

# Research on the Comprehensive Impact of ESG Indicators on Supply Chain Sustainability, Economic Growth, and Policy Making

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**Abstract.** This article aims to study the comprehensive impact of ESG (Environmental, Social, and Governance) indicators on supply chain sustainability, economic growth, and policy making. Through comprehensive analysis of relevant research and cases, this article finds that the application of ESG indicators has positive effects on the sustainability of supply chains and also has important effects on economic growth and policy making. In terms of supply chain sustainability, the introduction of ESG indicators prompts companies to adopt more environmentally friendly, socially responsible, and transparent business practices, improving the overall sustainability of supply chains. In terms of economic growth, ESG indicators help stimulate innovation and increase corporate competitiveness, as well as promote efficient use of resources and improved economic efficiency. In terms of policy making, ESG indicators provide a reference for governments and regulatory agencies to develop relevant policies and regulations, promoting the process of sustainable development. In summary, ESG indicators have a positive comprehensive impact on supply chain sustainability, economic growth, and policy making.

**Keywords:** ESG indicators; supply chain sustainability; economic growth; policy formulation; sustainability assessment.

## 1. Introduction

ESG (Environmental, Social, and Governance) indicators are important tools for assessing corporate performance in environmental, social, and governance aspects. In recent years, the application of ESG indicators has gained increasing attention and played an important role in supply chain sustainability, economic growth, and policy making. This article will delve into the comprehensive impact of ESG indicators on supply chain sustainability, economic growth, and policy making.

## 2. Overview of ESG Indicators

ESG is an acronym for Environmental, Social, and Governance. It refers to a set of indicators and standards for evaluating sustainability and responsible management in the corporate and investment fields. ESG indicators are used to measure the sustainability and responsible performance of companies and investment portfolios in environmental, social, and governance aspects. They provide a way to assess the performance of companies in sustainability and responsible management and to consider investment decisions more comprehensively. Environmental indicators involve the environmental impact and resource management of companies and investment portfolios. This includes energy efficiency, greenhouse gas emissions, water resource management, waste management, and the circular economy, among others. Environmental indicators help evaluate the contribution of companies to climate change, natural resource conservation, and ecosystem health. Social indicators focus on the impact of companies and investment portfolios on society and their social responsibility performance. This includes employee rights, labor relations, human rights protection, supply chain management, community involvement, consumer rights, diversity, and inclusiveness, among other aspects. Social indicators help evaluate the relationship between

companies and their stakeholders and the contribution of companies to social sustainability. Governance indicators involve the management structure and decision-making processes of companies and investment portfolios. This includes corporate governance, independence of the board of directors, quality of senior management teams, protection of shareholder rights, and corporate transparency, among other aspects. Governance indicators help evaluate the effectiveness of corporate governance, ethics, and values. ESG indicators are typically measured through data collection, reporting, and analysis, including reports from companies themselves, indicators from independent rating agencies, and various other available data sources. These indicators help investors and stakeholders assess the performance of companies in sustainability and responsible management, providing additional references and dimensions for investment decision-making.

### 3. Comprehensive Impact of ESG Indicators on Supply Chain Sustainability

#### 3.1. Environmental Aspects

Target layer	Accuracy Layer	Indicator level	Attribute of indicators
Environment	Energy consumption	Total energy consumption	Reverse
		The consumption of water resources	Reverse
	Waste emissions	The total emissions of greenhouse gases	Reverse
		Harmless waste disposal	Reverse
	Environmental management	Get green building certification	Forward
		Environmental conservation overall investment	Forward

