Construction of Green and New Quality Productivity Evaluation Index System for "Two High" Industries

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Abstract. Promoting the green and low-carbon development of the economy and society, aligning high-quality economic development with high-level environmental protection, and forming a synergistic and mutually reinforcing relationship is an effective path for China to enter a new stage of high-quality development, practice the new development philosophy, and build a new development pattern. This is also a key aspect of developing new quality productivity. Accelerating the development of green new quality productivity holds significant strategic importance for achieving the "carbon peak, carbon neutrality" goals. "Two Highs" industries refer to sectors characterized by high pollution and high energy consumption, such as coal, electricity, steel, and chemicals. These industries not only consume vast amounts of energy but also cause severe environmental pollution, posing a significant threat to ecological sustainability. Due to their heavy reliance on resources and high emissions of pollutants, precise regulation and green transformation are necessary to achieve environmental protection and sustainability goals. Establishing an evaluation system for green new quality productivity is crucial for accelerating the elimination of outdated capacities, promoting industrial restructuring, and driving the green, low-carbon, and high-quality development of "Two Highs" industries.

Keywords: Green Development, High-Quality Economic Growth, Carbon Neutrality, Two Highs Industries, Sustainable Transformation

1 INTRODUCTION

The development potential of green and new-quality productivity lies in facilitating the transition of productivity from traditional to modern forms and achieving incremental progress from old to new quality standards. Through scientific and technological innovation and management optimization, green and new-quality productivity enhances resource utilization efficiency and reduces pollution, thereby achieving sustainable development. Green and new-quality productivity encompasses the application of advanced technologies in the production process, including systems such as big data, the Internet, cloud computing, blockchain, and artificial intelligence, which drive the green transformation of traditional industries and foster the development of new industries. The high-tech enhancement of new quality laborers, labor materials, and labor

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objects has led to an overall increase in labor productivity and total factor productivity, thereby promoting high-quality economic and social development. Policy support, market mechanisms, and international cooperation have provided strong backing for green and new-quality productivity, making it a crucial force in driving the green and low-carbon transformation of the economy and achieving the goals of "carbon peak" and "carbon neutrality," thus creating a win-win scenario in terms of economic and environmental benefits.[1]

The connotation of green and new-quality productivity is primarily defined by the following aspects: first, new-quality workers, who master modern high-tech knowledge and labor skills, and who promote the high-tech enhancement of labor objects and labor materials; second, new-quality labor materials, including advanced tools and systems such as big data, the Internet, cloud computing, blockchain, and artificial intelligence, as well as the high-end precision instruments and intelligent equipment that complement them; third, new-quality labor objects, which encompass high-tech labor objects such as new materials, new energy, and data. Through scientific and technological innovation, new-quality productivity integrates the innovation and qualitative transformation of each production factor, enhances overall labor productivity and total factor productivity, facilitates the green transformation of traditional industries, and fosters the development of new industries, thereby achieving the organic unity of high-quality economic development and environmental protection. The key to achieving such productivity lies in promoting scientific and technological innovation and establishing a green, low-carbon mode of production.

2 THE NEED FOR GREEN AND NEW QUALITY PRODUCTIVITY EVALUATION IN TWO HIGH INDUSTRIES

As the primary sources of carbon-based fuel consumption and greenhouse gas emissions, high-pollution and high-energy-consumption industries are increasingly failing to meet the developmental needs of future society in the context of the global advocacy for a green economy. Therefore, it is imperative and strategically significant to develop a green and new-quality productivity evaluation system for the "two high" industries.

The green and new-quality productivity evaluation system aids in accurately identifying and regulating the environmental impact and resource efficiency of high-pollution and high-energy-consumption industries. According to the Circular of the State Council on the Issuance of the Comprehensive Work Program for Energy Conservation and Emission Reduction in the 14th Five-Year Plan, it is essential to strengthen the control of pollutant emission reductions in key regions and industries, especially the transformation and upgrading of the "two high" industries, to facilitate their green and low-carbon transformation. [2]

By assessing the green productivity of enterprises, outdated production capacities can be identified and eliminated, and enterprises can be encouraged to introduce advanced green technologies, improve resource utilization efficiency, and achieve high-quality development. China has implemented several measures in green finance

and industrial upgrading, such as establishing a green loan and green bond evaluation system, supporting clean energy projects, and promoting the transformation of the industrial structure towards green and low-carbon development. China has set the strategic goals of carbon peaking and carbon neutrality, and through a scientific evaluation system, can provide reliable data support and guidance for achieving these goals. The introduction and implementation of green financial policies, such as the Green Bond Support Project Catalogue (2021 Edition) and the Green Financial Evaluation Program for financial institutions, demonstrate China's firm determination to promote green transformation and achieve the "dual-carbon" goals, making these policies critical tools for realizing these objectives.

