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**TRANSPARENCY, LIABILITY, AND SUSTAINABILITY:  
CORPORATE GOVERNANCE CHALLENGES IN AI-DRIVEN  
ENVIRONMENTAL RISK MANAGEMENT**

**Rashmi B<sup>1</sup>**

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**ABSTRACT**

The integration of emerging technologies such as artificial intelligence and big data is a key driver of transformation in social, political, and economic strategies. Corporate green governance enhances competitiveness with the magnification of global climate change and sustainability challenges. The rapid development of artificial intelligence proposes novel governance principles as 'green governance innovation'. The present revolution in technology leads to the framing of new corporate governance forms, in which AI is operated to perform various managerial functions. The acceptance of AI in corporate governance poses serious risks in the execution of basic corporate principles, such as transparency and accountability, in terms of algorithmic bias and the right to privacy. The study examines the impact of corporate environmental, social, and governance performance on artificial intelligence applications. Although the technological influence enhances ESG performance, the accomplishment of AI raises multifarious matters and apprehensions, as it invites a series of ethical dilemmas for ESG fulfillment. The objective of this research is to evaluate the impact of technological advancement on the distinctive leadership's involvement in fulfilling the business goal, along with ESG considerations. The paper suggests the necessity of digitalization of the boardroom and preservation of its security using an advanced detection system, prioritizing the Chief Executive Officer's (CEO) duty to issue transparency and cybersecurity for reducing risks and enhancing trust in business activities. The paper proposes an 'AI by Corporate Design' framework for integrating AI solutions through re-engineering corporate mechanisms and processes, combining corporate governance rules, business, process management techniques, legal provisions like 'Privacy by Design', and recommendations for responsible AI use from regulations by integrating Stakeholder Theory and Dynamic Capabilities Theory to accentuate the theoretical apprehension of technology-driven

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corporate sustainability. Concerns regarding the environmental impact of AI have emerged along with the rapid development. The article explores the relevance of environmental law principles to frame the theoretical base and justification for an environmental regulation of AI, which is strictly based on public participation, environmental accountability, precaution, and access to justice, to deploy a systematic environmental impact assessment for maintaining sustainability.

**Keywords:** Artificial Intelligence application, green governance, ESG performance, corporate governance, corporate sustainability.

## Introduction

Innovations of the information age and the technological giants have changed basic human life collectively. In the physical world, the dramatic changes in the climatic conditions, the outbreak of the devastating wars, the spread of the virus across the globe, and the infiltration of virtuality are seen in everyday life. In recent times, people spend their time connected to their appliances, stuck to their screens, refreshing streams of personalized content. Artificial intelligence and its impact on our lives are one of the many applications in which the psychological trap of social networking is based, completely on advanced profiling capabilities that harness AI.

The implementation of artificial intelligence promotes rapid changes in the environment of businesses in several industries. An expert workflow is evident in operational efficiency and decision-making processes, driven by AI and its enhanced capabilities<sup>3</sup>. The significant growth in datasets and technologies ensures the firm's valuable insights into existing market trends, consumer behavior, and various operational procedures. Artificial intelligence algorithms process large volumes of data in real time, and it enables various enterprises to make choices that are based on facts<sup>4</sup>. The objective of the paper is to identify the areas where corporate firms require improvements and instruments strategies to mitigate their risk on the environment before they escalate. The paper also analyses the integration of artificial intelligence with environmental, social, and governance principles to advocate beneficial transformation.

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<sup>3</sup> Ranta, V et al., "Digital Technologies Catalyzing Business Model Innovation for Circular Economy- Multiple Case Study", 164, RESOUR. CONSERV. RECYCL., 105155. (2021).

<sup>4</sup> Soluk, J et al., "Small Steps for the Big Hit: A Dynamic Capabilities Perspective on Business Networks and Non-Disruptive Digital Technologies in SMEs", 191, TECHNOL. FORECAST. SOC. CHANG., 122490. (2023)

## Scientific Definitions of AI

The Dartmouth Conference of 1956 is signified as the founding stone of AI research. AI technologies and various sophisticated methods are growing, giving rise to many fair fields of application and saturated into various segments of social, economic, and personal activities. Although no ultimate definition of AI is cited so far, Russel and Norvig outlined the major components of AI as it thinks like a human being, acts with the ability to pass the ‘Turing Test’, the test, that Alan Turing called as ‘Imitation Game’, basically invites a conversation between a human party on one side and a human or computer interlocuter on the other side<sup>5</sup>, and thinks and acts rationally in a logic-based model<sup>6</sup>. AI is generally a highly developed, intelligent agent that could solve and carry out any intellectual task with performance similar to human beings.

