

# SCIENCE AND TECHNOLOGY MANAGEMENT STRATEGIES TO PROMOTE HIGH-QUALITY DEVELOPMENT OF AGRICULTURAL RESEARCH INSTITUTES

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**Abstract:** This article analyzes the current policies, technologies and backgrounds of the science and technology management in agricultural research institutes. It points out the existing problems and proposes specific strategies in terms of improving the management system, optimizing resource allocation, enhancing incentive mechanisms, and strengthening strategic development research, for reference.

**Keywords:** Agricultural research institutes; High-quality development; Technological management

## 1 INTRODUCTION

With the increasingly fierce global competition in technology and the high-level attention given by countries to achieving technological self-reliance and self-strengthening, agricultural research institutes, as the core institutions driving agricultural technological progress and innovation, have become even more crucial in terms of their technological management. Currently, the management of agricultural research institutes is confronted with a rapidly changing technological environment, complex and diverse policy requirements, as well as increasing international cooperation and competition pressures. Under this backdrop, how to stimulate the innovative potential of researchers, optimize resource allocation, and promote the transformation of research achievements through scientific management systems and efficient management methods has become a core issue in technological management.

## 2 DEFINITION OF THE NEW SITUATION IN TECHNOLOGY MANAGEMENT: POLICIES, TECHNOLOGIES AND GLOBALIZATION BACKGROUND

In the current new situation in our country, agricultural science and technology management is confronted with multiple influences from policies, technologies and the global context. Firstly, at the national policy level, with the implementation of the "15th Five-Year Plan", China has set the strategic goal of accelerating self-reliance and self-strengthening in science and technology, demanding more efficient and transparent science and technology management, and emphasizing innovation-driven development, encouraging major scientific research breakthroughs and industrialization applications. As a result, scientific and technological innovation has become the core driving force [1].

Secondly, the rapid development of technologies such as seed breeding technology, planting and cultivation techniques, production technology, breeding technology, agricultural informatization and intelligent equipment manufacturing technology will eventually lead to an overall situation where the modern agricultural industry system upgrades, production efficiency improves, quality and safety are controllable, resources and the environment are sustainable, and the competitiveness of the industrial chain is enhanced. The advancements in big data, robots, artificial intelligence and information technology have made the digitization and intelligence of technology management a trend. Research institutions need to leverage new technologies to enhance management efficiency and achieve precise resource allocation [2-5].

Finally, in the context of globalization, the competition in technology has intensified, and international scientific and technological cooperation and competition coexist. Chinese research institutions not only need to enhance their independent innovation capabilities, but also need to secure a position in the global technological competition. Based on this situation, scientific and technological management needs to take into account an international perspective and promote the global application and cooperation of scientific research achievements [6].

## 3 THE PROBLEMS FACED BY THE SCIENCE AND TECHNOLOGY MANAGEMENT DEPARTMENTS OF AGRICULTURAL RESEARCH INSTITUTES

Firstly, the management process of scientific research projects in agricultural research institutes is complex, with low decision-making efficiency and difficulties in promptly converting innovative achievements into practical applications. Secondly, the professional level of the scientific and technological management team needs to be improved, and there is a lack of management capabilities that match the rapidly evolving technological demands. Moreover, the management system and model are outdated, resulting in uneven allocation of research resources and insufficient funding and

equipment support for key research areas, which hinders the high-quality development of agricultural research institutes.

### **3.1 The Collaborative Innovation Mechanism for Project Management is not Well-Established**

In the current highly competitive environment of scientific and technological development, agricultural research institutes need to invest a great deal of effort to secure funds in order to continuously enhance their own innovation capabilities. Moreover, there are fragmented and administrative management tendencies in the allocation of scientific research funds, with unreasonable distribution in areas such as the purchase of research equipment, equipment maintenance, and salary and reward for researchers. This makes it difficult to support the smooth progress of scientific research work. Agricultural research projects have long cycles, high risks, and slow returns. Enterprises are more willing to invest in fields that yield quick results, and they have a weak willingness to invest in agricultural research projects, making it difficult for research institutes to obtain sufficient external projects. This further exacerbates the financial pressure.

Many agricultural research projects require continuous research over several decades, but the current project execution periods are mostly two to five years, which is insufficient to ensure the continuity of long-term projects. This makes it difficult to further advance the research. For different types of research projects, there are significant differences in implementation periods, requirements, and assessment management. It is difficult for managers to standardize the monitoring of project implementation progress. During project implementation, the communication mechanism between managers and researchers is weak, and managers are unable to conduct in-depth and complete management of the projects. The research groups pay insufficient attention to mid-term inspections, resulting in situations such as mismatch between budget allocation and project progress, and unreasonable budgets. The project undertaking units have a large workload in project auditing, which requires a significant amount of energy and resources from the research groups. The management department weakens the supervision of project conclusion review, and some project leaders prioritize awarding prizes over research, making the practicality of the research results poor and the quality of project completion greatly reduced.

