

# Practice and Experience in the Construction of Scientific and Technological Talents in Advanced State-Owned Enterprises

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## ABSTRACT

Based on the new development stage, it is self-evident that the construction of scientific and technological talents is of great importance. Based on the requirements of the situation faced by the construction of scientific and technological talents, this paper analyzed the typical practice and experience of the construction of scientific and technological talents in advanced enterprises, and provided operational guidance and practical reference for state-owned enterprises to build a highland of scientific and technological talents.

**Keywords:** *Scientific and Technological Talents, State-Owned Enterprises, Practice and Experience.*

## 1. INTRODUCTION

Science and technology innovation is the first productive force, and talents are the first resource of science and technology innovation. The key of national innovation-driven development strategy lies in talent-driven [1]. General Secretary Xi Jinping emphasized at the Central Talent Work Conference that it is necessary to adhere to the party's management of talents, to face the world's science and technology frontier, the main economic battlefield, the major national needs and people's life and health. China need to thoroughly implement the strategy of strengthening the country by talents in the new era, to cultivate, introduce and make good use of talents in all directions, to speed up the construction of important talent centers and innovative highland in the world, thus providing talent support for the basic realization of socialist modernization in 2035, and laying a good talent foundation for building a socialist modernization power in 2050. During the "14th Five-Year Plan" period, in order to realize self-reliance and self-improvement in science and technology, the talent elements are particularly important. In particular, the unique role and contribution of scientific and technological talents are becoming more and more prominent in China's innovation and development. The scientific and technological talents refers to those who grasp the frontier of scientific and technological development, master core technologies and strive to

break through strategic forward-looking key core technologies. The contingent of scientific and technological talents is a strategic core resource that is related to the overall situation of national scientific and technological innovation and development [2].

As the "main force" of China's scientific and technological innovation, state-owned enterprises should attach importance to the construction of scientific and technological talents. Only by thoroughly implementing the strategy of innovation-driven development and the strategy of strengthening enterprises with talents, by vigorously implementing the national major talent projects, effectively enhancing the incentive of scientific and technological talents, and accelerating the construction of high-level talents in central enterprises, can state-owned enterprises build a highland of scientific and technological talents, and give full play to its positive role in promoting China's scientific and technological self-reliance [3].

## 2. THE TYPICAL PRACTICE OF SCIENCE AND TECHNOLOGY TALENTS CONSTRUCTION IN ADVANCED ENTERPRISE SCIENCE

In recent years, state-owned enterprises have actively promoted the construction of scientific and technological talents, constantly improved the incentive mechanism, the strategic position of the construction of

scientific and technological talents has been further highlighted. Through continuously optimizing the team structure, the quality of the team has been significantly improved. State-owned enterprises have accumulated rich experience and practices in these explorations. This paper selected typical enterprises with rich exploration and remarkable achievements in the construction of scientific and technological talents, such as Aerospace Science and Technology, China Electronics, Baosteel, China Merchants and China Southern Airlines, and summarized their experiences, practices and inspirations in the training of high-end and short-supplied scientific and technological talents, the incentive evaluation, and the system and mechanism reform of scientific and technological talents.

### ***2.1. To Formulate The Development Plan Of Scientific And Technological Talents, And Promote The Construction Of Various Mechanisms As A Whole.***

Aerospace science and technology adheres to the principle of the party's management of talents, strengthens strategic traction and formulates development plans. In 2016, it issued the 13th Five-Year Development Plan for talent team construction, and put forward the development goals of talent team construction during the 13th Five-Year Plan period, six talent projects, such as training of aerospace entrepreneurs, training of science and technology masters, support of young top-notch talents, relay of high-skilled talents and gathering of professional talents in short supply, and 41 tasks in seven aspects, so as to promote the continuous optimization of talent team structure and the increasingly competitive advantage of the team. According to all elements of innovation chain, China Electric Power Division has carried out systematic mechanism reform from demand generation, resource allocation, project management, science and technology evaluation, achievement transformation, performance appraisal, innovation incentive, etc. They have successively launched a series of innovation systems, management methods and measures such as "Twenty Articles of Science and Technology Innovation in China Electric Power Division" and "Several Provisions on Strengthening Mechanism Innovation of" Star-Increasing Innovation and Creative Competition "to release innovation vitality and improve innovation efficiency.

