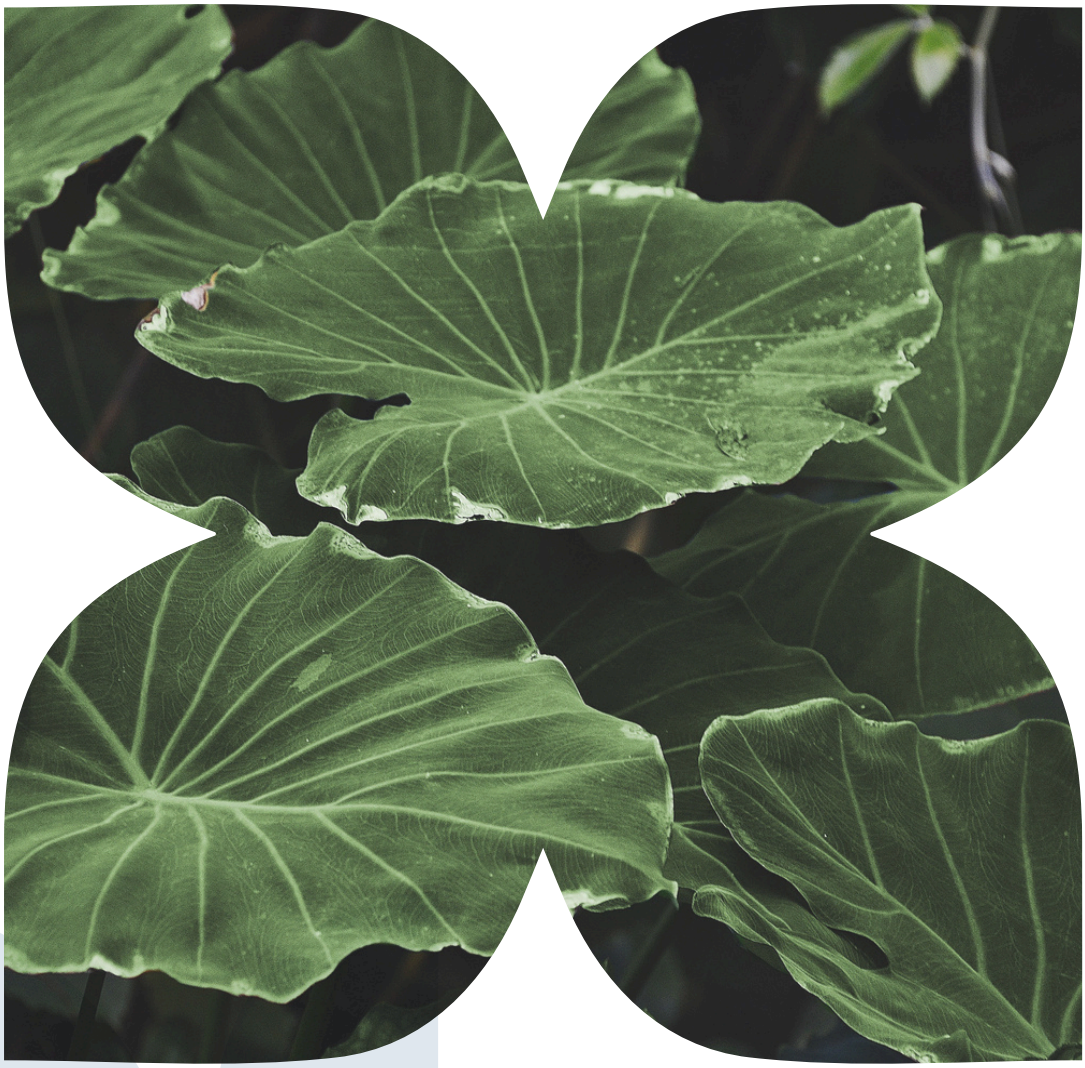
RecyGlo THAILAND

DIGITAL TRANSFORMATION & ESG

A GUIDE FOR MODERN BUSINESSES



EXECUTIVE SUMMARY

This paper explores the rising importance of Environmental, Social, and Governance (ESG) principles in business, with a focus on how companies are using digital technologies into their sustainability strategies. ESG frameworks such as the Global Reporting Initiative (GRI), Sustainability Accounting Standards Board (SASB), and Science-Based Targets (SBT) offer guidelines for measuring and reporting sustainability performance. The study clarifies the difference between Corporate Social Responsibility (CSR) and ESG, emphasizing that ESG is a structured, measurable approach embedded in core business operations, unlike CSR, which is often voluntary.

