

# Accelerating Compliance: Lessons for South Korea's Automotive Industry from Europe's ESG Model

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## Abstract

This study examined the policy implications for South Korea's automotive industry by comparing the European Union's regulatory approach to ESG governance with Korea's current framework. Using a qualitative comparative document analysis, the research evaluated supply chain risks, regulatory structures, enforcement mechanisms, and industry responses in both regions, with particular attention to the EU's Corporate Sustainability Due Diligence Directive (CSDDD). The analysis finds that the EU model combines legally binding due diligence requirements with monitoring systems, technological transparency tools, and institutional support for suppliers. These features collectively strengthen corporate accountability and reshape sourcing practices across global automotive supply chains. In contrast, South Korea's ESG policy remains largely voluntary and fragmented, limiting its ability to address systemic supply chain risks. The study concludes that while the EU approach cannot be directly transplanted, its integrated structure provides a useful policy reference for Korea. Effective reform would require mandatory due diligence rules combined with technological monitoring tools and targeted support for small and medium-sized suppliers. These findings contribute to ongoing policy debates on how emerging ESG regulations may reshape global industrial governance and supply chain sustainability.

*Keywords: ESG Policy, EU Corporate Sustainability Due Diligence Directive (CSDDD), Korean automobile industry, Supply chain sustainability, Comparative policy analysis*

## 1. Introduction

The automotive industry is enormously important to the global economy (OICA, 2023), particularly in regions with a strong manufacturing base like the European Union and South Korea (ACEA, 2024). These two regions host some of the world's largest automobile manufacturers, including BMW, Volkswagen, Mercedes-Benz, Hyundai, and Kia, to name a few. These large corporations are key players in global supply chains and thus have a strong influence on environmental, social, and governance (ESG) standards across their vast collection of suppliers and stakeholders. This means that with the growing global emphasis on sustainability and ethical business practices, the role of automakers in driving compliance in high-fidelity sourcing within supply chains is significant. In the EU, the trend has been moving toward stringent enforcement of ESG standards (Council of the EU, 2024), particularly through compliance mechanisms like the Corporate Sustainability Due Diligence Directive (CSDDD). South Korea, in contrast, remains in a transitional phase. While there have been voluntary efforts by some corporations to implement sustainability initiatives, these have been piecemeal and lack a legislatively binding mandate to drive true change. This has resulted in a more fragmented approach to ESG supply chain attainment. At the core of these issues is the sourcing of essential raw materials like lithium, cobalt, and aluminum from parts of the world that are noncompliant with ESG regulations. European automakers, under the obligations created by CSDDD, have started to shift supply chains to places with more transparent governance and sustainability issues or build partner capacity within the region

to improve ESG outcomes (Guerrero et al., 2024). This has prompted some resource-exporting countries to reform their regulations to maintain ties with European automakers (Sagala, 2018; Botchway et al., 2024). Korea, on the other hand, faces challenges in ensuring similar degrees of compliance within its companies' supply chains. This study therefore investigates how the European Union's ESG regulatory framework functions as a policy model and what specific lessons it offers for South Korea's automotive industry. The paper aims to (1) identify key ESG risks within automotive supply chains, (2) analyze how the EU's regulatory mechanisms attempt to address these risks, and (3) evaluate how similar approaches could be adapted within the South Korean context. The EU's approach provides a strong blueprint not only because of its strict enforcement provisions, but also because it integrates monitoring systems, technological transparency tools, and institutional support for suppliers. The paper proceeds as follows. Section 2 explains the research methodology. Section 3 provides a brief industry overview. Sections 4 and 5 analyze ESG risks and regulatory responses in Europe, while Section 6 evaluates early impacts. Section 7 discusses implications for South Korea, and Section 8 concludes with policy recommendations and research limitations.

## **2. Methods**

This study used a qualitative comparative research method to examine the influence of ESG regulations imposed by the European Union (EU) and South Korea on the global automotive industry's supply chain governance (Yin, 2018). It also attempted to derive policy implications that are effective for Korea. The following reference materials were used in this study: ESG-related policy documents and regulations of EU and South Korea, Academic and institutional research studies on supply chain governance, and Industry reports and case studies related to the automotive industry's manufacturing and procurement activities.