**Figure 1.** Selection of Environmental Responsibility Indicators in ESG Evaluation System.

The application of ESG indicators encourages companies to take emission reduction measures, such as improving energy efficiency, adopting clean energy, and low-carbon technologies. According to research by the United Nations Environment Programme, companies can significantly reduce greenhouse gas emissions into the atmosphere through these measures, thereby mitigating the impacts of climate change. Companies applying ESG indicators usually seek more efficient methods of resource utilization. This includes reducing water usage, lowering energy consumption, and optimizing raw material utilization, among others. Statistics show that resource waste and inefficient utilization in the supply chain can lead to increased costs, while the application of ESG indicators helps improve resource utilization efficiency and reduce excessive reliance on limited resources. ESG indicators drive companies to transition to a circular economy model, which reduces waste and the waste of resources and achieves the recycling and reuse of materials. This model helps reduce the demand for raw materials in the supply chain, reduce environmental pollution, and create economic and social value. Companies applying ESG indicators place greater emphasis on the management and prevention of environmental risks. By assessing environmental risks and potential impacts in the

supply chain, companies can take corresponding measures to mitigate these risks, such as preventing pollution, handling waste, and managing environmental incidents. Companies applying ESG indicators usually adhere to internationally recognized environmental standards and certification requirements. For example, the International Organization for Standardization (ISO) offers environmental management system standard ISO 14001 and carbon neutrality standard ISO 14064, among others. These standards and certifications ensure that companies implement appropriate environmental management measures in the supply chain, improving environmental sustainability.

Through the environmental impacts mentioned above, ESG indicators promote higher levels of environmental sustainability in the supply chain, reduce resource consumption and environmental risks, and enhance the reputation and competitiveness of companies in sustainable development. Additionally, they encourage companies to seek innovative environmental solutions within the supply chain, driving the entire industry towards more sustainable development.

### 3.2. Social Aspects

Primary indicators.	Secondary indicators	third-level indicator	Nature indicators
Social responsibility	Shareholder return	Return on net assets	Positive indicator
	Employee benefits	Cash paid to employees / Number of employees	Positive indicator
	Corporate credit relationships	Accounts receivable turnover ratio	Positive indicator
	Charitable expenses	Amount of donations	Positive indicator
	Taxation	Various taxes/Number of employees	Positive indicator
	Employment	Number of employees	Positive indicator
	Legitimacy	Compliance/non-compliance	Reverse indicator

**Figure 2.** Selection of Social Responsibility Indicators in ESG Evaluation System.

ESG indicators' social dimension considers the impact of companies on employees, communities, and stakeholders. In the supply chain, the application of ESG indicators can promote the protection of labor rights, improve working conditions, and advance social justice. Companies must also address human rights issues and the social responsibility of suppliers to ensure that their production processes do not have a negative impact. The application of ESG indicators in the social aspect also has a positive impact on the overall social responsibility of the supply chain. By applying ESG indicators in the supply chain, companies can promote the rights and well-being of employees, communities, and stakeholders, improving overall social responsibility. Specifically, ESG indicators require companies to protect labor rights, such as providing fair wages and good working conditions, ensuring employee safety and welfare. Additionally, ESG indicators require companies to improve working conditions in the supply chain, such as ensuring reasonable working hours, benefits, and a safe working environment, to safeguard the rights of supply chain workers. Furthermore, ESG indicators emphasize human rights issues, such as avoiding the use of child labor and forced labor, ensuring that human rights in the supply chain are not violated. By applying ESG indicators, companies can better manage social responsibilities in the supply chain, protecting and promoting the interests of supply chain stakeholders, and fostering social justice and sustainable development.

### 3.3. Governance Aspects

Primary indicators.	Secondary indicators	third-level indicator	Nature indicators
Corporate governance (G)	Board governance	Proportion of independent directors	Positive indicators
	Ownership balance	Percentage of ownership by the second to fifth largest shareholders	Positive indicators
		Percentage of ownership by the largest shareholder	
	Corporate governance outcomes	Dividend payout ratio	Positive indicators
		Return on capital	
		Interest coverage ratio	
	Corporate governance anomalies	Change in ownership ratio	Negative indicators
	External oversight	Annual audit opinion	Positive indicators
Transparency	<u>Shenzhen Stock Exchange</u> rating	Positive indicators	

