

Study on Management System of Major Scientific Research Projects

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Keywords: Strategic Priority Program of the Chinese Academy of Sciences, Project Management, Operation Management.

Abstract. In response to the needs of major national scientific research projects, especially the implementation of "Strategic Priority Program" of the Chinese Academy of Sciences, from the perspective of project operation management, we focus on the following five aspects, which involve project setting, project operation, adjustment and change, team selection and optimization, and intellectual property rights. Then, we explore the major scientific research project management systems, and have achieved the closed-loop and hierarchical project management by assisting the full cycle implementation of the Priority Program.

Introduction

Based on the background of the globalization of the world economy, technology has had a profound impact on the development of society. Scientific research projects are the key link in the development of science and technology, and their role in promoting technological development and social progress is increasingly prominent. On the one hand, scientific research project management conforms to the needs of economic development. On the other hand, it is also the guarantee of scientific and technological progress [1-3].

Different from the management of scientific research projects in the general sense, the Strategic Priority Program (B) the Chinese Academy of Sciences (hereinafter referred to as "Priority Program") is positioned in the basic research of superconducting device applications. It considers latest international developments and trends in the field of superconductivity, and aims at the urgent needs of superconducting quantum devices and circuits in the fields of population health, information security, radio astronomy, mineral resources detection and national defense construction, with extremely high sensitivity sensors and detectors. As a breakthrough, we will build a material↔device↔application-integrated ecological research environment, establish an advanced device research and development platform, and cultivate an international level R&D team, and strive to completely solve the problem of China's own core superconducting sensors and detectors in the first phase of the Priority Program. At the same time, we fully deploy superconducting sub-devices and their application basic research to achieve sustainable development of research and application of superconducting sub-studies in China. Therefore, it is both challenging and instructive to organize and manage the organization of such major research projects as superconducting.

Study on the Management System of Priority Program

To implement and manage the organization of the Priority Program, in combination with the national regulations on scientific research project management and the actuality of this Priority Program, the following three aspects have been usefully explored

Project Management Organization Mechanism Exploration

The support unit of the Priority Program is the Shanghai Institute of Microsystems and Information Technology (SIMIT) of the Chinese Academy of Sciences (CAS). The participating institutions

include universities, research institutes of the Chinese Academy of Sciences and other domestic first-class scientific research institutions.

The Priority Program implements the Leading Scientist responsibility system, to effectively achieve the sustainable development of the Priority Program's purpose. We establish the CAS Center for Excellence in Superconducting Electronics (CENSE) (hereinafter referred to as the superconducting center). The Superconducting Center is an unincorporated unit in the CAS. The supporting unit is the SIMIT.

Under the leadership of the Board of Directors, the Superconducting Center implements the Center Director and the Technical Chief Double Responsibility System. The Priority Program leader act as the Center Director and the technical chief is the academic leader who has an important international influence in the field of superconducting research. The board of directors includes the department head, the center director and the technical chief, the Priority Program support unit and the leader of the participating unit, as well as the influential user or the potential user representative.

The Superconducting Center has a Priority Program overall expert group, an international academic advisory committee and a Priority Program management office, which is responsible for the implementation of the superconducting Priority Program. The overall expert group is appointed by the leading scientist. The members include the Priority Program leader, the technical chief, the main person in charge of the project, the main technical person in charge of the participating unit team, and the main person in charge of the scientific research management department of the unit. The main duties are to ensure the Priority Program implementation and promote academic research efficiently, to promote Priority Program organizational management, integration and convergence. The International Academic Advisory Committee is appointed by leading scientists. The members are composed of well-known experts from relevant fields. The main responsibility is to provide academic guidance and academic consultation for the efficient implementation of Priority Programs. The Priority Program management office consists of the main leaders of the research and management department of the supporting unit, the administrative director of the superconducting laboratory, and the specific management personnel. The main responsibilities are to deal with the daily affairs in the Priority Program implementation and process management, and the Priority Program responsible person and Chief technical responsibility.

Project Management Exploration

Project Setting. The superconducting Priority Program sets up the assessment index task according to the "Priority Program-project-subject-topic" four levels. This Priority Program project has four projects and 14 subjects. According to the characteristics of R&D tasks, there are no topics for the purpose of facilitating efficient management.

One of the aims of Superconducting Priority Program is to drive, nurture and train young talents in scientific research, and projects and subjects are implemented at the two-level responsible system. The first person in charge of the project has the main responsibility for the project. The first person in charge of the subject is mainly responsible for the corresponding subject. If necessary, the first and second responsible persons of the project (or the subject) can determine their respective areas of responsibility through negotiation and report to the Priority Program management office.