AI has attained rapid development, attaining significant power for technological progress, productivity, improvement, and industrial transformation<sup>7</sup>. The implementation of artificial intelligence in improving energy efficiency, controlling emissions, executing innovation, and yielding substantial empirical findings. AI is considered a technical advancement, boosting automation and production efficiency in emission reduction and energy conservation, thereby enhancing resource utilization efficiency<sup>8</sup>.

## AI as a tool favoring business

The accelerated adoption of AI is causing significant revolutions in the business sector. AI integration in the governance aspect is multifaceted. The implementation of corporate governance, environmental, and social principles by the enterprises can regulate the impact of AI consistently, upholding moral values and social responsibilities. There has been a recent increase in ESG considerations and compliance, driven by regulatory bodies in multiple nations. The 17 United Nations Sustainable Development Goals (UNSDG) were ratified by all the member states of the United Nations as part of the 2030 Agenda for attaining sustainable development. As a result of this, the corporations worldwide are distinguishing the substantial impact on everlasting reputation, success, and stakeholder trust. The listed companies are mandated to adhere to ESG guidelines and are required to submit their annual financial reports along with their ESG reports.

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<sup>5</sup> Bernhardt, Christopher R., ‘Turing’s Vision: The Birth of Computer Science’, Mathematics Faculty Book Gallery 3., <https://digitalcommons.fairfield.edu/mathandcomputerscience-books/3>.

<sup>6</sup> RUSSEL, S., & NORVIG, P., ‘ARTIFICIAL INTELLIGENCE: A MODERN APPROACH’, (Pearson Series in Artificial Intelligence) 4<sup>th</sup> ed., (2020).

<sup>7</sup> Acemoglu, D., & Restrepo, P., ‘The Wrong Kind of AI? Artificial Intelligence and the Future of Labor Demand’, 13(1), Cambridge Journal of Regions, Economy and Society, 25-35, (2020).

<sup>8</sup> Soori, M., et al., ‘Optimization of energy consumption in industrial robots, a review,’ (3), Cognitive Robotics 142-157., (2023).

Hence, ESG compliance is a tool for demonstrating corporate commitment and responsibility towards society, aligning companies' objectives with environmental preservation, social equity, and transparent governance. AI is mainly concerned with the implementation of sophisticated machines, skilled in resolving complex problems, learning from expertise, and capable of accepting new challenges. It has the potential to revolutionize major fields such as health care by providing accessibility and enhancing personal care and remedies, connecting the globe as a whole to frame a brilliant human future. The convergence of AI and ESG principles transformed the landscape of corporate responsibility and governance.

### **AI and ESG**

AI can be portrayed as a convergence of technologies and algorithms through which machines could be empowered to perform tasks that really need human brain and intelligence. Various strategies, such as data patterns, data analysis, and decisions made based on it, and responses to human language and encompassed by these responsibilities. Although AI has been encircled in academic research, it has embedded its presence in fulfilling business operations. This integration is considered an assimilation of cultural adaptation and technological adoption. The utilization of AI is needed for the development of transparency and intricate supply chains. Machine learning algorithms can be used to identify the most effective sustainability development strategies and to evaluate their effectiveness in society. By the proper employment of data driven insights, fostering collaboration among legislators, corporations, developers, and communities, AI can be instrumented as a beneficial instrument in the ESG development. The association of AI with environmental, social and governance facilitate active transformation in the business sectors, by enhancing their operational efficiency and disaster management facilities, develops a positive impact on the social responsibility and sustainable practices. Companies can practice their business ethics, enhance efficiency of their sustainability practices, by making use of these AI tools.

### **The role played by AI in corporate governance**

AI can be considered as a powerful tool for reshaping business entities by implementing and assessing their strategic goals. AI's emerging role in corporate governance and sustainability development is outlined by a growing body of research and practice<sup>9</sup>. AI can hence be considered

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<sup>9</sup> Samara et al., "Artificial Intelligence and Machine Learning in Corporate Governance: A Bibliometric Analysis", 44(2), Human Systems Management., 349 – 375., (2025).

as a catalyst for strategic and institutional transformation rather than a mere tool to analyze how enterprises share risks, transparency and accountability in multi shareholder environments<sup>10</sup>.