**Figure 3.** Selection of Corporate Governance Indicators in ESG Evaluation System.

ESG indicators' governance dimension considers internal and external decision-making and control mechanisms of companies. In the supply chain, the application of ESG indicators can facilitate effective corporate governance, transparency, and accountability. By establishing and complying with supply chain norms, and establishing sound risk management mechanisms, companies can better address challenges in the supply chain, improving overall sustainability. The application of ESG indicators in the governance aspect has a positive impact on the sustainability of the supply chain. By applying ESG indicators in the supply chain, companies can enhance corporate governance effectiveness and transparency, improving the overall sustainability of the supply chain. Specifically, ESG indicators require companies to establish sound decision-making and control mechanisms, including clear responsibilities, effective management structures, and transparent information disclosure. Meanwhile, ESG indicators encourage companies to develop and comply with supply chain norms and ethical guidelines to ensure ethical and compliant behaviors in the supply chain. ESG indicators also require companies to establish appropriate risk management mechanisms, including identifying and evaluating risks in the supply chain, and implementing corresponding risk mitigation measures. Through the application of ESG indicators, companies can better manage governance issues in the supply chain, strengthen internal control and risk management, and improve the overall sustainability and stability of the supply chain.

## 4. Impact of ESG Indicators on Economic Growth

### 4.1. Stimulating Innovation

The application of ESG indicators helps companies seek innovative sustainable solutions and promotes the development of innovation. For example, the development of clean energy technologies or the promotion of renewable materials can bring new business opportunities and contribute to economic growth. Stimulating innovation is a crucial factor in promoting sustainable development in

companies and supply chains. Innovation can help companies continually improve products, services, and business processes, enhance efficiency, and reduce costs. It can also contribute to achieving sustainable development goals. Companies can establish a culture and mechanism that encourages employees to propose innovative ideas, such as establishing innovation reward programs or organizing creative competitions, motivating employees to actively engage in innovation activities. Collaboration with supply chain partners, research institutions, or innovative companies, for joint research and technology innovation projects, leveraging resources and knowledge sharing, to promote the generation and application of innovations. Companies can invest in innovation projects, including internal research and development projects and external innovative enterprises, to accelerate the realization and commercialization of innovation achievements. Companies can establish an innovation ecosystem, collaborate with supply chain partners, innovative companies, industry organizations, etc., to explore and apply new technologies, business models, and solutions. Companies can establish innovation platforms and laboratories, providing resources and support for employees and partners to conduct innovation experiments and projects.

By implementing the above methods, companies and supply chains can continuously drive innovation, optimize business processes, develop sustainable products and services, and address market changes and challenges, achieving sustainable development goals.

#### **4.2. Enhancing Competitiveness**

The application of ESG indicators helps companies establish a favorable corporate image, improve brand value, and credibility, thereby enhancing competitiveness. Consumers increasingly prefer products and services that demonstrate environmental and social responsibility. By applying ESG indicators, companies can meet consumer demands and gain a market advantage. Increasing competitiveness is a key goal for companies and supply chains in achieving sustainable development. This can be achieved by providing high-quality products and services, satisfying customer needs and expectations, establishing a good brand reputation and customer loyalty. Optimizing supply chain processes, reducing logistics costs, improving production technologies, and procurement strategies to achieve cost reduction and efficiency improvement. Continuously innovating and developing new products or services to fulfill market demands while actively exploring new markets to expand the business scope of companies and supply chains. Establishing close partnerships with supply chain partners, creating efficient and mutually beneficial supply chain networks, and providing flexible and reliable supply chain services. Enhancing employee capabilities and skills through training and development programs, strengthening teamwork and collaboration, and improving the overall competitiveness of companies. Actively fulfilling corporate social responsibilities, focusing on environmental protection, human rights, and community well-being, to establish a good corporate image and gain recognition and support from consumers, investors, and stakeholders. Through the comprehensive application of the above methods, companies and supply chains can effectively utilize resources, improve economic efficiency, reduce costs, and achieve sustainable development and economic viability.

