

Research on Promoting Corporate Green Transformation and Upgrading Through Supply Chain Transmission Mechanisms

Hexuan Wang^{1,a,*}

*¹Institute of Management Science and Engineering, Central University of Finance and Economics,
Beijing, 102206, China*

a. 18131899185@163.com

**corresponding author*

Abstract: Investors have widely embraced the development of investment themes that balance environmental protection, social responsibility, and corporate governance, as the concept of ESG (Environmental, Social, and Governance) continues to gain momentum in global investment fields. Therefore, how to strengthen the concept of sustainable development, promote internal green innovation, and incentivize companies to voluntarily undergo green transformation has become a critical issue of our time. Based on the research methods and conclusions of relevant literature, supplemented by case studies and discussions, this paper explores the detailed factors that drive the transformation and upgrading of ESG practices, while confirming the reliability of the supply chain transmission mechanism for ESG. The findings provide concrete and reliable policy guidance to promote green transformation in various industries, implement the concept of green development, and vigorously develop green and low-carbon economies. The research concludes that the supply chain plays a significant role in transmitting ESG benefits, primarily reflected in the downstream enterprises' influence on upstream enterprises.

Keywords: ESG Concept, Green Transformation, Supply Chain Transmission, Carbon Reduction

1. Introduction

Corporate green transformation and upgrading is a call of the times. Integrating the ESG (Environmental, Social, and Governance) concept into corporate operations and management is of great significance for companies to adapt to the demands of the times and the market, especially for large-scale companies. These companies need to align with the development of the times, continuously innovate in ESG practices, and undergo technological reforms to maintain core competitiveness, aiming for long-term sustainable development in the market[1]. In ESG practices, companies continuously optimize the effective use of resources, improve production capacity through better resource allocation, and impact economic benefits[2]. Companies with outstanding ESG performance tend to create a positive social image, attracting more responsible and creative talents while also increasing trust and cooperation efficiency among employees, improving the utilization of internal and external resources, and thereby promoting green technological innovation within the

company[3]. ESG investors are not only seeking financial performance but also hope to satisfy other preferences, such as reducing social issues and increasing stakeholder benefits[4].

Current research mostly focuses on the results and significance of ESG-driven green transformation, emphasizing the importance of companies internally adjusting their strategies. However, there is limited literature that concentrates on the externalities of green innovation development. The existence of industrial and supply chains provides a transmission mechanism for externalities between upstream and downstream companies. In traditional supply chain management, companies focus mainly on factors like cost, quality, and delivery time[5]. However, companies that integrate new concepts will drive the transformation and upgrading of the supply chain.

This paper first introduces the necessity of ESG investment and the advantages of corporate green transformation and upgrading. It then discusses how the supply chain transmission mechanism conveys the externalities of the ESG concept, leading to the characteristics and benefits of the supply chain transmission mechanism. The paper expands on this by summarizing other literature, and ultimately arrives at conclusions that encourage mutual influence between companies. The main contributions of this paper are: Firstly, it enhances the understanding of the impact of ESG on corporate green innovation and transformation. Secondly, it reveals the specific pathways of ESG-driven green transformation through case studies. Thirdly, it deepens the understanding of the supply chain transmission mechanism and its role in transmitting the externalities of green innovation transformation. As it transmits ESG performance, it also highlights the asymmetry inherent in the transmission mechanism.

2. Literature Review

2.1. ESG Concept and Green Spillover in Enterprises

ESG, as an important concept in the field of sustainable investment, has gradually expanded into the scope of corporate sustainable development, viewing corporate sustainability from the perspective of the external sustainability of investment targets. The ESG concept represents a non-financial sustainability evaluation system that assesses a company's overall performance in environmental, social, and governance aspects[6]. It reflects the link between the company and its stakeholders, as well as the "operability" of the company's approach to achieving sustainable development. Unlike traditional corporate financial goals that focus on maximizing economic profits, ESG emphasizes the need to fulfill social responsibilities, playing a crucial role in finding a balance between social governance, green development, and profit maximization. However, the ESG concept not only constrains a company's profit-generating capacity but also has a certain feedback effect. Companies that firmly practice ESG principles can establish a positive corporate social image, thereby generating brand effects, gaining support from downstream customers, and capturing a larger market share. Individual investors, as the most important and numerous participants in the investment market, make decisions based on subjective and external factors. As the concept of green development becomes increasingly prominent, a company's ESG performance can attract more individual investors. ESG ratings are the primary way for capital market participants to understand a company's ESG performance. They provide incremental information about a company's environmental, social, and governance performance, reflecting the company's value and sustainability potential, and are significant for individual investors' decision-making[7]. Conversely, ESG ratings also play a crucial role in improving a company's own ESG performance, enhancing management efficiency, and promoting Chinese-style modernization[8]. Individual investors can select companies with better ESG performance based on ESG ratings, which is a feedback effect.

