Employment Promotion in China's Green Industry Development

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Abstract. This study is centered around the intricate interplay between the evolution of China's green industry and its pivotal role in fostering employment opportunities. Against the backdrop of the green sector's rapid growth juxtaposed with overarching economic challenges, understanding the employment-enhancing potential of the green industry holds paramount importance. This paper critically examines the existing employment landscape within China's green industry and the associated challenges it grapples with. Moreover, it meticulously dissects the catalysts driving the green industry's employment-promoting prowess, spotlighting instances such as the new energy vehicle sector and waste separation industry. Conclusively, the study presents a repertoire of affirmative policy recommendations poised to further fortify the symbiotic relationship between green industry expansion and robust employment generation. By shedding light on the symbiotic relationship between green industry growth and substantial job creation, this research contributes to the discourse on sustainable economic development. As China navigates the dynamic landscape of environmental concerns and economic progress, recognizing the capacity of the green industry to drive employment becomes pivotal. By examining the successes and challenges faced by sectors like new energy vehicles and waste separation, this study underscores the need for strategic policies that bolster employment opportunities. Ultimately, these insights offer a roadmap for policymakers and stakeholders to harness the full potential of the green industry in nurturing a resilient economy while addressing environmental imperatives.

Keywords: Green industry; China; employment.

1. Introduction

The world's green industry has grown significantly in the context of advances in environmental governance and environmental protection concepts in human societies, with green industries emerging in all industrial sectors, including agriculture, industrial manufacturing, and services. However, since the global pandemic of the new COVID-19 epidemic, the world economy has suffered setbacks, with some economies facing stagnant or even declining economic growth. A key indicator of stagnant economic development has been the decline in employment figures in various countries, with a significant increase in the mismatch between the lack of jobs in society and the surplus of young adults in the workforce. As the world's largest developing country, China is facing environmental pressures caused by ecological degradation and traditional industrial models. Therefore, promoting and developing green industries has become one of the key strategies for sustainable development in mainland China. As a large developing country with a population of 1.4 billion, China faces the challenge of both developing its economy and improving the living standards of its people, as well as the challenge of increasing resource scarcity. Vigorously promoting industrial transformation and upgrading, developing green industries, and taking an environmentally friendly green development path are China's inevitable choices [1]. The revenue of the national environmental protection industry continues to maintain a relatively fast growth trend, according to the estimate of the China Environmental Protection Industry Association, the revenue of the national environmental protection industry reached 1.77 trillion yuan in 2019, an increase of about 11.5% year on year. According to the Statistical Bulletin of National Economy and Social Development in 2019, the national investment in ecological protection and environmental governance increased by 37.2%, which is 31.8% higher than the average growth rate of investment in various industries [2].
Employment in green industries, as an important indicator in the process of green transformation, is of great significance in promoting economic growth, reducing employment pressure, improving the working environment and increasing workers' income. The development of green industry employment is not only important for economic growth but also has a positive impact on solving social problems, protecting the environment and improving people's quality of life. Green industry employment can create more job opportunities, improve people's living standards, improve the working environment for workers, and reduce environmental pollution and consumption of natural resources. In addition, the green industry helps promote the upgrading of economic structure, enhance the country's innovation capability and competitiveness, and realize the goal of sustainable development. Therefore, it is of great theoretical and practical significance to study the employment of green industry in mainland China.

There are a number of problems and challenges in the development of green industry employment in mainland China. First, the development of green industries is to some extent constrained by technological innovation and market demand. In the transition period, the scale and employment opportunities of green industries may be limited due to the lack of sufficient technical support and market demand. Second, the structure and quality of employment in green industries also warrant attention. At present, most employment opportunities in green industries are concentrated in labor-intensive jobs with relatively low skill requirements and low wages. How to improve the structure and quality of green industry employment and realize skill upgrading and wage growth is an important issue. In addition, green industry employment needs to address important practical difficulties such as talent training and transformation.

