

Research on R&D Expenditure of Scientific Research Projects in State-Owned Enterprises

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Abstract: With the rapid development of the world economy, scientific and technological strength has become an important indicator of a country's comprehensive strength, and the competition around occupying the commanding heights of science and technology has become unprecedented and fierce. Since the 18th National Congress of the CPC, state-owned enterprises have played an important role in promoting the high-quality development of China's economy by promoting cutting-edge technology development and basic research, and accelerating scientific and technological innovation. A series of "national key tools" have appeared, demonstrating the strength and responsibility of state-owned enterprises. At the same time, the R&D expenditure of scientific research projects of state-owned enterprises has increased year by year, providing a financial guarantee for the development of scientific research projects of state-owned enterprises. However, there are also some problems to be solved, such as low level of project management, ineffective budgeting and implementation of R&D expenditure, and poor supervision of R&D expenditure during and after the event, and weak financial management knowledge of scientific researchers. This paper analyzes the current situation of research and development expenditure of state-owned enterprises, finds its problems, and puts forward reasonable suggestions.

1. Introduction

State owned enterprises are the pillar of China's national economic development and play an important role in the development of the national economy. The 18th National Congress of the CPC proposed a major deployment to implement the innovation-driven development strategy. The 19th National Congress of the CPC further proposed that "innovation is the first driving force for the development and strategic support for building a modern economic system". The 20th National Congress of the CPC once again emphasized the major deployment of accelerating the implementation of the innovation-driven development strategy and accelerating the realization of high-level science and technology for self-reliance. In the new journey of building a socialist modern country in an all-round way, self-reliance in science and technology is the strategic support for national development. Enterprises are the main body of innovation [1]. China has increased its

investment in R&D in the past decade (See Figure 1), and the annual growth rate of R&D investment has been growing steadily in the past decade, basically maintaining a double-digit growth rate (See Figure 2). Over the past decade, state-owned enterprises have stepped up efforts in scientific research and innovation, increased investment in research and development projects, and made a series of achievements. Many space series spacecraft, such as Shenzhou, Tianwen, Chang'e, have successfully returned to the skies, the Beidou satellite navigation system has been fully opened, and the C919 domestic large passenger aircraft has been operated. The "choke" problem in 5G communications, high-speed railways, industrial, aircraft, energy and electricity, biological science, and other fields has been alleviated; fill in the gaps in many areas in China. Among them, R&D expenditure plays a crucial role in the development of scientific research projects of state-owned enterprises. R&D expenditure can provide sufficient financial support and resource guarantee for the development of scientific research projects. At the same time, the operation of scientific research projects can be judged according to the investment progress of R&D expenditure. Reasonable R&D expenditure can promote the smooth progress of scientific research projects. Therefore, this paper takes the research and development expenditure of state-owned enterprises as the starting point to analyze the existing problems.

