

Sustainability in the European Automotive Sector: Approaches and Challenges

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Abstract: Sustainability has become increasingly essential for companies to remain competitive. The automotive industry is one of the sectors most affected by sustainable regulatory standards. Companies face pressures, changes in consumer behaviour, and evolving expectations alongside growing demands for environmentally sustainable practices. However, sustainability implementation practices and main initiatives remain inconsistent across the sector. This study aims to identify key indicators for successful sustainability implementation by analysing best practices among the four largest companies within the European automotive industry through quantitative and qualitative content analysis. The findings define main approaches and challenges companies faced, categorising key activities within the environmental, social, and governance (ESG) dimensions, and underscoring the importance of embedding sustainability into corporate strategy. The analysis also highlights inconsistencies between stated objectives and actual approaches of analysed companies, which may jeopardise the effectiveness of sustainability implementation, companies' competitive positions, and performance. Based on the analysis of best practices, the study provides practical recommendations and guidelines for smaller manufacturers, suppliers, and other industries and organizations to adapt and successfully implement sustainability initiatives.

Keywords: Automotive industry, sustainability, strategy, ESG reporting

1. Introduction

In recent years, poor air quality, elevated levels of emissions, greenhouse gases, and the scarcity of safe drinking water are all significant factors that are negatively impacting both human health and the environment. [1,2] As resources are not unlimited, there is growing concern about the sustainability of the current way of life and whether we can maintain an adequate quality of life for future generations. [3] National and international governments strive to protect life on the planet by

introducing legislative standards and regulations that compel organizations to integrate sustainability into their management practices. At the same time, customers and other stakeholder groups exert additional pressure, increasing the demand for sustainable business practices. [4-6] The implementation of sustainability cuts across several different sectors, for example, sports organizations [7], hospitality [8], education [9], and industry, especially the automotive industry.

The production of cars and road transport emits higher carbon emissions than any other mode of transportation. [10] Car ownership has become increasingly commonplace in personal road transportation, contributing to the growing congestion on roadways in contemporary society. This leads to higher traffic density and substantial emissions released into the atmosphere, which harm the environment. [11,12] Traffic congestion in major cities is often linked to industrial activity. Technological advances in communications, electronics, and innovations in engine technologies, including electric vehicles, hydrogen cells, and biofuels, are reshaping the sector. [13] To remain competitive, automotive companies must respond swiftly to these changes. This creates pressure on integrating sustainability into management, and many companies demonstrate how sustainability can be effectively integrated into strategy and business practices to help advance greener transportation. Some organizations face challenges, which are reflected in their performance.

However, the perception and implementation of sustainability by individual automotive companies vary considerably. Sustainability refers to a state that can persist indefinitely, whereas sustainable development is a process that progresses towards sustainability. [14] Sustainability involves a purposeful behavioural change in human civilization, focusing on relationships with oneself, the environment, and resources, aimed at meeting current needs while respecting resource limits. [15] The industry faces significant challenges in achieving sustainability goals, with society exerting pressure to use resources efficiently and ensure long-term existence. [16] Globally, the automotive industry can be considered one of the largest and most complex industries [17,18] and a key sector that significantly impacts global sustainability. However, the activities of companies within this sector do not always meet the established rules, regulations, and expectations. [19] The adoption of sustainability in the automotive industry is a fundamental issue. However, the specific actions and steps taken may vary depending on the needs of each organization. [20] It is crucial not only to implement sustainability and carry out the required actions but also to communicate these efforts transparently to their stakeholder groups. Companies dealing with sustainability issues can take a number of frameworks – GRI (Global Reporting Initiative), SASB (Sustainability Accounting Standards Board), TCFD (Task Force on Climate-related Financial Disclosures). The most common indicator is their ESG Rating, consisting of three dimensions – Environmental, Social, and Governance. ESG rating, such as (Sustainalytics, MSCI, or ISS ESG), is also a key indicator for potential investors. These ESG Ratings may include different results, as they measure

different indicators in different hierarchies. [21] While in other industries, ESG has been shown to have a significant positive impact on a company's financial performance, in the automotive sector, the evidence is scarce or divergent. [22] The question, therefore, remains: how to implement sustainability while improving financial performance? This study aims to identify the approaches and challenges faced by the largest European automotive companies. It reveals how these companies successfully integrate sustainability into their strategies and how they respond to the pressures associated with its implementation. These findings, best practice insights, and proposed roadmap help other companies in effectively implementing sustainability initiatives.