The research also highlights the growing legal pressure on companies to adopt ESG, with new regulations imposing fines, taxes, and penalties for non-compliance. The paper stresses how digital technologies, including AI and blockchain, are transforming ESG reporting and helping businesses meet regulatory demands. As ESG becomes an essential part of corporate governance, companies that embrace it are better positioned for long-term success and resilience.

INTRODUCTION

Environmental, Social, and Governance (ESG) factors have become important benchmarks for evaluating a company's sustainability and long-term value creation. Ramadhani (2019) notes that ESG has rapidly gained prominence across the business and financial sectors as it offers a quantifiable framework for assessing corporate sustainability performance. The integration of ESG principles—whether through regulatory requirements or voluntary initiatives—has become a strategic tool. This is done by identifying potential risks and opportunities to drive more informed financial decision-making. However, despite global momentum toward full ESG integration, some companies continue to fall behind. For example The Paris Agreement, which pushes countries to shift toward a low-carbon economy and reduce Greenhouse Gas (GHG) emissions, has increased pressure on the critical sectors to align with these sustainability goals (Ramadhani, 2019).

Several studies have established the financial benefits of strong ESG practices. For instance, according to a Harvard Business School study, **companies fully incorporating ESG initiatives achieved significantly higher profitability and stock market performance compared to those with weak ESG ratings** (John, 2024). This can be confirmed further as McKinsey & Company similarly pointed out that **effective ESG strategies can influence a company's operating profits by as much as 60%** (John, 2024). Additionally, various studies highlighted the important role of digital transformation in driving corporate ESG performance. Wu and Li (2023) observed that digitalization enhances ESG outcomes by reducing operational inefficiencies and improving corporate reputation, while Sun and Saat (2023) demonstrated how intelligent manufacturing technologies can elevate ESG performance in the manufacturing sector. Zhong et al. (2023) further noted that **digital transformation strengthens internal controls and corporate governance**, leading to improved ESG scores. Based on these findings it is not doubt that digital innovation plays an important role in advancing ESG initiatives and positioning companies for sustainable growth.

This paper aims to explore the evolving global ESG landscape and its business implications, particularly as digitalization and Artificial Intelligence are currently reshaping corporate strategies and accelerating ESG outcomes.

UNDERSTANDING ESG FROM DIVERSE BUSINESS PERSPECTIVES

There is a general assumption that many top companies that focus on ESG have led them to achieve better financial results. But in reality, they can achieve more than that. For example, **Unilever**, which is known for its sustainable practices, has regularly outperformed its competitors in profitability and growth. One of the top global Electric Vehicle (EV) producers, **Tesla**, with its emphasis on sustainable energy, has not only boosted its market value but also placed itself as a leader in the automotive industry (John, 2024).

In driving social responsibility, the '**S**' in E**S**G plays a very impactful role. For business leaders, understanding how ESG's social and governance aspects impact employees and company culture is essential. Promoting diversity and inclusion is a key part of the social aspect. A diverse team brings different ideas and boosts creativity which then leads to greater job satisfaction and productivity. **Microsoft**, for example, has made significant efforts in this area through programs for underrepresented groups and transparency in diversity metrics. As a result, Microsoft has a more innovative workforce (John, 2024).

Focusing on employee well-being also enhances engagement and productivity – **Salesforce**, known for its excellent health benefits and flexible work options, has seen high employee satisfaction and performance. Adhering to ethical labor practices, like fair wages and safe working conditions, builds trust and loyalty, as shown by **Nike**'s efforts to improve its supply chain conditions (John, 2024). Effective governance, which includes transparent reporting and a diverse board, ensures ethical practices and accountability. **Intel**'s detailed ESG reporting and **Procter & Gamble**'s diverse board are great examples of this commitment (John, 2024).

While Corporate Social Responsibility (CSR) and ESG are often used interchangeably, there are key differences between the two. CSR primarily ***focuses on a company's ethical obligations to society, often seen as voluntary activities beyond legal compliance***. ESG, on the other hand, is a more structured approach that integrates environmental, social, and governance factors into a company's financial and operational strategies. Empirical research shows that businesses adopting ESG frameworks perform better in terms of risk management and long-term profitability compared to those with traditional CSR programs. This is largely due to ESG's emphasis on measurable and reportable outcomes, making it more impactful in aligning business activities with global sustainability goals.

