



Research on the Whole Process Efficiency Management of Shandong Science and Technology Plan Project

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Abstract. The whole process efficiency management of science and technology plan projects is an important guarantee to improve the implementation quality of science and technology plan projects, improve the efficiency of fund use, control the implementation risks, and promote the transformation of project achievements. According to the current situation of science and technology plan project management in Shandong Province, China, combined with PDCA cycle management, from the perspective of the whole process management of project guide preparation, initiation, implementation, acceptance, achievement transformation and later management, taking the major science and technology innovation construction projects in Shandong Province as an example, elaborate the construction path of science and technology plan project management in Shandong Province, and puts forward countermeasures and suggestions to improve the efficiency of the whole process management of science and technology plan projects in Shandong Province.

Keywords: Science and technology plan · Project management · PDCA cycle · Whole process

1 Introduction

The whole process efficiency management of science and technology plan projects refers to the management of projects planned to be carried out with scientific research and technology development as the content. Based on the whole life cycle of projects, the tasks and responsibilities of each stage are refined. And the manager mainly super vise and manage the whole process of project progress, quality, funds. China's provinces and cities have continuously deepened the reform of "streamline the government, delegate power, and improve government services", improved the management process of science and technology plan projects, and formed their own management theory system. However, compared with the complex and diversified science and technology plan projects, at present, there are still some problems in the management system of science and technology projects in China, such as simple and extensive models, low efficiency

of transformation, and insufficient integration of industry, University and research, etc. How to standardize and improve the management efficiency of science and technology plan is of great significance to the implementation of China's development strategy, the improvement of science and technology level, the promotion of economic development and the enhancement of comprehensive national strength.

2 The Present Situation and Problems of Shandong Science and Technology Plan Project Management

Around the reform of science and technology plan project management, Shandong Province has issued a number of documents, which have made provisions on the management process, funds, integrity supervision, etc. In addition, Shandong Province pays attention to the application of network information technology, and carries out various work based on the cloud platform of Shandong Province, including project collection, application, project initiation, review, expert database management, etc.

Shandong Province carries on the classification management to the science and technology plan project, and sets the Shandong Province science and technology Department, the competent department of the project, the management professional institutions, and the project undertaking units as the supervision subjects. In the management process of science and technology plan projects, the science and technology plan projects are divided into five links: guideline preparation, application acceptance, project review and approval, implementation, final acceptance. Under the exploration and improvement, the project management of Shandong science and technology plan is equal to that of advanced regions in terms of management framework and management content. However, there are still some problems in project setting, such as process management, review methods and acceptance mechanism.

2.1 The Preliminary Investigation Work is Not Sufficient

The feasibility and progressiveness of some science and technology plan projects are not enough. Before the project is launched, the research work on science and technology plan projects is not solid. First, in the preparation of the guide, there is no in-depth investigation of the social and industrial demands for science and technology development, and the orientation of science and technology support was not clear and accurate; Second, in the process of project initiation, there was no comprehensive and in-depth consideration of the relevant background, development impact and economic benefits of a scientific and technological project, and no in-depth investigation of the technical capacity and funds of the relevant undertaking units.

2.2 The Whole Process Management of the Project is Deficient

There is a phenomenon of "heavy ends, neglecting the process and weak transformation" in the management of science and technology projects in Shandong Province. Shandong Province has insufficient supervision on the implementation of science and technology

plan projects. In the development process of science and technology plan projects, milestone management is insufficient. The manager did not establish reasonable management nodes and corresponding supervision system according to the characteristics of projects, it is not conducive to the overall management and progress control of projects.

2.3 Review Expert Mechanism is Not Perfect

In the process of science and technology plan project management, the review experts are often temporarily organized for the conclusion of the project. The time involved in the project is short, and the evaluation standards are not uniform, which affects the quality and efficiency of the acceptance work. At present, there are mainly three problems in the evaluation expert mechanism of Shandong Province. First, the composition structure of evaluation experts is unreasonable; Second, some experts' discourse power is too heavy and there is a phenomenon of circle culture; Third, the list of experts is not open and transparent enough.