The basis for the document selection was the relevance to the automotive supply chains, enforcement practices and corporate due diligence. Specifically, peer review literature, official institution reports, government and policy analyses were selected only from 2018 onwards. In addition, reports from private actors were selected when they contained information on the response of companies to the pressure of ESG regulations and the adherence to ESG norms. In general, ESG theories and other reports concerning other than the automotive sector were not included. The descriptive statistics have only an explanatory function to describe the industry structure.

This study was based on a comparative document analysis of the EU and South Korea. The critical analytical dimensions of regulatory structure, enforcement mechanisms, technologies and supplier support were derived from the literature and applied to the institutional context of ESG governance in the EU and South Korea. This study used a comparative institutional analysis and policy evaluation approach to derive policy implications that can be directly used to further develop ESG policy in Korea.

## **3. The Automotive Industry in the European Union and South Korea**

The European Union (EU) and South Korea are two of the world's leading regions for car production (ACEA, 2024). Both are also part of the global production networks of the major automobile manufacturers worldwide. Due to their huge importance in the global automobile industry, EU and Korean car manufacturers are in a position to ensure that sustainable standards are implemented throughout the entire supply chains. Unlike the focus on the size of the automobile markets in the EU and Korea and the performance of the automobile manufacturers, this study regards the EU and Korea as two different institutional frameworks, in which the companies have to apply a different set of regulations.

EU adopted a more rule-based approach (Council of the EU, 2024) through the imposition of mandatory due diligence and enforcement measures (e.g. the Corporate Sustainability Due Diligence Directive) whereas South Korea is taking a more market-based approach (Wijekoon et al., 2024) that is still evolving. This has resulted in differential institutional conditions that give rise to variations in firms' monitoring activities, ESG risk exposure and compliance actions.

The two contexts differ from each other significantly, and it is possible to establish a reference framework for comparison by analyzing the ESG governance practices in the automotive supply chains. In the next few sections, we

will elaborate on the institutional background in the two contexts and, based on that, explain how the institutional background affects supply chain monitoring, due diligence practices, and regulatory compliance.

#### **4. ESG Risks in Automotive Supply Chains**

The global auto industry is characterized by a highly complex cross-border supply chain that reaches from the extraction of raw materials for the production of components to the final vehicle assembly and distribution (Automotive Technology, 2024). At the same time, cost optimization is always an issue for the automobile manufacturers. However, the often long and complex global supply chains of the auto industry are also a significant source of ESG problems which can negatively affect the company's image and existence. This is especially true for the extraction of critical minerals such as lithium, copper, aluminum and cobalt, which are often extracted in low regulatory environments, often in developing countries with weak governance.

A recent example was uncovered by a investigation by The Guardian into the global cobalt industry, a metal used in the batteries of electric and hybrid vehicles. The Democratic Republic of Congo supplies about 70% of the world's cobalt (USGS, 2024). As part of the investigation, The Guardian discovered significant ecological and human damage caused by mining in the region. In an interview in 2024, Didier Makal, one of the investigative journalists of The Guardian, explained that “the acid waste from mines is leaking into rivers and causing terrible damage to the agricultural sector, to aquatic life and therefore to people's health. People are dying before they reach the age of 40, which is disastrous. (Makal, 2024, para. 4)” Environmental damage caused by extraction activities in a country that is far from the production site of a car can pose significant risks for car manufacturers in a supply chain.

Water degradation is another environmental risk example. We have seen in numerous instances that water degradation is caused by the activities of mining. In Ghana for example, the activities of small-scale illegal miners have contaminated almost all the major rivers in Ghana with mercury; causing great ecological and environmental damage to our water bodies, as well as the point of use or where communities depend on water for consumption (Obiri-Yeboah et al., 2021). Furthermore, in mineral rich or rather mineral exporting countries, there are instances where water is heavily required during mining activities and is thus contaminated by tailings or harmful by-products. This is a major pressure point to downstream companies to uphold responsible sourcing practices.