EVOLUTION OF ESG

As mentioned in the previous section, businesses have adopted ESG practices to help build investor confidence. However, Ramadhani (2019) believes that ESG has not yet fully replaced traditional investment methods. Achieving sustainability, however, remains a difficult task. According to Shapsugova (2023), international law does not explicitly require the use of ESG principles. However, many international agreements, guidelines, and standards promote ideas that are central to ESG principles.

Some of these international frameworks and guidelines include:

1

The United Nations Global Compact

This is a voluntary program that encourages companies to adopt sustainable, socially responsible practices and report on their progress. It includes ten principles related to human rights, labor, the environment, and anti-corruption, aligning with ESG values (UNGC, 2020).

2

The Principles for Responsible Investment (PRI)

Supported by the United Nations, PRI offers a guide for including ESG factors in investment decisions. It consists of six principles focusing on ESG issues within investment practices (United Nations, 2000).

3

OECD Guidelines for Multinational Enterprises

These guidelines provide recommendations for responsible business conduct, covering topics like human rights, the environment, and combating bribery. While not legally binding, they encourage companies to follow internationally recognized standards (OECD, 2011).

4

United Nations Sustainable Development Goals (SDGs)

The SDGs set 17 goals aimed at addressing global social and environmental challenges by 2030. They encourage businesses to align their strategies with these goals, which encompass many ESG issues (UN, 2015).

5

The Paris Agreement

This international agreement seeks to limit global temperature rise and requires countries to commit financially to reducing carbon emissions. It emphasizes the need for businesses to adopt low-carbon practices, a key part of ESG's environmental focus (UNFCCC, 2016).

Businesses are required to follow the laws and regulations that apply to their activities, which is considered a basic responsibility in the corporate world (Shapsugova, 2023). Legal obligations cover many areas, including labor and employment laws, environmental regulations, and fair trade practices. Additionally, a plethora of opportunities originates from these guidelines and international agreements, which businesses need to tap on to. Businesses not equipped with necessary resources, including digital adoption, are sadly left out of these opportunities.

Recent developments in ESG reporting have seen the introduction of globally recognized standards such as the **Global Reporting Initiative (GRI)**, **Sustainability Accounting Standards Board (SASB)**, and **Science-Based Targets (SBT)**. These frameworks offer businesses detailed guidance on how to measure and report their environmental, social, and governance efforts. As ESG practices become mandatory in various regions, adherence to these frameworks ensures transparency and accountability as exemplified in the table below.

GRI	SASB	SBT
provides a comprehensive set of standards for sustainability reporting	*focuses on financial materiality related to ESG factors*	*drives businesses to set carbon reduction targets in line with climate science*

In Southeast Asia and beyond, **ESG compliance is increasingly becoming part of legal structures.** Governments are introducing punitive mechanisms such as **fines, levies, and carbon taxes** to enforce environmental and social governance. For instance, several countries in the region are implementing **carbon taxes** to align with global climate targets. Additionally, **non-compliance with ESG** standards can **lead to reputational damage** and **legal penalties**, as new laws make ESG practices **mandatory** across sectors. As these regulations grow, companies are pressured to incorporate ESG into their core strategies to avoid financial and legal repercussions.

DIGITAL TRANSFORMATION & ITS IMPACT ON ESG

Digital technologies like **Artificial Intelligence, Internet of Things (IoT) and Blockchain** have significant potential to not only improve businesses but the society (Guerra et al., 2023; Wang et al., 2023). Digital transformation involves incorporating these technologies into all areas of a business, changing how it operates and delivers value to customers (Vial, 2019). This can be achieved by establishing a digital strategy that aligns a business's goals with these technologies to gain a competitive advantage (Correani et al., 2020). Digital resources refer to a company's digital assets and capabilities, such as hardware, software, data, and digital skills (Mikalef and Gupta, 2021).

