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Impact of ESG on Supply Chain Management -- Based on International Trade

Zhixu Liu[1,*]

[1]Southwestern University of Finance and Economics, Chengdu, Sichuan, 611130, China

*Corresponding author. Email: 3480358388@qq.com

ABSTRACT. ESG is an investment concept and corporate evaluation standard that measures the environmental, social, and governance benefits of a company from three factors: environment (E), social (S), and governance (G). Under the trend of global sustainable development, ESG has become an important dimension for investors' investment decisions and has a profound impact on the international economy and trade. Therefore, after extensive data and information collection, the impact of ESG is summarized and analyzed from the perspective of the supply chain, and recommendations for ESG administration are made from the perspective of supply chain risk and security.

Keywords: ESG, sustainable development, supply chain management

1 Introduction

In 2004, former UN Secretary General Kofi Annan first proposed the ESG concept, and the ESG evaluation system derived from it became a concrete projection of the sustainable development concept in business circles, making the efforts of corporate sustainable development traceable. The ESG concept promotes the transformation and upgrading of enterprises and pushes industries around the world to develop in the direction of green, recyclable and sustainable, which has a significant impact on the global economy and trade. Nowadays, the development of economic globalization has spread corporate supply chains all over the world, but with the collapse of the China-US community and the Russian-European community, the original supply

P. Dou and K. Zhang (eds.), *Proceedings of the 2023 International Conference on Economic Management, Financial Innovation and Public Service (EMFIPS 2023)*, Advances in Economics, Business and Management Research 287,
https://doi.org/10.2991/978-94-6463-441-9_70

chains have been impacted and their vulnerability has increased, among which supply chain risk and supply chain security have become widely concerning topics. Analysis from these two perspectives can provide feasible suggestions for improving global supply chains and maintaining smooth international trade.

In this article, the historical background of the development of the ESG concept is first introduced, and then the similarities and differences between Chinese and international ESG evaluation systems are compared. In analyzing the impact of ESG on international economic and trade development, in addition to summarizing its impact on commercial banks and multinational enterprises, two cases of LEGO and Facebook are cited, and suggestions are made from the perspective of the supply chain in both risk management and security management.

2 Overview of ESG's Development

ESG includes three major factors: environment (E), social (S), and governance (G), which are a series of investment concepts and corporate evaluation standards that measure the environmental, social, and governance performance of a company rather than its financial performance.

Ethical investment arose in biblical times. The earliest recorded case of ethical investment was born in the 18th century when Quaker Puritans emigrated from Europe to the Americas, disgusted with the old and corrupt European customs that restricted members from investing their time and money in areas such as the slave trade, gambling, and munitions.

In the 20th century, due to industrial disasters, nuclear power plant leaks, tanker oil spills, and growing environmental concerns, ethical investors emphasized the promotion of business equality, worker equality, and racial and gender equality, which resulted in socially responsible investment (SRI) that balances profit and sustainability. In 1987, the United Nations defined "sustainable development", and stated that SRI is aimed at pursuing investment benefits and integrating environment, social, and governance into the decision-making process.

In the 21st century, economic globalization has brought about the rapid development of global trade, and shareholder primacy theory has also brought about many problems. Enron, once one of the world's largest energy, commodity and services companies, collapsed in financial fraud, and Enron Europe filed for bankruptcy on November 30, 2001, which resulted in heavy losses for investors, caused shockwaves through the U.S. and global stock markets, and made "corporate governance" a new dimension of investment.

The "stakeholder" theory was born in the 1960s, and the term "stakeholder" can be traced back to Freeman's Strategic Management: A Stakeholder Approach published in 1984. In contrast to the traditional shareholder primacy theory, the "stakeholder" theory believes that the development of a company cannot be achieved without the input and participation of its stakeholders [1]. In the 21st century, the "stakeholder" theory has gained a wider social basis, and the ESG concept was first introduced by UN Secretary General Kofi Annan in 2004. 20 financial institutions in 9 countries are involved in researching how to integrate environment (E), social (S), and governance (G) with corporate asset management, securities services, and related economic activities. In 2005, the Who Cares Wins report was created to examine how the three elements of ESG can be brought into play to facilitate the construction of a stronger and more flexible investment market.

