

PROCEEDINGS ARTICLE

## Research on the Development of Skills-Based Talent in Equipment Manufacturing Industry

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### Abstract

The equipment manufacturing industry is a foundational and strategic industry that provides technical equipment for various industries of the national economy. It is a strong guarantee for industrial upgrading and technological progress. The team of technical workers is the important foundation for supporting Made in China and Created in China. Building a large army of skilled workers is of great significance for promoting and strengthening the development of equipment manufacturing industry. Although in recent years, China has strengthened policy supply, optimized the guarantee mechanism, and actively built a high-skilled talent team for the industry, there are still problems in the training, evaluation, service, and management of workers, and the quality of skilled workers is generally not suitable for the needs of the development in the manufacturing industry. Therefore, we should strengthen the construction of skilled talent teams in equipment manufacturing industry from promoting industrial development and upgrading, improving policy measures and organizational mechanisms for skilled talent, perfecting the training of industrial skilled talent, and the optimization and management of industrial skilled talent, so as to provide a solid talent support for Industrial development.

**Keywords:** Equipment Manufacturing Industry; Skilled Talent; Problems; Countermeasures

The equipment manufacturing industry is a strategic industry that provides technical equipment for various industries of the national economy. It has a high degree of industrial relevance, employment absorption capacity, and is technology and capital-intensive. It is an important guarantee for the industrial upgrading and technological progress of various industries and a concentrated reflection of the country's comprehensive strength. China's equipment manufacturing industry, as an important pillar of the national economy, has made significant progress in terms of scale, technology, and industrial chain in recent years, and the level of equipment manufacturing is gradually developing towards high-end. The report of the 20th National Congress the Communist Party of China has elevated masters and highly skilled talents to the national strategic talent level. General Secretary Xi Jinping points out "The technical workforce is an important foundation for China's manufacturing and innovation, and plays an important role in promoting high-quality economic development". Therefore, focusing on the urgent needs of industrial upgrading and high-quality development of enterprises, and striving to strengthen the construction of skilled talent teams in the equipment industry, is of great significance.

### 1. THE CURRENT SITUATION OF THE DEVELOPMENT OF SKILLED TALENTS IN THE EQUIPMENT MANUFACTURING INDUSTRY

In recent years, China has actively promoted the high-quality development of the equipment manufacturing industry, created a good industrial development environment, and improved talent attraction and retention development environment. Such documents have made top-level design and planning for industrial development, and a series of measures have been introduced to increase support in terms of finance taxation, technological innovation, industrial upgrading and transformation, and

internationalization. China is accelerating its transition from a big equipment country to a strong equipment country. The output value of China's equipment manufacturing industry has been the highest in the world for many years, accounting for about 30 percent of the global total.

Meanwhile, policy supply is strengthened, and the guarantee mechanism is optimized to actively create high-skilled personnel team for the industry. By 2023, the total number of skilled workers in the equipment manufacturing industry exceeded 50 million, accounting for more than 35% of the skilled workers in the manufacturing industry, of which the proportion of high-skilled talents (senior worker and above) was about 28%, lower than that of Germany (40%) and Japan (35%). In terms of industry distribution, the supply of basic occupations such as Welding and CNC machine tool operation in traditional fields is relatively sufficient, but the aging is serious, with more than 60% of the workers over 40 old. The demand for emerging fields such as industrial robot operation and maintenance, intelligent manufacturing system integration, and new energy equipment commissioning is prominent, with a gap of 3 million in 2023. In terms of regional distribution, the talent clustering effect in the Yangtze River Delta and the Pearl River Delta is significant accounting for more than 50% of the country, while the Northeast, Central and Western regions have difficulty in recruiting workers.