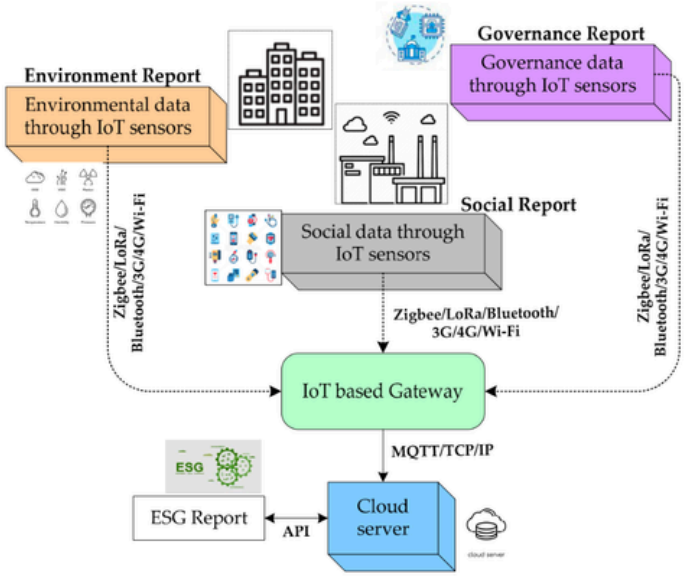
ESG and digital transformation are closely linked (MAPL World, 2024). Digital tools help businesses reduce environmental impact through technologies like IoT sensors, which provide real-time data for optimizing energy use. At the same time, **strong cybersecurity systems protect sensitive ESG data, ensuring compliance with privacy regulations**. Digital platforms also enhance communication with stakeholders, encouraging transparency and trust. To maximize benefits, businesses must align their digital strategies with ESG goals, creating a more sustainable and responsible approach.

Integrating ESG with digital transformation brings significant advantages (MAPL World, 2024). Digital tools streamline data collection and reporting, helping companies meet evolving ESG requirements. Technologies like AI and smart grids also help reduce environmental impact by optimizing resource use. This data-driven approach not only improves sustainability but also makes **companies more attractive to investors**. Additionally, digital solutions enhance **social responsibility** by promoting **transparency** and empowering employees through sustainable practices.

More than 200 of the world's largest companies predict that climate change could cost them nearly USD 1 trillion, with most of the damage happening within the next five years (Green, 2019). Although ESG is meant to ensure long-term financial success, **moving from traditional ESG to digital ESG can save even more money.** Companies can cut management costs by using or buying digital technology services (Wang et al., 2022). Many businesses are adopting digital transformation, which helps them **lower costs** and become **more efficient** (Pinheiro et al., 2022). The way companies share information with stakeholders will also change in a digital setting (Aerts et al., 2007). This means that digitalization can **reduce gaps in information and communication** costs between companies and stakeholders, lowering the chances of misleading financial practices. It also increases transparency, allowing for more meaningful collaboration with stakeholders.

A study by Saxena et al. (2022) suggests a **smart ESG reporting platform** that uses blockchain and IoT technology. This platform aims to improve **transparency**, **security**, and **reliability** in the ESG reporting process. The system collects environmental data through corporate crowd-sensing. As environmental data from weather models and sensor networks grows, it must be stored, managed, and shared globally with researchers and policymakers. The proposed ESG architecture, illustrated in Figure 1 below, is built on IoT, where smart devices exchange data. IoT consists of five layers, including the perception layer, which uses wireless sensors to gather data. Various sensors like oxygen, gas, PM2.5, PM10, and CO2 measure air quality and carbon footprints in real-time. These sensors help **evaluate sustainability impacts** and **improve health** through better environmental quality. Additional sensors track factors like pressure, heart rate, and glucose levels, contributing to social ESG metrics (Saxena et al., 2022).

Figure 1: IoT Framework for ESG



Source: Saxena et al. (2022)

Big data structure has also been incorporated into ESG reporting. This structure includes **data sources, collection, storage, analysis, and visualization**. ESG data typically comes from remote sensing, IoT devices, operational systems, and social media. This data is enormous and helps **identify hidden patterns, trends, and preferences**. Environmental data covers air quality, weather, forests, water resources, and waste management. Remote sensing data, which grows rapidly—by about 20% each year—makes up a large part of this big data. The study explores the benefits and challenges of using geospatial big data, such as **improving time management, reducing fuel use, boosting revenue**, and **enhancing urban planning** and **healthcare**. It also highlights new technologies being developed to manage and analyze this data.

