

Research on the Path to Improving Quality and Efficiency of Talent Cultivation in the Electric Power Industry under the New Situation of the 15th Five-Year Plan

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Abstract: With the new period of the 15th Five-Year Plan, the electric power industry is a foundation and a core direction for national development; therefore, it needs to be reformed, optimised and strengthened in depth, and public demand for high-quality and leapfrog development is also rising. The supply scale and quality of human resources are the main drivers of industrial development, but currently, the total quantity is small, there are structural problems, and the cultivation system is insufficient. It will not meet the needs of development. In light of the new environment of industrial reform, this paper will systematically study the strategic importance of electric power human resources and talent cultivation, identify the main problems in this area, and put forward a comprehensive cultivation path of "simultaneous introduction and cultivation, structural optimisation, system improvement, and incentive guarantee" to help electric power enterprises build a strong talent foundation and achieve high-quality development. The new thing is that we have built a closed-loop system for talent cultivation that can be applied in practice and keep up with changes in the industry.

Keywords: Reform of the Electric Power Industry, Human Resources, Talent Cultivation, High-Quality Development

1. Introduction

The launch of the 15th Five-Year Plan has shown that the development direction of China's electric power industry will be "green, low-carbon, safe, efficient and intelligent". The Implementation Opinions on Improving the National Unified Electric Power Market System issued by the General Office of the State Council have clarified that the main goal is to build a national unified electric power market system by 2030, and thus have advanced the electric power industry into a new period of systematic deepening reform^[1]. The reform and development of the electric power industry need technological progress, market reform and model innovation, and the foundation for all this work is provided by human resources. Talent is needed to solve the "impossible trinity" problem of energy^[2] and advance the construction of new-type power systems, and it will also provide a foundation for carrying out industrial reform and achieving high-quality development^[3].

China's power industry is moving from the old power system to a new power system at present. Large-scale grid connection of new-energy sources, deep integration of digital and intelligent technologies in the electric power industry, continuous improvement in the marketization level of electricity trading, etc., have given rise to new professions such as electricity traders and have placed high demands on the professional quality and all-round ability of talents^[4].

2. Core Importance of Electric Power Human Resources and Talent Training in the New Era of the 15th Five-Year Plan

2.1 Human Resources for Electric Power are the Foundation of the Reform of the Electric Power Industry

During the 15th Five-Year Plan period, the reform of the electric power industry has aimed to build

a national unified electric power market, construct new-type power systems and promote green and low-carbon development. In order to carry out the above tasks, we need a good team with the right structure, high quality and outstanding ability. With the development of joint trading and the coordinated development of multiple product markets in the reform of the electric power market, a large number of interdisciplinary talents are needed who have a good understanding of power system operation, know finance and law, and are familiar with trading rules. By 2025, the shortage of electricity trader positions will be 38,000 people. The construction of new-type power systems requires the integration of power sources, grids, loads and energy storage; it also needs to be digitally and intelligently upgraded, so high-level talents with multidisciplinary backgrounds and multi-domain skills are needed to solve the technical and practical problems.

2.2 Electric Power Human Resources are the Core Competitiveness for High-Quality Development of Electric Power Enterprises

With the new stage of the 15th Five-Year Plan, electric power companies have been under the double squeeze of intense market competition and economic changes. As the most dynamic and promising core resources of the enterprise, people are needed to achieve all levels of competition. The high-quality development of electric power companies requires not only advanced technology and full equipment support but also a professional team of talent that can keep up with changes in technology, market conditions and management. Work in all of the above places, such as the development and operation of new energy, smart grid construction, electricity trading and integrated energy services, all require skilled professionals^[5]. Based on the above, it can be seen that power companies that pay more attention to training their staff and nurturing talent are generally better at responding to changes in the industry and technology, and can thus take the lead in competition.

2.3 Training for Talent can address the problem of talent shortage and boost the spirit of talent

The speed of development of power industry technology in the 15th Five-Year Plan period has also been rising. With the construction of new-type power systems, digitalisation and market-oriented reforms have increased the demand for professionals with good professional skills and all-round abilities. The old model of talent cultivation can no longer meet the needs of the industry. Talent training can be employed to strengthen the foundation for improving the quality of talent, optimise the structure of talent, motivate talent to be more proactive, and address the problem of asynchronous development in the quantity and quality of talent improvement^[6]. Organise some regular and practical training for the current staff to update their knowledge and improve professional skills in light of changes in technology and work demands. Nurture interdisciplinary talents who can think creatively and work in various fields to meet the talent demands of new areas. It can also improve the career development path for talented people, motivate employees to study harder and work better, create a virtuous cycle of "cultivation - utilisation - advancement", and at the same time, strengthen the integration of industry and education to build collaborative education platforms, continuously providing high-quality talents to the electric power industry by promoting the organic connection of the education chain, talent chain, industrial chain and innovation chain.