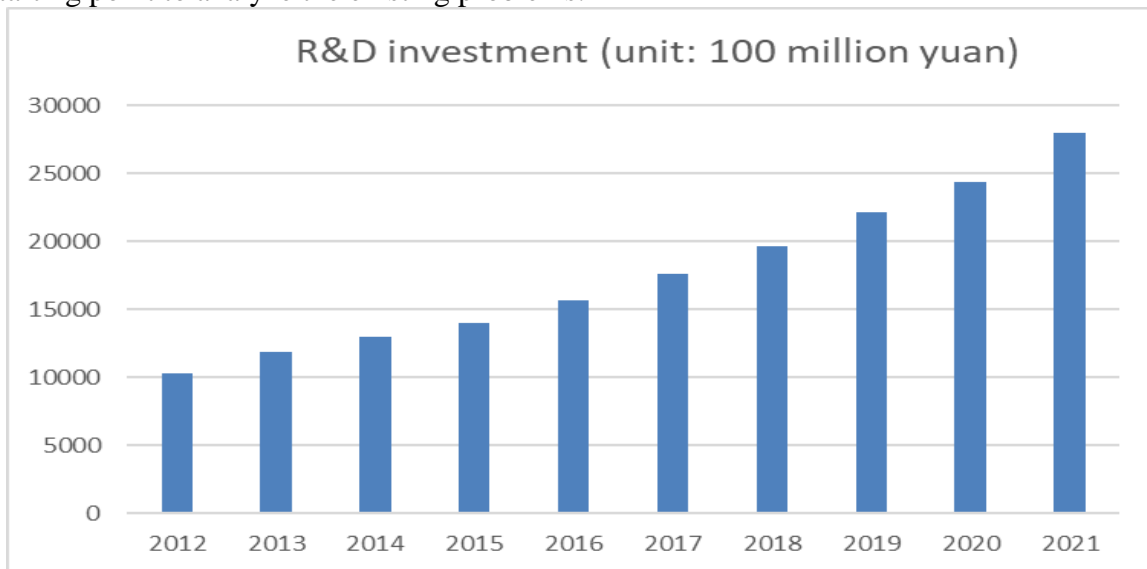


Figure 1: China's R&D investment from 2012 to 2021.

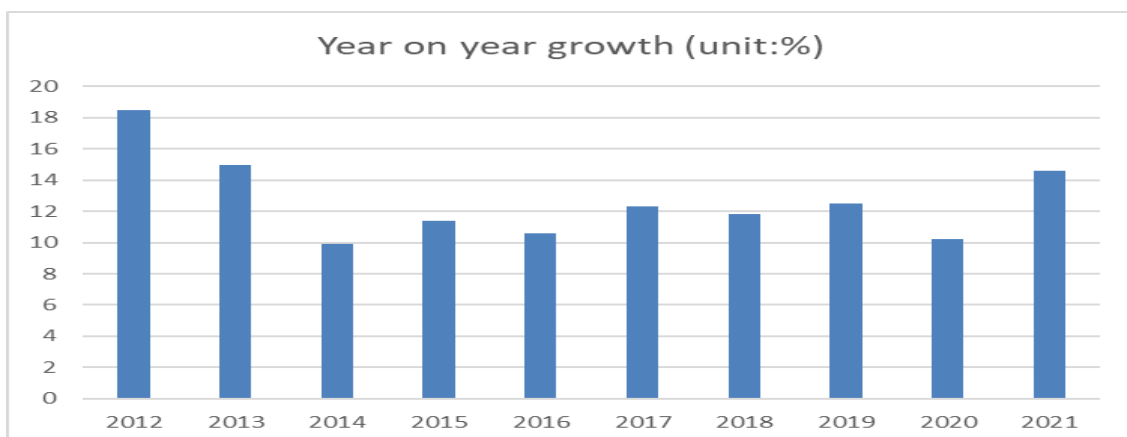


Figure 2: Growth rate of China's R&D investment from 2012 to 2021.

2. Problems in R&D Expenditure of Scientific Research Projects of State-Owned Enterprises

Over the past decade, state-owned enterprises have thoroughly implemented the major deployment of the CPC Central Committee, taken the initiative to take the responsibility, and actively acted to further promote the strategy of strengthening the country through science and technology. During this period, the scientific and technological innovation ability and scientific research level of state-owned enterprises have been substantially improved, a number of significant landmark achievements have been made, key core technologies have made breakthroughs, played a great leading role in the field of scientific and technological innovation, and vigorously inspired the self-confidence and pride of the Chinese nation. However, there are some problems in the research and development expenditure of state-owned enterprises.

2.1. Defects in the Level of Project Management

Scientific research project management is not equivalent to daily enterprise management. Applying the method of enterprise management to scientific research projects will inevitably lead to maladjustment in various aspects. At the same time, the management method also lacks certain pertinence and scientificity. First of all, R&D personnel are not managers, but technicians engaged in R&D. Without a set of management methods specifically applied to scientific research projects, it is difficult to ensure the smooth development of scientific research projects. The level of management will directly affect the transformation of final scientific research achievements. At the same time, without a high level of management, it will also affect the management efficiency and utilization efficiency of R&D funds. As the source of a scientific research project, ineffective R&D investment will only hinder the development of the entire project. In addition, the collaboration rate between departments is low, resulting in communication costs, resulting in low efficiency of the entire scientific research project. The scientific research projects of enterprises are timely. In the process of practice, some scientific research managers lack the spirit of keeping pace with the time and flexibility, resulting in that the development of projects cannot be adjusted according to the real-time situation [2].