In the decade since then, ESG has achieved rapid development. The 2020 Sustainable Development Report published by KPMG shows that 80% of the top 100 companies in the selected 52 countries have published sustainable development reports [2]. In October 2015, the U.S. Department of Labor formally canceled the previous policy that inhibited pension ESG investment for social responsibility reasons and declared that "ESG factors are reasonable for trustees to consider in making investment decisions" [3].

3 Comparison of ESG Evaluation Systems

3.1 ESG Evaluation Systems

Many domestic and foreign investment institutions use ESG as an important basis for investment decisions, and major global exchanges continue to promote the degree of ESG disclosure of listed companies. A report released by Morgan Stanley shows that the excess returns of the ESG indicators of MSCI emerging markets in recent years mainly come from the application of the ESG concept, which indicates that the application of the ESG concept can bring better social and economic benefits [4].

Compared with Western countries, China has low social awareness and market influence of existing ESG rating studies and low correlation of different evaluation systems due to the late start of ESG system development [5].

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3.1.1 Foreign ESG Evaluation Systems.

Table 1. Comparison of Foreign ESG Evaluation Systems

Indicator	KLD	MSCI	Sustainalytics	Thomson Reuters	FTSE Russell	S&P Dow Jones Indices	Vigeo Eiris
Whether to consider product safety	√	√		√			√
Whether to consider financial indicators		√	√	√		√	√
Whether to consider controversial events	√	√	√	√			√
Whether to exclude sensitive industries	√	√			√		
Whether to standardize the rating		√			√	√	
Whether to consider the company's initiative to expose problems	√				√		
Whether to communicate with companies		√	√		√		
Whether to use scoring method	√	√	√	√		√	√

Whether to consider the risks and opportunities of ESG	√	√	√	√

Note: The table is from the *Current Status, Comparison, and Outlook of Domestic and Foreign ESG Ratings* published by Wang Kai and Zhang Zhiwei in 2022

"√" indicates that this indicator is considered in this evaluation system. Table 2 is the same.

Foreign ESG rating agencies include non-profit organizations such as international rating companies and environmental organizations. The European Environment Agency has conducted a survey of representative sustainability rating agencies in Europe and the United States and found that these rating agencies mainly use MSCI, S&P Dow Jones, and other internationally influential stock indices as reference standards.

According to Table 1, MSCI, KLD, and FTSE Russell have better rating indicators, but most rating agencies do not include "whether to consider the company's initiative to expose problems" in their rating indicators. Take Samsung as an example, in 2016, the Samsung note7 frequently exploded, and Samsung recalled note7 around the world but refused to recall the phones in China, which is unacceptable to Chinese consumers. Affected by this incident, Samsung's market share in China dropped from 20% to 1%. In 2019, Samsung closed its last factory in China. Therefore, considering whether a company is brave enough to expose problems voluntarily is beneficial to examine corporate social responsibility and reduce information asymmetry in the market, and various rating agencies should consider it as an important ESG rating standard.

The Morgan Stanley Sustainable Investment Study found that reviewing the performance of 10,228 public funds from 2008 to 2014, sustainable investment funds returned more than traditional funds. In addition to this, Oxford University found that 90% of over 200 studies on sustainable investment showed that sustainable standards reduced a company's cost of capital and 88% showed that ESG practices improve company business performance [6]. The Benchmark Report 2018 published by the Responsible Investment Association of Australia (RIAA) found that 44% of Australia's professionally managed assets are currently managed through socially responsible investment (SRI) practices. Of the total FUM managed by SRI funds, more than A$681 billion is being managed through systematically integrated ESG investment practices [7].