## **2. PROBLEMS IN THE DEVELOPMENT OF SKILLED TALENTS IN THE EQUIPMENT MANUFACTURING INDUSTRY**

### **2.1. The Quality of Skilled Talents Does Not Meet the Needs of the Development of Manufacturing Industry**

The traditional industry has a large number of talents, while the strategic emerging industries have a shortage of talents, especially in the high-tech industries such as high-end equipment manufacturing, new materials, and aerospace, which are key development industries. There is a gap of 3 million people in the posts of industrial robot maintenance, intelligent manufacturing system integration, and new energy equipment commissioning in 2023. The phenomenon of shortage of skilled talents is more serious, especially the lack of academic leaders with international vision and mastering of international core technology. From the perspective of the workforce, there are more junior technicians, fewer senior technicians, more traditional, fewer modern technicians, more technicians with single skills, and fewer composite technicians.

### **2.2. The Government Also Needs to Further Improve the Mechanism for Promoting**

Although a series of documents have been issued successively, the measures taken by local government departments to introduce, retain and train skilled talents are largely the copy application of relevant national policies, and the measures reflecting regional characteristics and features are relatively insufficient. There are not many measures focusing on the characteristics and trends of regional industry development, the degree of emphasis on skilled talents is not high. The corresponding safeguard measures and incentive measures are also not perfect. There is little contact between the education department, universities and enterprises. There is a lack of collaborative mechanism and relevant contact platform.

### **2.3. The System of Skills-Based Talent Training is Not Perfect Enough**

Although China has been deepening the integration of industry with education, and has adopted innovative practices in terms of school-enterprise cooperation, vocational education, and major setting, on the whole, the development and training of skilled talent teams are not closely integrated with enterprises. The training orientation is inaccurate, and training characteristics are not distinct. The updating of teaching content and personnel training models is lagging behind, and traditional teaching is still the main method, which fails to meet needs of enterprises for industrial transformation and upgrading in the new era, and lacks professional job skills. It is difficult for enterprises to recruit skilled talents who meet the job requirements the first time, and they generally need to be trained internally, increasing the labor cost of enterprises. At the same time, enterprises have not established an effective system for training of skilled talents. The training investment is insufficient, and the training methods are also relatively single, lacking a planned and organized training model.

#### **2.4. The Evaluation System for Skilled Talent Needs to be Further Improved**

According to the research surveys, many enterprises reflect that although the job level development system and the skill talent evaluation scheme have been established, the implementation is at a standstill or in the early stage of basic work, and there is no dynamic management. At the same time, because the processes involved in the production and of enterprise products are complicated and there are many types of skill positions, a huge job recognition system is needed to evaluate each skill type professionally, which is undoubtedly a great challenge for the existing job level evaluation system of enterprises. Many enterprises are powerless in the professional evaluation of skilled talent, and it is difficult to make a fair and objective evaluation of each type of work from a professional perspective.

#### **2.5. The Employment Service System and Vocational Qualification Assessment for Skilled Workers are Not Perfect Enough**

At present, most of the equipment manufacturing schools in colleges and universities in various places cooperate with enterprises, which can guarantee a certain rate of employment. Overall, there is a lack of perfect employment service system, and there are few service sites in industrial parks, enterprises, colleges and universities. The aggregation and leading effect of labor models and craftsmen at all levels are insufficient, and the precise service supply for multi-subjects such as small and medium-sized enterprises, voc colleges (technical colleges), on-the-job workers and vocational education students is limited, which makes it difficult to allocate suitable talents to the most suitable posts. At the same time, there is a disconnection between education and training and qualification certificates, and qualification certificates and enterprise employment requirements, which fails to form an effective connection in the work of enterprise selection and skilled talent selection.

#### **2.6. The Economic Treatment and Social Status of Skilled Talents are Not High Enough**

Due to the influence of education, professional title, seniority and identity, the remuneration of skilled talents is generally low compared with of high-level professional and technical personnel in enterprises. The remuneration system and incentive mechanism are still not sound. Due to the control of the total remun and the influence of the existing wage structure, it is difficult for skilled talents to match their remuneration, incentives and related benefits with the existing remuneration system they are promoted. At the same time, the social concept of "emphasizing education and neglecting ability; emphasizing equipment and neglecting technicians; emphasizing theory and neglecting operation" is still deeply rooted, and the attractiveness of skill employment and skill development for young people is insufficient, and the social recognition of technicians is insufficient. Many employees surveyed in the enterprises said that "the income is not high, the social status is low, and the sense of identity is not strong".