### ***2.2. To Innovative Talent Introduction Mechanism, Gathering Innovative High-Level Talents***

Aerospace Science and Technology has established a "trinity" talent introduction mechanism for college graduates, social talents and overseas talents. They

regularly publishes the talent demand guide for core professionals in the field of aerospace technology. By building a talent introduction network platform and talent evaluation system, they have realized open recruitment of employees and established an internal talent market and gradually realized the orderly flow of talents. Through implementing the project of gathering professionals in short supply, they have established a full-scale management mechanism for talent introduction. They have improved overseas high-end talent recruitment methods by vigorously implementing overseas "intelligence gathering plan" and "intelligence integration plan", and introduce more than 300 foreign experts to the group company to conduct academic and technological exchanges every year. Facing the key direction in the field of network information, China Electronics Division insists on team introduction and gives priority to the introduction of overseas high-level talents. They have introduced about 100 high-level innovative teams with foundation, potential and clear research direction every year, and gathered a large number of leading scientific and technological talents who are good at cohesion and overall coordination.

### ***2.3. To Improve The Professional Development Mechanism Of Scientific And Technological Talents, And Promote The Growth Of Employees.***

It is of vital importance to establish career development channels for scientific and technological talents, and encourage them with career development. Aerospace has implemented the innovative talent development plan, and established the development sequence of scientific and technological experts and the reserve sequence of experts composed of academicians, national experts, academic and technical leaders of group companies and academic and technical leaders of colleges. Moreover, they have set up high-level scientific and technological innovation positions such as lifelong researcher, senior researcher, chief researcher and chief researcher for major system innovation, professional technology research and product development. Aerospace Science and Technology has divided the scientific and technological talents into six teams, including model (product) design, model (product) management, pre-research, professional technology, process, technical foundation and guarantee. They have designed a career development path consisting of 5 hierarchies and 15 levels, including the director, deputy director and deputy director, and worked out the qualification standards for scientific and technological talents, and clarified the responsibilities, qualification, promotion and withdrawal of different categories and levels of scientific and technological talents. China Electric Power Department has deepened the reform of talent development system and mechanism in formulating the Guiding Opinions on Deepening the

Reform of the System and Mechanism of Talent Development, and putting forward policy measures for the support mechanism of talent cultivation, talent evaluation, mobility, incentive and talent introduction mechanism, etc. The Measures for the Management of the Flow of Scientific and Technological Talents were promulgated to encourage and promote the orderly flow of scientific and technological talents. Through organizing the post setting work of public institutions, and putting forward the guiding opinions of all kinds of posts at all levels, China Electric Power Division has strengthened the construction of career development channels for high-level professional and technical talents, and improve the career platform of scientific and technological experts.

#### ***2.4. To Perfect The Personnel Training Mechanism To Help Talents Stand Out.***

State-owned enterprises need to strengthen systematic cultivation, improve the organizational system of personnel training, and promote the systematization and systematization of scientific and technological personnel training. Aerospace science and technology always adheres to the synchronization of engineering promotion and talent training, pays attention to finding and cultivating talents in key model development and major technological research. By vigorously implementing the relay plan of leading talents, and boldly selecting scientific and technological talents with both ability and political integrity, outstanding technology capability purposefully and consciously to participate in major projects and key model development, they have trained and selected a large number of talents in the practical process. For the "Excellent Talent" with great development potential, they are selected as early as possible to preside over or undertake major scientific research projects, major science and technology plans and major engineering (industry) projects, so that they can be reused in the period of the most active innovative thinking and the most vigorous innovative ability. Aerospace Science and Technology dared to break the age and seniority restrictions, promptly recommend young talents with outstanding work performance and great development potential to the positions of chief commander and chief engineer, so as to promote rapid growth. They also implemented a series of talent projects such as young top talents support and scientific and technological innovation team building, carried out in-depth joint training of scientific and technological talents with colleges and universities, and gave key support, key training and key use to outstanding talents, so as to encourage reserve talents to develop academically while actively undertaking technological innovation projects. China Electric Power Division strived to build a large number of strategic scientific and technological talents who can grasp the general trend of world science and

technology and judge the development direction of science and technology. In 2012, China Electric Power Branch established the system of chief expert and chief scientist to smooth the development path of scientific and technological talents. So far China Electronics Division has hired more than 100 chief experts and chief scientists, forming a leading team of key science and technology frontier technologies, major scientific research projects and engineering research and development. At the same time, state-owned enterprises should give prominence to the orientation of "high precision, high precision and lack of skills", improve the platform for talent introduction, and formulate a reserve talent training plan. By focusing on training and introducing academicians, state-owned enterprises could create a group of young strategic scientists with forward-looking and international vision.