Alan Turing first promoted AI research in the 1950s, and John McCarthy coined the term "artificial intelligence" in **1955**. AI has significantly impacted various industries, including **marketing**, **finance**, **engineering**, **healthcare**, and **education**, by creating systems that mimic human thinking with greater accuracy and speed. As AI becomes more prevalent, it's essential to regulate these systems to prevent potential risks and ensure ethical use. Incorporating AI into ESG assessments may be necessary, given its importance across many sectors. To address concerns about AI accountability and knowledge gaps, standardized measures and effective control mechanisms are needed (Saxena et al., 2022).

Investors are increasingly seeking models that incorporate both ESG factors and behavioral biases. Despite biases like loss aversion, recent experiments have integrated AI with ESG data to **improve investment decisions** (Saxena et al., 2022). Natural Language Processing (NLP) algorithms are used to analyze governance and social data, providing simpler ways to **predict ESG rankings** (Saxena et al., 2022). Companies with high ESG ratings have shown better financial performance. Proper governance of AI systems can align ethical principles with practical applications, although it requires robust evaluation tools. Therefore, the use of AI can enhance ESG investment by overcoming data biases and improving the analysis of critical information.

Blockchain has transformed the financial industry with its distributed ledger technology, supporting applications like **asset management** and **peer-to-peer data sharing** (Saxena et al., 2022). This is particularly useful for international climate finance, where a lack of standardized reporting exists. Blockchain enhances transparency and **automation** in ESG reporting by using IoT devices to collect data, which is then transmitted through a blockchain gateway for privacy and transparency. Smart contracts further **automate processes**, ensuring accurate sustainability evaluations. Studies show blockchain improves transparency, security, and **data authentication**, often in combination with IoT and AI, especially in areas like **energy trading** and **carbon emissions monitoring** (Saxena et al., 2022). Table 1 below highlights several studies on the implementation of blockchain technology for ESG.

Table 1: Blockchain Technology Applications in ESG Research

Research Reference	Research Objectives	Use of Blockchain	Industry
Liu, X., Wu, H., Wu, W., Fu, Y., & Huang, G. Q. (2021). Blockchain-enabled ESG reporting framework for sustainable supply chain. In Sustainable Design and Manufacturing 2020: Proceedings of the 7th International Conference on Sustainable Design and Manufacturing (KES-SDM 2020) (pp. 403-413). Springer Singapore.	A blockchain-based framework and token-based mechanism were proposed to support the sustainability assessment of companies in relation to ESG.	Transparency, data authentication & consistency	**Supply Chain**
Wu, W., Fu, Y., Wang, Z., Liu, X., Niu, Y., Li, B., & Huang, G. Q. (2022). Consortium blockchain-enabled smart ESG reporting platform with token-based incentives for corporate crowdsensing. Computers & Industrial Engineering, 172, 108456.	Utilizing IoT and blockchain technologies to combat greenwashing in firms and create reliable, transparent ESG reporting systems.	Security, transparency, and creditability	**Clothing and Textile**
Jiang, L., Gu, Y., Yu, W., & Dai, J. (2022). Blockchain-based life cycle assessment system for ESG reporting. Available at SSRN 4121907.	Using a blockchain-based Life Cycle Assessment system to cross-validate ESG disclosures from businesses across the entire value chain.	Life Cycle Assessment	**Electric Vehicles**
Gu, Y., Jiang, L., Yu, W., & Dai, J. (2022). Towards blockchain-enabled ESG reporting and assurance: From the perspective of P2P energy trading. Available at SSRN 4121798.	An innovative system integrates ESG with financial data for real-time reporting through blockchain, while automating assurance services using smart contracts.	Credibility, transparency, andtraceability	**Energy Trading**
Cerchiaro, D., Leo, S., Landriault, E., & De Vega, P. (2021). DLT to boost efficiency for Financial Intermediaries. An application in ESG reporting activities. Technology Analysis & Strategic Management, 1-14.	A pilot study was conducted to evaluate the significance of distributed ledger technology.	Agile, transparent, andautomated data collection	**Asset Management**
Golding, O., Yu, G., Lu, Q., & Xu, X. (2022, May). Carboncoin: Blockchain tokenization of carbon emissions with ESG-based reputation. In 2022 IEEE International Conference on Blockchain and Cryptocurrency (ICBC) (pp. 1-5). IEEE.	Carboncoin is a blockchain investment that tokenizes the rights of energy producers to generate carbon credits.	On-chain assets	**Carbon Trading**

Source: Author's illustration from various sources and Saxena et al. (2022)

