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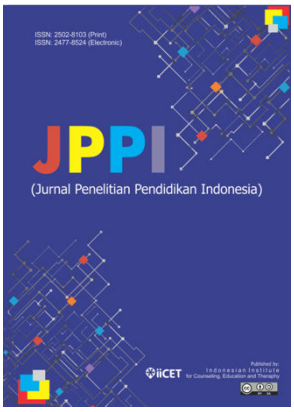


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# Sectoral analysis of ESG (environmental, social, and governance) integration in corporate governance: insights from sustainable finance

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**ABSTRACT**

This research explores the critical intersection of sustainable finance and corporate governance, emphasizing the role of Environmental, Social, and Governance (ESG) factors across various industry sectors. The primary objective is to highlight how ESG considerations impact long-term value creation and risk mitigation within sectors such as technology, semiconductors, building, commercial services, and healthcare. Through a comparative analysis of ESG scores, the study aims to uncover patterns and discrepancies in ESG integration across these sectors, providing insights into their respective commitments to sustainability. To address the reviewer's feedback, the study clearly articulates its research goal: to assess how different sectors perform regarding ESG metrics and identify the factors contributing to observed variations. The methodology includes the collection of secondary ESG data from reputable sources, such as the Dow Jones Sustainability Index, using statistical analysis to identify trends and differences in ESG adherence. The findings reveal significant sector-specific variations, with technology and semiconductor sectors achieving the highest ESG scores, while the building and healthcare sectors exhibit substantial room for improvement. The implications of these results are practical; businesses can leverage these insights to enhance their ESG integration strategies. In conclusion, the study advocates for a stronger incorporation of ESG metrics into corporate decision-making processes, promoting a future of sustainable and ethical business practices across industries. By doing so, it aims to foster long-term resilience and positive societal impact.



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# Introduction

The dynamic landscape of modern finance and corporate governance has been profoundly reshaped by the global transition toward sustainability and responsible investment. The integration of Environmental, Social, and Governance (ESG) factors has evolved into a strategic imperative that links corporate performance with long-term societal and environmental goals. Recent studies emphasize that ESG is no longer merely a compliance requirement but a catalyst for innovation, competitive advantage, and resilience against market volatility (Aldowaish et al., 2022; Daradkeh, 2023; Vrečko et al., 2023; Eccles & Klimenko, 2019; Khan et al., 2016). This shift reflects growing investor and stakeholder pressure for firms to adopt business models that deliver both financial and non-financial value (Freeman, 2010; Rivera, 2023; Li et al., 2020).

Despite the surge in ESG research, much of the existing scholarship relies on cross-sectoral assessments or aggregate indices that often overlook the heterogeneous nature of ESG drivers across industries (Nicolò et al., 2021; Arayssi & Jizi, 2022; Gupta & Chaudhary, 2023). Treating ESG performance as homogeneous risks obscuring the unique pressures and opportunities faced by sectors that differ in technological maturity, supply-chain complexity, and exposure to environmental risks (Becchetti et al., 2022; Jin & Lei, 2023). This study addresses this gap by asking: How do sectoral variations in ESG integration shape corporate financial performance and stakeholder trust? By highlighting industry-specific ESG pathways, the research advances a more nuanced understanding of ESG adoption that moves beyond aggregate rankings.

The selection of the Technology, Semiconductors, Building, and Healthcare sectors reflects their contrasting ESG profiles and challenges. Technology-intensive industries tend to lead in governance transparency and data-driven environmental innovation (Aldowaish et al., 2022; Vrečko et al., 2023; Rivera, 2023), while traditional, asset-heavy sectors such as Building continue to grapple with persistent issues such as embodied carbon emissions, waste management, and worker safety (Nicolò et al., 2021; Buganová et al., 2023). Meanwhile, Healthcare operates at the intersection of strong social responsibility and stringent regulatory compliance, facing trade-offs between R&D-intensive environmental impacts and patient-oriented social priorities (Yoon et al., 2018; Li et al., 2020; Park & Xie, 2021; Zumente & Bistrova, 2021). By focusing on these distinctions, the study provides empirical evidence that ESG′s financial and reputational impacts cannot be generalized across all industries.