#### **4.3. Facilitating Resource Efficiency and Economic Benefits**

The application of ESG indicators helps companies optimize resource utilization, reduce waste, improve production efficiency, and enhance economic benefits. By conserving energy and materials, reducing waste and losses, companies can achieve cost reduction and improved efficiency. Promoting resource efficiency and economic benefits contribute to sustainable development and economic viability for companies and supply chains. This can be achieved by adopting efficient equipment and technologies, improving production processes, reducing energy and water consumption, and optimizing energy and water utilization efficiency. Implementing waste and pollutant reduction, recycling, and treatment to minimize environmental pollution and reduce waste management and emissions costs. Optimizing logistics networks, improving warehousing and transportation efficiency, reducing transportation costs and logistics environmental impact, while lowering inventory levels and

improving resource utilization efficiency. Advocating for product reproduction, reuse, and recycling through closed-loop supply chains and circular economy models to extend the product lifecycle, reduce resource consumption and waste. Collaborating with supply chain partners to develop sustainable procurement policies, promoting environmental and social responsibility standards in the procurement process, and enhancing resource utilization efficiency and economic benefits. Conducting cost-benefit analyses of each link in the supply chain, identifying and evaluating wasteful and inefficient processes, and implementing corresponding improvement measures to enhance economic efficiency and resource utilization. Through the comprehensive application of the above methods, companies and supply chains can utilize resources effectively, improve economic benefits, reduce costs, and achieve sustainable development and economic feasibility.

## **5. Impact of ESG Indicators on Policy Making**

### **5.1. Providing Policy Making Basis**

ESG indicators provide an important reference for governments and regulatory agencies to develop policies and regulations related to sustainable development. By assessing the performance of companies based on ESG indicators, governments and regulatory agencies can formulate more effective policies to promote sustainable development. ESG indicators offer data and information on the environmental, social, and governance aspects of companies, industries, and supply chains. Through this information, policymakers gain a comprehensive understanding of the sustainability performance. Such indicators help policymakers understand the environmental management, social responsibility, and governance practices of companies and supply chains, evaluating their contributions to sustainable development goals. Through the analysis of ESG indicators, policymakers can identify problems and challenges, and formulate corresponding policies and measures to address them. For instance, if an industry performs poorly in environmental aspects, policymakers can develop relevant policies to encourage the industry to adopt environmentally-friendly production methods, limit emissions, and reduce resource consumption. Similarly, if a company demonstrates outstanding social responsibility, policymakers can incentivize other companies to learn and emulate such practices through relevant rewards and incentives. ESG indicators also help policymakers evaluate the effectiveness and impacts of policies, monitoring and tracking the progress of sustainable development goals. By continuously collecting data and analyzing indicators, policymakers can assess and adjust the implementation of policies, driving the progress of sustainable development.

### **5.2. Promoting Information Transparency**

The application of ESG indicators can promote information transparency, providing governments and regulatory agencies with more detailed data and information. By monitoring and analyzing this information, governments and regulatory agencies can understand and evaluate the status of supply chains, enabling them to develop more targeted policies. ESG indicators provide data and information on the sustainability performance of companies, industries, and supply chains. Through public disclosure of this information, governments can promote information transparency. Policymakers can develop regulations and requirements that mandate corporate disclosure of ESG data and information, including environmental impacts, social responsibility, and governance practices, among others. This disclosure can be conducted through reports, announcements, websites, etc., allowing stakeholders to understand the sustainability performance of companies and make assessments and comparisons. Public disclosure of ESG data and information enhances market transparency, allowing investors, consumers, and stakeholders to better understand the sustainability performance of companies, making more informed decisions. By publicly disclosing ESG data and information, companies face higher public scrutiny and oversight, as well as market and investor incentives, prompting them to improve and enhance sustainability performance gradually. Publicly disclosing ESG data and information provides a more comprehensive assessment of corporate risks and opportunities, helping investors better understand the sustainability risks and values of companies, thus making more informed

investment decisions. Good information disclosure and transparency enhance corporate trust and reputation, winning recognition and support from consumers, investors, and stakeholders. By promoting information transparency, ESG indicators have an important impact on policy making, helping to drive the achievement of sustainable development goals and creating a positive market environment and social atmosphere.