Predictive ESG risk modelling is possible through the implementation of AI. It makes an outstanding contribution in connecting unprecedented precision with identified and forecasted environmental, social, and governance principles<sup>11</sup>. AI algorithms identify patterns that seriously warn sustainability performance by leveraging datasets from climatic conditions<sup>12</sup>, supply chain data<sup>13</sup>, satellite imagery<sup>14</sup>, and regulatory disclosures<sup>15</sup>. The companies can enhance resilience and enable proactive controlling methods by applying these models into organizational risk management systems<sup>16</sup>. The European Union's Corporate Sustainability Reporting Directive (EU's CSRD) and the United States Securities and Exchange Commission, (U.S. SEC's) climate disclosure rules, expands the scope of ESG regulations, requiring companies to collect, verify and disclose vast non- financial data<sup>17</sup>.

An AI-driven decision-making system enables the board as well as the executives to make more informed strategic decisions based on real-time sustainability data<sup>18</sup>. AI-enabled dashboards and visualization tools enable internal and external stakeholders to simplify complex ESG performance metrics, thereby promoting transparency, trust and engagement<sup>19</sup>. Green Innovation gives

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<sup>10</sup> Ali et al., "A Systematic Literature Review of Artificial Intelligence in the Health Care Sector: Benefits, Challenges, Methodologies, and Functionalities", 8(1), *Journal of Innovation and Knowledge*, 100333, (2023) <https://doi.org/10.1016/j.jik.2023.200333>

<sup>11</sup> Zhang, C., & Yang, J., "Artificial Intelligence and Corporate ESG Performance", 96, 103713, *International Review of Economics and Finance*, (2024). <http://doi.org/10.1016/J.IREF.2024.103713>

<sup>12</sup> Mohamed Riyath & Inun Jariya., "The role of ESG reporting, artificial intelligence, stakeholders and innovation performance in fostering sustainability culture and climate resilience", *Journal of Financial Reporting & Accounting*.

<sup>13</sup> S. Wang & Zhang, "Enhancing environmental, social, and governance performance through artificial intelligence supply chains in the energy industry: Roles of innovation, collaboration, and proactive sustainability strategy.", 245., *Renewable Energy*, 122855., (2025c)

<sup>14</sup> Hosseini et al., "Geospatial Artificial Intelligence (GeoAI) and satellite imagery fusion for soil physical property predicting", 15(19), *Sustainability* 14125., (2023).

<sup>15</sup> Zeng, F et al., "An optimized machine learning framework for predicting and interpreting corporate ESG greenwashing behavior", 20(3), *PLoS One*, e0316287., (2025).

<sup>16</sup> Abhayawansa, S., & Tyagi, S., (2021) "Sustainable investing: The Black box of environmental, social, and governance (ESG) ratings.", 24(1) *Journal of Wealth Management*, 49-54., (2021).

<sup>17</sup> Lambooy, T. et al., "Nature as a stakeholder: Including nature in corporate governance practices to meet the EU corporate sustainability reporting directive.", 16(2)., *Mednarodno Inovativno Poslovanje*., (2024)., <https://doi.org/10.32015/JIBM.2024.16.2.5>

<sup>18</sup> Samoilenko & Osei-Bryson, "Design of a modular DSS for public health decision-making in the context of a covid-19 pandemic landscape", 191, *Expert systems with Applications*., 116385., (2022). <https://doi.org/10.1016/J.ESWA.2021.116385>

<sup>19</sup> Neset et al., "Visualization-supported dialogues in the Baltic Sea Region.", 48(11)., *Ambio*., 1314-1324., (2019). <https://doi.org/10.1007/s13280-019-01250-6>

reference to improved products, processes and practices for reducing environmental impacts and to ensure sustainability<sup>20</sup>.

### **Challenges on Corporate Governance**

Experts acknowledged that all corporate governance operations, ranging from monitoring duties and strategy settings to decision-making and compliance activities, are profoundly affected by the advanced capabilities of AI, commonly in data collection, valorization, and processing- mainly through machine learning and operational algorithms. The extent to which AI will affect business transactions and corporate governance structure is still controversial. On one side the scholars also argue that AI changes the current corporate governance paradigm, highlighting the agency problem, a long-lasting challenge<sup>21</sup>. On the other hand, it is argued that AI improves governance procedures and practices without corporate boards and managers' obsolete roles. Traditional board members may be replaced by the technical board members, which operates through algorithms, assessing instantaneous strategic alternatives, and executing the decisions based on the data that match the company's goals and moral values. This opinion is based on three views, which are the development of so-called general artificial intelligence<sup>22</sup>, performance of AI tools for both administrative and judgment tasks being graded over humans<sup>23</sup>, and hence humans become less suitable to work as board members than machines<sup>24</sup>. The replacement of human board members with AI machine tools and algorithms need not strictly improve decision-making from the shareholders' perspective. Hence the experts outlined the significant limitation of technology and algorithms to play the role of boards in a company<sup>25</sup>.