Beyond its empirical contribution, this research extends existing theoretical frameworks by applying stakeholder theory and the resource-based view to sector-level ESG practices. While much of the literature conceptualizes ESG integration as a uniform mechanism for mitigating risks and enhancing firm value (Freeman, 2010; Khan et al., 2016; Eccles & Klimenko, 2019; Hamad & Cek, 2023), emerging evidence reveals that ESG acts as a strategic asset only where industries possess the absorptive capacity–technologies, governance structures, and skills–to translate sustainability demands into competitive capabilities (Becchetti et al., 2022; Duan et al., 2023). Sectoral differences in ESG pathways thus bridge universal ESG models with industry-specific governance realities.

Finally, the study offers practical implications for firms, investors, and regulators by demonstrating that ESG strategies must be tailored to sectoral contexts rather than applied as one-size-fits-all frameworks. Recognizing the determinants of ESG performance at the sectoral level allows companies to design targeted interventions that improve governance credibility, align financial strategies with sustainability objectives, and respond effectively to evolving stakeholder expectations (Eccles & Klimenko, 2019; Vrečko et al., 2023; Gupta & Chaudhary, 2023; Buganová et al., 2023). Such context-specific approaches strengthen decision-making for managers, enhance accountability for investors, and inform policies that promote meaningful ESG integration in the era of sustainable finance.

# Method

In this study, the research method involves a structured approach to analyze Environmental, Social, and Governance (ESG) performance across various industry sectors. The population includes companies operating in sectors such as technology, commercial services, construction, healthcare, and finance. A purposive sampling method was employed to select companies with available ESG data from credible sources like the Dow Jones Sustainability Index and other recognized ESG rating agencies. The

sample represents companies from diverse geographical regions to ensure a balanced comparison of ESG performance across industries (Becchetti, et al., 2022).

The instrumentation for data collection involves gathering ESG scores from publicly available reports and databases. These scores encompass factors related to environmental initiatives, social responsibility, and governance practices. To ensure the validity and reliability of the data, only standardized ESG ratings from established agencies were used (Duan, et al., 2023; Ma et al., 2023). Additionally, the literature review was conducted to support the analysis by examining recent academic studies and industry reports that compare ESG performance across sectors (Zumente & Bistrova, 2021).

The procedure includes a comparative analysis of ESG performance among companies within each sector. Statistical methods were used to analyze the variations in ESG scores, identifying trends and disparities across industries (Cho, et al., 2019; Jin & Lei, 2023). Advanced statistical tools such as correlation analysis were applied to determine the relationship between sector-specific factors and ESG performance, providing insights into the drivers of sustainability practices (Hamad & Cek, 2023). The limitations of this methodology include potential discrepancies in the availability and reporting standards of ESG data across different regions and industries.

Finally, the research scope is focused on understanding how different sectors integrate ESG factors into their business practices. Although the study is limited by its reliance on available open-source data, it provides a comprehensive analysis of sector-specific ESG trends. This analysis offers actionable recommendations for companies aiming to enhance their sustainability practices and align with global ESG standards (Gupta & Chaudhary, 2023; Buganová, et al., 2023).

# Results and Discussions

### Cross-sector performance patterns.

The comparative analysis of ESG scores across five sectors–Computer, Building, Commercial Services, Semiconductors, and Medical–reveals clear performance disparities. The Computer (avg = 68.53) and Semiconductors (avg = 68.06) sectors lead with the highest average ESG scores, reflecting more systematic integration of environmental, social, and governance practices. In contrast, the Medical (avg = 60.67) and Building (avg = 62.17) sectors lag behind, highlighting persistent challenges in embedding ESG principles into strategic and operational processes.

