Synopsis

Unique ESG risks are posed by AI adoption, including its environmental impact through increased energy consumption by data centers. The article provides practical insights into managing these risks and outlines a five-step approach for effective ESG risk mitigation in organisations adopting AI technologies.

AI and emerging ESG risks: a pragmatic approach

by **Rajagopal** Kannan

introduction

Artificial Intelligence (AI) is nowadays considered a panacea in the business world and its adoption has accelerated exponentially since the advent of Generative Pre-trained Transformer (GPT) architecture. Like its applications in other domains AI can support sustainability risk management in various ways, such as automated regulation tracking, bolstering taxonomy alignment, emission monitoring, and improved climate risk modelling. However, AI adoption brings a set of new risks too. For instance, simple ChatGPT queries require ten times more electricity than a Google search due to the electricity consumed by AI data centers. This impacts the electricity (Scope 2) emissions of AI developers and the value chain (Scope 3) emissions of AI end users, impacting sustainability performance and increasing risks of non-compliance, penalties and reputational damage.

This article attempts to highlight the emerging ESG risks arising from AI adoption, its unique characteristics and provides risk managers with a five-step approach to manage AI-driven ESG risks effectively.

AI and emerging ESG risks

AI, while improving the efficiency of business processes, changes the organizational risk landscape with a spectrum of new risks that impact not only the environment but also the social and governance aspects of the business. Key ESG risks related to AI are presented in Figure 1.

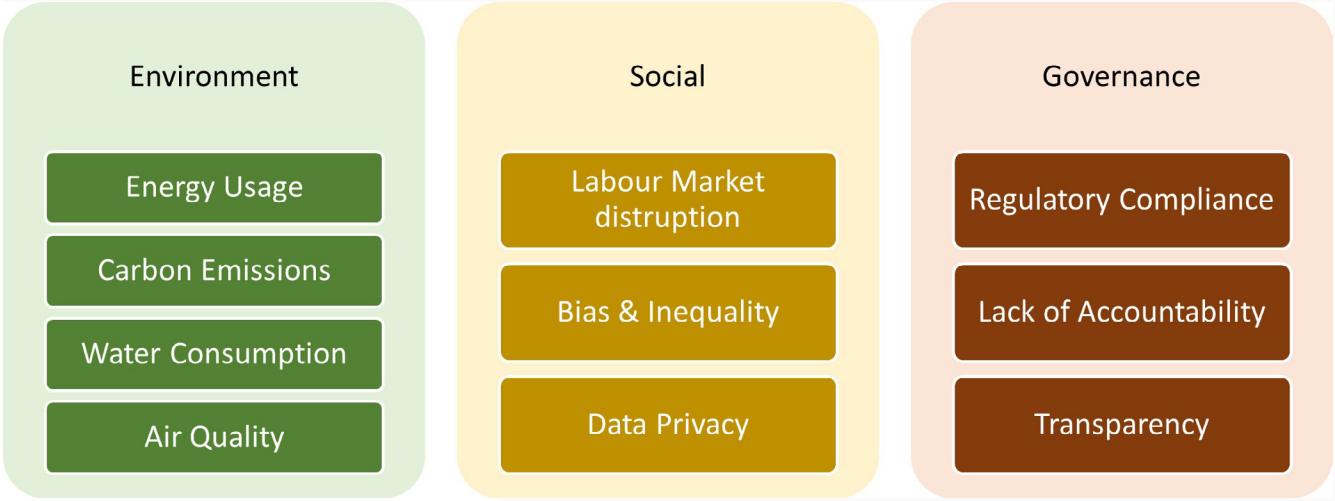

Figure 1. AI-driven ESG Risks

While the social and governance implications of AI adoption are readily identifiable and understandable, its environmental impacts are considerably less intuitive. Hence, selected empirical data are presented here to help understand AI's environmental consequences.

1. **Energy usage:** AI models are trained and deployed in data centers. The accelerated trend in AI adoption requires more data centers with high performance servers leading to increased energy demand. Data centers accounted for about 1.5% of global electricity consumption in 2024 and their electricity use is expected to reach 945 TWh by 2030, almost double the current level. At present, the majority of data centers' energy needs are met by fossil fuels.

2. **Emissions:** CO2 emissions from electricity use by data centers was 180Mt in 2024 and is estimated to reach 300Mt in 2030 in base case and up 500Mt in the lift-off case. It is worth mentioning that data centers are among the fastest growing sources of emissions.