### **Proposed Framework to Manage the Corporate Governance Transition**

The AI systems integration into corporate operations brings enormous challenges and risks related to various areas such as privacy, safety, security, bias, ethics, transparency, explainability, accountability, and so on. The implementation of AI in corporate management could affect it adversely if it is not operated wisely, jeopardizing both the corporate efficiency and stakeholders'

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<sup>20</sup> Liu et al., "Green Innovation and Corporate ESG performance: Evidence from Chinese listed companies", 95., *International Review of Economics & Finance*, 103461., (2024).

<sup>21</sup> C. Michael et al., "Theory of firm: managerial behavior, agency costs and ownership structure", 305., *Journal of Financial Economics*, (1976).

<sup>22</sup> H. Henry et al., "The limits of machine intelligence: Despite progress in machine intelligence, artificial general intelligence is still a major challenge", 20., *EMBO Reports*, (2019).

<sup>23</sup> M. Petrin, "Corporate Management in the Age of AI", 30, *UCL Working Paper Series*, (2019).

<sup>24</sup> M. Fenwick & E.P.M. Vermeulen., "Technology and Corporate Governance: Blockchain, Crypto and Artificial Intelligence", 2., *Texas Journal Business Law*, (2019).

<sup>25</sup> Enriques, L & Zetzsche, A., "Corporate Technologies and the Tech Nirvana Fallacy.", 71, *Hastings Law Journal*, (2019).

rights<sup>26</sup>. A framework named AI by corporate design invites remarkable inspiration from the privacy by design concept. The framework highlights proactive measures and active responses, impact analyses on Stakeholders' rights, designing both corporate processes and governance structure by the integration of AI, providing transparency and accountability throughout the life cycle of AI, and dedication and commitment to a operation centric approaching the deployment of AI with corporate strategies<sup>27</sup>. The concept of 'dynamic detection' demonstrates the necessity of safeguarding against all cyber threats. Cybersecurity and related dangers are being dealt with by boardrooms, which are increasingly expected to prioritize cybersecurity and digital transformation. Corporate governance necessitating boards to hold the CEO responsible for cybersecurity and cyber risks results in legal thumping or undergoing supervisory scrutiny<sup>28</sup>. AI value chain presents many challenges, due to the complex and multi layered nature of AI lifecycle. Recent legislative developments including in the EU, the CSRD and the Corporate Sustainability Due Diligence Directive (2024) (CSDDD) aims to enhance transparency and accountability by requiring companies to disclose their environmental impacts and ensure that their operations align with broader sustainability goals<sup>29</sup>.

## Conclusion

AI technology develops across diverse industries, thereby establishing a digital industrial space, which can shape economic and social development. Sustainable development goals can be achieved by uniting AI with green governance. Corporate green governance can be achieved by the continuous breakthrough in AI technology. Focusing policy orientation to enhance total turnover efficiency improves utilization energy of green assets. At the same time, implementation of policies to promote AI technologists increases the renewable energy usage. Dedicated funds should be established to increase renewable energy usage, and reduction of carbon waste across the country. Financial institutions are called to incorporate the equation of AI as "AI +green governance. Regulators can further encourage enterprises to leverage AI for optimized financial management, ensuring green investment budgets liquidity alliance with the green governance expenditures. This approach shutters short term financial pressures from constraining enterprises' long term green transformation.

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<sup>26</sup> L. Floridi, "Soft Ethics, and the Governance of the Digital", 31, *Philosophy and Technology*, 3., (2018).

<sup>27</sup> Giuseppe Claudio Cicu., "Bridging Traditional Corporate Governance and Technology: the AI Corporate Design Framework to Computational Corporate Governance Model", 10(1-2), *The Italian Law Journal*, 350-351., (2024).

<sup>28</sup> Kombate, Y et al., "A bibliometric method for analyzing IoT hacking solutions in network services.", 203., *Procedia Computer Science*, 141-148., (2022).

<sup>29</sup> Thomas Le Goff., "Environmental Law's Principles Applied to Artificial Intelligence: A Path Towards Regulation, *International Review of Law*", *Computers & Technology*., (2025), <https://doi.org/10.1080/13600869.2025.2506166>