These findings support previous evidence that technology-intensive industries adopt ESG practices earlier and more effectively due to their innovation capacity and data-driven governance (Aldowaish et al., 2022; Vrečko et al., 2023), whereas asset-heavy sectors face structural barriers such as legacy infrastructure and complex supply chains, which slow progress in sustainability adoption (Nicolò et al., 2021; Arayssi & Jizi, 2022).

### Insights from leaders and laggards within sectors.

The comparison between leaders and laggards within each sector underscores the importance of firm-level strategy in shaping ESG outcomes. Microsoft (72.76) in the Computer sector and Applied Materials (71.71) in Semiconductors exemplify strong ESG performance driven by transparent disclosure, proactive environmental initiatives, and effective board-level oversight. By contrast, firms like Adobe (66.75) and Lam Research (65.06), while maintaining respectable ESG standards, reveal room for improvement in operational integration and governance focus.

A similar pattern appears in other sectors. Verisk Analytics (71.58) leads the Commercial Services sector with robust Social and Governance practices, while CoStar (60.11) lags behind, resulting in the widest intra-sector gap (11.47). These disparities highlight that governance quality and strategic commitment–rather than sectoral affiliation alone–are decisive factors in determining ESG performance (Eccles & Klimenko, 2019; Khan et al., 2016).

### Sectoral priorities and stakeholder expectations.

The ESG performance patterns highlight that sector-specific material issues shape how companies prioritize sustainability efforts. In Computer and Semiconductors, factors such as energy efficiency,

responsible AI/data use, and supply-chain oversight are both financially material and reputationally significant, helping these industries achieve higher ESG scores. By contrast, the Building sector faces persistent challenges due to hard-to-abate environmental impacts such as embodied carbon, construction waste, and worker safety. These structural barriers slow rapid ESG progress, even for leaders like Owens Corning (64.53) that have credible programs in place.

The Medical sector's mid-range performance reflects strong Social and Governance compliance driven by strict regulations and patient-safety priorities, but progress on environmental practices lags due to complex R&D processes and global supply-chain dynamics (Yoon et al., 2018; Li et al., 2020). These sectoral differences support the materiality-driven view of ESG, which emphasizes that ESG investments are most effective when they address issues central to a firm's long-term financial performance (Khan et al., 2016).

### Trends, disparities, and theoretical interpretation.

The findings illustrate that while ESG reporting standards have improved globally (Daradkeh, 2023; Vrečko et al., 2023), sectoral disparities persist. Technology-related sectors lead, service-oriented sectors perform moderately, and construction-related industries remain behind. This sectoral clustering is consistent with stakeholder theory, which predicts stronger ESG adoption in sectors facing higher reputational pressure and stakeholder scrutiny (Freeman et al., 2010; Eccles & Klimenko, 2019), and with resource-based views, which stress that ESG becomes a strategic asset where industries possess the absorptive capacity–skills, technology, and processes–to translate sustainability demands into competitive capabilities.

### Best practices and mechanisms.

Across the leading firms–Microsoft, Applied Materials, Verisk Analytics, and Eli Lilly–three best-practice mechanisms emerge: (1) Governance orchestration: active board oversight, ESG-linked executive compensation, and reliable non-financial reporting (Eccles & Klimenko, 2019; Arayssi & Jizi, 2022); (2) Operational embedding: integrating ESG goals into R&D, capital expenditure, supply-chain management, and product design (Aldowaish et al., 2022; Vrečko et al., 2023); (3) Stakeholder signaling: transparent, decision-useful disclosures that lower information asymmetry and build investor confidence (Khan et al., 2016; Rivera, 2023).

These practices transform ESG from a policy statement into a capability that differentiates sector leaders from laggards. Implications and recommendations. The evidence suggests that ESG strategies should be sector-specific rather than uniform: (1) Computer & Semiconductors: move from compliance to leadership in Scope-3 emissions management and AI-governance metrics; (2) Commercial Services: enhance S/G assurance, particularly in data ethics and human-capital development; (3) Building: prioritize embodied-carbon measurement, worker-safety telemetry, and green-procurement policies to close environmental gaps; (4) Medical: strengthen supply-chain traceability and equitable-access metrics to enhance S-pillar credibility and investor trust (Yoon et al., 2018; Li et al., 2020; Park & Xie, 2021).