Given this international and domestic economic backdrop, this study focuses on the relationship between the development of green industries and their employment promotion in Mainland China. This paper attempts to answer the following important empirical questions: Has the development of green industries in mainland China created stable and substantial jobs? If so, what kind of labor has been absorbed into the market by these green industry jobs and what are their general characteristics? Finally, does the development of green industries fit into the overall direction of current economic development in mainland China, is it able to adapt to the overall employment environment, and is it worthy of further investment by the government and the market?

The purpose of this study is to provide an in-depth analysis of the current situation, problems and challenges of green industry employment in mainland China, and to propose appropriate solution strategies. Specifically, the study will focus on the following aspects: analyzing the current situation and development trend of green industries in Mainland China, and exploring their impact on employment; studying the structure and quality of employment in green industries and analyzing the problems and challenges; studying the impact of technological innovation and market demand on employment in green industries, and to make relevant policy recommendations; studying the problems of talent cultivation and transformation and propose strategies to promote talent development in green industries; proposing policies and measures to promote employment in green industries and facilitate the development of green industries.

The arrangement of the main analysis part of this paper is roughly in four aspects. First, it analyzes the current situation of green industry employment in Mainland China, including the definition and scope of green industry, the current development of green industry in Mainland China, the scale and structure of green industry employment, and the quality and treatment of green industry employment. The second part analyzes the problems and challenges of green industry employment in Mainland China, including technological innovation and market demand, employment structure and quality, talent training and transformation. The third part is policies and measures to promote green industry employment in Mainland China, including technological innovation and market promotion policies, employment structure adjustment and improvement policies, and talent training and transformation policies. The fourth part, case studies and analysis, select two major green industry employment cases, namely new energy vehicles and waste classification, and analyzes the reasons for the success of
these cases and their experiences, and finally summarizes the policies and strategies that can be learned from them.

2. Current Situation of Green Industry Employment

The development of green industries in mainland China has made remarkable progress, becoming an important force for economic growth and sustainable development. As domestic awareness of environmental protection and sustainable development continues to grow, green industries are gradually becoming a new engine of economic development. On July 16, 2021, the national carbon market in the brewing for many years after the official start of trading in Shanghai, so far has been the second anniversary, and the data show that, up to August 10, the national carbon market cumulative volume of 242 million tons, the cumulative turnover amount of 11.157 billion yuan, the day the market closing price of 69.52 yuan per ton, compared with the opening of the early stage of the market of 52 yuan per ton or so increased by more than 30%[3].

First of all, the green industry shows a good growth trend in employment. According to statistical data, the scale of employment in the green industry has been expanding, providing a large number of employment opportunities for society. In East China, analyzing the weights of the internal indicators of the development status of green employment and the environmental value of green employment, it can be found that there are four indicators with a weight of more than 10% in the development status of green employment, namely: the ratio of the total value of green industry to the gross domestic product (0.115), the ratio of the number of people employed in the green industry to the number of people employed (0.159), the total investment in fixed assets of the green industry (0.122), the internal expenditure on (R&D) (0.132) and the total investment in the green industry (0.132). (R&D) (0.132) [4]. Especially in the fields of renewable energy, environmental protection and clean technology, the employment growth of green industry is obvious. The development of green industry has led to the growth of related industrial chains, such as solar panel manufacturing and wind power equipment manufacturing, providing new employment opportunities for many workers.

Second, the employment structure of green industries has been gradually optimized. With the continuous development of the green industry, the number of jobs in the green industry that require technology, innovation and high-quality talents has gradually increased. For example, the demand for occupations such as green building designers, environmental engineers and renewable energy researchers is gradually increasing. This also provides workers with more career choices and improves the quality of employment and wages.

The geographic distribution of green industry employment is also diverse. Not only in first-tier large cities such as Beijing, Shanghai and Guangzhou, but the distribution of green industry employment has also begun to expand to second-and third-tier cities and rural areas. This not only alleviates the population pressure in first-tier cities but also promotes the development of local economies. In some resource-rich but economically underdeveloped regions, green industry development has created local employment opportunities, driven local economic growth and narrowed the development gap between regions.