### **5.3. Guiding Social Responsibility**

The application of ESG indicators helps promote the implementation of corporate social responsibility. Governments and regulatory agencies can encourage companies to fulfill social responsibility in the supply chain according to ESG indicators, contributing to social sustainable development. ESG indicators cover the performance of companies and investment portfolios in environmental, social, and governance aspects. Policymakers can guide companies to assume more social responsibility by implementing policies and regulations that adhere to ESG indicators. Governments can issue regulations, policies, and incentives to encourage companies to actively fulfill social responsibility, participate in public welfare, community development, and other activities. Policymakers can also guide companies to promote social responsibility in the supply chain. For example, governments can require companies to follow sustainable procurement principles in the supply chain to safeguard the labor rights and environmental management of suppliers and avoid using suppliers that engage in illegal labor or harm the environment. Policymakers can develop related policies and standards to ensure that companies take on social responsibility under ESG indicators, guiding companies towards more sustainable development. By promoting corporate participation in social responsibility activities, policymakers emphasize the significance of social responsibility to sustainable development, inspiring more companies to engage in social responsibility initiatives. Through policy guidance, companies are more likely to invest in social activities, allocate resources to address social issues, and enhance social welfare. By emphasizing corporate social responsibility, policymakers can encourage closer collaborations between companies and stakeholders, enhancing social benefits. In summary, ESG indicators, through policy making, play a significant role in guiding social responsibility. They emphasize the importance of social responsibility to companies, encouraging them to assume greater social responsibility, promoting sustainable development.

In conclusion, ESG indicators have a positive comprehensive impact on supply chain sustainability, economic growth, and policy making. They drive companies to adopt more environmentally friendly, socially responsible, and transparent business practices, enhancing the overall sustainability of supply chains. ESG indicators stimulate innovation and increase corporate competitiveness, while promoting the efficient use of resources and improved economic efficiency. Additionally, they serve as a reference for policymakers, facilitating the development of policies and regulations related to sustainable development. By implementing ESG indicators, companies and supply chains can achieve higher levels of sustainability, economic growth, and contribute to the overall well-being of society.

## **6. Conclusion**

ESG indicators assess the sustainability and responsibility performance of companies through the evaluation of environmental, social, and governance factors, which have a wide-ranging impact on the supply chain. In terms of supply chain sustainability, ESG indicators require companies to manage their environmental impact, including reducing carbon emissions, conserving energy, and promoting the circular economy. This helps improve the environmental performance of the supply chain, reduce ecological risks, and enhance the competitiveness of sustainable business development. Additionally, ESG indicators encourage companies to establish partnerships with suppliers to collectively improve the environmental sustainability of the supply chain. In terms of economic growth, ESG indicators assess the sustainability and social responsibility performance of companies, helping investors identify and select investment opportunities that align with ESG goals. More and more investors are incorporating ESG considerations into their investment decisions, encouraging companies to achieve

long-term economic growth and financial stability through sustainable development. In terms of policy-making, the application of ESG indicators can provide important references and data foundations for governments and regulatory agencies. The assessment results of ESG indicators can help governments formulate relevant environmental and social policies to promote improvements in corporate sustainability. Furthermore, the application of ESG indicators also urges governments to place more emphasis on factors such as environmental protection, social justice, and good governance during the policy-making process, driving society towards a more sustainable direction. In summary, ESG indicators have comprehensive impacts on the sustainability of the supply chain, economic growth, and policy-making. Strengthening the management of ESG factors in companies, promoting higher environmental sustainability and social responsibility performance in the supply chain, can contribute to long-term economic growth and sustainable development. Moreover, the application of ESG indicators can provide important references for policymakers, facilitating improvements in the policy environment and promoting the realization of sustainable development.

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