3 Application of PDCA in Science and Technology Plan Project Management

3.1 PDCA Overview

PDCA cycle means that the management process is divided into four stages: plan, do, check and action. The four stages are cycled as a whole, and each stage is a small whole that is cycled separately, presenting a closed-loop management mode of "big ring sets small ring, small environmental protection big ring". In a continuous PDCA cycle, the qualified ones are included in the standard, the unqualified ones are included in the next cycle for solution. After continuous development, the management shows a process of continuous improvement in quality.

3.2 Significance of Using PDCA

First, Standardize the management. PDCA is based on the management ideas of pre, during and post event, combined with the whole life cycle management theory of the science and technology plan project, the total process of project management and the distribution plan division of each stage are placed in the closed-loop management system of planning, execution, inspection and processing. Each module is clearly divided, and the progress of the project is comprehensively monitored, so that the management work is more clear, standardized and unified. Second, Improve the management level. In the PDCA management system, Leader can timely learn the problems and potential risks in the project progress through the analysis and judgment the development status of the project. More importantly, inspection according to PDCA model can more accurately find the links of the problems, locate the responsible person and supervise the solution of the problems.

4 Case Analysis

4.1 Introduction to Shandong Major Scientific and Technological Innovation Construction Project

Shandong major scientific and technological innovation construction project is a key R&D plan organized and implemented by the Shandong science and technology Department. Focus on the key development areas, major industrial needs and key innovation tasks of Shandong Province, and carry out the whole chain innovation design in different fields according to the basic frontier, major common key technologies and application demonstration. Shandong major scientific and technological innovation construction project include natural science and technology, to improve the existing products (processes), to develop new products (processes) or systematic research to complete engineering tasks.

4.2 Whole Process Efficiency Management of Shandong Major Innovation Construction Projects

4.2.1 Planning Stage (P)

The working procedure of the planning stage is divided into four steps. First, status quo investigation. Before the preparation of the project guide, Shandong science and Technology Department conducts consultation on development needs, development direction, technology reserves and other contents within the society and industry through open e-government; Second, analyze the reasons. Analyze the scientific and technological information obtained, then, clarify the reasons for the existence, above all, research the needs and demands of social development reflected behind; Third, dig deep. To excavate the main factors and find out the main influencing factors from various influencing factors; Fourth, plan formulation. According to the scientific and technological development demands of Shandong Province, establishment the guidelines for the scientific and technological plan projects, and formulate the overall plan of science and technology plan project management.

4.2.2 Execution Stage (D)

(1) Declaration Acceptance

Shandong science and Technology Department issues the project application notice, then organizes the project application based on the Shandong Provincial Science and technology cloud platform. When accepting an application, it is necessary to verify whether the application conditions, application period, application unit, applicant, project research content, application procedures and other contents meet the application requirements. Next, review and approve the projects that meet the requirements.

(2) Review and Approval

According to the project situation, Shandong Science and Technology Department will establish project evaluation indicators and organize experts to conduct project evaluation, including the project significance, research contents and objectives, research methods

and technical routes, expected results and their applications, research basis and work division. Finally, publicize the proposed projects in the provincial science and Technology Department.

(3) Project Implementation

Before the implementation of the project, it is necessary to make overall arrangements for personnel, equipment and funds. Refine the project objectives and plans, formulate the distribution plan based on the project life cycle and task categories, including the plan content, completion time, fund allocation, etc. More importantly, the project undertaking unit shall establish a responsibility system to ensure the orderly implementation of the project and the implementation of the tasks.

4.2.3 Inspection Stage (C)

Activities in the inspection stage generally include: (1) Real-time recording and communication. Record the progress, quality and fund contents in the project implementation in real time, and the superintendent shall timely understand the project dynamics at important nodes to facilitate inspection and management; (2) Timely rectification. The problems found during the project implementation shall be communicated and rectified in a timely manner. First, Locate the specific responsible person according to the problem; Then, develop solutions and timelines, and keep communication; Finally, the problems shall be inspected, tracked and corrected in the process of solving the problems to ensure that the problems can be truly solved.