The project leader is responsible for the project objectives and tasks, and is responsible for project research objectives, content, plan formulation and implementation, and cooperation with participating units and collaborating units during the project process. The subject leader is responsible for the subject objectives and tasks, and is responsible for the research objectives, content, plan development and implementation, and cooperation with the collaborating units during the implementation of the project. The persons in charge shall conscientiously complete the contents of the implementation of the responsibility book and the annual plan, accept the supervision of the Priority Program overall group, submit relevant materials to the Priority Program management office on time, and cooperate with the completion of the Priority Program evaluation and acceptance work.

Priority Program Implementation Process. The four projects of this Priority Program constitute a complete ecological research environment. The person in charge of the project (or subject) must be responsible and efficient in promoting the implementation of the project (or subject), and strengthen cooperation to elaborate fully the Priority Program cluster advantage. The Priority Program team attaches great importance to organic integration and convergence. The organic integration and convergence include cooperation and communication between projects and projects, subjects and subjects, and collaboration units. It also includes Priority Program goals, each participating unit or jointly outside the Priority Program project. Through the annual work conference, quarterly work conference, monthly technical exchange regular meeting, and collaborative unit personnel interaction, the task indicators of each node are effectively realized, to deploy or strive for project resources.

The Priority Program encourages other types of substantive interactions between participating units, and the content and effectiveness of interactions (such as joint project applications, collaborative research papers and patents) are one of the important basis for allocating Priority Program funding. The Priority Program implements the annual work conference system and hold two working meetings each year, and fully considers the characteristics of the Priority Program targets, fewer participating units, and relatively concentrated research tasks. Each work meeting is divided into two parts: project report and program report. Each project leader organizes the project to report to the Priority Program group. Leading scientists and leaders of the department in charge of the department participated, and the Priority Program responsible person and the technical chief organization project reported to the Priority Program overall group, the leading scientist. The report includes the implementation of the project (or subject) and work plan, integration and convergence, the latest international developments and development trends of the research content, existing problems and the next work plans.

The first annual work meeting of the Priority Program is held in the first quarter of each year. The content of the meeting focuses on summarizing the progress of the previous year's research. Compared with the completion of the previous year's work plan, the annual work report and the funding use report will be revised and improved, and the meeting will be reported to the superior office. The person in charge of the project (or subject) generally submits the annual work report and the draft report on the use of funds to the Priority Program management office step by step before the first working meeting of the year. After the first Priority Program work meeting, the Priority Program person in charge and the technical chief shall propose the current budget adjustment plan and the adjustment fee allocation plan according to the progress of the previous year's project (subject). After the review of the leading scientist, the annual budget will be reported to the higher authorities. .

The second annual working meeting of the Priority Program is held in the third quarter of each year. The content of the meeting focuses on reporting the progress of the research this year and the next year's work plan and annual budget. The person in charge of the project (or subject) generally submits the annual work plan and the annual budget draft to the Priority Program management office step by step before the second working meeting of the year. The Priority Program person in charge and the technical chief proposed the next year's work plan and annual budget adjustment opinions based on the progress of the work plan for the current year. After the revision, the project will be reported to the higher authorities in the next year.

Project (or subject) Adjustment and Change. The Priority Program implementation of the dynamic adjustment system is to fully and timely reflect the latest developments in the subject area, as well as the dynamic changes in the research objectives, directions, content and teams of Priority Program, projects and subjects, to ensure the smooth implementation of Priority Program and achieve significant output.

Dynamic adjustment is based on whether it is conducive to the promotion of major achievements. The major achievements of Priority Program mainly include meeting major national strategic needs, solving major scientific problems, breaking through key core technologies, opening up new areas, and generating important international influences. Dynamic adjustment mainly includes research objectives, direction, content, personnel, funding, organizational structure and management system.

Dynamic adjustment can be used in one of the top layer and bottom layer modes. Leading scientists make toplayer adjustments, projects and subject based on the frontier development of the discipline and changes in the domestic and international situation, with reference to the advisory opinions of the International Academic Advisory Committee, combined with the opinions and suggestions of the Priority Program person in charge, the technical chief and the Priority Program group. Dynamic adjustments should be made in a timely manner based on the overall requirements of the leading scientists. Bottom layer adjustments are proposed by the subject, project, and Priority Program leader or technical chief to lead the scientists to review and determine the adjustments.

The Priority Program dynamic adjustment is mainly reported and approved according to the procedures specified in the Priority Program management implementation rules.

Team Selection and Optimization. The Priority Program person in charge, technical chief, project leader and core team leader of the participating unit are set in the Priority Program. The Priority Program person in charge and the technical chief are appointed by the leading scientist. The project leader and the team leader of the participating unit are jointly nominated by the Priority Program person in charge and the chief of the technology to lead the appointment of scientists. The core post staff period is the same as the Priority Program (or project) study period. At the end of the employment period, the leading scientists can adjust the core positions according to the international assessment. The center director and the technical chief are responsible for formulating the human resource planning for the Priority Program projects, setting up technical, support and management positions according to the Priority Program task requirements, and determining the job conditions for the posts.

