

# Study on the Influence of ESG Performance of Manufacturing Enterprises in Liaoning Province on New-Quality Productivity

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**Abstract:** Against the backdrop of the accelerated global industrial transformation and the increasingly prominent environmental and social issues, the manufacturing industry in Liaoning Province is under the pressure of transformation and upgrading. This article focuses on the manufacturing enterprises in Liaoning Province. By comprehensively applying the literature research method and the case analysis method, it deeply analyzes the internal connection and influence mechanism between their ESG performance and New-quality productivity. The purpose is to reveal how to empower the transformation and upgrading of the manufacturing industry in Liaoning Province and enhance New-quality productivity through ESG practices. The research findings show that the manufacturing enterprises in Liaoning Province exhibit diverse performances in the environmental, social, and governance dimensions of ESG. The ESG performance synergistically empowers New-quality productivity through three major paths: technological innovation, industrial structure optimization, and resource allocation efficiency enhancement. In conclusion, enterprises, the government, and society should work together both internally and externally. By relying on ESG practices, they can boost the transformation and upgrading of the manufacturing industry in Liaoning Province, enhance New-quality productivity, and drive the high-quality development of the regional economy.

**Keywords:** Manufacturing Enterprises in Liaoning Province; ESG Performance; New-Quality Productivity; Transformation and Upgrading; Sustainable Development

## 1. Introduction

With the accelerating global industrial revolution and increasingly prominent environmental and social issues, the manufacturing industry in Liaoning Province is faced with the urgent pressure of transformation and upgrading. New-quality productivity emphasizes the integration of elements such as scientific and technological innovation, green development, and talent drive, and has become a key path for the manufacturing industry to break through bottlenecks and move towards high-quality development. For the manufacturing industry in Liaoning Province, cultivating and developing New-quality productivity is a crucial move to get rid of the dependence on the traditional development path and reshape industrial advantages. The ESG (Environment, Social, Governance) concept provides a comprehensive framework for the sustainable development of enterprises. Exploring the influence mechanism of the ESG performance of manufacturing enterprises in Liaoning Province on New-quality productivity is of great theoretical and practical significance for guiding enterprises to implement sustainable development strategies, promoting the green transformation of the regional economy, and enhancing industrial competitiveness.

Overseas research on ESG performance started relatively early and has yielded fruitful results. At the theoretical level, Friedman (1970) proposed that corporate social responsibility is a means to increase profits, which triggered extensive discussions. Subsequent scholars expanded the research to the impact of environmental and social responsibilities on the long-term value of enterprises. In terms of practical research, numerous cases of multinational enterprises have shown that positive ESG practices can reduce operational risks and enhance brand reputation. In domestic research, the ESG field has

developed rapidly along with the in-depth implementation of the concept of sustainable development. Scholars have discussed its connotation and the construction of an evaluation system. Institutions such as SynTao Green Finance have designed local ESG rating indicators in combination with China's national conditions, covering dimensions such as environmental protection compliance, employee welfare, and corporate governance structure. In 2023, China first proposed the concept of New-quality productivity. Domestic scholars mainly conduct research on its basic connotation. They explain the connotation from the perspectives of industrial upgrading and factor changes and demonstrate the key role of scientific and technological innovation in the high - quality development of industries and the economy.

Scholars at home and abroad have conducted a large number of studies on ESG performance and New-quality productivity which lays a good foundation for this project. However, most of the existing achievements are discussed at the broad industrial or listed company level and do not deeply combine the characteristics of the manufacturing industry in Liaoning Province. In the analysis of the action mechanism, there is a lack of exploration of the micro-processes such as resource integration and technology absorption of manufacturing enterprises in Liaoning Province, making it difficult to provide sufficient guidance for enterprises to formulate precise policies. This study comprehensively uses the literature research method and case analysis method, widely collects and combs academic literature at home and abroad on ESG and New-quality productivity selects typical manufacturing enterprises in Liaoning Province, deeply analyzes their ESG practice measures and the actual impact on New-quality productivity provides practical support for theoretical viewpoints, and enhances the credibility and persuasiveness of the research.