3.1.2 Domestic ESG Evaluation Systems.

Table 2. Comparison of Domestic ESG Evaluation Systems

Indicator	SynTao Green Finance	CASVI	Harvest Fund	IIGF	SSI	RKS	Asset Management Association of China
Whether to consider product safety	√		√			√	√
Whether to consider financial indicators	√	√	√	√	√		√
Whether to consider controversial events		√	√				
Whether to exclude sensitive industries		√					
Whether to consider the company's initiative to expose problems							√
Whether to use scoring method	√		√			√	

Whether to consider the risks and opportunities of ESG	√	√	√	√

Compared with foreign countries, the ESG concept in China has developed only after the "360 carbon peaking and carbon neutrality" goals were proposed, and the social awareness and market influence of the ESG rating system is limited. Most markets lack a basic understanding of ESG, companies lack uniform standards in the process of ESG information disclosure, and the quality of information disclosure is poor, resulting in limited data sources for ESG evaluation systems.

As of June 2022, there are about 20 ESG rating agencies in China, represented by China Securities Index Co., Ltd. (SSII), SynTao Green Finance (STGF), and China Alliance of Social Value Investment. The ESG ratings of different agencies differ to some extent in terms of coverage, rating methods, and rating indicators, which may affect the comparison and selection of investors and enterprises.

Organizations that carry out ESG-related ratings and publish reports in China are mainly consulting firms and universities. Some rating agencies cover multiple aspects, but most of them only focus on a certain aspect of ESG, and the rating targets are mostly listed companies with better information disclosure. The representative ESG rating system in China is the Rankins CSR Ratings, which includes four aspects: E (economic), S (social), N (natural), and G (governance), with 15 primary indicators and 56 secondary indicators.

3.2 Comparison of Domestic and Foreign EGS Evaluation Systems

Table 3. Comparison of foreign ESG evaluation systems

Rating Agency	Release Time	Data Source	Indicator System	Rating Method	Number of Enterprises

Bloomberg	2018	Public information of listed companies Regulatory department News and public opinions NGO	3 dimensions 300 data points	1-100 points	1000
FTSE	2018	Public information of listed companies Regulatory department	3 dimensions 14second-level indicators 300 or more data points	1-5 points	730
MSCI	2018	News and public opinions NGO Public information of listed companies Regulatory department	3 dimensions 10second-level indicators 37second-level indicators	1-100 points	478
SSII(China)	2018	News and public opinions NGO Enterprises channel Public informatio	3 dimensions 14second-level indicators 26third-level indicators	From C to AAA	4167

		n of listed companies Regulatory department			
STGF(China)	2018	News and public opinions Public information of listed companies Regulatory department	3 dimensions 13second-level indicators More than 200 data points	From D to A+	755
CASVI(China)	2019	News and public opinions Agency services Pubic information of listed companies	3 dimensions 9second-level indicators 27third-level indicators 55fourth-level indicators	From D to A+ From B- to AA+	478

Note: This table is from Evaluation of ESG Ratings for Chinese Listed Companies From the Perspective of Stock Price Crash Risk published by Sicheng Li in 2022

According to Table 3, in terms of release time, SSII and Bloomberg's data can be traced back to 2009 and 2011 respectively, and STGF released China's first ESG database evaluation system for A-share listed companies in 2018, followed by SSII and CASVI.

In terms of data acquisition, the data of domestic and international ESG rating agencies mainly come from the official websites of listed companies, announcements, regulatory authorities, non-profit international organizations, and news, among which CASVI also has proxy service channels, and SSII carried out data processing by combining web crawlers and semantic analysis naming with entity identification [8].

In terms of evaluation indicators, both domestic and international ESG evaluation system indicators include three dimensions: environment, social, and governance, in addition to CASVI, which adds economic efficiency indicators, STGF and MSCI pay extra attention to anti-corruption indicators. In order to adapt to the Chinese context, the SSII evaluation system also adds indicators such as China Securities Regulatory Commission penalties and targeted poverty alleviation.

In terms of rating methods, domestic and international agencies use either "rating" or "scoring" methods. Among the agencies using the "scoring" method, Bloomberg and MSCI set their scores in the range of 1-100, and FTSE sets its scores in the range of 1-5; among the agencies using the "rating" method, they classify companies into 7-10 grades. CASVI also sets enhanced grades from B- to AA+.