3 CONSTRUCTION OF A GREEN AND NEW QUALITY PRODUCTIVITY EVALUATION INDEX SYSTEM FOR THE TWO HIGH INDUSTRIES

The development of a green and new-quality productivity evaluation index system for "two high" enterprises should begin from both input and output perspectives. Regarding inputs, the indicators primarily include carbon-based fuel and energy consumption, environmental protection management inputs, resource utilization efficiency, and human resource inputs, such as fossil fuel consumption, electricity consumption, and investments in environmental protection technology and equipment. On the output side, focus is given to indicators such as greenhouse gas emissions, wastewater and waste gas treatment, energy-saving and emission reduction effects, and economic benefits, including CO_2 emissions, wastewater discharge rates compliant with standards, and the energy consumption reduction rate per unit of product.

Additionally, a comprehensive assessment is conducted from both dynamic and static perspectives to promote enterprises in achieving green, low-carbon, and high-quality development. From a dynamic perspective, long-term carbon emission trends of enterprises are assessed, and continuous improvement in carbon emissions is identified through annual CO_2, NOX, SO_2, and CO emission indicators. Additionally, improvements in energy use efficiency are measured, utilizing annual energy consumption per unit of product and energy use efficiency indicators to observe companies' progress in energy conservation. Furthermore, technology innovation and application are tracked by assessing the development of enterprises in environmental technology through investments in environmental technology R&D and the number of new technology applications. Secondly, the improvement of green productivity is evaluated by measuring the growth and economic benefits of green productivity through the growth rate of green product sales and the return on investment in environmental projects. [3]

From a static perspective, the current level of carbon emissions is assessed, determining the status of carbon emissions of enterprises through annual CO_2, NOX, SO_2, and CO emission indicators. Additionally, current energy use efficiency is measured by utilizing the energy consumption per unit of product and energy use efficiency indicators to assess the enterprise's energy use at a specific point in time. Furthermore, the

current status of environmental protection investment is assessed by determining the enterprise's investment in environmental protection technology and equipment, and the cost of environmental protection treatment. Secondly, environmental compliance is measured by using the wastewater compliance rate and the exhaust gas compliance rate to assess the enterprise's adherence to environmental regulations. Finally, production efficiency and economic efficiency are assessed by measuring the enterprise's revenue from the sale of green products and the revenue from the transfer of environmental protection technology. [4]

Combining dynamic and static perspectives comprehensively reflects the efforts and effectiveness of enterprises in low-carbon development and green transformation, promoting their achievement of green, low-carbon, and high-quality development.The results are displayed in Table 1.

Table 1. Evaluation system of green and new quality productivity of two-high enterprises

consid-erations	subfactor	norm	Description of indicator values
labor force	labor	R&D investment rate	Research and development expens-es - salaries and wages/operating income
		R&D human resource ratio	Number of R&D staff / Number of employees
		Ratio of highly qualified human resources	Number of undergraduates and above / Number of employees
	Physical labor (objects of labor)	Fixed asset input rate	Fixed assets/total assets
		Manufacturing cost ratio	Manufacturing costs/total assets
produc-tion tool	hard technology	Depreciation of R&D assets	R&D expenses - depreciation and amortization/operating income
		R&D facility lease rate	Research and development expens-es - lease payments/operating in-come
		R&D direct investment rate	R&D expenses - direct in-puts/operating income
		Intangible assets ratio	Intangible assets/total assets
	soft technology	Asset utilization efficiency	Operating income/average total assets
		financial leverage	Owners' equity/total assets
green produc-tion	Environmental pollution and resource depletion	NOx emission intensity	Emissions of exhaust NOX
		Sulfur dioxide emission intensity	Emissions of SO_2 from exhaust gases
		Carbon monoxide emission intensity	Emissions of exhaust CO
	Green governance	Wastewater compliance rate	Effluent compliance rate
		Percentage of investment in environmental protection	Environmental input rate