3. Prominent Problems in Talent Cultivation in the Electric Power Industry under the New Situation of the 15th Five-Year Plan

3.1 The growth in the total number of talents is slow, and the gap between supply and demand is widening

With the continuous deepening of the reform of the electric power industry in the 15th Five-Year Plan period, the demand for talents in the construction of new-type power systems, new energy development and market-oriented electricity trading has been rising rapidly. The increase in the total number of talents is much slower than that in the industry, and there is a relative shortage of talent. According to the 2025 China Electric Power Industry Talent Annual Development Report^[7,8], the total talent demand in the electric power industry for 2025 will be 31.2% higher than three years ago, and the demand for digital talents will be 4.5 times that in two years ago. In the same year, there was a shortage of electricity trader positions of 38,000, and the lack of interdisciplinary talent was also very severe.

Although some power companies have improved their recruitment of talent and increased the total

number of staff, most of the new hires are still at the entry level. There is a shortage of high-quality, highly skilled and multidisciplinary talent supply, and it is difficult to meet the demand for high-quality and rapid industrial development. The lack of talent in the new energy (NES), smart grid (SG), electricity trading (ET) and digital operation and maintenance (DOM) sectors is even more pronounced. According to the 2025 White Paper on Talent Development in China's Electric Power Industry, the main talent shortage in the electric power industry in 2025 will be 198,000 people; this includes 72,000 in the new energy sector, 51,000 in the digital operation and maintenance area, 38,000 in electricity trading, and 37,000 in the smart grid field. The gap is now an important obstacle to the transformation and upgrading of the industry.

3.2 The Talent Structure is Unbalanced and fails to meet the development needs of the industry

There are some problems in the current talent structure of the electric power industry, which are shown below. First, there is an uneven distribution of specialisations. The supply of talent in the traditional areas of electric power specialisation, such as power system automation and electrical engineering, is relatively abundant; however, the supply of talent in new fields such as new energy, digitalisation, electricity trading and financial risk control is very scarce, and it is difficult to meet the demands of new-type power system construction and electric power market reform. Second, there is a problem of hierarchical asymmetry. Although the stock of grassroots operational talents is large, the supply of mid-level managers, high-level decision-makers and interdisciplinary talents is limited; thus, the construction of the talent echelon has not been effective. Third, there is a problem of age distribution. Some power companies have an aging workforce, lack young and talented people, face serious talent shortages, and thus cannot develop sustainably in the current era. The distribution of talent is uneven, so the development of technology and markets in the power sector has been hampered; as a result, the high-quality development goals for the industry under the 15th Five-Year Plan have not been achieved. By 2025, in terms of the distribution of age, the proportion of young talents under the age of 35 in China's electric power industry will be 35.6%, and the proportion of talents over the age of 45 will drop to 44.8%. The problem of a shortage of talent has been eased but not eliminated. In terms of the structure of specialisations, by 2025, the proportion of talents in traditional electric power specialisations will be 64.2%, and the share of talents in new-energy and digitalisation fields will be 35.8%. Gradually adapting to changes in the industry has been improving, but there is still a deficiency.

3.3 The talent cultivation system is not good, so the results of training are limited

Although most electric power companies have paid attention to talent training, there are many deficiencies in the current talent cultivation system, the results of training are not good, and it is difficult to match talented individuals with the needs of the company. First of all, the goals of the training are not clear. Some enterprises do not have a plan, are not in line with the reform direction of the industry or the development strategy of the enterprise under the 15th Five-Year Plan, etc. The training content does not meet the needs of the job, so it will not help cultivate the talent the company needs. Second, the training mode is too basic, and it is still mainly traditional offline lectures and centralised training. There are not many teaching methods of case studies, field trips, group discussions and online courses that can motivate employees' enthusiasm for learning and achieve good training results. Third, the integration of industry and education is not deep; it is only at the level of vocational education and focused on front-line operations. It is not a general macro-theory that covers all aspects, so it fails to meet the high demands of talented individuals in scientific research and management who need to integrate theory and practice. The content of the training bases is out of date to some extent. Fourth, there is no training and assessment system. There is a lack of all-around evaluation and feedback; therefore, we do not know how effective the training has been, and it is not possible to adjust the content and form of the training accordingly; the training work has become a mere formality.