3. **Water consumption:** Recent research finds that training GPT-3 in Microsoft's U.S. data centers can consume a total of 5.4 million liters of water, including 700,000 liters of scope-1 on-site water consumption. Data center water consumption globally is estimated to be 1,068 billion liters annually by 2028, an 11-fold increase from the current level.

4. **Air quality:** AI lifecycle from chip manufacturing to data center operations degrades air quality through emission of particulate matter. One recent study found that training an AI model of Llama3.1's scale can produce air pollutants equivalent to more than 10,000 round trips by car between Los Angeles and New York City.

AI-driven ESG risk: why risk managers must adapt

Given the rapid adoption of AI, it becomes imperative for risk managers to comprehend the nuances of AI integration as well as its ESG impacts. The dual nature of AI applications - offering both opportunities and risks – requires risk managers to carefully evaluate AI use cases viz-a-viz their potential downsides and to make informed trade-offs between business growth and risk exposure. Failure to strike the right balance between the potential benefits and risks of AI adoption can negatively impact the business and undermine the very purpose of AI implementation.

Unlike traditional risks, AI-driven risks have unique characteristics that pose the following challenges for risk managers:

- **Multi-node Impacts:** It affects diverse functions simultaneously as AI implementations are cross-functional and may lead to concentration risks.

- **Non-linear Nature:** The effects of AI are not linear; they vary across the business function and organizational dimensions, requiring a distinct risk methodology. For example, AI reduces emissions in manufacturing, improves governance in banks, shows stronger ESG gains in state -owned firms; thus, it affects functions differently, highlighting the need for a tailored approach.

- **Cross Dimensional Effect:** AI adoption has impacts on environment, social and governance dimensions of organizations and thus requires a holistic risk management approach.

Risk managers must understand the unique characteristics of AI risks and implement a robust risk management framework to ensure that the ESG risks emerging from AI are mitigated in a timely manner while enabling the business to achieve its goals.

five-step approach to AI-driven ESG risks

Despite the fact that AI and ESG are emerging fields from two distinct domains – AI serves as a tech enabler, while ESG promotes transparency through disclosure – AI both intersects with and cuts cross ESG. This interrelation requires a control environment that is robust in managing both the technology and ESG risks. Risk managers, accordingly, must adopt standards related to technology risks such as NIST AI RMF, ISO/ IEC 42001, OECD AI Principle as well as standards related to ESG (GRI, SASB, ISSB, TCFD). Building on the above standards and frameworks, below is an effective five-step approach to AI-driven ESG risks.