## 2. Relevant Theoretical Foundations

### 2.1 Theoretical Connotation of ESG

ESG (Environment, Social, and Governance) is a sustainable development concept that originated in the 1960s and a development approach that comprehensively considers environmental performance, social

responsibility, and corporate governance [1]. ESG refers to the concept of incorporating environmental, social, and corporate governance factors into investment decisions and corporate operations. It is the basis for enterprises to monitor and regulate their own performance and an important standard for investors to measure and evaluate the sustainable development ability of enterprises and their fulfillment of social responsibilities [2].

The environmental dimension focuses on the relevant governance, strategies, impacts, risks, and opportunity management of enterprises in response to climate change during the production and operation process, as well as the comprehensive impacts on the natural ecology such as energy conservation and emission reduction, pollution prevention and control, and ecosystem protection.

The social dimension focuses on the interaction between enterprises and internal and external stakeholders. Internally, it focuses on the protection of employees' rights and interests and the implementation of the innovation-driven development strategy. Externally, enterprises actively support rural revitalization and social welfare undertakings. While ensuring the healthy development of the company, they continuously give back to investors and treat suppliers, customers, and consumers in good faith to promote the sustainable development of the economy and society.

The governance dimension focuses on the decision-making, supervision, and operation management mechanisms of enterprises. Incorporate the concept of sustainable development into various systems and processes of corporate governance, improve the corporate governance structure, form a system of checks and balances of power, and protect the interests of shareholders. Enterprises timely and accurately disclose financial and non-financial information, especially the progress of ESG related practices and the achievement of goals, respond to the concerns of investors and society, and enhance market trust. In business activities, abide by social ethics and business ethics.

Through the comprehensive consideration of these three dimensions, ESG provides a comprehensive and in-depth measurement

perspective for the sustainable development of enterprises, guiding enterprises to move towards a long-term stable, green, and harmonious development path.

## 2.2 Theoretical Analysis of New-Quality Productivity

The so-called New-quality productivity takes the leap of laborers, means of labor, objects of labor, and their optimized combination as the basic connotation, and takes the significant improvement of total factor productivity as the core symbol. Its characteristics lie in innovation, the key is high quality, and its essence is advanced productivity [3]. New-quality productivity is a state of advanced productivity in which innovation plays a leading role, getting rid of the traditional economic growth mode and the development path of productivity. It has the characteristics of high technology, high efficiency, and high quality and conforms to the concept of new development. It is generated by the revolutionary breakthrough of technology, the innovative allocation of production factors, and the deep transformation and upgrading of industries. It takes the leap of laborers, means of labor, objects of labor, and their optimized combination as the basic connotation and takes the significant improvement of total factor productivity as the core symbol.

New-quality productivity represents a leap in productivity. It is a new high-level modern productivity, different from traditional productivity. It is a productivity in which scientific and technological innovation plays a leading role and is the latest manifestation of the modern transformation of productivity [4]. It can be seen that New-quality productivity is not only a "quantitative" improvement of the constituent elements of traditional productivity but also a comprehensive transcendence of the productivity system from quantitative change to qualitative change [5]. Therefore, the logical main line of the development of New-quality productivity is that a new round of scientific and technological revolution drives industrial innovation and industrial structure changes, promotes the upgrading of the economic structure, and is finally manifested as a significant improvement in total factor productivity.

## 2.3 The Relationship between ESG and

### New-Quality Productivity

#### 2.3.1 Conceptual Fit

"Green development is the foundation of high - quality development, and New-quality productivity itself is green productivity." This view is in line with the green development concept of ESG. New-quality productivity emphasizes innovation-driven development, and the development of ESG is inseparable from the leading role of innovation-driven development in production. Through scientific and technological innovation and structural adjustment, a more sustainable, efficient, and fair future economic system can be constructed [6-8].

#### 2.3.2 Investment Promotion

Green investment helps to improve the level of New-quality productivity of enterprises. Its action path is to promote enterprises to accelerate the formation of New-quality productivity by improving their ESG performance [9].