2. Methodology

The primary objective of this article is to provide a brief overview of how automotive companies approach sustainability and integrate it into their business practices. In addition to adopting sustainability principles, several challenges emerge, and identifying them enables organisations to adjust and refine their strategies accordingly. The research subject consists of the four largest European automotive companies, selected based on their revenue rankings in the latest available Fortune Global 500 list. [23] According to this criterion, four companies were chosen for analysis: Volkswagen Group, Stellantis, BMW Group, and Mercedes-Benz Group.

The research questions (RQ1, RQ2) and hypotheses (H1) in this study are: RQ1- Is there a relationship between a company's ESG rating and its financial performance (measured by EBIT), within the European automotive industry? H1-Companies achieving higher ESG scores also demonstrate higher financial performance (measured by EBIT). RQ2-How do the largest European automotive companies implement sustainability within their strategies?

This study employs a mixed-methods approach combining quantitative and qualitative content analyses. A quantitative analysis focuses on the comparison of the selected companies' ESG Ratings – Sustainalytics, MSCI, and ISS ESG - with their financial performance (EBIT) to address RQ1 and to test H1. The qualitative comparative analysis identifies sustainability strategies, approaches, and key challenges. Data were collected through secondary research using publicly available sources, including official corporate reports (MSCI, ISS ESG) and external databases (Sustainalytics). The findings are presented through comparative tables that highlight the main differences, common trends, and sustainability-related strategies within the European automotive sector.

Hypothesis H1 assumes a positive relationship between ESG scores and financial performance (EBIT). However, due to limited access to complete historical data (e.g., missing MSCI/ISS ESG values for Stellantis), it was not possible to perform a robust statistical verification of this relationship. For future quantitative research, it is recommended to use correlation analysis (e.g., Pearson's or Spearman's correlation) or regression modelling to verify the strength and direction of

the ESG Ratings and EBIT relationship. We also recommend using time series data for EBIT and ESG scores (e.g., Sustainalytics, MSCI, ISS ESG) for at least five consecutive years. This would allow us to capture the trend and any delayed effects of sustainability on financial performance. To ensure valid results, it is necessary to ensure a uniform type of source data and to identify external factors (e.g., changes in ESG methods, regulatory interventions) that may affect the output values.

3. Findings

The findings provide a concise overview of the application of sustainability elements in European automotive companies, outlining the challenges and approaches encountered. Results are structured according to the ESG framework: environmental, social, and governance pillars.

All analyzed companies communicate their sustainability activities to stakeholders via websites and reports, underscoring the importance of integrating sustainability into corporate strategy. ESG Rating serves to evaluate environmental, social, and governance approaches, providing investors with recommendations and assessing the alignment of companies' strategy, objectives, and internal measures. The comparison of companies' ESG Ratings is presented in Table 1.

Table 1 ESG Rating. Source: [24-27]

	Volkswagen Group	Stellantis	BMW Group	Mercedes-Benz Group
Sustainalytics	27.5	21.7	23.8	21.5
Industry Risk Rank	Medium Risk (47 out of 85)	Medium Risk (20 out of 85)	Medium Risk (24 out of 85)	Medium Risk (18 out of 85)
ISS ESG	C+	-	C+	C+
MSCI	B	-	A	A

Sustainalytics data are current as of May 20, 2025, while MSCI and ISS ESG data reflect the most recent publicly available ratings from 2024. Analysed companies operate at a Medium Risk level according to Sustainalytics. [24] MSCI and ISS ESG Ratings were obtained from the companies' publicly available annual reports. Stellantis did not publish its assessment in reports. Development of EBIT (operating results) in million EUR is illustrated in Figure 1.