Social risks are important too. The Democratic Republic of Congo has long been associated with the use of child labor in cobalt mining. Cobalt is used in car batteries. The mining of cobalt can cause health problems such as cancer, kidney damage and neurological damage for children that work in the mines (U.S. Department of Labor [DOL], n.d.). Labor abuses and poor working conditions have been found in other mining regions which supply materials to carmakers. These social and labor risks pose a material legal and reputational risk for carmakers.

While environmental and labor issues are often highlighted as some of the main challenges for companies when ensuring that their global supply chains operate responsibly, governance issues such as corruption are a material challenge too. Take the case of British-based commodity trading firm Glencore paying \$1 billion to regulators in Cameroon, the Democratic Congo, Ghana, Indonesia, Brazil and Mexico after being accused of bribery and market manipulation (Voris, 2023). This highlights how poor governance issues such as corruption can create a whole host of compliance risks for MNCs that can be very hard to manage – even if a company has its house in order and has implemented controls at the level of individual mines, including gem, metal and other mining operations.

The ESG risk cases presented in this paper demonstrated that material ESG risks in the automotive supply chains are connected and therefore systemic. They are triggered by underlying structural drivers that are inherent to the extraction of commodities in certain high-risk countries and therefore require a systemic approach to ESG risk monitoring, due diligence and governance. Understanding ESG risks in the automotive sector will enable us to assess the potential impact of existing or proposed EU regulation on the governance of the global automotive supply chains..

#### **5. Reforming Supply Chains in Europe**

The EU has emerged as a leader in the regulation of ethical sourcing in the automobile manufacturing industry. The 2024 Corporate Sustainability Due Diligence Directive (CSDDD), which “requires companies to ensure that

human rights and environmental obligations are respected along their chain of activities” (Council of the EU, 2024), is a prime example of this. Companies based in the EU with a worldwide turnover of EUR 450 million (approx. USD 507 million) and over 1000 employees fall under CSDDD. Non-EU companies with an equivalent turnover and number of employees within the EU are also covered by this mandate (Council of the EU, 2024).

CSDDD is particularly important in the EU automotive industry because each manufacturer has substantial supply chains that reach around the world. Under CSDDD, all companies are legally obliged to do sufficient due diligence into their own supply chains and work to prevent human rights and environmental violations (Corporate Sustainability Due Diligence Directive, n.d.).

The CSDDD doesn’t specify how these requirements are to be met. At its core, CSDDD is about compelling large corporations to research and understand where their materials come from and ensuring sustained compliance with defined standards. Companies need to examine their supply chain for potential issues like environmental destruction, child labor, and human rights abuses, among others. This manifests in practices like only sourcing from certified mines to ensure no human rights violations are involved (Segal, 2020). Strategies and policies to mitigate ongoing risks also need to be put in place—like periodic supplier audits (ImpactBuying, n.d.)—to ensure ongoing compliance.

This doesn’t mean, however, that these measures will just be accepted in good faith. Regular disclosure through periodic reports is also required, as are specific ways to prevent future violations, if these occurred (Niejahr et al., 2024). While the level of detail required in these reports is not specified, it does explicitly require that companies provide descriptions of the following: “(i) their due diligence policies and processes; (ii) the identified potential and actual adverse impacts; (iii) the measures taken to address these impacts; and (iv) a transition plan for combating climate change” (Niejahr et al., 2024). This ensures the work on ethical sourcing is a continuous process, rather than a singular certification. Companies are also compelled to create a grievance mechanism to ensure that outside parties can report unethical sourcing (Corporate Sustainability Due Diligence Directive, 2024).

What sets CSDDD apart from many other international efforts to ensure ethical sourcing is its enforcement mechanism. Companies found to be noncompliant with directives can be fined up to 5% of their global turnover (Duan, 2024). In addition, victims are also empowered with the right to sue companies if they are harmed due to corporate negligence (Corporate Sustainability Due Diligence Directive, 2024).

It is also important to understand how the relationship between larger automobile manufacturers and small and medium enterprises (SMEs) is impacted by CSDDD. While only large companies are directly impacted by CSDDD, there is also a downstream effect. As part of their compliance measures, large automakers are implementing a number of measures to ensure that suppliers behave ethically. Firstly, there are strict contractual requirements for suppliers to only source and produce goods responsibly, and regular audits are conducted to ensure ongoing compliance. Companies like Mercedes-Benz have also provided incentives like preferred seller statuses or financial incentives to SMEs that have excellent track records of following ethical sourcing mandates (Segal, 2020).