Although the development of green industry employment in mainland China has achieved some positive results, it still faces some challenges. First, the structure of green industry employment remains unbalanced. Despite the increased demand for some high-skill, high-wage jobs, there are still many labor-intensive jobs. As a result, workers' skill levels and wages are relatively low, which imposes some constraints on the quality of employment.

Second, green industry employment also faces the problem of skill matching. With the development of green industry, the demand for highly skilled personnel has gradually increased. However, there is a certain mismatch between the supply and demand of skills in the current labor market. On the one hand, some workers lack relevant green skills and knowledge, making it difficult for them to adapt to the employment needs of green industries. On the other hand, the skills of some workers do not match the demand of green industries, resulting in a waste of talent. Therefore,
strengthening vocational training and education in green industry and improving the skill level and adaptability of workers are important challenges for green industry employment.

In addition, green industry employment is also constrained by the problem of insufficient market demand. Although green industries are supported and promoted by the government, it is still difficult to obtain stable and continuous orders from the market. Compared with traditional industries, technology innovation cycles in green industries are longer and more costly, and market demand is relatively low. Therefore, governments need to further strengthen policy support for green industries, such as providing financial incentives, reducing tax burdens, and optimizing industrial policies, in order to stimulate market demand for green products and services and thus promote employment growth in green industries.

3. Difficulties and Challenges in Green Industry Employment

3.1. Difficulties and Challenges in Technological Innovation

The development of green industry must rely on technological innovation, but at present, there are problems in mainland China, such as insufficient technological research and development capacity, lack of independent intellectual property rights and core technologies. Many green technologies are still dependent on imports, resulting in high technology costs. In addition, as green technologies are updated rapidly, enterprises need to increase research and development (R&D) investment to keep up with technological development. However, some small and medium-sized enterprises (SMEs) are unable to carry out large-scale technological innovation and R&D due to financial and technological constraints, which limits the further development of the green industry.

3.2. Human Resource Challenges and Difficulties

The green industry has a high demand for high-quality and skilled talent, but there is currently a mismatch between the supply and demand of talent in mainland China. On the one hand, there is a relative shortage of high-end talent, which makes it difficult to meet the needs of enterprises. The green industry needs high-end talents such as environmental protection engineers, new energy engineers, sustainable development experts, etc., and the cultivation cycle of these talents is relatively long, resulting in insufficient supply. On the other hand, due to the rapid development of the green industry, the training and education of green technology-related professions are lagging behind, resulting in an unreasonable talent structure. In addition, some talents tend to choose traditional industries instead of green industries, which also aggravates the imbalance between the supply and demand of talent.

3.3. Market Demand Challenges and Difficulties

The market demand for the green industry is affected by many factors. First of all, the lack of environmental awareness of consumers has become an important factor limiting the growth of market demand. Although the improvement of environmental awareness has become a global trend, some consumers in mainland China are still more concerned about the price factor and have little willingness to consume green products. Second, the government's policy guidance is not clear enough, and the lack of long-term and stable support policies makes the position of enterprises in market competition relatively unstable. In addition, there are problems such as fierce price competition and product homogenization in the market, which restrict the development and innovation of enterprises.

3.4. Challenges and Difficulties in Policy Support

Government policy support in the development of green industry is crucial to promote the development of the industry. However, the current policy system in Mainland China is not yet perfect and lacks clear policy direction and long-term planning. The implementation of some policies is inadequate, resulting in limited policy impact. In addition, the phenomenon of local protectionism
hinders the development of the green industry to some extent. Policy differences and uneven implementation in different regions have led to the unbalanced development of the green industry, which affects enterprises' market expectations and willingness to invest. Green industrial policy can achieve the design goal of "double improvement" of enterprises' innovation performance and environmental performance and promote the high-quality development of industries. However, the effect of green industrial policy is heterogeneous in different cities. However, the effect of green industrial policy in different cities is heterogeneous, and green industrial policy will not immediately change the environmental performance of enterprises like environmental regulation but will gradually play a role after a period of time after the implementation of the policy [5]. Therefore, the government needs to formulate clearer, more stable and long-term policies to increase support for green industries and improve the effectiveness of policy implementation.