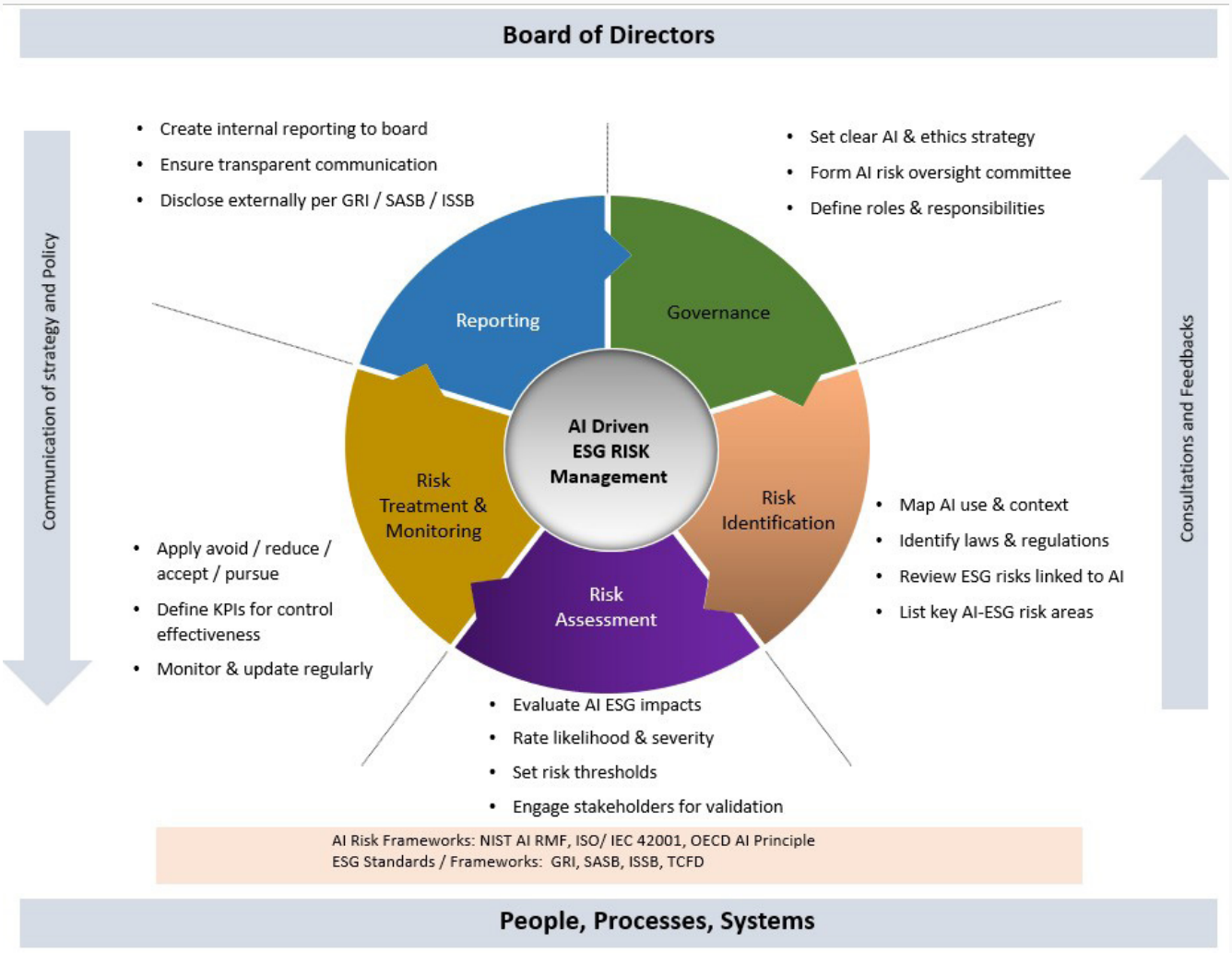

Figure 2. Five-Step AI-driven ESG Risk Management Framework

Governance:

- Set a clear organizational strategy for AI development / adoption, including an ethical AI use policy.
- Establish accountability for AI use setting up, including the creation of senior management committee for overseeing the AI risk management.
- Define clear roles and responsibilities for individuals managing the AI risks.
- Ensure that adequate policies and procedures related to AI risk management are in place, aligned with existing applicable standards and industry best practices.

Risk Identification:

- Understand the organization's context from the perspective of AI development/adoption.

- Understand the international and local legal and regulatory frameworks governing AI application development / adoption.
- Review the organization's existing risk inventory from an ESG perspective and assess whether the risks have actual or potential impacts on environment, society or governance in relation to AI applications.
- Building on this knowledge, identify and enumerate all the actual and potential ESG risks related to AI applications.

Risk Assessment:

- Evaluate the positive and negative impacts of AI applications on environment, society and governance.
- Assess the likelihood and severity of the identified risks.
- Set appropriate quantitative and qualitative thresholds for ESG risks related to AI.
- Conduct consultations with the stakeholders who are impacted by or vulnerable to the identified risks.
- Determine the materiality of the risks based on assessed risk levels, stakeholder consultations viz-a-viz the quantitative and qualitative thresholds.

Risk Treatment and monitoring:

- Depending on the materiality of the risks, adopt appropriate risk treatments – accept, avoid, pursue (to convert risk into opportunity) or reduce the risk.
- Establish measurable KPIs to track the effectiveness of risk treatments.
- Monitor risks continuously and adapt risk treatments dynamically as appropriate.

Reporting:

- Establish an internal reporting framework for senior management and board.
- Communicate the organization's ESG risks related to AI applications transparently including how those risks are being managed internally.
- Establish a framework for transparent external communication of ESG risks related to AI.

This five-step approach is continuous and iterative in nature. The reporting layer feeds back into

governance, and communication and feedback loops reinforce it, while evolving AI and ESG standards keep the model current and dynamic. This framework can be either established as a standalone model or integrated with the organization's enterprise risk management framework. Its applications to both AI development companies and AI adoption companies are presented in Figure 3.