Based on the two-factor theory of productivity, a new quality productivity indicator system is constructed, encompassing two main aspects: labor force and means of production. The labor force consists of live labor and materialized labor. Indicators of live labor include the salary of R&D personnel, the percentage of R&D personnel, and

the percentage of highly educated personnel, reflecting the enterprise's investment in and reliance on high-quality human resources. Indicators of materialized labor include the proportion of fixed assets and the proportion of manufacturing costs. Considering the characteristics of enterprises in the field of high-precision science and technology, which rely on high-end machinery and equipment, these indicators can effectively measure the material inputs and production costs of enterprises.

Production tools are categorized into hard and soft technologies. Indicators of hard technology include the percentage of direct investment in R&D, depreciation and amortization, leasing expenses, and intangible assets, reflecting the investment in hardware equipment and intangible assets, and indicating the R&D capability and innovation level of the enterprise. Indicators of soft technology include the total asset turnover ratio and the inverse equity multiplier. The total asset turnover ratio measures the efficiency of resource utilization of the enterprise, while the inverse equity multiplier takes into account financial risk; the higher the inverse, the lower the risk, indicating a higher productivity level of the enterprise. [5]

Furthermore, considering the enterprise's environmental pollution and resource consumption, it is necessary to include green governance-related content. Specific indicators include exhaust emissions (CO_2, NOX, SO_2, etc.), wastewater discharge rate, and environmental investment rate. Exhaust emissions reflect the environmental impact of the enterprise in the production process, the wastewater discharge rate measures the performance of the enterprise in wastewater treatment, and the environmental investment rate indicates the enterprise's investment in environmental protection. These indicators provide a comprehensive assessment of an enterprise's efforts and effectiveness in environmental management and resource utilization, ensuring that the enterprise achieves high productivity while considering environmental protection and sustainable development.

Through the above indicators, the constructed evaluation system can comprehensively reflect the performance of the "two high" enterprises in terms of green and new-quality productivity, and promote enterprises to achieve green, low-carbon, and high-quality development.

4 CONCLUSIONS

Autonomous innovation in science and technology and new-quality productivity are key to coping with global changes and the "necklace" problem. In the face of accelerated global changes, enterprises need to rapidly enhance their capacity for independent innovation in science and technology, accelerate the formation of new productivity and its evaluation index system, and promote the development of new technologies, new industries, new models, and new fields. Only in this way can enterprises be guided to achieve major breakthroughs in scientific and technological innovation, thereby reshaping the economic structure, eliminating dependence on the middle- and low-end industrial chain, and ushering in a fundamental transformation of the industrial and economic competition pattern. General Secretary Xi Jinping emphasized that "we have to deepen the reform, so that the vitality of all factors such as labor, knowledge, tech-

nology, management, and capital can burst forth competitively, allowing all sources of creating social wealth to fully flow." The role of these factors in promoting the development of productive forces is irreplaceable. In the current new round of scientific and technological revolution and industrial change, technological innovation has become the main driving force of productivity development. Enterprises should make full use of domestic and foreign markets, integrate scientific and technological innovation resources, and improve the quality and allocation efficiency of advanced elements such as new materials, new technologies, and data resources. This will allow each element of the new-quality productivity to function optimally, guide the gathering of advanced elements into new industries, stimulate innovation and entrepreneurship, and promote industrial chain reengineering and value chain regeneration, thereby achieving high-quality development.

Moreover, it is crucial to build a stable and optimal innovation environment. The government needs to play the role of policy guarantor, strengthen the central position of enterprises in science and technology innovation, and stimulate the innovation vitality of the entire society. By strengthening international scientific research cooperation, improving laws and regulations, actively protecting intellectual property rights, exploring financial forms and modes compatible with the digital economy, and promoting finance to better serve scientific and technological innovation, geographic, organizational, and technological constraints can be overcome, further promoting the development of new technologies, new industries, and new business forms.

In summary, independent innovation in science and technology and the development of new productive forces must occur in a stable and optimal innovation environment to achieve the goal of "science and technology is the first productive force" and advance China's economy to a new stage of high-quality development.

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