That is not to say that SMEs have a completely smooth ride when it comes to these mandates. Unlike their larger counterparts, these firms face constraints on the resources, both financial and human, that they can employ to meet the rigorous due diligence mechanisms. This can be particularly difficult if purchasing agreements have detailed reporting and ongoing monitoring requirements. Larger firms are also imposing more onerous technology requirements on supplier reporting, which can be difficult for smaller organizations that don’t have access to in-depth IT expertise (Dempere et al., 2024). The EU is not blind to these challenges and has implemented a number of programs to alleviate the difficulties that these SMEs face. As such, there are grants available to support SMEs implementing due diligence frameworks in their organizations and several compliance toolkits for technical support (Zakari, 2024).

While it is still early to assess the results of CSDDD, there have already been some effects that may offer guidance on the ultimate implications of the mandate. The most visible change has occurred in the way Foreign Direct Investment (FDI) is managed, with capital increasingly being directed to suppliers with a track record of ethical sourcing (Guerrero et al., 2024). An example of this is Volkswagen, which redirected a large number of its battery sourcing contracts to suppliers that have certified ethical mining operations and currently satisfy CSDDD mandates (Ahuja, 2020).

While CSDDD represents one of the most comprehensive regulatory attempts to improve ethical sourcing, it is

not without weaknesses. One major concern is the compliance burden placed on firms, particularly smaller suppliers that may struggle with reporting requirements, technological upgrades, and ongoing audit obligations. If implementation costs become excessive, companies may respond by shifting sourcing away from higher-risk regions rather than improving conditions within them. This could unintentionally exclude developing-country suppliers from global value chains rather than incentivizing reform. There is also a risk that compliance becomes overly procedural, focusing on documentation and reporting rather than achieving real improvements in labor or environmental outcomes.

For South Korea, these limitations highlight the importance of designing ESG policy frameworks that balance enforcement with capacity-building support. Simply replicating strict due diligence rules without accompanying financial assistance, technological support, and supplier training could impose disproportionate burdens on domestic SMEs and weaken supply chain resilience. Understanding both the strengths and potential unintended consequences of the EU approach is therefore essential for identifying which elements of the model can be effectively adapted to the Korean context, a question explored further in the following sections.

## 6. The Initial Results of Supply Chain Reforms

In response to and anticipation of the stringent requirements of CSDDD, many European automobile manufacturers have turned to technology to improve supply chain transparency. For example, blockchain technology allows companies to trace the origins of raw materials and helps avoid suppliers who engage in unethical practices like labor exploitation or sourcing from areas of conflict. These tracing systems work by creating a blockchain-based system that records every transaction covering a commodity (Duke, 2021). Large European car manufacturers like BMW, Volkswagen, and Renault have all started implementing these types of systems. BMW's PartChain Project is instructive in this regard (BMW Group PressClub, 2020).

The project began in 2019 with a pilot scheme for the purchase of car headlights, and following this success, it was decided to expand to a large number of other suppliers. BMW has a vast number of suppliers spread throughout the world, and it was incredibly complex to track the movement of raw materials and components before they actually arrived at BMW. Initiating due diligence was time-consuming and cumbersome because it required navigating documentation and the IT systems of reams of suppliers and their suppliers, and so forth. PartChain offered a solution that could offer standardization of reporting and immediate traceability. According to Andre Luckow, head of innovation and emerging technologies, BMW Group, this “has enabled nearly seamless transparency and impacted broader data-sharing initiatives” (Luckow, 2022). For example, Catena-X, which creates collaborative data ecosystems with the automotive value chain, has used this technology to “enable businesses such as OEMs, small and medium enterprises, and recycling companies to take full advantage of a secure data-based economy” (Steiner and Münch, 2024).