The total number of the Priority Program members is 120, of which 80 are relying on the supporting unit and 40 are from participating units. All units can recruit the right amount of project hiring personnel according to the actual needs of the Priority Program tasks. The Priority Program undertaking units are responsible for handling the employment procedures, and the employment relationship of the current personnel remains unchanged. For the backbone of science and technology and key positions, the main signing of medium and long-term employment contracts. For the new intermediate and below positions, in principle, it is necessary to employ 1-3 years of project before the position can be employed. No matter it is job hiring or project hiring, it is necessary to adhere to the principle of "setting jobs on demand, hiring by job, competitive selection, and contract management", in accordance with the procedures of open recruitment, competitive recruitment, and merit-based admission. The hiring of the Priority Program personnel shall be carried out by the participating units in accordance with the implementation rules of the Priority Program personnel management, and shall be selected among the existing personnel of the team who undertake the Priority Program tasks of superconducting.

The center director, the technical chief, the person in charge of the project, and the person in charge of the team of the participating units should concentrate their energies on the Priority Program research work. In order to ensure the smooth implementation of the project, the stability of the personnel is very important. The core team of the research team invests Priority Program working hours every year, and generally not less than 5/4 of the total annual working hours.

Intellectual Property Management. Intellectual property is an intangible property right and an objective and real property. Scientific research institutions are the link between the government and the industry. The core business is scientific research and development, the second is the export of innovation results, and the third is the industrialization of innovation. The core business of the superconducting center involves the discovery, protection and operation of intellectual property. Due to the particularity of intellectual property rights, in order to manage intellectual property rights, it is necessary to establish a reasonable and comprehensive intellectual property management model.

The Priority Program emphasizes on the accumulation and protection of intellectual property. Through the establishment of the "Intellectual Property Pool", the original technical data such as experimental reports, data manuscripts, drawings, and sound images formed during the Priority Program implementation process will be effectively collected and stored. .

The Priority Program encourages cooperating extensively within the Priority Program framework, and encourages jointly publishing research papers and jointly declaring patents through cooperation. However, each project or subject undertakes confidentiality obligations for relevant information, samples, products, and software that are openly communicated internally during the Priority Program implementation process. It may not be disclosed to a Priority Program external third party without permission.

Assessment and Evaluation Management

The Priority Program implements annual summary, mid-term evaluation and acceptance-check system. The annual summary is carried out in the first quarter of each year, the mid-term evaluation is carried out in the third year after the start, and the third-party independent performance evaluation is carried out in the fifth year.

The Priority Program and project annual inspections are organized by the supervision office in CAS related to the business and implemented through the Priority Program annual first working meeting. The annual inspection of the project is carried out by the Priority Program person in charge and the technical chief organization, which can be linked to the first annual work meeting of the Priority Program. The inspection results serve as the main basis for the allocation of comprehensive Priority Program funding.

The mid-term assessment and acceptance-check are organized by the institution-level bodies related to the development plan. The evaluation experts are composed of high-level experts and leaders of the national macro management department, and can organize international assessments when necessary.

1) The 3-year mid-term evaluation focuses on diagnosis and discovery issues and promotes the output of Priority Program results. The main contents of the inspection include the pioneering direction of the research direction, the level and ability of the Priority Program person in charge, the technical chief and the project leader, the research results obtained by the Priority Program and the project, the expected representative results and their level & influence.

2) The 5-year performance appraisal focuses on the quality of the Priority Program output, the level of the talent team, the academic status and influence of the Priority Program, the Priority Program operation management and Priority Program development trend. The assessment results are the main basis for whether or not to support the rolling funds, whether to adjust the core personnel, research direction and research content.

Summary

Major scientific research projects are aimed at major issues in the forefront of science, major technical problems in social production, and other important issues that need to be solved in economic and social operations. It is necessary for the project team to complete the project tasks through cross-integration of knowledge in multiple disciplines and comprehensive innovation, which requires reasonable and comprehensive the management system is escorted.

Through the Priority Program five-year operation management, we have achieved the closed-loop of the management and supervision, as well as the closed loop of the human-resource, cost and material. The effective experiment has effectively supported the construction of the world-class superconducting super-learning research team, and produced a series of international leading, original, important display research achievements and high-level paper; It promoted the construction of the international advanced superconducting device & process platform, and mastered the independent research and development of unit process and process integration technology; accelerated the training of an internationally competitive research team; effectively promoted China's superconducting core device Long-term problem-solving by people has laid the foundation for promoting the development and application of superconducting sub-studies in China.

Acknowledgement

This work is partially supported by the Strategic Priority Research Program of Chinese Academy of Sciences, Grant No. XDA18000000.

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