#### ***2.5 To Optimize The Salary Incentive Mechanism To Stimulate Employees' Innovation Vitality.***

State-owned enterprises need to build a diversified incentive system and fully mobilize the initiative of scientific and technological talents. Aerospace Science and Technology formulated the management method of linking salary with assessment results, clarified the decision mechanism of salary, and implemented the "double-linkage" mechanism of linking the annual salary of the principal responsible person of the unit with the assessment results of the unit's operating performance. Moreover, they linked the total salary of the unit with the assessment results of the operating performance and economic benefits, and established the mechanism of linking the personal income of employees with their own assessment results and the assessment results of the unit's operating performance. In addition, they actively explored and implemented new incentive methods, researched and formulated the "Pilot Program of Incentive Plan for Key Talents in Aerospace Technology Application and Service Industry". They have comprehensively implemented seven key incentive methods such as excess profit reward, EVA reward, post dividend right, project dividend right, equity incentive, virtual equity and scientific and technological achievements transformation reward in qualified units, so as to enhance the market competitiveness of key talent compensation. China Electric Power Department actively promoted the construction of medium-and long-term incentive mechanism. They have explored a variety of medium and long-term incentive methods such as income distribution, dividend incentive and equity incentive from the transformation of scientific and technological achievements. Within the total wages, they carried out the pilot project of income sharing of key talent in major projects and the pilot project of post dividend rights in public institutions, making use of the advantages of China's high-tech electric enterprises to

support enterprises with high contribution of human capital and technological elements to carry out equity-based incentives. For example, Hikvision was aimed at three types of businesses with long investment cycle, high return and high risk, new businesses that needed investment exploration, businesses that were temporarily losing money but needed to increase investment, and businesses that were not obviously related to their industries but would be related in the future. It was aimed at four core talent of the company, namely, senior managers, managers, core technicians and key employees who had a direct impact on the overall performance and sustainable development of the company, and encouraged employees to invest in business follow-up, thus building an innovation platform and establishing a benefit sharing mechanism. They also explored the incentive mechanism of breakthrough innovation, issued the Measures of China Electronics Technology Group Corporation for promoting the Transformation of Scientific and Technological Achievements, and increased the incentive of teams in the process of transformation and industrialization of scientific and technological achievements, so that innovative talents of various subjects and different positions could get reasonable returns in the process of transformation and industrialization of scientific and technological achievements.

### ***2.6. To Establish A Guarantee Mechanism For Innovation And Entrepreneurship, And Create An Open And Inclusive Innovation Culture Atmosphere.***

The last is to establish the guarantee of innovation and entrepreneurship mechanism. Taking incentive policies such as leave without pay, equity and dividends, change performance appraisal methods, establish fault-tolerant mechanism, set up special funds, etc., state-owned enterprises could provide guarantee for employees' "double innovation" in mechanism, thus creating a good atmosphere of attaching importance to and encouraging scientific and technological innovation, improving employees' enthusiasm for innovation and entrepreneurship, and stimulating the vitality of scientific and technological innovation. Among them, Aerospace Science and Technology supported employees to start businesses on the job for 2 years (under special circumstances, no more than 3 years), and established a back-to-work security system to clear institutional barriers for employees to start their own businesses and re-start businesses within enterprises. Baosteel promoted the pilot program of "individual investment in shares", encouraged innovation and entrepreneurship teams to invest in shares, tied up with enterprise development, helped each other in the same boat, and stimulated team entrepreneurship and innovation enthusiasm. After the free incubation period,

China Merchants considered giving certain options to the key talent of the project team for the internal double-creation projects further incubated by the Group. During the duration of the project, if the relevant personnel do not exercise the corresponding options, after the project exits, a one-time reward would be given to the excess income according to the pre-agreed proportion. China Electric Power Branch has established the flow mechanism of scientific and technological talent, allowing scientific and technological talent to flow across units or leave their posts to start businesses, and the original unit could retain the personnel relationship for three years. Through establishing a "green channel" within the group, they could encourage the team to set up joint-stock small and micro project companies to start businesses.

### **3. CONCLUSION**

The construction of scientific and technological talents is the top priority of human resources management in state-owned enterprises. The quality and ability of scientific and technological talents directly determine the level of scientific and technological innovation [4]. In the process of concrete management practice, it plays a vital role in the sustained and stable development of enterprises how to effectively manage, maintain their steady development and give full play to their talents [5].

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