In terms of company coverage, CASVI has the broadest coverage, covering almost all A-share listed companies. Foreign rating agencies' reference data covers the world, with Bloomberg's ESG ratings covering most Chinese companies and FTSE and MSCI less.

4 Impact of ESG on International Economy and Trade

4.1 Impact of ESG on Commercial Banks and Multinational Companies after Its Creation

Economists such as Wajahat Azmi found that there is a positive relationship between ESG activities and bank cash flow and efficiency, besides, ESG activities can provide policymakers of commercial banks with reference in emerging markets [9]. Influenced by the ESG concept, the World Bank attaches great importance to environmental protection and supports environmental protection actions in developing countries by conducting rigorous environmental assessments of loan projects that may cause environmental impacts. The World Bank also directly makes project investments targeting poverty alleviation, which are mainly used for agricultural and rural development, basic education, and health care in poor areas.

In addition, Song Kim and other economists processed data from 4,708 firms from 1991 to 2013 and found that ESG factors have a positive effect on corporate earnings [10]. Based on Derwall, Guenster, Bauer, and Koedijk's finding that more environmentally efficient portfolios lead to higher investment returns, numerous researchers have demonstrated a stable positive relationship between ESG factors and corporate financial performance. Higher corporate social responsibility (CSR) reduces corporate systemic risk and enhances corporate value, so corporate governance (G) is the most significant ESG factor affecting corporate value. If the social effect of a company is better, its credit rating is higher and the risk of corporate default is lower. For larger multinational companies, the impact of the ESG factor is more significant.

4.2 ESG Concept in International Economy and Trade

4.2.1 LEGO's Environmental Philosophy and Its Impact

As a world-renowned toy manufacturer, LEGO is committed not only to helping children develop through creative toys, but also to fostering a sustainable, green, and healthy planet.

In 2013 and 2014, LEGO reduced the size of the cartons for packaging by 14%, saving about 7,000 tons of cardboard. In 2018, LEGO introduced plant-based polyethylene blocks to replace the petroleum-based plastics used in the past. In April 2022, the LEGO baseline will replace disposable plastic packaging with paper bags and gradually complete the new packaging debut in major markets around the world.

The CRSHUB report shows that LEGO's ESG assessment score is 68, which stands out from 30,984 companies in its industry. Since 2013, LEGO has submitted annual disclosures to the CDP, a non-profit environmental disclosure platform, and has been awarded the highest grade of "A" by the CDP for several of its climate change disclosures.

With suppliers outside of the LEGO Group's own operations generating 90% of LEGO's total carbon emissions, LEGO said that the company should not limit itself to its own sustainability, but also focus on the sustainable strategies and initiatives of its partners such as suppliers. LEGO's greenhouse gas emissions target is to reduce carbon emissions by 37% in 2032 compared to 2019, a target that applies across LEGO's own operations and supply chain.

Hasbro and Mattel are LEGO's competitors. Influenced by industry benchmark LEGO, Hasbro plans to reduce waste to landfill by 50%, greenhouse gas emissions by 20%, water use by 15%, and eliminate plastic packaging from new products by 2022. Mattel expects to achieve a zero-waste goal in manufacturing by 2030, a 30% reduction in absolute greenhouse gas emissions in the carbon emissions range 1+2, a 25% reduction in plastic packaging, and 100% use of recycled and recyclable bio-based plastic packaging.

4.2.2 Facebook's User Information Leakage and Its Impact

In 2013, Aleksander Kogan, a scholar from the University of Cambridge, was allowed by Facebook to connect the psychometric app he developed through Facebook's platform to access user data with the promise that it would be used for academic purposes only, and that the data of about 50 million users were captured. However, Kogan reneged on his promise and sold the captured data to Cambridge-Analytica, a commercial analytics company.