4. Policies and Measures to Promote Green Industry Employment

Public policy plays an important role in the development of green industry, and the government should take green technology as the core to clarify the direction of development; it is an important prerequisite to determining government-enterprise cooperation and boundaries in the development of green industry; and it is also important to establish the institutional framework of green industry [6].

After determining the development strategy of the green industry, the policies and measures to deal with the dilemmas and challenges of green industry employment, including technological innovation, talent cultivation and transformation, market promotion, and employment structure adjustment, become clearer.

4.1. Policies and Measures for Technological Innovation

Strengthen government support for green technology research and development. The government can increase capital investment, establish special funds to support green technology innovation and R&D and encourage enterprises to increase investment in technological innovation. At the same time, it should establish a technological innovation cooperation platform to promote cooperation among enterprises and between enterprises and scientific research institutions and promote technology exchange and transformation.

Encourage enterprises to strengthen the application and protection of independent intellectual property rights. The government may provide professional advice and services to assist enterprises in the application and protection of intellectual property rights and provide relevant policies and economic support to encourage enterprises to independently innovate and protect intellectual property rights.

Promote the integration of green technology into traditional industries. The government can formulate relevant policies to encourage cooperation between traditional industries and green technology enterprises and promote the application and transformation of technology in traditional industries. At the same time, strengthen the training and promotion of green technology, improve the green technology literacy of employees in traditional industries, and promote the popularization and application of green technology.

4.2. Policies and Measures in Talent Cultivation and Transformation

Strengthen the cultivation of green industry talents in higher education and vocational training. The government can increase its support for colleges and vocational training institutions and provide special funds for teaching equipment and teacher training for green industry talent cultivation. At the same time, it should cooperate with enterprises to establish school-enterprise cooperation bases, strengthen the combination of practical teaching and enterprise practical training, and improve students' practical operation ability.

Formulate incentive policies to cultivate green industry talents. The government can provide incentives such as scholarships and internship allowances to attract more outstanding students to
choose green industry-related majors and increase the supply of talent. In addition, establish a talent evaluation mechanism that takes environmental protection and green technology capabilities as an important indicator for talent evaluation and encourages talents to gravitate toward the green industry.

Strengthen the transformation and introduction of talents. The government can formulate relevant policies to encourage enterprises to cooperate with universities and scientific research institutions to promote the transformation and application of scientific research results. At the same time, strengthen the introduction of high-level talents, provide a good development environment and policy support for talents, and attract more high-end talents to join the green industry.

4.3. Market Promotion Policies and Measures

4.3.1 Establish a sound market mechanism.

The government can strengthen market supervision of the green industry, formulate green product certification and standards, and improve consumer recognition and confidence in green products. At the same time, enterprises are encouraged to carry out publicity and promotion of green products to increase the market share of green products.

4.3.2 Strengthen government guidance on market demand for the green industry.

The government can formulate preferential policies to encourage consumers to buy and use green products, such as providing tax incentives or subsidies for green products, lowering the price of green products, and increasing market demand. In addition, the government can also increase the procurement of green industries to promote the development of the market.

4.3.3 Establish green industry development fund.

The government can set up a green industry development fund to support the development and market promotion of green industries. The fund can provide support in the form of low-interest loans, venture investment, and incentive funds to help enterprises overcome the financial bottleneck in the early stage of development and promote the rapid development of green industries.