#### 2.3.3 Mutual Empowerment

ESG brings new concepts, market innovation, and institutional innovation to New-quality productivity and helps its development. With scientific and technological innovation as the core, New-quality productivity has the characteristics of high technology, high efficiency, and high quality, follows the concept of new development and the requirements of high-quality development, and is a strong driving force for sustainable development. The two interact and develop collaboratively [10].

#### 2.3.4 Innovation-driven Correlation

Under the "dual carbon" goal, the ESG level encourages the dual innovation development of enterprises, thereby improving New-quality productivity. When the environmental uncertainty is high, enterprises are more inclined to exploratory innovation. Moreover, the ESG performance promotes enterprises to improve New-quality productivity through green technological innovation [11,12]. Digital New-quality productivity can significantly optimize the ESG performance of enterprises, which is achieved through two channels: alleviating financing constraints and promoting green technological innovation. And it has a more prominent promoting effect on the ESG performance of enterprises with high growth potential and high technological innovation levels [13].

Therefore, New-quality productivity and ESG play a coupling and conjugate role in promoting high-quality economic development, achieving green transformation, undertaking social responsibilities, and optimizing corporate governance.

### **3. Influence Mechanism of ESG Performance of Manufacturing Enterprises in Liaoning Province on New-Quality Productivity**

#### **3.1 Influence of the Environmental Dimension on New-Quality Productivity**

##### **3.1.1 Promoting Green Technological Innovation**

In order to reduce the impact of production and operation on the environment, enterprises increase the intensity of green technological innovation such as energy conservation, emission reduction, and pollution control. For example, Dalian Heavy Industry has improved resource utilization efficiency by implementing green technology upgrading and environmental protection renovation projects, promoted the green transformation of its leading industries, and thus provided technical support for the development of New-quality productivity. Fangda Special Steel has also achieved fruitful results in technological innovation in its ESG practice. In the environmental field, investing a large amount of money in the research and development of clean steelmaking technology and pioneering the “negative energy steelmaking process in converter steelmaking”. Through means such as waste heat recovery and efficient gas utilization, the energy consumption per ton of steel is 30% lower than the industry average, which not only reduces production costs but also wins a reputation for green development for the enterprise.

##### **3.1.2 Optimizing the Industrial Structure**

The ESG performance prompts enterprises to transform towards green and low-carbon industries, increase the proportion of environmentally friendly and resource-saving industries, reduce high-energy-consuming and high-pollution industries, and promote the transformation of traditional manufacturing industries towards high-end, intelligent, and green development, achieving a win-win situation of economic and environmental benefits and promoting the improvement of

New-quality productivity. ESG practice has opened up a new path for the optimization and upgrading of the industrial structure of manufacturing enterprises in Liaoning Province. From the perspective of the transformation of traditional industries, taking Anshan Iron and Steel in Liaoning Province as an example, driven by the ESG concept, it has carried out in-depth green transformation of its iron and steel main business. On the one hand, it has eliminated backward production capacity. In the past five years, it has shut down more than 10 old ironmaking blast furnaces and steelmaking converters with high energy consumption and high pollution, reducing the crude steel production capacity by more than 3 million tons, and reducing energy consumption and pollutant emissions from the source. On the other hand, it has vigorously introduced intelligent manufacturing technologies to create a "Smart Anshan Iron and Steel". At the Bayuquan Steel Base, through the full coverage of the 5G network, the remote control of production equipment and the intelligent diagnosis of faults have been realized. The production efficiency has increased by 25%, the cost per ton of steel has been reduced by 120 yuan, and the product quality stability has reached 99.5%, thus promoting the iron and steel main business to move towards high-end, intelligent, and green development.