Facebook's ESG scores for each category were 82 for the environment (E), 22 for social (S), and 6 for governance (G). While Facebook scored 82 on environmental protection, which is not unusual for technology companies, Standard & Poor's gives more weight to social and governance in its ESG evaluation of Internet companies like Facebook. A series of crisis events prevented Facebook's ESG score from placing it in the top 75% of the Media & Entertainment sector, and the Standard & Poor's 500 ESG index removed Facebook on April 30, 2019.

The Facebook incident shows that the power boundaries of technology and the social responsibility of Internet companies are particularly important today when the Internet is highly developed.

Apple's CEO publicly criticized Facebook at the European Computers, Privacy, and Data Protection Conference in early 2021. At the Ignite Conference, Microsoft also emphasized the importance of security. According to the financial report, Microsoft's overall security revenue exceeded $10 billion in 2020, up 40% year-over-year, accounting for about 7% of the company's total revenue in the previous year. In August 2021, Google announced a $10 billion investment over the next five years to strengthen cybersecurity, including "zero trust" security technology, software supply chain security, and open source security.

5 Recommendations for Supply Chain ESG Governance

With regard to thinking about global ESG governance from the perspective of the supply chain, there are three main reasons: First, carbon emissions from supply chains account for a large share of industrial production processes. In 2008, the global supply chain network associated with transportation equipment and construction demand in the United States contained a large cluster of Chinese CO2 emissions, accounting for 17% and 10% of U.S. CO2 emissions respectively [11]. Second, with economic globalization, Western companies design and manage in their own countries, outsourcing procurement, production, and transportation logistics abroad, where key links, including bulk commodity transportation and factory production, are under the control of China and Russia, which are in conflict with the Western. This uncertainty has exacerbated the implosion of the global supply chain. Finally, digital transformation is increasingly advancing, the software is penetrating into daily life and all industries, full-link security protection is becoming increasingly difficult, the software supply chain is becoming more complex, and security incidents are frequent, thus posing a threat to user privacy and property security.

5.1 Supply Chain Risk Management

Jörn-Henrik Thum's research on the automotive industry shows that supply chain risk management has the potential to improve supply chains in the automotive industry, and those companies that have a low level of implementation of supply chain risk management instruments have a lower average in terms of responsive improvement and flexibility [12]. In 2017, German automotive parts supplier Schaeffler Group suffered a supply chain crisis in China when one of its suppliers' Chinese factories was shut down by the local government for violating environmental regulations. In response to this incident, Schaeffler stated that it would take at least three months to find a new supplier, which resulted in an expected parts supply shortfall of more than 1,500 tons and a shortage that directly affected 49 downstream automakers, preventing 3 million vehicles from leaving the production line as scheduled and causing an estimated economic loss of $43 billion.

The above cases demonstrate the lack of transparency in supply chains. A research by Christopher S. Tang et al. shows that supply chain visibility and transparency can enable companies to reduce supply chain risk and improve supply chain efficiency. By making their supply chains transparent to the public, companies can recruit consumers, non-governmental organizations, and even the suppliers' own employees to expose the unethical activities of their suppliers [13].

To improve supply chain visibility, companies are required to accurately identify ESG-related issues and collect data throughout the supply chain. For disclosure, companies should communicate with internal and external stakeholders about the level and hierarchy of their disclosures. More specifically, companies should start with materiality assessment, which is an evaluation of the interests of internal and external stakeholders. It will not only help companies understand product logistics trends and the number of suppliers, but also the operational processes of each link in the supply chain.

5.2 Supply Chain Information Security Management

Resilience 360 reports that nearly 300 cybersecurity incidents affected supply chain entities in 2019. With one company sharing data with more than 500 third parties on average, Ponemon Institute data shows that about 61% of U.S. companies have experienced data leakage in their supply chains [14].

In 2013, retail giant Target experienced the leakage of hundreds of millions of users' information due to a third-party HVAC provider, with an estimated cost of $292 million. In 2014, Home Depot, the largest U.S. retailer of home decor and building materials, experienced a data leakage due to a hacker using a third-party provider's network to invade the network and implant a malicious program, with an estimated cost of $198 million. In July 2017, more than 14 million Verizon subscribers' personal data was compromised due to improperly configured security on third-party vendor NICE Systems cloud servers.