A further technology-based solution to ethical sourcing is the use of Artificial Intelligence (AI). AI analytics can be employed in order to analyze huge databases, including financial records, social media posts, news items, and regulatory filings, to identify high-risk suppliers (Antwi et al., 2024b). This technology can also be used as a predictive tool to detect patterns of behavior associated with unethical practices. AI also allows for real-time and ongoing compliance monitoring, particularly if used in conjunction with blockchain technology. By automating these processes through AI, automobile manufacturers can also accrue compliance savings (Antwi et al., 2024a). Companies like Daimler and Volvo are actively including AI in their compliance processes, particularly when it comes to assessing at-risk supplier behavior and red-flagging issues before they become serious (Daimler Truck, 2024; Williams and Kelly, 2024).

The most profound impact, though, was expected to occur in economies in the so-called Global South, where European automakers source many of the raw materials to manufacture car components. CSDDD is placing pressure on suppliers in Asia, Africa, and Latin America to meet the required high standards in human rights and sustainability. For example, mining operations in the Democratic Republic of Congo—major suppliers of cobalt for electric vehicles—are under intense scrutiny for human rights abuses (Nolan, 2025). Due to this, sourcing is shifting to countries like Canada and Australia, which have stronger regulatory and compliance systems.

Nations that take a proactive approach seem to reap the highest benefit. Pressured by CSDDD changes, the

government in Indonesia (Sagala, 2018), a major supplier of lithium and nickel, is in the process of introducing national sustainability certificates to ensure trade with European automakers continues. Ghana, a source of cobalt for EV batteries, has also introduced greater labor and environmental regulation in its mining sector to strengthen its trade relationship with European carmakers (Botchway et al., 2024). Greater compliance standards are also pushing firms to engage in technology transfer and joint compliance infrastructure development. For example, some European car manufacturers have entered joint venture agreements with suppliers in South Africa and Brazil to ensure ethical sourcing (Competition Authorities of the BRICS Working Group, 2021). These joint ventures include investments in training, supply chain monitoring technology, and fair labor standards are delivering long-run benefits for local suppliers. To further support SMEs in the Global South, the European Partnership for Sustainable Development is also assisting impacted countries to prevent the added cost of audits and compliance certification from pushing suppliers out of business (European Commission, n.d.).

## **7. Ethical Sourcing and the South Korean Auto Industry**

South Korea remains in a transitional stage of ESG governance, while the European Union has moved toward legally binding due diligence requirements. For decades, Korean companies have generally operated within a regime of voluntary compliance with international sustainability standards. However, in 2023 members of the National Assembly put forward the Act on Human Rights and Environmental Protection for Sustainable Business Management which indicates a potential move towards a more legislative framework.

The draft law seeks to require companies to conduct due diligence with regard to human rights and environmental risks. If passed, it would be one of the most sweeping due diligence laws enacted in Asia. The Bill would cover companies listed in Korea and would also apply foreign companies operating in Korea with 500 or more employees, with an annual revenue threshold of KRW 200 billion. Significantly, the Bill adopts a broad definition of supply chains by covering direct and indirect business relationships along the value chain (Wijekoon et al., 2024). Korean automobile manufacturers, which operate through extensive global sourcing networks, would therefore be squarely within that scope.

Korean automakers also have deep ties to global supply chains for battery materials, metals and electronic components. Their dependence on lithium, cobalt, aluminum, and nickel sourced from regions with poor environmental and labor governance exposes them to the same ESG risks faced by European firms (Boafo et al., 2024). As Korean manufacturers expand electric vehicle production and a steadily strengthening foothold in global battery markets, these upstream risks increasingly become operational risks that threaten operations, access to market, investor confidence and compliance expectations from foreign regulators.

The Bill includes elements inspired by the United Nations Guiding Principles on Business and Human Rights and the OECD Guidelines for Multinational Enterprises, requiring companies to use due diligence systems, risk assessment processes, and monitoring mechanisms in their supply chains (Business & Human Rights Resource Centre, 2023). Possible sanctions for failure to comply include maximum fines of KRW 50 million or up to five years in prison. But the legislation has not yet passed a parliamentary vote, meaning that South Korea currently lacks any comprehensive mandatory due diligence framework.

In the absence of binding regulations, Korean companies have relied mostly on voluntary ESG initiatives. The Korean Green Taxonomy (K-Taxonomy) links economic activities to environmental targets such as emissions reduction, pollution control, and biodiversity protection (Hwang and Lee, 2022). The issuance of KRW 250 billion green bonds from Hyundai Motor Group is a good example as it shows investors' increasing demand on sustainability performance (Sung, 2023).