##### **3.1.3 Cultivating Emerging Industries**

Manufacturing enterprises in Liaoning Province have achieved remarkable results by leveraging the ESG concept. The new energy vehicle industry cluster in Shenyang is booming, and many enterprises have integrated ESG into their development strategies. For example, a new energy vehicle enterprise, in the environmental dimension, has developed an efficient battery recycling technology with a battery recycling rate of over 90%, reducing resource loss. In the social dimension, it has created more than 2,000 jobs locally and has driven the employment of more than 5,000 people in upstream and downstream supporting enterprises. In the governance dimension, it has established a diversified shareholder check and balance structure to ensure the scientific nature of decision-making. With its good ESG performance, it has attracted a large amount of investment and talent, promoted the rapid growth of the enterprise, and driven the output

value of the entire new energy vehicle industry chain in Liaoning Province to increase by 200% in three years. It has built a complete industrial ecosystem covering vehicle manufacturing, battery research and development, and charging pile layout from scratch, becoming a growth pole of New-quality productivity in Liaoning Province and reshaping the industrial pattern.

**3.1.4 Improving resource recycling efficiency**  
Implementing the resource recycling utilization model prompts enterprises to optimize the production process, improve the utilization rate of raw materials, and reduce waste emissions. This process reduces the production costs of enterprises, improves production efficiency, achieves a win-win situation of economic and environmental benefits, and promotes the improvement of New-quality productivity.

### **3.2 Influence of the Social Dimension on New-Quality Productivity**

#### **3.2.1 Employee Empowerment and Innovation Vitality**

When enterprises attach importance to the protection of employees' rights and interests and provide rich career development opportunities, employees' sense of belonging and loyalty will be enhanced, and they will be more willing to invest in innovation work. For example, measures such as setting up internal innovation reward mechanisms and carrying out skill training can stimulate employees' innovative thinking and bring a steady stream of innovative ideas to the enterprise, which can be transformed into New-quality productivity. For example, Dalian Heavy Industry provides employees with diversified training and development opportunities, builds a complete innovation platform, and sets up a high-value innovation reward fund. Fangda Special Steel closely cooperates with universities and scientific research institutions to establish a joint talent training mechanism and attract high-end talents to join. Relying on the talent advantage, it has successfully developed high-strength automotive steel, which is widely used in the manufacturing of new energy vehicles, opening up a new market for the enterprise and achieving a win-win situation of economic and social benefits, demonstrating the strong boosting force of ESG on technological innovation and New-quality productivity.

#### **3.2.2 Supply Chain Collaborative Innovation and Upgrading**

Enterprises fulfill their social responsibilities in the supply chain. Through supply chain collaborative innovation, they integrate upstream and downstream resources, carry out green procurement, shorten the product research and development cycle, improve product quality, and enhance the overall competitiveness of the industry. BMW Brilliance selects suppliers in accordance with ESG standards and builds a close cooperation ecosystem, promoting upstream and downstream collaborative optimization of resource utilization. At the raw material procurement end, it cooperates with suppliers to develop lightweight and recyclable materials, which not only reduces the weight of the vehicle and energy consumption but also expands the channels for material recycling and reuse, realizing the closed-loop flow of resources. In the logistics and distribution link, it integrates the logistics resources of regional suppliers and implements the joint distribution mode, improving the overall resource allocation efficiency of the supply chain. Taking the green supply chain as a link, it connects the upstream and downstream of the industry to jointly create New-quality productivity.

### **3.3 Influence of the Governance Dimension on New-Quality Productivity**

#### **3.3.1 Preventing Market Risks**

A sound corporate governance structure helps enterprises accurately identify market opportunities and risks. For example, Shenyang Machine Tool has established independent directors and professional advisory committees. When formulating strategies, it fully considers ESG factors and makes early arrangements for emerging green industries to ensure that the enterprise's resources are invested in the field of New-quality productivity with development potential. Based on the technical characteristics of the intelligent equipment industry, Siasun Robot has established a complete risk early warning and response mechanism. Enterprises establish a sound ESG information disclosure mechanism, enabling stakeholders such as investors and regulatory agencies to understand the enterprise's actions in environmental protection, social

responsibility, and governance, forcing the enterprise to continuously improve and develop New-quality productivity steadily.