4.3.4 Enterprise green investment

Green investment is an extremely important way for enterprises to combat pollution and improve environmental quality, which is both a key measure to advocate ecological and environmental protection at the national level and a practical action for enterprises to respond to the national call. In the process of designing and implementing the green industrial policy, the government should take into account the size of the enterprise and the corresponding resource base and strengthen the combined use of environmental policy tools. For enterprises with strong capital, the government should use environmental tax policy tools to "force" enterprises to participate in green practices and expand the scale of green investment; for small and medium-sized enterprises with weak resource bases, the government should use environmental subsidies to inspire them to alleviate the financing constraints due to the cost of environmental governance and reduce the uncertainty of normal production and business activities.

4.4. Employment Structure Adjustment Policies and Measures

Strengthen vocational training and transfer and placement. The government can strengthen the training of workers transferring from traditional industries to green industries, provide relevant vocational training and skill upgrading opportunities, and help workers adapt to the development needs of green industries. The government can provide financial subsidies, tax incentives, and other incentives to attract more investors and enterprises to participate in the green industry, thus promoting employment growth.

Second, vocational education and training should be strengthened to improve the skills of workers in the green industry. The government can cooperate with universities and vocational training institutions to offer relevant courses and training programs to cultivate more talents that meet the
needs of the green industry. At the same time, establish industry standards and certification systems to improve the quality and competitiveness of green industry practitioners.

Finally, strengthen the publicity and promotion of the green industry to increase public awareness and support for the green industry. The government can organize green industry exhibitions, publicity activities, etc. to enhance public understanding and recognition of the green industry, encourage more people to choose to work in the green industry, and alleviate employment pressure.

4.5. Low-carbon City Pilot Policy

Low-carbon city pilot policy is a special comprehensive policy that can significantly develop the green industry by promoting multi-dimensional industrial transformation with the city as the carrier. The focus of low-carbon cities is to transform high-carbon industries into low-carbon industries, and at the same time, synergistic innovation of various policy instruments is needed [7]. The significance of low-carbon city policy is that cities are born out of industry, and in turn can provide agglomeration of public and business services to facilitate the agglomeration and continuous supply of labor in industry, which in turn favors green industry. Therefore, low-carbon cities are an important integrated policy to comprehensively promote green industry employment.

5. Successful Case Studies of Employment in Green Industries

The new energy vehicle industry and the waste sorting industry in mainland China are two successful green industries. They have the following success factors and key experiences in promoting employment and can also learn from other green industries.

5.1. Success Factors of Employment Promotion in the New Energy Vehicle Industry

5.1.1 Policy support and financial investment

The Chinese government has introduced a series of policies to support the development of the new energy vehicle industry, such as subsidies and purchase tax exemptions, which provide a favorable development environment and economic incentives for enterprises. In addition, the government has invested a large amount of funds to support R&D and build new energy vehicle infrastructure, providing strong support for the development of the industry. The state and governments at all levels have introduced a large number of favorable policies and corresponding plans to promote new energy vehicles. They include macro policies such as overall development planning for the new energy vehicle industry, micro policies such as purchase subsidies, exemptions and reductions of vehicle purchase tax and consumption tax, preferential electricity tariffs, unlimited number and free parking and charging, and indirectly favorable policies such as limiting the number of traditional fuel vehicles and restricting the number of vehicles and the number of vehicles [8].

5.1.2 Complete industrial chain and synergistic development

China's new energy vehicle industry covers the entire industrial chain, including R&D and manufacturing of key components such as batteries, motors and intelligent control systems, as well as vehicle manufacturing, sales and services. In addition, close cooperation and synergistic development have been established among all links of the industry chain, which has improved the competitiveness and efficiency of the whole industry.

5.1.3 Talent cultivation and technological innovation

China actively cultivates professional talents and strengthens R&D and innovation of new energy vehicle technologies. The government has cooperated with universities and research institutes to establish professional research teams and laboratories, providing the industry with continuous technical support and innovation power.
5.1.4 Improving market demand and consumption