Technological initiatives have also emerged. Recently, Hyundai and Kia developed the Supplier CO<sub>2</sub> Emission Monitoring System (SCEMS), an AI-and-blockchain-based system that tracks emissions through supplier networks (Hyundai Motor Group, n.d.). While this system improves environmental transparency, it is much narrower than the extensive due diligence obligations emerging in the EU as it focuses primarily on emissions monitoring and not broader labor, human rights and corruption risks.

One major shortcoming of the Korean model today is that companies' responses to ESG controversies tend to be

reactive and not institutionalized. A case in point is Hyundai's decision to end its aluminum sourcing agreement with Adaro Minerals—a move taken under pressure from climate activists (Jong, 2024). As this case demonstrates, Korean automakers are already directly impacted by ESG risks in their global supply chains without binding regulation domestically. With growing international investor, regulatory and consumer demand for traceability and responsible sourcing, reliance on ad hoc responses may render firms less competitive in global markets.

Regulatory guidance alone will not be enough to improve ESG governance for South Korea's automotive industry. Firms and suppliers will require structural support mechanisms, such as subsidies, training programs, and shared traceability technologies. With its advanced digital infrastructure, Korea has opportunities to further develop AI-based risk monitoring and blockchain traceability while building collaborative data platforms along supply chains. A key consideration will be ensuring that small and medium-sized suppliers can participate in these systems—the resilience of Korean automotive production will ultimately depend on the capabilities of companies upstream. Such considerations highlight not only the urgency to reform policy, but also the need for designing ESG frameworks that are aligned with regulatory incentives and complemented with support for capacity-building.

## 8. Conclusion

The comparison between South Korea and the European Union's approach to improving ESG standards among supply chains is highly instructive. The EU has been a trailblazer in the realm of compulsory compliance and in creating innovative solutions to address the challenges of ensuring ESG fidelity within automotive supply chains. These experiences offer guidance to South Korea as it begins contemplating compulsory guidelines similar to CSDDD. The adoption of technologies such as blockchain and AI, together with subsidies and support programs for SMEs, offers potential avenues to smooth this transition and build stakeholder trust.

Korea's experience also illustrates the limits of relying on public pressure campaigns and voluntary corporate ESG programs. The EU's more enforcement-driven approach—based on substantial fines for noncompliance while simultaneously providing support for firms lacking expertise or capital—offers valuable lessons for South Korean policymakers. By aligning with emerging best practices from the EU, South Korea can balance economic competitiveness with ethical responsibility, ensuring that its automotive industry remains a global leader while upholding sustainability and human rights standards.

### 8.1 Research Limitations

This study is subject to several limitations that should be considered when interpreting its conclusions. First, the analysis relies primarily on publicly available policy documents, corporate disclosures, and secondary academic sources. Because many corporate supply chain practices are not fully transparent, it was not possible to conduct a detailed empirical evaluation of firm-level compliance outcomes or internal governance processes.

Second, the relatively recent adoption of the EU's Corporate Sustainability Due Diligence Directive limits the ability to assess its long-term effectiveness. Since the directive will only be fully implemented over the coming years, measurable impacts on supplier behavior, production costs, and trade patterns remain uncertain. Future longitudinal studies will therefore be necessary to evaluate whether regulatory pressure produces sustained improvements in ESG performance.

Third, the policy implications proposed for South Korea may face practical implementation challenges. Differences in industrial structure, regulatory capacity, domestic political priorities, and supplier dependence mean that EU-style reforms cannot be directly transplanted without adaptation. In particular, the high reliance of Korean manufacturers on tightly integrated SME networks may require more gradual regulatory sequencing combined with stronger state-supported capacity building.

### 8.2 Future Research

In terms of future research, more systematic monitoring of the EU's regulatory experiment will be essential. As CSDDD compliance mechanisms mature and enforcement cases emerge, researchers will gain clearer insight into how

mandatory due diligence reshapes global supply chains. Comparative empirical research examining supplier adaptation, cost redistribution, and technological adoption across regions will provide deeper understanding of which policy designs most effectively improve ESG outcomes while maintaining industrial competitiveness.

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