3.4 The Talent Incentive Mechanism is ineffective, and there is a serious problem of talent outflow

To motivate the staff and keep the good ones, we have added some new incentives. At present, there are many shortcomings in the talent incentive system of some power companies, and it has failed to meet the demands for talent development and value creation. First of all, the incentive methods are too basic; they are mainly material incentives and lack other kinds, such as spiritual incentives, career development incentives, emotional incentives, etc., so it is difficult to motivate employees' work enthusiasm and creativity fully. Second, the distribution of incentives is not reasonable and tends to be too even. The incentive gap between outstanding talents and ordinary employees is small, so the value

of talents is not emphasised and there is little motivation for competition among talents. Third, there is no good career-development plan. In some enterprises, the promotion path is limited, and there are no smooth transitions among the positions of management, technical and skill-based positions, etc., for the development of talent. Fourth, there is no talent assessment system. The evaluation criteria give too much weight to educational background and length of service, neglecting the actual abilities and work performance of talented individuals; thus, it is difficult to objectively and comprehensively determine the value of these talents. Therefore, the excellent talents have not been properly rewarded, and a problem of talent outflow has arisen; thus, the gap between the supply and demand for talent has widened.

4. Targeted Strategies for Talent Cultivation in the Electric Power Industry under the New Situation of the 15th Five-Year Plan

4.1 Optimising the Layout of Talent Introduction and Cultivation to Address the Mismatch in Talent Supply and Demand

In light of the problems of a small total talent pool and a serious mismatch between supply and demand, electric power companies should adhere to the principle of "simultaneous introduction and cultivation, with efforts from both sides" to optimise the arrangement of talent introduction and cultivation and increase the supply of talent. On the one hand, the company should enhance the recruitment of talent, better align these requirements with the development needs of the industry, focus on attracting high-quality interdisciplinary talent in emerging areas such as new energy, digitalisation, electricity trading and financial risk control, as well as scarce talent at the senior management and core technology levels. Enterprises should also strengthen cooperation with universities and research institutions to introduce talent based on order, reserve young talents in advance, and solve the problem of a talent shortage. At the same time, the company should nurture its own talent, make full use of the potential of current employees, and organise systematic and targeted training according to the needs of all positions and levels to improve both the quantity and quality of its talent.

At the same time, with the support of resources such as new-type power system demonstration projects and major science and technology special projects, enterprises should build industry-education integration training bases, promote collaborative education among universities, enterprises and research institutions, expand the scale of talent cultivation, and improve the quality of cultivation. According to the data, by the end of 2025, China's electric power industry will have established 142 industry-education integration training bases and nurtured a total of 523,000 person-times of all kinds of electric power talents, including 207,000 person-times of high-skilled talents, thus reducing the demand for talent in some areas. It is still far short of the annual talent demand of 258,000 person-times in 2025.

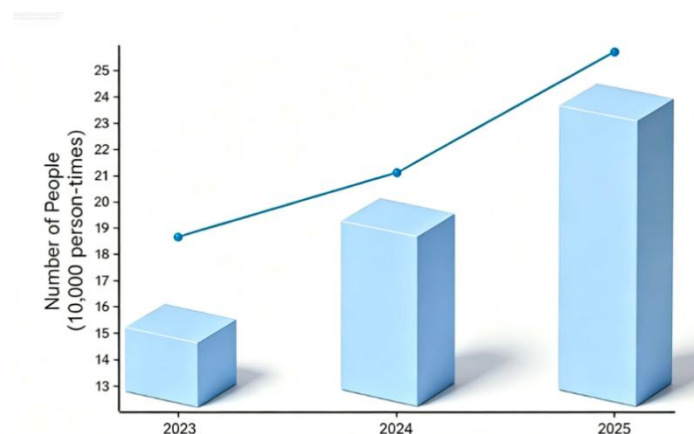


Figure 1. Comparison between the Talent Cultivation Volume and Demand of Industry-Education Integration in the Electric Power Industry from 2023 to 2025 (Unit: 10,000 persons).

4.2 Optimise the Talent Structure in line with the Development Needs of the Industry

In light of the requirements for reform and high-quality development of the electric power industry

in the 15th Five-Year Plan period, efforts will be made to improve the talent structure and address the problem of structural imbalance. First, increase investment in the new areas of new energy, digitalisation, electricity trading and smart grids to strengthen the introduction and training of talent in these fields, and reduce the supply of talent in the traditionally oversupplied areas; thus, achieve an optimal match between professional talent and industry demand. Second, build a three-tier system of "young talents, core talents and leading talents" to strengthen the talent echelon, clarify the cultivation goals and development paths at each level, and improve the cultivation and support of young talents in light of the talent shortage problem. Third, the age structure should be optimised to increase the cultivation and nurturing strength of young talent, improve the growth path and development platform, and build a younger, more professional and interdisciplinary talent team.