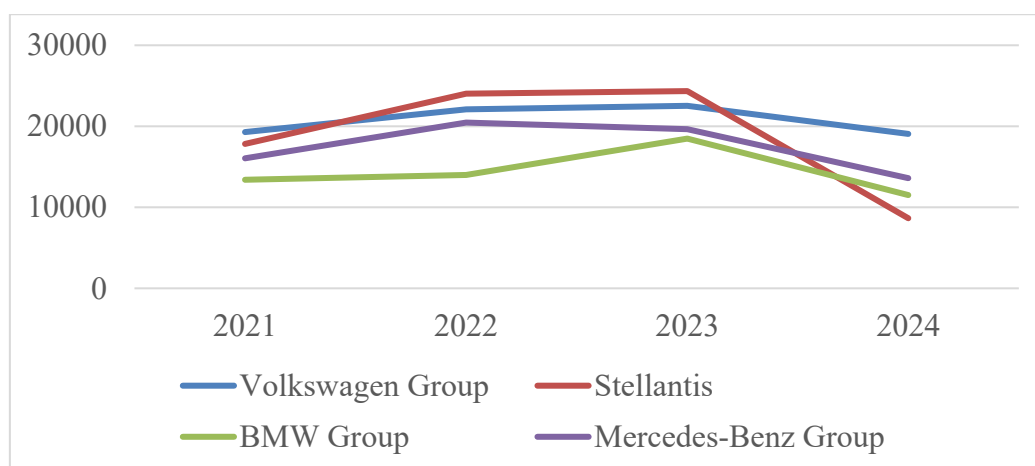


Fig. 1 EBIT/operating results of companies in mil. EUR. Source: [23-31]

One of the key elements in implementing sustainability in the automotive industry is addressing the ecological issue and reducing the environmental impact of their business. The challenges and approaches in the environmental pillar are listed in Table 2.

Table 2 Challenges and Approaches in the Environmental Pillar. Source: [25-28]

Company	Challenge	Approaches/activities
Volkswagen Group	Net carbon neutrality by 2050	Electrifying products, decarbonizing the value chain, and generating renewable energy. Using recycled materials and renewable resources, efficiency, and establishing cycles for materials and water. Preserve the ecosystem – reduce harmful emissions and soil erosion.
Stellantis	Net-zero emissions by 2038	Carbon footprint reduction by offering a wide range of low-carbon product portfolio, reducing impact on the air, and zero-emission vehicles. Responsible water stewardship – water recycling
BMW Group	Net-zero emissions by 2050	Utilize renewable energy and electrify vehicles. Reduce CO2 emissions by at least 40 million tons in 2030
Mercedes-Benz Group	Carbon neutrality by 2039	Electrification of vehicles, CO2 emission along the value chain. Using sustainable materials, power generation from renewable energies

The companies share the common goal of achieving neutrality in environmental strategies and differ in their timeframe and specific approaches. Nevertheless, all companies emphasize electromobility promotion and alternative power unit investment. Companies have developed strategies addressing both their objectives and associated challenges in the environmental pillar. The Volkswagen Group has introduced the program GoToZero [25], Stellantis implements its Dare Forward 2030 strategy, which includes the initiative SUSTAINera [28], the BMW Group follows its Next Level Sustainability strategy [26], and Mercedes-Benz Group has adopted the Ambition 2039 strategy [27]. Main indicators in the social pillar are presented in Table 3.

Table 3 Challenges and Approaches in Social Pillar. Source: [25-28]

Company	Employees	Female	Challenges and Approaches
Volkswagen Group	614 082	124 125 20.2%	Increase the average number of training hours per employee and employability.
Stellantis	248 883	54 820 22%	The highest level of health and safety for employers. Upholding human and labor rights, fair working conditions –Human Rights Program, preventing child and forced labor
BMW Group	158 441	34 223 21.6%	Reduce workplace injuries through occupational safety management, employee safety training, certification, and prevention through stress and safety analyses. Upskilling and developing managers, promoting talent retention. Promoting diversity and inclusion
Mercedes-Benz Group	175 264	41 605 23.7%	Conduct an employee survey. More than 70% of employees in digital transformation by 2030. Turn2Learn qualification initiative - employees from administration and production training to become data and AI specialists

Table 3 illustrates that companies prioritize different social pillar activities. Some focus on developing and promoting employee skills and capabilities, while others emphasize the work

environment and safety. The differences may reflect varying policy settings, stated objectives, and corporate priorities. Table 4 compares the main challenges and approaches in the governance pillar.