The demand for green and energy-saving products in the Chinese market is gradually increasing, and consumer awareness is also gradually improving. As a representative of green traveling, new energy vehicles are considered and sought after by the majority of consumers, and the market scale is constantly expanding, providing a huge development space for the new energy vehicle industry. At the same time, the environment of other vehicle platforms has also had a positive impact on the development and employment promotion of new energy vehicles. Under the "dual-carbon" goal, in the process of adopting new energy vehicles for operation on travel platforms, the government has shifted from subsidizing the development of new energy vehicles for operation on roads to subsidizing the decline of subsidies, and has supported the adoption of new energy vehicles for operation on travel platforms from multiple perspectives, including the creation of a good business environment and the implementation of reasonable regulations, and etcetera; changes in relevant government policies and measures have affected the development of new energy vehicles for operation on travel platforms, and have also influenced the development of new energy vehicles for operation on other platforms. Strategies for using new energy vehicles for transportation [9].

5.2. Success Factors of the Waste Separation Industry in Promoting Employment

In the past 20 years or so, China's municipal domestic waste disposal volume has been growing steadily, and according to the relevant data released by the National Bureau of Statistics, China's municipal domestic waste disposal volume increased from 170.809 million tons to 228.018 million tons in 2012-2018, with an average annual growth rate of 5.95%, and the volume of harmless municipal domestic waste treatment increased from 145 million tons in 2012 to 226 million tons [10].

5.2.1 Government guidelines and laws and regulations

The Chinese government has introduced mandatory laws and regulations on waste classification, which provide policy protection and guidance for the development of the waste classification industry. The government has also invested in the construction of waste classification facilities and the promotion of intelligent waste classification systems, providing infrastructure support for the development of the industry.

Public participation and awareness: Waste classification requires the active participation and support of the public. The Chinese government has raised public awareness and acceptance of waste classification through community campaigns and educational activities. The active participation of the public in waste classification provides a steady flow of raw materials and demand for the development of the waste classification industry.

5.2.2 Industrial chain development and resource recovery

The waste classification industry covers a wide range of aspects, such as waste collection, classification and treatment, and resource recovery. China has established a huge waste classification and resource recovery system, forming a complete industrial chain and circular economy model. Resource recovery enterprises provide new development impetus to the waste classification industry by extracting recyclable materials from waste.

5.2.3 Technological innovation and management optimization

The waste classification industry has carried out a series of technological innovations and management optimization to improve the efficiency and accuracy of waste classification through the application of intelligent equipment and systems. At the same time, the company is also focusing on product innovation and marketing, developing more environmental protection products that meet the market demand, and enhancing the competitiveness of the industry.

In summary, the success factors of the new energy vehicle industry and the waste classification industry include policy support and capital investment, industrial chain integrity and synergistic development, talent training and technological innovation, market demand and consumption upgrading, government policies and laws and regulations, public participation and awareness,
industrial chain development and resource recycling, technological innovation and management optimization. These experiences are not only applicable to other green industries but can also provide reference and inspiration for the development of green industries in other countries and regions.

6. Conclusion

This study argues that the rapid growth and development of China's green industry is conducive to employment, providing opportunities for job growth and labor transition and growth in China's labor market. Considering the specificity of China's development model, the recommendations of this study mainly focus on the government as the leading force in proposing policy recommendations with Chinese characteristics. Facing the multidimensional challenges of technology, talent, market and policy, this study combines the successful cases of China's new energy vehicle and waste classification industries and proposes a series of measures such as technological innovation, talent transformation, market promotion and policy-led measures, with the overall orientation of combining the research of government, industry and technology.

The study focuses on the economic and social impact of the development of the green industry, especially its positive impact on promoting employment, which is another important benefit of the green industry in addition to the level of environmental protection. The author believes that promoting the long-term development of green industries will be a reasonable policy tool in the situation of macrconomic development facing bottlenecks and challenges, and will bring positive effects in many aspects, which will not be limited to the promotion of employment.

Future policy research can also take specialized and comprehensive policies such as low-carbon cities as a direction, focusing on the development of the theory of guiding green industries to promote employment through urban carriers. Meanwhile, China's green industries are very diversified, and future research can also select other important cases to track the employment status of different green industries and summarize the labor characteristics of green industries.

References