information Technology to Continuously Innovate Geological Survey Project Management Mode

At present, the effectiveness of information technology on geological survey project management has not been fully developed, and the effect of online project management on ensuring project quality and improving project results is not obvious, and the effect of online management is general at this stage. In the process of geological survey project management, we should pay attention to blockchain, artificial intelligence, Internet of Things, big data and other new generation information technology applications, give full play to the role of the existing "geological cloud" platform, and the above-mentioned new technologies, new methods of integration and innovation, and constantly applied to geological survey project management, to further standardize project implementation, improve the originality of project results, ensure the fairness of project evaluation,

strengthen the efficiency of project management, and promote and improve the intelligent management of geological survey projects.

6 Conclusions

With the new national demand for geological work and the continuous expansion of geological survey business, it is necessary to keep pace with the times, improve the project management mechanism and system of geological survey, establish a scientific and reasonable project management system covering the whole process of geological survey, and improve the procedures and requirements of technical, quality and economic management from project establishment to data submission, in order to ensure that geological survey work can be followed and based on rules and regulations, to improve the relevance and accuracy of project management, and to support the continuous emergence of highlight results and innovative results.

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