4.2.4 Processing Stage (A)

The processing stage is the most important part of PDCA model, and is a process to promote the continuous improvement of projects management. First, analyze and check the problems dealt with in the inspection stage. If there are still remaining problems, proceed to the next PDCA cycle for solution until the problems are solved; According to the whole life cycle of Shandong major scientific and technological innovation projects, the Processing stage work include the final acceptance, achievement transformation and post management. In addition, after the completion of the project, analyze the whole process management performance, especially judge whether the setting of milestone nodes is reasonable and effective, and summarize the experience so as to improve the follow-up management performance.

(1) Final Acceptance

First of all, the acceptance department should establish a fair and reasonable acceptance evaluation system. Secondly, Shandong science and technology Department organizes a project acceptance report meeting. The project leader need report on the research content, key technologies, innovation points, project results and fund utilization of the project. The expert group will make comments according to the report content, conduct on-site investigation and inquiry according to the project situation, then, this group will give a comprehensive score to the project completion, and decide whether to pass the acceptance.

(2) Achievement Transformation

The transformation of achievements of major scientific and technological innovation construction projects is carried out in accordance with the idea of “government guidance, market leadership, demand traction and accurate docking”. The transformation of achievements can be realized through the transfer of achievements, joint R&D institutions, universities, industrial organizations and other units to jointly develop and promote applications, or establish transfer platforms and incubators with their own strength.

(3) Post Management

When the project is completed for 2–3 years, the project output, contribution to the industry and development potential will be assessed. Among them, output evaluation mainly focuses on the type, quantity and quality of project output results; The industrial contribution assessment mainly examines the transformation, application and technology diffusion of project innovation achievements; The development potential assessment mainly examines the important fields of the application of the project achievements, the necessity of development, and judges whether to give further support based on this.

5 The Optimization Path of Shandong Science and Technology Plan Project Management

5.1 Improve the Expert Review System

First, strengthen the construction of expert database, absorb experts with deep academic attainments, flexible thinking and high moral level, establish a perfect, scientific and dynamic expert database. Second, in the selection of the review team, it is necessary to reasonably configure the composition of experts, carefully review the list of experts, avoid acquaintances, establish an expert group covering multiple fields that can be subject to public supervision. In addition, the review process should be fair and open, and the whole process should be recorded for future inspection.

5.2 Optimize the Whole Process Efficiency Management System

First, classify the science and technology plan projects and adopt different process management methods according to the project development characteristics. Second, based on the whole life cycle of the project and combined with PDCA, carry out the whole process, multi-dimensional, integrated supervision of projects, focusing point on progress, quality and funds. Third, during the progress of the project, we shouldn't stick to the mid-term and annual inspection nodes, but set reasonable milestone nodes. The “milestone” is proposed by the project undertaking unit before the project starts, and the project organization will organize experts to implement it.

5.3 Improve Acceptance Evaluation Methods

The final acceptance evaluation includes three parts: objective evaluation, implementation evaluation and performance evaluation. It mainly inspects the completion of project

initiation objectives, fund and time administrative situation and output result level. The evaluation system shall be established based on the principle of combining qualitative indicators with quantitative indicators, and combining common indicators with individual indicators. In addition, for major projects, post evaluation methods shall be established, that is, the evaluation of expected economic benefits and social effects after the completion of the project for a period of time.

6 Conclusions

Science and technology plan project management is an important measure to promote a country's science and technology development and improve innovation vitality. Based on the current situation of science and technology plan project management in Shandong Province, combined with PDCA model, from the perspective of the life cycle of science and technology plan project, this paper constructs the efficiency management method of the whole process of science and technology project in Shandong Province, aiming at improving the efficiency of project management and promoting the development of economic innovation.

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