By highlighting how ESG outcomes differ across and within sectors, the study contributes to both theory–extending stakeholder and resource-based perspectives to the sectoral-capability level–and to practice, by offering investors, regulators, and corporate managers evidence to design more targeted policies and incentives for sustainable finance.

## Sectoral Variations in ESG Performance

The study shows that ESG performance varies significantly across sectors and is influenced by each industry's priorities and challenges. The Computer (avg = 68.53) and Semiconductors (avg = 68.06) sectors achieved higher ESG scores, reflecting strong integration of environmental sustainability, responsible governance, and innovation-driven practices. These findings are consistent with previous studies that highlight the role of technological capability and data-driven governance in accelerating ESG adoption (Aldowaish et al., 2022; Vrečko et al., 2023).

In contrast, the Building (avg = 62.17) and Medical (avg = 60.67) sectors recorded lower ESG scores due to persistent barriers such as embodied carbon emissions, construction waste, and complex global supply chains, which hinder rapid ESG progress despite notable initiatives by leaders in these sectors (Nicolò et al., 2021; Arayssi & Jizi, 2022). These patterns confirm the materiality-driven view of ESG

performance, which emphasizes that ESG initiatives yield the greatest impact when they address issues most relevant to the sector's financial and operational outcomes (Khan et al., 2016).

**Table 1.** Average ESG Scores Across Sectors and Score Ranges

| Sector | Average ESG Score | Highest ESG Score | Lowest ESG Score | Range |
|---|---|---|---|---|
| **Computer** | 68.53 | Microsoft (72.76) | Adobe (66.75) | 6.01 |
| **Semiconductors** | 68.06 | Applied Materials (71.71) | Lam Research (65.06) | 6.65 |
| **Commercial Services** | 65.83 | Verisk Analytics (71.58) | CoStar (60.11) | 11.47 |
| **Building** | 62.17 | Owens Corning (64.53) | Watts Water Tech (59.21) | 5.32 |
| **Medical** | 60.67 | Eli Lilly (62.81) | Idexx Laboratories (57.37) | 5.44 |

Table 1 summarizes the average ESG scores across the five main sectors, as well as the range between the highest- and lowest-scoring companies within each sector. Technology-oriented sectors such as Computer and Semiconductors lead with average scores above 68, indicating a higher level of ESG integration and maturity. In contrast, the Building and Medical sectors lag behind, highlighting the need for greater focus on reducing environmental impacts and strengthening governance. The wide score range in the Commercial Services sector (11.47) reflects significant disparities in ESG strategies among companies within the same industry.

## Leaders and Laggards within Sectors

ESG performance is not solely determined by sector-level factors but also by firm-level strategies and governance quality. Leaders such as Microsoft (72.76) in the Computer sector and Applied Materials (71.71) in the Semiconductors sector excel through strong disclosure, proactive environmental initiatives, and board-level oversight. By contrast, Adobe (66.75) and Lam Research (65.06), though competitive, demonstrate weaker integration of ESG into core operations.

In the Commercial Services sector, Verisk Analytics (71.58) leads with robust Social and Governance practices, while CoStar (60.11) lags behind, contributing to the widest intra-sector gap (11.47). These disparities highlight the decisive role of governance quality and strategic commitment in driving ESG performance (Eccles & Klimenko, 2019; Khan et al., 2016).