### **3. COUNTERMEASURES FOR THE DEVELOPMENT OF SKILLS-BASED TALENTS IN THE EQUIPMENT MANUFACTURING INDUSTRY**

#### **3.1. Under the Government'S Guidance, Improve Policy Measures and Organizational Mechanisms for Skilled Talent**

First, reasonably position and formulate supporting policies. Carry out an all-round analysis of the foundation and trend of the development of the equipment manufacturing industry, draw on the experience and achievements of the development of skilled talents in domestic and foreign industries, adhere to the long-term development goals, further formulate and issue guiding documents at the national and provincial levels, and introduce support policies for high-quality and distinctive development of technical education. The demand in key fields such as advanced manufacturing industry and strategic emerging industries should be well aligned. A number of cutting-edge specialties should be built, and the measures for the cultivation, evaluation, use, incentive and security of skilled personnel in the equipment manufacturing industry should be improved. These will promote the development of the quality, scale and of skilled personnel in line with that of new productive forces.

Second, integrate all kinds of resources to form a joint force. The development of skilled personnel in the equipment manufacturing industry requires the organization and leadership multiple

government functional departments such as the Provincial Development and Reform Commission, the Provincial Industry and Information Technology Department, the Provincial Education Department, the Provincial Science and Technology Department, and will also involve enterprises, universities, research institutes, and industry associations. Therefore, to achieve overall layout and control, integrate the strength and resources of all parties, and further explore effective models. It is necessary to establish a "global, normalized, diversified, and effective" working of all parties. Establish relevant coordination mechanisms, establish industry-education linkage platforms, and build a number of high-level composite talent training and practice bases around industrial and supply chains, so as to promote the integration and development of talents training and use among large, medium, small, and micro manufacturing enterprises.

Third, create a good social orientation. The government should form a mainstream consciousness in society that "technical talents are also talents, and skilled workers are also important human resources", ensure that skilled workers become respected professions, highlight the "high, precise, cutting-edge and scarce" orientation, comprehensively strengthen the service guarantee for leading talents in high-skills, and improve the political treatment, economic treatment and social treatment of leading talents in high-skills. Vigorously promote the spirit of labor model and craftsmanship, make full use of mainstream media, mobile Internet and new media to tell good stories of labor model and craftsmanship well, and create a social atmosphere in which labor is glorious, skills are precious, and creation is great. Create a social fashion in which labor is glorious a work style in which excellence is pursued.

Fourth, improve the mechanism for increasing financial input. Implement and improve the subsidy policies for vocational training and skills assessment, gradually increase proportion of vocational training subsidy expenditure, and include the construction fund for high-skilled talent teams in the budget for local government talent work. Raise funds through channels, and establish a financial input system that is compatible with the school operation model and training requirements, focusing on supporting the implementation of the construction plans for demonstration (back) schools, high-quality characteristic schools, key specialties, internship and training bases, "dual-qualified" teacher teams, and information technology. The provincial finance may grant comprehensive awards and subsidies based on the actual investment in vocational education and the results of performance evaluation in various places.

### **3.2. Demand Oriented, Perfect the Training of Industrial Skilled Personnel**

First, talent training should be based on the needs of new-era regional industry transformation and upgrading. We should always focus on adapting to the environment of economic and social development and the transformation and upgrading of regional industries, take the development needs of advanced equipment manufacturing industry as the guide, understand the needs regional industries from the aspects of supply quantity, quality and structure, further determine the goals of talent training, promote the connection between major settings and industry needs, curriculum content professional standards, and teaching process and production process. Promote the effective connection of manufacturing industry chain, entrepreneurship chain and training chain, focus on strategic industries such as advanced equipment manufacturing, fine chemical industry, and metallurgical new materials, and establish a talent supply chain that integrates recruitment training, employment, and improvement, cultivate a skill talent industry chain, and focus on the training of high-skilled talents and urgently needed talents, and accelerate expansion of the skill talent team.