2.2. Problems in Preparation and Implementation of R&D Expenditure Budget

Budget is the beginning of the project. A reasonable, effective, and enforceable budget plan can reduce the difficulties in the early stage of the project and provide overall assurance for the smooth implementation of the whole project. However, in the current scientific research projects of state-owned enterprises, there is a problem that the prebudget preparation of R&D expenditure is unreasonable. The project has made mistakes at different levels in the process of operation, and the budget situation is not combined with the actual situation, which leads to the inconsistency between the budget plan and the actual implementation situation in the process of project development. The temporary adjustment of the budget will directly affect the development of subsequent projects. At the same time, the R&D expenditure budget cannot be effectively implemented in the process of project development, and the budget plan is almost transparent, losing its guiding significance.

2.3. Inadequate Supervision in and after R&D Expenditure

Due to the lack of supervisors who are fully engaged in the statistics of R&D expenditure consumption in the whole project development process, it is impossible to obtain first-hand information related to the project development process, which affects the timeliness. In the process of scientific research project operation, each expenditure was not detailed and registered, which led

to the confusion of R&D expenditure management data and was not conducive to a comprehensive understanding and summary of R&D expenditure investment afterwards. In addition, the lack of a dynamic regulatory mechanism within the unit, coupled with the lack of experience or insensitivity of scientific researchers to new policies, will inevitably lead to R&D expenditure not meeting the requirements of the system, and ultimately affect the outcome of the final audit [3].

2.4. Weak Knowledge of Scientific Researchers in Financial Management

After all, researchers are technicians who focus on R&D and pay more attention to whether the scientific research project itself can be completed on time. In this regard, they arrange R&D expenditure while ignoring professional financial management [4], which easily leads to differences between the actual situation and the budget plan in the process of project development. However, due to their weak financial management knowledge, researchers cannot accurately solve the existing differences and adjust the differences, it is also impossible to reasonably predict the efficiency of funds according to different needs, thus affecting the smooth progress of the project and bringing resistance to the development of scientific research projects. In addition, when preparing the scientific research project budget, the business personnel lacked financial knowledge and failed to obtain the necessary communication with the financial personnel, resulting in the non-standard scientific research project budget, which had a negative impact on the normal development of the scientific research project [5].

3. Countermeasures and Suggestions on Improving the Research and Development Expenditure of State Owned Enterprises

3.1. Improve the Management Level of Scientific Research Projects and Promote the Change of Management Forms

Table 1: Application process of scientific research projects

Project initiation	Early declaration	Collect project declaration information, analyze and screen possible declaration projects, discuss the feasibility of the declaration, formulate declaration contents, and organize declarations.
	Declaration stage	Research the project application guide, confirm the applicant, propose the project application topic, research content, expected results, confirm personnel, formulate plans, prepare the application form and feasibility report, prepare the financial budget, review and fill in the relevant application system.
Project implementation	Project initiation announcement, project contract signing, detailed research content, implementation progress, expected results, financial budget implementation, indicators, etc., project implementation plan, internal control management, etc., project implementation seminar held quarterly, and project implementation report submitted on schedule.	
Summary and evaluation	Before the end of the project implementation period, formulate the project summary acceptance schedule, prepare the acceptance materials, hold the acceptance materials seminar, confirm the form, time, place, etc. of the acceptance requirements, set up an acceptance team, modify the acceptance materials according to the acceptance opinions, and file them.	

Scientific research project management is actually to accurately control the whole scientific research project [6]. The level of scientific research project management directly determines whether the whole scientific research project can be carried out smoothly. Different from enterprise management, scientific research project management should have a unique way and method. The whole process of scientific research projects shall be tracked and managed, and the whole process from project declaration, project establishment, project development to the final project completion shall be comprehensively controlled, strictly grasping the application process of scientific research projects (See Table 1), to timely find the problems encountered in the project development and properly solve and reduce the difficulty of project operation. Only with a higher level of scientific research project management can we better ensure the rational and efficient use of R&D expenditure. In addition, in terms of management form, we broke through the inherent limitations of time and space, made full use of big data, information and Internet online platform, learned online utilization of R&D expenditure of scientific research projects, and properly arranged according to the process.