**Table 2.** Comparison of ESG Leaders and Laggards within Sectors

| Sector | Leader (Score) | Laggard (Score) | Key Strength of Leader |
|---|---|---|---|
| Computer | Microsoft (72.76) | Adobe (66.75) | Strong disclosure, proactive environmental governance |
| Semiconductors | Applied Materials (71.71) | Lam Research (65.06) | Advanced sustainability integration and supply-chain oversight |
| Commercial Services | Verisk Analytics (71.58) | CoStar (60.11) | Robust S/G practices, transparent reporting |
| Building | Owens Corning (64.53) | Watts Water Tech (59.21) | Focus on green materials and construction safety |
| Medical | Eli Lilly (62.81) | Idexx Laboratories (57.37) | Strong compliance with S/G standards and patient safety |

This table shows that ESG gaps exist not only across sectors but also within the same sector. ESG leadership is determined by a combination of governance strategies, transparent reporting, and the integration of ESG targets into company operations. The significant disparity observed in the Commercial Services sector highlights the importance of benchmarking among companies as a strategy to improve ESG performance.

## Factors Influencing ESG Performance

ESG outcomes are shaped by a blend of regulatory frameworks, market dynamics, and technological innovations. Sectors operating under stringent regulations, such as Medical, often show stronger

performance in Social and Governance pillars due to compliance pressures and patient-safety regulations but face challenges in environmental performance because of global supply-chain complexity (Yoon et al., 2018; Li et al., 2020).

Meanwhile, technology-driven sectors such as Computer and Semiconductors benefit from innovation capacity and competitive pressure that encourage efficient energy use and transparent ESG reporting, enabling companies like Microsoft and Applied Materials to lead even in dynamic markets (Aldowaish et al., 2022; Vrečko et al., 2023). In service-oriented sectors, such as Commercial Services, stakeholder expectations related to ethical data use, diversity, and privacy influence companies like Verisk Analytics to prioritize S/G pillars (Eccles & Klimenko, 2019; Rivera, 2023).

### Implications and Recommendations

The findings highlight that ESG strategies need to be sector-specific rather than uniform across industries. The Building sector requires more robust approaches to embodied-carbon measurement, waste management, and worker-safety monitoring, while the Medical sector needs to improve supply-chain traceability and environmental performance to complement its strong S/G compliance (Yoon et al., 2018; Li et al., 2020; Park & Xie, 2021).

High-performing firms such as Microsoft, Applied Materials, Verisk Analytics, and Eli Lilly demonstrate the benefits of effective governance orchestration, operational embedding of ESG goals, and transparent disclosures, which transform ESG from a compliance exercise into a competitive advantage (Eccles & Klimenko, 2019; Rivera, 2023). Policymakers and investors should develop differentiated ESG metrics and tailored incentives to encourage progress in lagging sectors and reward material improvements in ESG performance (Khan et al., 2016; Vrečko et al., 2023).

## Conclusions

This study highlights the essential connection between sustainable finance and corporate governance, demonstrating the central role of Environmental, Social, and Governance (ESG) factors in shaping business strategies. The findings emphasize that integrating ESG into financial decision-making is not merely a moral responsibility but a strategic imperative for achieving long-term value creation and resilience. By aligning financial objectives with societal and environmental priorities, companies can strengthen stakeholder trust, enhance innovation, and secure a competitive edge in an increasingly sustainability-driven global market.

The comparative analysis of ESG performance across sectors reveals that no single approach fits all industries. Technology-intensive sectors such as Computer and Semiconductors have integrated ESG practices more effectively, driven by innovation and governance maturity, while sectors like Building and Medical continue to face structural barriers. These disparities underscore the importance of sector-specific strategies and highlight opportunities for lagging industries to learn from leaders in embedding ESG into operations and governance structures.

The study also recognizes the challenges in ESG integration, including differences in reporting standards, regulatory environments, and market dynamics across sectors. These issues point to the need for more standardized ESG reporting frameworks and policies that promote consistent, transparent evaluation of sustainability performance. Future research should further explore sector-specific ESG priorities and provide tailored recommendations to close performance gaps. By addressing these challenges and building on best practices, businesses, investors, and policymakers can foster a more robust, equitable, and forward-looking ESG ecosystem that supports both financial success and sustainable development.

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