Second, establish and improve a modern vocational education system that meets the needs of industry for skilled talent. Establish a-level and multi-pronged pattern for training in vocational education, in which the government plays a leading role, enterprises are the main participants, vocational are the main focus, cooperation between enterprises and schools is the foundation, and social sectors including industry associations are widely involved. Explore establishing vocational education groups that the entire industrial chain, and suggest that vocational schools and enterprises establish coordination mechanisms, set up relevant majors and educational resources in the schools that keep pace with those in the enterprises, and create a linkage pattern in which vocational education is biased toward the needs of the enterprises, and establish professional systems and dynamic adjustment mechanisms that suited to the needs of advanced manufacturing, modern services, and strategic

emerging industries and more. Implement a system of integration of industry with education and cooperation between enterprises schools, and actively practice the apprenticeship teaching mode of "cooperation between enterprises and schools, and alternation of work and study". Give full to the main role of enterprises, and support enterprises to independently carry out training projects such as new apprenticeship training and technician training, and implement training subsidy policies.

Third, improve the vocational training system for skilled personnel. Great efforts should be made to carry out employment skills training, job skills training, and entrepreneurship training. Efforts should also be made to strengthen the construction and services of the public service platform for education management, so as to achieve the connection and sharing of data and information among schools, enterprises and society. Promote the construction of public vocational training bases at different levels. High-level vocational training bases that integrate vocational education, public training, research and study, contest training, skills evaluation, and employment services should be established in higher vocational schools and technical schools. A number of professional talent training bases that integrate industry with higher education, research and study, and application should be built in general universities, higher technical, manufacturing enterprises, industrial parks, and makerspaces. The construction of the "Internet+ " training platform should be strengthened, and the "Internet vocational skills training should be popularized. A unified skills training and evaluation management information system with registered management for every province and an electronic file of lifelong vocational skills training for workers should be established.

### **3.3. Optimize Management, Strengthen the Support and Guarantee for the Construction of Skilled Talent in Industries**

First, a system that links skill levels to pay grades should be established. A wage distribution mechanism based on job value, competency and performance should be established, focusing on "more pay for higher skills, more pay for more work". Enterprises should make personalized settings for the use of funds, resource support and research performance in scientific research projects according to actual conditions. The assessment and fulfillment should be unlimited at the top and guaranteed at the bottom.

Second, a diversified incentive mechanism should be established. Fully leverage the excellent new product awards of our county and every province, focusing on rewarding individuals teams that have made outstanding contributions to the development of industrial technology, especially in emerging industries. For skilled talents who have made outstanding contributions in the transformation of high-tech, creating significant economic or social benefits, the government will grant generous rewards. Guide employers to explore implementing incentive measures such as project-based salaries, position dividends special rewards, and equity participation in technological innovation results for high-skilled talents, and clarify that high-skilled talents at all levels will enjoy the same treatment professional and technical personnel at corresponding levels.

Third, further strengthen the staffing services for equipment manufacturing enterprises. It is necessary to improve the normalized service mechanism for the staffing of key enterprises, as well as the coordination between the labor-intensive areas and the labor-exporting areas. For some key enterprises with strong employment-driving ability and large staffing scale, it is necessary to establish a public employment service contact system, set up employment service specialists, and implement fixed-point services. It is possible to try to carry out recruitment, find out the staffing needs of key enterprises in advance, and customize exclusive live broadcast plans for each enterprise.

Fourth, carry out international cooperation and exchanges of industrial skilled personnel. Organize industrial skilled personnel to actively participate in the implementation of the strategy going out and the construction of the national "Belt and Road", strengthen international skills exchanges, implement special training plans for skilled personnel, select excellent high-sk personnel to go abroad (overseas) for skills training, and cultivate high-skilled leading talents with international vision in the industry. At the same time, should also attract foreign large enterprises, carry out various forms of international cooperation of skilled personnel, and use the resources of skilled personnel in other countries to enrich and inspire the experience of skilled personnel.

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