4.3 Optimising the Talent Cultivation System to Improve the Efficiency of Training

According to the development needs of the industry in the 15th Five-Year Plan period, an organised, diverse, efficient and practical talent cultivation system should be established to promote the deep integration of talent cultivation with job requirements, enterprise development and industry reform. First, we need to know why we are organising this training. In light of the reform direction of the electric power industry and the development strategies of enterprises, a medium- and long-term talent cultivation plan needs to be established, and the training goals and contents for all positions and levels should be specified to improve the relevance and systematic nature of the training. Second, add new training forms. Break away from the traditional model and take many forms, such as "online + offline", "theory + practice" and "case study + exercise". Digital Twin technology and Virtual Reality technology can be employed to improve the foundation of training and build a platform for integrating virtual and real training. Third, promote the integration of industry and education. Strengthen the model of collaborative education, promote joint construction of talent cultivation and training bases by electric power companies, universities and research institutions, and deepen the connection among the education chain, talent chain, industrial chain and innovation chain. Fourth, set up an all-weather fund. Build a closed-loop management system for "training-assessment-feedback-optimisation", link the results of assessment with employee promotion, salary and merit evaluation, accurately measure the effect of the training, and continuously improve the content and form of the training. Establish a closed-loop operation of "goal setting, plan execution, assessment and feedback, optimisation and improvement" to meet the actual needs of the job and promote the growth of talent for the benefit of training. According to industry statistics in 2025, electric power companies that introduced closed-loop training management have seen an increase of more than 38% in the pass rate of employee training and a rise of 45% in the conversion rate of training results compared with those in the old system.

4.4 Optimisation of the Talent Incentive System to Retain Good Employees

Strengthen the talent incentive system to attract more talented individuals to join the company and retain good employees; thus, we will have strong support for the high-quality development of the electric power industry. First, enhance the motivation system and introduce various kinds of rewards for money, praise and other forms of recognition. In addition to raising the salaries of top-performing employees, honour and recognise outstanding individuals with commendations, awards, etc., so that they feel more valued and respected. Second, change the distribution mode of bonuses from uniform distribution to one based on performance and individual strengths. Increase the incentive intensity for key employees of the company to promote competition and innovation. Third, expand the development path for staff by building a diversified platform of management, technology and skills; open up job transfer channels; increase the scope of talent cultivation and training. Fourth, establish a fair and reasonable talent assessment system that is independent of educational background or length of service; focus instead on actual abilities, work results, innovation achievements, etc., and do not lose good people.

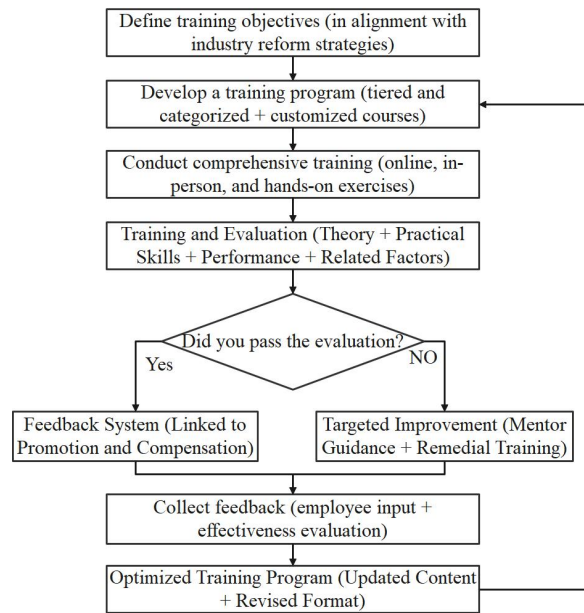


Figure 2. Flowchart of the Closed-Loop Management for Talent Training in the Electric Power Industry.

5. Conclusion

In light of the new stage of the 15th Five-Year Plan, reforms in the power industry have been continually deepening, construction of new-type power systems is accelerating, and high-quality development has become the main direction of the industry. As the frontrunner in the development of the industry, good people have gradually attracted more attention. Currently, there are many problems in the development of talent in the electric power industry, such as a small total number, structural deficiencies, a weak cultivation system and an insufficient incentive mechanism. The number of new recruits is no longer sufficient for the demands of high-quality development, so we need to cultivate talent and make adjustments. In light of the development needs of the 15th Five-Year Plan, electric power enterprises should follow the principle of "simultaneous introduction and cultivation, structural optimisation, system improvement and incentive strengthening" to attract top talent by optimising the layout of introduction and cultivation, adjusting the talent structure, improving the cultivation system and enhancing the incentive mechanism, thereby building a high-quality, interdisciplinary and innovative talent team.

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