The ESG concept also generates green spillover effects. When a company implements green innovation, environmental protection technologies, or sustainable practices, its positive impact is not

limited to the company itself, but spreads to surrounding enterprises or organizations, creating positive externalities. These externalities can spread within the industry chain or across industries, influencing the green performance and innovation capabilities of other companies. Specific ways in which these effects occur include experience sharing, customer demands, or market signals.

2.2. Supply Chain Transmission

The commonly used definition of a supply chain in academic literature is a network organization involving three or more entities (organizations or individuals), which connects upstream and downstream through the flow of products and services to ultimately deliver them to the market [9]. This includes the entire process and network of raw material procurement, production and processing, distribution, and final delivery to consumers. Multiple links and participants, interconnected and interdependent, form a complete value chain in the supply chain. Currently, there is a trend of digital transformation within supply chains. It is precisely due to the close connection within industrial supply chains that there are opportunities for ESG green spillover effects. Improvements in the ESG performance of customer companies can drive green innovation in the supply chain. The ESG advantages of downstream customer companies can promote green innovation activities in midstream companies. Downstream customers can enhance green awareness, strengthen commercial credit support, and provide green technology spillovers, all of which can promote green innovation in midstream companies[10].

2.3. The Impact and Pathways of Corporate ESG Green Innovation

In the era of ESG prominence, companies face significant challenges and opportunities to achieve green transformation and upgrading. This is a vital way for companies to enhance their competitiveness and long-term value and is necessary in the current context. First, governments worldwide have introduced green and environmental policies, which impose legal risks and economic losses on non-compliant companies. Second, investor demand is increasingly focused on environmental performance, which is a key factor in determining the quality of corporate investments. Furthermore, consumer demand is shifting towards green products and services, serving as an indicator for corporate transformation, and providing a crucial opportunity to improve brand image and capture market share. Finally, green transformation and upgrading can enhance the efficiency of internal production resource utilization, effectively reducing costs and increasing profits. This not only requires companies to actively take measures in environmental protection but also emphasizes positive social responsibility and sound governance structures.

Companies introduce environmentally friendly new technologies, products, and management models into their products, services, and processes to reduce environmental impact and improve resource utilization efficiency. Green innovation helps companies cope with environmental regulations and changing consumer demands, bringing multiple impacts and value. First, it has a direct environmental impact, improving resource utilization, reducing greenhouse gas emissions and other harmful emissions, and effectively promoting sustainable development. Building a strong corporate image enhances market competitiveness and customer acceptance, while the development of green technologies and products creates new commercial opportunities. Finally, companies can receive support from social policies, such as tax reductions and other policy benefits, based on their achievements in ESG green innovation.

Relatively speaking, companies can achieve energy conservation and emission reduction through technology research and development, product design, and production process optimization, thus reducing consumption and stimulating transformation. Internally, they can foster a culture that

encourages green innovation, while externally, they will be influenced by the externalities of the industry chain, further promoting transformation and upgrading.

3. Case Analysis

3.1. Boehringer Ingelheim – A Global Leading Pharmaceutical Company

Boehringer Ingelheim, a leading enterprise in the fields of pharmaceuticals, animal health, and biopharmaceutical production, has a significant global influence. The company has committed to achieving carbon neutrality in its global operations by 2030. As of now, the company has made notable progress in the green transformation across its R&D, procurement, production, logistics, and recycling sectors. Despite declining drug procurement prices and a less favorable market, Boehringer Ingelheim has maintained strong competitiveness by reducing costs.

The company uses a biocatalysis platform to reduce the use of organic solvents, which has led to technological improvements in its R&D and synthesis processes. In the procurement process, Boehringer Ingelheim has reduced the weight of drug packaging, reused transportation cartons, minimized resource waste, and improved transportation efficiency. The company also selects upstream suppliers based on their ESG performance and purchases green electricity from solar power plants, achieving external ESG transformation effects. Furthermore, it is gradually phasing out refrigerants with high global warming potential and focusing on green production capacity.

For its international operations, the company reuses imported wooden pallets that have been fumigated, and has implemented an incentive mechanism to promote the integration of internal green transformation concepts, reducing fuel costs during transportation. In the recycling stage, the company has adopted a circular economy approach, ensuring that 99% of waste in its factories does not go to landfill.

These transformation measures at various stages have saved resources and costs, improved resource efficiency, and significantly reduced waste and energy consumption. Through the transformation of its green supply chain, Boehringer Ingelheim has reduced operational costs, enhanced market competitiveness, and increased social influence, making it a successful example of green supply chain transformation.

3.2. Autoliv – A Global Leading Automotive Safety System Supplier

Autoliv, a leading supplier of automotive safety systems, focuses on addressing common pain points in global society. In 2022, the company committed to achieving carbon neutrality in its operations by 2030 and net-zero emissions across its entire supply chain by 2040. This requires a thorough study and transformation of its supply chain transmission mechanisms.