### 3.3.2 Optimizing Resource Allocation

A reasonable governance mechanism ensures that the enterprise's resources flow to key innovation projects. In the allocation of R&D funds, through processes such as project evaluation and expert demonstration, projects that have a significant role in improving New-quality productivity are screened out. Based on the ESG concept, TBEA Shenyang Transformer Group comprehensively examines the energy consumption and resource loss problems in all production links. By introducing an advanced intelligent manufacturing system, it realizes the interconnection of equipment and real-time data collection, accurately analyzes production bottlenecks and resource waste points, effectively improves production efficiency, and realizes the accurate allocation of resources.

### 3.3.3 Improving Operational Efficiency

Enterprises can better identify and manage potential risks and improve operational efficiency by improving the governance structure, establishing a transparent supervision mechanism, and protecting the rights and interests of stakeholders, laying the foundation for the cultivation of New-quality productivity. For example, Dalian Heavy Industry has constructed an ESG governance structure and continuously improved management efficiency.

## 4. Strategies for Improving the ESG Performance and New-Quality Productivity of Manufacturing Enterprises in Liaoning Province

### 4.1 At the Enterprise Level

#### 4.1.1 Strengthen ESG Awareness and Strategic Integration

Manufacturing enterprises in Liaoning Province should strengthen ESG awareness from top to bottom, fully integrate the ESG concept into the enterprise development strategy, formulate long-term ESG goals and action plans, and form a consensus from senior leaders to grassroots employees to ensure that ESG practices run through the entire process of enterprise production and operation. They can learn from the experience of international

advanced enterprises, set long-term and phased goals, and refine them into the annual plans and performance assessment indicators of each department to ensure that the ESG concept takes root. Through regular internal publicity and case sharing, popularize ESG knowledge to all employees, create an atmosphere of full participation, make ESG an inherent part of enterprise operations, and fundamentally drive the development of New-quality productivity.

#### 4.1.2 Increase Investment in Green Technological Innovation

Enterprises should set up special R&D funds to ensure continuous investment in green technological innovation. On the one hand, focus on key technological breakthroughs in energy conservation and emission reduction in traditional manufacturing industries, such as researching and developing high-efficiency waste heat recovery and utilization technology in the steel industry and exploring green synthesis processes in the chemical industry. On the other hand, actively lay out emerging technology fields, such as the application of artificial intelligence and the Internet of Things in intelligent manufacturing. Encourage enterprises to jointly build R&D centers with universities and scientific research institutions to achieve in-depth integration of production, education, and research, inject scientific and technological impetus into New-quality productivity and create a green competitive advantage.

#### 4.1.3 Optimize the Corporate Governance Structure

Improving the internal governance system is the key to enhancing ESG performance. Enterprises should optimize the composition of the board of directors and introduce independent directors with professional ESG knowledge backgrounds, such as environmental experts and social responsibility scholars, to provide diverse perspectives for decision-making. Strengthen the supervision function of the board of supervisors and include the implementation of ESG into the scope of supervision to ensure compliant operation. In terms of information disclosure, enterprises should follow domestic and foreign authoritative ESG reporting standards, improve the quality and frequency of disclosure, and detail information such as environmental data, measures for protecting employees' rights and interests, and the effectiveness of supply chain

management to respond to the concerns of investors and society and enhance market trust. At the same time, establish an ESG risk early warning and response mechanism, regularly evaluate the impact of external factors such as climate change and changes in policies and regulations on the enterprise, and formulate response strategies in advance to ensure the stable development of the enterprise and help continuously improve New-quality productivity.

## **4.2 Government-Level Support**

### **4.2.1 Improve the Policy and Regulatory System**

The government should play a leading role in accelerating the improvement of the ESG related policy and regulatory system, creating a good institutional environment for manufacturing enterprises in Liaoning Province to practice the ESG concept and cultivate New-quality productivity. On the one hand, introduce targeted industrial policies. According to the characteristics of the manufacturing industry in Liaoning Province, formulate special plans for energy conservation and emission reduction in high-energy-consuming industries such as steel and chemical industries, and provide support for emerging green manufacturing industries. On the other hand, establish an incentive and restraint mechanism. Through tax adjustment, provide income tax exemptions for enterprises that actively invest in environmental protection technology research and development and achieve clean production. In terms of financial subsidies, tilt towards enterprises with remarkable achievements in building green supply chains and improving employee skills through training.