The individual security components or elements of a supply chain information security system can only ensure that the overall security control objectives are met when they are integrated and collaborated as a whole. If a company evaluates the security and privacy policies of all suppliers, the likelihood of leakage can be reduced from 66% to 46%. This requires coverage of all vendors, although some of them may already have detailed cybersecurity defenses. However, small vendor organizations do not have the same level of cybersecurity controls, or even a security leader and basic security awareness.

6 Conclusions

Large enterprises that attach importance to ESG governance and sustainable development can bring positive benefits to the market and promote the same type of enterprises to actively explore ESG governance to catch up with the market trend, and even drive the circular development of the supply chain and promote the transformation and upgrading of the supply chain. For example, LEGO's circular development has driven Hasbro, Mattel, and other types of enterprises to establish sustainable development goals; the software supply chain security accident represented by Facebook's leakage of user information has alerted a series of Internet companies, including Google and Microsoft, and the issue of user information security and trust has attracted their attention. With the previous experience of Facebook, Internet companies will be more cautious in protecting users' privacy.

The continued development of economic globalization has exacerbated the vulnerability of supply chains, which subsequently brings huge risks and security issues. Thinking from the perspective of ESG governance, increasing supply chain transparency, establishing a supply chain rating system, and maintaining software supply chain information security can reduce the risk of implosion within the global supply chain while promoting sustainable development.

References

1. Peng Zhenming, Jiang Hua. On the Theory of Stakeholders and the Improvement of Corporate Governance Structure of Our Country [J]. Journal of Gansu University of Political Science and Law,2007(1):45-50.
2. Huang Shizhong. ESG concept and company reports refactoring [J]. Journal of accounting monthly, 2021, No. 909 (17) : 3-10. DOI: 10.19641 / j.carol carroll nki. 42-1290 / f 2021.17.001.
3. Tu Guangshao. Concept and Practice of ESG Responsible Investment (Part 1) [J]. China Finance,2019(01):13-16.
4. Chen Ning, Sun Fei. Comparison of ESG system development at Home and abroad and suggestion of constructing ESG system [J]. Development Study,2019,0(3):59-64. (in Chinese)
5. Wang Kai, Zhang Zhiwei. Current situation, comparison and Prospect of ESG rating at home and abroad [J]. Finance and Accounting Monthly,2022(2):137-143.
6. Jin Xien. Experience of Global ESG Investment Development and its enlightenment to China [J]. Modern Management Science,2018,0(9):15-18.
7. Lee, D.D., Fan, J.H. and Wong, V.S.H. (2021), No more excuses! Performance of ESG-integrated portfolios in Australia. Account Finance, 61: 2407-2450.
8. Li, S., Yin, P., Liu, S. (2022). Evaluation of ESG Ratings for Chinese Listed Companies From the Perspective of Stock Price Crash Risk. Frontiers in Environmental Science.
9. Azmi, W., Hassan, M.K., Houston, R., & Karim, M.S. (2021). ESG activities and banking performance: International evidence from emerging economies. Journal of International Financial Markets, Institutions and Money.

10. Kim, S.U., & Li, Z. (2021). Understanding the Impact of ESG Practices in Corporate Finance. Sustainability, 13, 3746.
11. Kagawa, Shigemi, Suh, et al. CO2 emission clusters within global supply chain networks: Implications for climate change mitigation[J]. Global Environmental Change: Human and Policy Dimensions, 2015, 35:486-496.
12. Thun, Jörn-Henrik, Daniel Hoenig. An empirical analysis of supply chain risk management in the German automotive industry. International Journal of Production Economics 131 (2011): 242-249.
13. Tang, Christopher S., Volodymyr Babich. Using social and economic incentives to discourage Chinese suppliers from product adulteration. Business Horizons 57 (2014): 497-508.
14. Yoshiyasu Takefuji (2022) Security Enhancement of Third Parties Is Needed in Global Supply Chain Management, Journal of Applied Security Research, DOI: 10.1080/19361610.2022.2086785.