Table 4 Challenges and Approaches in Governance. Source: [25-28]

Company	Challenges	Approaches
Volkswagen Group	Integrity and compliance. Combating corruption and bribery. Corporate culture	“The Code of Conduct”- the ethical and value-based foundation for integrity and compliance. Analysis of potential risk (excluding Porsche AG Group – own activities). Written guidelines, anti-corruption training
Stellantis	Strengthen ethical practices and accountable operations in the value chain, mitigate risks related to corruption, bribery, and sustainability, while increasing operational efficiency and trust. Foster a culture of integrity.	Implemented key policies, Code of Conduct, and a comprehensive set of E&C policies. Adopt a Code, Fraud Prevention and Whistleblowing. Mitigate unethical behaviours within the procurement process and promote responsible financial transaction management.
BMW Group	Preventing, detecting, and combating corruption and bribery. Eliminating the risk of reputational damage and negative publicity by reducing the extent of participation in political decision-making.	Preventing corruption through internal communications activities and regular monitoring, disclosure of company positions and lobbying activities, the existence of lobbying-related rules, and the “Compliance Essentials” training course
Mercedes-Benz Group	Responsible corporate governance. Integrity and compliance. Digital trust, transparency, data responsibility and combating corruption, fair competition, and compliance with requirements.	Identify material impacts, risks, and opportunities – in line with the requirements of the ESRS. Declaration of corporate governance. Build trust through transparency, committed to respecting human and employee rights.

All companies pursue similar objectives in the governance pillar, primarily focused on combating corruption and promoting integrity, while developing specific approaches and procedures based on their corporate strategy. The most notable difference is observed at Mercedes-Benz Group, which places strong emphasis on digitalization. This suggests that the company may be more responsive to market changes and faster in integrating them into its strategy. In contrast, a potential issue exists at Volkswagen Group, where the absence of a unified governance strategy is evident, as the Porsche brand conducts its own separate governance analysis.

4. Discussion

The findings of this study confirm a shift toward more proactive sustainability implementation into strategy. However, companies face diverse challenges and adopt different approaches. The results underline the importance of communicating sustainability activities. All the large compared companies regularly publish annual reports, this align with a previous studies, which indicate that effective sustainability communication is crucial for successful business management and sustainable development [32], sustainability reporting allows organizations to disclose the social and environmental impact of their activities on stakeholders and the wider society [33] and the effectiveness of ESG framework implementation, the equal importance of its components, and the significance of ESG Rating as a performance indicator for investors. [34] Sustainability strategies

should integrate all three ESG pillars (environmental, social, governance) in a balanced and interconnected manner.

The results show that Mercedes-Benz Group achieved the best ESG rating among the companies analysed (lowest risk according to Sustainalytics and highest rating according to MSCI), but it did not report the highest EBIT. This discrepancy suggests that high ESG scores may not have an immediate impact on financial performance and that ESG benefits may be long-term or indirect. Conversely, Volkswagen Group reported the highest EBIT but also the highest ESG risk. This may reflect its strong market position alongside insufficient progress in ESG areas. Volkswagen's ESG score may still be negatively influenced by the 2015 emissions scandal (known as 'Dieselgate'), which significantly damaged the company's reputation and led to stricter regulation and increased public scrutiny. Although the company has implemented several corrective measures, its ESG rating still reflects this burden. An ESG-based strategy offers considerable benefits, in line with previous research. [35] The relationship between financial performance and ESG Rating (RQ1, H1) could neither be confirmed nor refuted due to insufficient data. However, a trend can be observed indicating that the company with the highest ESG score did not achieve the highest EBIT. Future examination is required for relevant confirmation. Achieving carbon neutrality is the primary challenge within the environmental pillar, however, timeframes differ. Some companies pursue more ambitious and dynamic strategies. Electromobility is perceived as a key strategy, highlighting its role in addressing environmental challenges and creating opportunities. This confirms earlier research. [10] Greater variation exists in the social pillar. Company-specific goals shape different challenges and strategies; however, promoting women's employment consistently emerges as a priority. The positive impact of gender equality on broader sustainability outcomes aligns with previous studies. [36] Integrating sustainability into corporate governance and reporting is essential. A clear, well-defined company policy is crucial. Sustainability should be directly linked to corporate strategy, which is consistent with previous studies. [37]