Currently, Autoliv has integrated sustainability into its corporate strategy and performance assessments. The company has independently developed low-carbon driver-side units and low-carbon emission seatbelt products, as well as airbag fabric materials made from low-carbon PET materials, reducing greenhouse gas emissions while achieving product lightening.

In procurement, Autoliv has established a sustainable purchasing strategy, replacing high-carbon materials with low-carbon raw materials, promoting the use of renewable electricity in its supply chain, and emphasizing the role of the supply chain in reducing product carbon footprints. The company also requires suppliers to recycle and reuse production waste.

During production, Autoliv is gradually phasing out the use of fossil fuels, advancing low-carbon circular projects, and pushing forward with "electrification" processes. The company has made decisions related to smart logistics transformation, applying systematic carbon emission management, optimizing space utilization in transportation, reducing manual operations, and recycling energy

savings through technological advancements. It also integrates packaging material recycling, consolidating saved resources for reinvestment in production.

Under the current conditions, Autoliv has decisively taken steps toward transformation, placing an emphasis on enhancing the role of supply chain transmission and leveraging the externalities of ESG effects. By 2023, two of its factories in China have fully adopted green electricity, four factories have installed rooftop photovoltaics, and the company has extended its efforts to upstream suppliers, increasing their use of renewable electricity and reducing waste from raw materials and intermediate products.

In summary, Autoliv continues to refine its energy-saving and emission-reduction strategies, is committed to the design and production of green products, and fully utilizes the low-carbon concepts within its supply chain. It serves as a model for low-carbon logistics and green transformation, contributing significantly to sustainable upgrades.

4. Mechanism Summary

Based on the case analyses above and other industry and corporate transformation examples, some key mechanisms can be summarized. Companies have an inherent motivation for ESG investment, which is more complex than the motivation for traditional investments. Most scholars believe that investors choose ESG investments primarily to achieve investment performance, which is the most common motivation, followed by non-financial motivations, such as ethical considerations. Studies show that the performance of ESG investments is not lower than that of traditional investment portfolios. This is the initial intention behind corporate green innovation transformations. Therefore, a company's ESG performance can radiate through the supply chain to other enterprises with direct business connections. Specifically, the impact mechanism mainly reflects and is transmitted through the product requirements of downstream enterprises (demand side) to upstream enterprises (supply side). This is because upstream enterprises provide raw materials, equipment, and tools to downstream enterprises for production. Hence, the level of environmental investment by suppliers can directly or indirectly affect the production process and the final product's greening of demand-side companies. As a result, downstream enterprises have sufficient motivation to require suppliers to improve the greening level of their production processes and products[11]. On the other hand, the influence of upstream enterprises on downstream enterprises is not as pronounced, which also proves the asymmetry of supply chain transmission[12]. According to PwC's survey on the ESG maturity of Chinese supply chains, 5% of companies have taken the lead in transformation as pioneers, and through the influence of the supply chain, have affected the decision-making of 35% of followers. These followers have carried out detailed transformation route designs for certain supply chain segments and investigated ESG-related risks with suppliers, thus forcing 40% of competitor companies to undergo comprehensive transformation and upgrades. Eventually, 20% of the leading companies in the market have emerged, driving ESG performance.

5. Conclusion

A company's ESG (Environmental, Social, and Governance) performance is not only a crucial indicator of its own sustainable development but also has the potential to influence its partners and the overall industry through the radiating effects of the supply chain. Implementing green supply chain strategies can successfully reduce resource consumption and waste emissions while maintaining market competitiveness, demonstrating the positive externalities of ESG performance. By innovating low-carbon products and adopting sustainable procurement strategies, companies can drive the entire supply chain toward a low-carbon economy, showcasing the leadership role of ESG performance within the industry.

The asymmetry of the supply chain is an important characteristic of corporate ESG transformation. Downstream companies (demand side) play a key role in setting product requirements for upstream companies (supply side), while upstream companies have relatively weaker influence over downstream enterprises. This characteristic underscores the importance for companies, when formulating ESG policies, to pay attention to the interactive relationships between upstream and downstream players and to promote overall green transformation across the supply chain through incentive mechanisms.

In addition, through proactive supply chain management and innovative practices, companies can not only achieve their own carbon neutrality goals but also establish a strong brand image in the market, enhancing their social impact. Cooperation and competition among companies drive the improvement of ESG performance, creating a positive feedback loop. The successful transformation of pioneers can motivate followers, thus generating broader influence within the industry and ultimately driving sustainable development throughout the market.

Therefore, when undergoing green transformation, companies should fully leverage the synergistic effects of the supply chain, actively communicate with partners, and promote the joint development of both upstream and downstream players. This will enable a win-win situation in terms of economic benefits and social responsibility. At the same time, companies should develop scientifically sound transformation strategies and incentive mechanisms to cope with the ever-changing market environment and increasingly stringent environmental regulations, ensuring that they maintain competitiveness and sustainability in future development.

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