### **4.2.2 Increase Financial Support**

Financial support is a key driving force for manufacturing enterprises in Liaoning Province to improve their ESG performance and give birth to New-quality productivity. The government should set up special support funds, focus on green technological innovation in the manufacturing industry and projects for the transformation of energy-saving and environmental protection facilities, and provide precise support in the form of project subsidies and loan interest subsidies. Implement tax preferential policies, allowing enterprises that purchase environmental

protection equipment and carry out comprehensive resource utilization to offset the investment amount of the equipment against the payable tax amount, and improve the enthusiasm for ESG investment.

### **4.2.3 Strengthen Public Service and Platform Construction**

The government should strengthen the supply of public services, build diversified platforms, and empower the ESG practices and the development of New-quality productivity of manufacturing enterprises in Liaoning Province. Firstly, build a production-education-research cooperation platform, establish an industrial technology innovation alliance, and set up a joint talent training base between universities and enterprises. Secondly, create an information sharing platform, establish an enterprise ESG database, build a green technology trading platform, gather advanced energy-saving, environmental protection, and intelligent manufacturing technology achievements at home and abroad, and accelerate the diffusion and application of new technologies in the manufacturing industry in Liaoning Province. Thirdly, improve the technology exchange platform, organize mutual visits and exchange activities among enterprises, promote excellent ESG practice models, and promote collaborative innovation among upstream and downstream enterprises in the industrial chain. Use the platform's cohesive force to stimulate the potential of New-quality productivity of manufacturing enterprises in Liaoning Province and create a sustainable development industrial ecosystem.

## **4.3 At the Social Level**

### **4.3.1 Publicity, Education, and Promotion**

Through activities such as ESG forums, industry exhibitions, and training lectures, strengthen the publicity and promotion of the ESG concept and the importance of New-quality productivity and improve the attention and support of all sectors of society for the sustainable development of manufacturing enterprises in Liaoning Province.

### **4.3.2 Professional Service Support**

Encourage financial institutions to develop ESG financial products and provide enterprises with services such as green financing and social responsibility investment. Provide differentiated credit lines and interest rate

discounts according to the enterprise's ESG rating. Support consulting companies, industry associations, etc. to provide enterprises with professional services such as ESG consulting, certification, and technical guidance to help enterprises improve their ESG performance and New-quality productivity level. Set up an industrial guidance fund to attract social capital participation, focus on cutting-edge fields such as intelligent manufacturing and new materials, invest in potential enterprises, accelerate the industrialization of scientific and technological achievements, inject capital vitality into New-quality productivity and boost the high-quality development of the manufacturing industry in Liaoning Province.

## 5. Conclusion

The study found that the performance of manufacturing enterprises in Liaoning Province in various ESG dimensions presents a diverse situation: in the environmental dimension, achievements have been made in many aspects such as energy conservation, emission reduction, and pollution control, and many enterprises have realized resource recycling through technological innovation; in the social dimension, the protection of employees' rights and interests has been solidly implemented, supply chain management has gradually become green and collaborative, and the fulfillment of social responsibilities has demonstrated a sense of responsibility; in the governance dimension, the corporate governance structure has been continuously optimized, information disclosure has become more standardized and transparent, and the risk management system has been firmly established.

The ESG performance has a profound impact on New-quality productivity and it empowers through three coordinated paths: technological innovation, industrial structure optimization, and resource allocation efficiency improvement. Enterprises should strengthen ESG awareness, increase investment in green technology, and optimize governance. The government should improve policies and regulations, strengthen financial and financial support, and build service platforms. Only by the joint efforts of internal and external forces can we help manufacturing enterprises in Liaoning Province implement sustainable development strategies, promote the

transformation and upgrading of the manufacturing industry in Liaoning Province through ESG practices, improve New-quality productivity and drive the high-quality development of the regional economy.

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