3.2. Improve the Budgeting of R&D Expenditure and Strengthen Budget Implementation

Table 2: Budgeting process

Step	Content
Step 1	Collect all information required by the budget
Step 2	Preliminary forecast of corporate financial targets for the next year
Step 3	Propose detailed department budget plan and submit it
Step 4	Review and summarize the budget plan and put forward suggestions on comprehensive balance
Step 5	Formally prepare the annual financial budget draft of the enterprise, review and approve it
Step 6	Release for implementation

Table 3: Details of R&D expenses

Project	Concrete content
Labor cost	Pay salaries, bonuses, allowances, subsidies, social insurance premiums, housing, provident fund, and other labor costs for in-service R&D personnel
Direct input cost	Material, fuel and power costs directly consumed by R&D activities. Operating, maintenance, adjustment, inspection, repair, and other expenses of instruments and equipment used for R&D activities, as well as leasing expenses of instruments and equipment rented through operating lease for R&D activities.
Depreciation expense	Depreciation expense refers to the depreciation expense of instruments and equipment used for R&D activities.
Cost of intangible assets	Amortization expense of software, patent rights and non patent technologies used for R&D activities, as well as new product design expenses and new process procedure formulation expenses.
Other related expenses	Such as expert consulting fees, high-tech R&D insurance fees, R&D achievements, retrieval, analysis, evaluation, appraisal, evaluation, acceptance fees, intellectual property application fees, registration fees, travel expenses, conference fees, etc.

Budgeting is a basic budget measure for scientific research projects. When completing the basic budget of scientific research projects, the financial management system should be followed to improve the overall planning and management of the scientific research project funding budget [4].

The efficiency of fund utilization is a key factor affecting the success of scientific research projects. A reasonable R&D expenditure budget can provide overall guidance for the development of projects, facilitate R&D personnel to understand the operation of scientific research projects, and make judgments and real-time adjustments based on the existing situation. This requires improving the budgeting of R&D expenditure, preparing a reasonable budget in combination with the actual situation of specific scientific research projects, following the financial management system, strengthening communication with financial personnel, and checking the rationality and feasibility of the budget plan to make use of project funds planned, purposeful, and efficient. State owned enterprises should also, on the basis of the budget preparation process (See Table 2), comprehensively consider the details of various R&D expenses (See Table 3), so that the budget preparation can reflect the actual situation.

3.3. Supervise the Whole Process of R&D Expenditure

Strengthen the supervision of the whole process of R&D expenditure, define the whole process of each fund from investment to implementation, and expose the use of each fund to the sun. The scientific research department should also cooperate with the financial department and the internal control department to establish a complete budget supervision system, track the implementation of the budget and the utilization efficiency of R&D expenditure, to ensure the rationality of R&D investment. Ensure that financial personnel participate in the whole process of R&D investment and check the rationality and feasibility of the budget according to the operation effect. At the same time, the scientific research funds can also be classified and managed by means of informatization [7]. Supervise and manage the classified funds through the Internet online platform to ensure that the responsibilities related to each fund are implemented to specific individuals and specific steps for refined management.

3.4. Improve the Quality of Scientific Researchers in Financial Management

After all, scientific researchers are technicians engaged in project research and development, and do not have a comprehensive understanding of financial management related knowledge. If they want to combine research, development, and management in the process of scientific research, they have a great difficulty, which requires that scientific researchers should have certain knowledge and literacy in financial management, and improve their understanding of the necessity of capital management. Financial personnel shall actively participate in the preparation process of project initiation materials such as scientific research project funds and feasibility study report [8]. Set up a scientific research management department, set up special posts, and equip professional personnel to be responsible for communication between the scientific research department and various departments [9]. In particular, the exchange and communication between the R&D department and the financial department shall be strengthened, the exchange meetings between the two departments shall be held regularly, the financial personnel shall be invited to give lectures and guidance, the scientific researchers shall be trained on basic financial management knowledge, and the quality of the R&D personnel in financial management shall be improved, so that the scientific researchers can realize the importance of financial management knowledge in ensuring the rational use of R&D expenditure of scientific research projects.

4. Conclusion

In the context of the rapid development of the world economy and the fact that scientific and technological strength has become the main focus of competition between countries, it is

increasingly important to strengthen scientific research and innovation and enhance national hard power. Over the past ten years, the national R&D investment has been heavily skewed to provide basic guarantee for the improvement of scientific and technological strength. As the leader of national scientific research innovation, state-owned enterprises should take the lead, shoulder the banner, improve the management level of scientific research projects, improve the budgeting of R&D investment and subsequent supervision and management, pay attention to the training of financial management knowledge of R&D personnel, strengthen departmental communication and coordination, and ensure the smooth development of scientific research projects, To inject strong impetus into the country's road to prosperity.

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