### **3.2 Insufficient Development of Specialized Talent Pool**

There is a shortage of professional management talents in agricultural research institutes and the structure is unbalanced. There is a lack of comprehensive talents who are both proficient in the profession and management. Currently, many managers have no professional background and lack relevant management knowledge and professional qualities. Their management work mostly remains at the basic level of handling documents and organizing materials. On the other hand, the current agricultural research field is facing problems such as weak attraction of high-level innovative talents and prominent brain drain in underdeveloped regions of research institutions; newly introduced highly educated talents have shortcomings such as a single knowledge structure and weak field practice ability, and the problems of broken academic echelons and unbalanced talent structure are relatively prominent.

The salaries and benefits of agricultural research management personnel are generally lower than those in popular industries. The implementation of supporting policies such as housing, children's education, and household registration is not in place. Moreover, the evaluation and incentive mechanism for agricultural research management personnel is unreasonable. The evaluation and appointment of managers often follow the standards for researchers, while the evaluation indicators for managers are few and the process is difficult. The evaluation overly emphasizes the quantity of achievements such as awards, papers, and patents, while neglecting actual work, which has seriously dampened the enthusiasm of research management personnel.

### **3.3 Outdated Management System and Model**

Some agricultural research institutes have an overly bureaucratic nature, with problems such as cumbersome approval procedures and rigid regulatory mechanisms. Sometimes, the management department not only participates in the project execution-related work but also is responsible for the evaluation of the results, which leads to the unfairness and arbitrariness of management. The distribution of scientific research resources is uneven, there is poor interdepartmental coordination, the sharing effect of scientific research instruments and equipment is insufficient, and it only manifests in form, failing to form a scientific research synergy. Most agricultural research institutes have not formed a modern management system. Archival management and project coordination still rely on traditional methods, and the management methods are outdated. Facing the new trend of interdisciplinary and multi-disciplinary integration in scientific research, the existing management model cannot achieve the rational allocation of resources, resulting in repetitive research contents and homogeneous competition among teams, causing waste of scientific research resources.

## **4 STRATEGIES FOR IMPROVING THE SCIENTIFIC MANAGEMENT LEVEL OF AGRICULTURAL RESEARCH INSTITUTES**

### **4.1 Improve the Management System of Science and Technology**

#### ***4.1.1 Establish a scientific and reasonable management mechanism and simplify the approval process for scientific***

### **research projects**

Firstly, unnecessary administrative approvals need to be reduced, and the processes of project initiation, approval and execution in scientific research should be optimized. By introducing information technology, such as electronic approval systems, manual steps can be eliminated, thereby increasing the speed and accuracy of project approval. Secondly, a hierarchical management model should be established, and differentiated management should be implemented for different scales and types of scientific research projects to avoid "one-size-fits-all" policies and ensure the rational allocation of resources [7].

#### **4.1.2 Strengthen the autonomy of scientific research and enhance the decision-making participation of scientific and technological management personnel**

To better stimulate the innovative vitality of scientific researchers, agricultural research institutes should grant more autonomy to research teams and managers. In particular, managers should clearly define their responsibilities and functions in the management of scientific research projects, allowing them to truly participate in all aspects of project application, approval, implementation, conclusion, auditing, and evaluation, promptly identifying problems and preventing risks such as unreasonable budget planning, slow implementation progress, and failure to meet the conclusion indicators. In terms of project approval, budget allocation, and research direction selection, researchers and managers should have greater decision-making space. By establishing academic committees or expert review groups, the participation of researchers in major decisions should be enhanced, and effective communication and interaction should be formed among management, researchers, and managers. At the same time, continuous efforts should be made to promote flat management, reduce management levels, and grant teams more autonomous management authority.

## **4.2 Optimize the Allocation of Research Resources**

### **4.2.1 Utilize big data and information technology to enhance the efficiency of resource allocation**

With the rapid development of information technology, scientific and technological management needs to fully utilize big data and information technology to improve the efficiency of resource allocation. By building a digital management platform for scientific research resources, real-time and dynamic monitoring and intelligent allocation of resources such as equipment, funds, and talents can be achieved. For example, the construction of a scientific research project information database involves management at all dimensions throughout the project process, including project budget preparation and submission, personnel duplication check, fund usage, achievement submission, and implementation progress, etc. Big data technology can help research institutions more accurately assess the needs and performance of scientific research projects, ensuring that resource investment matches research output. At the same time, by using information platforms, the process of resource application and allocation can be simplified, achieving automation and transparency in resource allocation, reducing human intervention, and improving the efficiency and accuracy of scientific research work.