Scientific implication contributes to the standardization of sustainability assessment by applying ESG indicators, simplifying the comparison of sustainability performance across companies. Managerial implications lie in defining clear sustainability objectives, activities, challenges, and approaches based on the best practices of the largest companies. Based on the findings of this study, a practical roadmap is proposed. This framework is designed to support companies in the automotive sector that have not yet fully integrated ESG principles into their core business strategies to support the systematization and continuous integration. The roadmap (Table 5) follows the Plan-Do-Check-Act (PDCA) cycle and ensures continuous improvement logic, but also considers the strategic approaches and challenges identified through the analysis.

Table 5 ESG Roadmap Based on PDCA Cycle and Continuous Improvement. Source: authors

	Key Activities	Main Approaches	Key Challenges	Responsibility
Plan	ESG materiality assessment, stakeholder analysis. Define ESG priorities based on three dimensions in a balance, ESG targets (e.g., net carbon footprint, employee training, preventing corruption), KPIs, and ESG risks and opportunities.	Materiality analysis defines key stakeholders, the ESG Framework, and ESG benchmarking (e.g., ESG Rating-Sustainalytics, MSCI, ISS ESG)	Relevant, realistic, and measurable ESG KPIs, lack of standardized and unified ESG data, and compliance with regulatory standards	ESG or Sustainability Team, Top Management
Do	Integrate ESG priorities into strategy and business operations. Implement targeted ESG initiatives and key policies. Organization – assign responsibilities and resources. Integrate ESG into reports.	ESG strategy alignment with company strategy, cooperation between departments in accordance, stakeholder engagement programs	Achieve alignment across the company. Adopt and embed a culture of ESG principles among employees and suppliers, ESG in corporate key policies, and rules.	ESG or Sustainability Team, HR
Check	Regularly monitor ESG performance against KPIs, monitor changes in legislative expectations, customer behaviour, etc. Publish transparent and complete Sustainability and Annual Reports. Gather stakeholder feedback, conduct internal audits.	ESG performance framework, ESG reporting frameworks, internal sustainability audits, stakeholder dialogues, and disclosures	Sustainability reporting complies with legislative requirements and standards. Complete, clear, and transparent information, disclosure of the company's position. Analysing stakeholder expectations.	ESG or Sustainability Team, Marketing Management, Market Research Department
Act	Targets based on ESG performance review and impact. Areas of underperformance and risk focusing. Update and implement the ESG strategy and continuous training.	Continuous improvement programs, ESG workshops, and corrective action plans	Adapting to changing regulations and market trends	Top Management, ESG or Sustainability Team, HR

Incorporating these dimensions ensures that the roadmap remains actionable and aligned with the actual needs of companies operating in the automotive sector.

5. Conclusion

This study analysed the implementation of sustainability in the largest European automotive industry. The findings confirm that the integration of sustainability holds a justifiable place within corporate strategy. However, a lack of clear recommendations and inconsistent approaches in implementing key elements of sustainability remains. This study highlights the importance of transparent ESG reporting and provides a roadmap to successful sustainability implementation.

Emphasis on regular, complete, and comprehensible ESG reports is a key element of competitiveness in today's regulatory-intensive and value-oriented environment. Transparency fosters trust among investors, customers, and employees, thereby reducing reputational risks. Companies should ensure that their ESG reporting reflects current activities and sets specific measuring goals and methods. The proposed roadmap, based on generally applicable principles (PDCA cycle, ESG framework) and its structure, is adaptable for companies in other sectors, such

as manufacturing, logistics, sports organizations, education, and services. This makes useful tool for any organisation seeking to integrate sustainability into its strategies and processes systematically.

A limited number of companies and sources included in the comparison represent a limitation of this study. Future research should focus on integrating sustainability into business management at the national level and examining its impact on organisational performance.

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