CHALLENGES & OPPORTUNITIES

II

Integrating ESG considerations into the IoT comes with challenges (Moudgil et al., 2023). One key issue is the risk of **data privacy breaches** and **security vulnerabilities**. With connected devices generating vast amounts of data, there is the possibility that unauthorized parties could gain access or misuse this information. To counter this, companies must **implement strong data protection strategies** and ensure their **IoT products comply with relevant privacy regulations.**

Another challenge that Moudgil et al. (2023) pointed out is the **technological obsolescence** and **e-waste**. As new IoT devices are developed, older ones become outdated and end up in landfills. If not properly disposed or recycled, e-waste can cause environmental damage and health risks. To tackle this, businesses can **adopt a circular business model, refurbishing and reusing older devices instead of discarding them**.

Miśkiewicz (2019) highlights that the rapid growth of digital infrastructure, such as data centers and high-tech devices, can cause a significant **rise in energy use**. This increase can lead to **higher carbon emissions** and put **pressure on limited natural resources**. The rise of automation and digitization also **threatens jobs**, as workers lacking necessary digital skills, Miśkiewicz (2019) argues that they may struggle to adapt to new roles, resulting in social and economic challenges.

CHALLENGES & OPPORTUNITIES

Nonetheless, rapid growth of digital technologies has significantly transformed the fast-changing business landscape, **offering SMEs with new and unique opportunities for growth and innovation** (Marcysiak and Pleskacz, 2021). Wang and Esperanca (2023) argue that as businesses undergo digital transformation, integrating ESG principles becomes increasingly important. This integration not only promotes **responsible business practices** but also supports **long-term sustainability** and **ethical operations**, helping companies adapt to evolving market demands while contributing positively to society and the environment.

According to Kwilinski et al. (2023), there is **strong evidence that digitalization has a significant positive impact on ESG performance within individual countries**. Additionally, the spillover effect shows that the advantages of digitalization extend beyond national borders, benefiting ESG performance in neighboring countries. This interconnected impact emphasizes the **global influence** of digitalization on sustainability and responsible business practices. As digital technologies advance and spread across regions, the overall sustainability and ESG performance of those countries tend to improve. This offers promising opportunities for **international cooperation**, allowing countries to collaborate and leverage digitalization for a more sustainable future.

As discussed in the previous section, advanced technologies like AI, IoT, and blockchain are transforming how businesses manage their environmental impact and improve ESG performance. Ramchandani (2024) stated that AI-driven predictive analytics help **optimize energy consumption**, potentially **reducing global emissions by up to 4% by 2030,** while IoT devices, such as those used in agriculture, can **cut water waste by 50%.** Blockchain enhances transparency and trust in ESG reporting by ensuring data accuracy, a crucial factor as **55% of organizations** now see it as essential for trustworthy ESG practices (Ramchandani, 2024). The **renewable energy sector**, with significant cost reductions in **solar power (82% over the last decade)**, and the rise of **electric vehicles,** projected to account for **50% of global sales** by 2030, further highlight how technology is driving sustainability. It can be suggested that these innovations not only reduce environmental impact but also **create business opportunities** for companies providing services that support AI, IoT, blockchain, and renewable energy solutions.

CONCLUSION

Integrating ESG principles into core business strategies has become an important driver for long-term profitability and competitive advantage. As noted by John (2024), ESG initiatives positively impact key areas such as employee engagement, brand reputation, and overall financial performance. By embedding ESG into the business framework, companies not only create sustainable value for all stakeholders but also position themselves for accelerated growth in an increasingly competitive marketplace. ESG-driven practices enhance operational efficiencies, mitigate risks, and attract investment, making them essential for any forward-thinking organization. Furthermore, companies that prioritize ESG demonstrate a commitment to societal and environmental values, promoting innovation and strengthening stakeholder trust.

However, to fully operationalize ESG strategies and drive meaningful results, businesses must embrace digital tools and technologies like artificial intelligence and big data analytics. These technologies are essential for tracking, implementing, and refining ESG goals in real time, ensuring accountability and continuous improvement. Leveraging AI-powered tools enables companies to optimize ESG reporting, streamline resource allocation, and ensure compliance with regulatory standards. By adopting these digital innovations, businesses can future-proof their ESG initiatives, ensuring they not only meet but exceed stakeholder expectations in sustainability, governance, and social responsibility. In doing so, they secure their position as leaders in the evolving global economy.

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