### **4.2.2 Scientifically allocate research resources, and encourage resource sharing and cross-departmental cooperation**

In agricultural research institutes, the fairness and scientificity of resource allocation directly affect the effectiveness of research work. A scientific and reasonable resource allocation mechanism should be established, based on the priority of research projects, innovation potential and actual needs, to carry out differentiated resource allocation. For major research projects and cutting-edge fields, more funds, equipment and human resources should be allocated first. At the same time, agricultural research institutes should break down departmental barriers and encourage teams from different disciplines and research directions to share resources. By establishing a cross-departmental research resource sharing platform, instruments, experimental facilities and data resources can be more effectively utilized, avoiding duplicate investment and resource waste, promoting interdisciplinary cooperation and stimulating the vitality of scientific research innovation.

## **4.3 Improve the Incentive and Evaluation Mechanism for Technology Managers**

### **4.3.1 Establish a diversified incentive mechanism to enhance the independent innovation motivation of management personnel**

Compared with researchers, managers' work achievements are difficult to quantify, have low visibility, and are at a disadvantage in terms of career advancement and job competition. Their promotion channels are narrow, which greatly dampens their enthusiasm for work [8]. To stimulate the innovative potential and enthusiasm of management personnel, agricultural research institutes should encourage them to undertake "challenging" tasks, motivate them to think actively and improve management practices, and establish an evaluation mechanism that prioritizes both performance capabilities and innovative potential [9]. In addition to traditional salary and bonus incentives, various other methods such as professional title promotion, management honors, and project support should also be considered. Corresponding incentive policies should be formulated. Cross-disciplinary personnel should be introduced to management positions for dedicated management work, such as technical managers and professional researchers. People with expertise should be assigned to management positions to enable managers to possess both professional knowledge and management skills. This will not only solve the problem of insufficient dedicated personnel for technology transfer but also allow researchers to focus on technological development without being distracted by multiple responsibilities. On this basis, flexible research management models can be introduced, providing researchers with more time and space for independent research, reducing administrative burdens, and enhancing the freedom of research work. Through these

diverse incentive measures, the enthusiasm of managers and researchers can be enhanced, promoting the generation of innovative results.

#### **4.3.2 Reform the evaluation system for scientific research achievements and establish balanced incentive policies for both basic research and applied research**

Currently, the evaluation system for scientific research achievements often overly relies on the number of published papers and the scale of research projects, while neglecting the particularities of different types of research. Research management and evaluation serve as the "commander" of scientific research activities, playing a crucial role in guiding scientific research [10]. Research institutions should reform their evaluation systems and establish scientific and reasonable multi-dimensional evaluation criteria, integrating the academic value of basic research with the practical contributions of applied research. For basic research, emphasis should be placed on long-term academic influence and innovation rather than short-term achievements. For applied research, the focus should be on technology transfer, market application, and social benefits. On this basis, agricultural research institutions should also set corresponding incentive policies according to the characteristics of different fields, encouraging researchers to achieve a balanced development between basic research and applied research, and promoting diversified scientific research output.

### **4.4 Continuously Strengthening Strategic Development Research**

#### **4.4.1 Strengthen dynamic management of research directions**

Discipline construction is the lifeline and foundation of agricultural research institutes [11]. In today's highly competitive environment, managers should cultivate strategic development thinking. Management departments must take the lead in establishing an agricultural research achievement management and analysis system to enable real-time aggregation and statistical analysis of project outcomes, thereby supporting the identification of competitive research directions and optimization of research layouts. From a managerial perspective, it is essential to implement resource allocation strategies: strengthen key research disciplines, support the development of strategic emerging research fields, and optimize or even phase out directions with irrational approaches or persistently low performance.

#### **4.4.2 Foster new growth points in research directions**

As a crucial vehicle for building a strong agricultural nation driven by digital and intelligent technologies, smart agriculture is profoundly reshaping the structure of agricultural labor demand [12]. Accelerating the realization of self-reliance and strength in seed industry technology is crucial for securing China's food bowl and fortifying the defense line of food security, as well as a core support for building a strong agricultural country [13]. Agricultural research institutes should consolidate their leading positions in national research on biological breeding and smart agriculture, focusing on cultivating key scientific research directions in future industries such as agricultural microbial inputs, agricultural artificial intelligence and robotics, and food nutrition and health. Efforts should be made to establish multiple new growth points, strengthen the unique technological resource advantages of agricultural research institutes, and produce a series of irreplaceable novel scientific research achievements.

## **5 CONCLUSION**

In summary, under the new circumstances, the scientific management of agricultural research institutions is crucial for enhancing research innovation efficiency and serves as a key driver in boosting national technological competitiveness. By optimizing management systems, allocating research resources rationally, and establishing effective incentive mechanisms, we can facilitate the transition of research teams toward specialization and professionalization [14]. Furthermore, strengthening strategic development research enables closer coordination across all aspects of science and technology management, facilitates the implementation of major scientific achievements from agricultural research institutes, and promotes efficient transformation of scientific and technological outcomes, thereby achieving sustainable development in agricultural modernization [15].

## **COMPETING INTERESTS**

The authors have no relevant financial or non-financial interests to disclose.

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