	AI Development	AI Adoption
Governance	- Set up AI – ESG oversight committee - Define responsible AI strategy for environmental and social impacts - Adopt AI ethics policy on data privacy and bias.	- Establish Board level AI risk oversight - Define AI use policy ensuring just transition, data privacy - Set AI vendor compliance criteria for AI ethics and standards
Identification	- Identify applicable AI laws and ESG standards and develop check list - Map AI systems and data sources across all projects - Review model design and algorithms for energy efficiency and data bias.	- Identify local and global AI compliance requirements - Map AI use cases across business functions - Assess AI vendors and implementation practices for ESG risks - Identify potential social impacts such as workforce reduction, data privacy and bias
Assessment	- Evaluate how AI development affects energy and emission, algorithms bias and data privacy - Engage with employees, communities and regulators to validate the assessment - Prioritise risks based on evaluation and stakeholders' input.	- Assess impacts of AI use such as scope 3 emissions, data bias, potential job losses and data privacy. - Engage with employees, customers and communities through stakeholder engagement. - Priorities risks based on the evaluation and stakeholders' input.
Treatment	- Energy efficient model design - Renewable energy powered data centre - Carbon offsetting programs - Bias deduction & inclusiveness checks	- Encourage AI vendor carbon footprint offsetting - Adapt responsible AI use - Employee upskilling programs - Establish SLAs for AI vendors
Reporting	- Establish reporting framework in line with ISO/IEC 42001 and NIST AI RMF - Track and monitor data centre's energy and emissions aligned with GRI 302 & 305. - Track and monitor bias, workforce displacement and data privacy compliance as per GRI 401, 404 & 418. - Publish sustainability report with detailed disclosure on AI-driven ESG risk management and carbon offsetting programs.	- Integrate AI-driven ESG risk dashboard in board reporting - Maintain transparency on vendor ESG performance - Track and monitor bias in AI outputs, workforce effects and data privacy - Track and monitor KPIs related to emission, carbon offsetting related to AI systems in line with GRI & SASB. - Publish sustainability report detailing AI-ESG impacts in line with GRI, TCFD & IFRS S1 & S2.

Figure 3. Five-Step AI-driven ESG Risk Management Framework in Action

key challenges and the way forward

The above framework is robust in nature, but the real challenge lies in its effective execution. The key challenges in operationalizing the framework stem from weak governance, unclear regulatory mapping, a static compliance-driven approach, and poor data quality.

Lack of clear accountability for AI-driven ESG risks across technology, sustainability and risk functions, coupled with the limited AI knowledge at the board level, weakens governance and hinders meaningful board oversight of risk. Further, AI use cases evolve faster than the risk and regulatory mapping, resulting in inadequate and inconsistent risk identification. Fuelling this challenge, AI-driven ESG risks, given their qualitative nature are difficult to quantify using traditional risk models, leading to the underassessment of material risks. Reporting and disclosure remain largely narrative-driven and focused on policy rather than outcomes. Adding to the problem, the existence of multiple disclosure standards coupled with poor data quality and lack of auditability make the external reporting inconsistent and unreliable.

Overcoming the challenges requires shifting ESG from a reporting exercise to a decision-grade risk discipline. This calls for a holistic approach to risk management, starting from the top down – setting clear AI-ESG accountability at the board and senior management level, supported by a centralized inventory of AI use cases combined with materiality-aligned risk assessments. Risk controls must be embedded across the AI lifecycle, supported by a unified data framework to enable traceable and consistent reporting. Last, but not least, successful implementation of the framework requires integrating people, processes, and systems through strong governance, communication and continuous oversight.

conclusion

Given the pivotal role of AI in business automation and its widespread adoption across business divisions, it is imperative for risk managers to understand the risks arising from AI implementation and take a balanced, pragmatic approach.

AI Disclaimer: The author used ChatGPT to research and collect the source documents referenced here and to create the list of reference texts.

author

Rajagopal Kannan

Rajagopal is a Risk Management Consultant and ESG Subject Matter Expert leading ESG risk management and sustainability initiatives, currently serving as Director – Projects & Value Chain at SAM Corporate LLC, a UAE-based FinTech cum consulting firm providing advisory services and ESG software solutions.

Previously, he worked as a Risk Manager at a UAE-based bank. He has 12+ years of banking experience across credit origination, credit structuring, and risk management. His expertise spans Basel II & Basel III, risk modelling, regulatory risk reporting, internal control and auditing, IFRS 9, ESG and Climate-related risks.

He holds MFM, MPhil., CBiiiPro, CRCMP, GRCP, GRCA, CSM, SCR, and PRM. He is also a GRI-certified Sustainability Professional and has the CISI Level 3 Award in Risk in Financial Services & Investment Operations.

peer-reviewed by

Chandrakant Maheshwari