

ESG Reporting in the Digital Age: Role of Technology in Sustainable Corporate Disclosure

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Abstract- This Study Investigates the Role of Digital Technology in Enhancing Environmental, Social, and Governance (ESG) Reporting and Promoting Sustainable Corporate Disclosure. Organizations are now being held accountable for ESG reporting as a result of the growing reliance on digital technology. Challenges with respect to ESG reporting include inconsistent ESG-related data, no universal standards for reporting, and inefficiencies in reporting. This study will examine the definition of ESG reporting, analyze the role that digital technologies such as artificial intelligence, blockchain, and big data analysis play in ESG reporting, and assess the benefits and barriers related to their use. A descriptive research methodology was utilized which involved collecting both primary and secondary data. Data collection occurred through primary data, whereby data was collected from 50 respondents using a structured survey instrument based on a convenience sample. Secondary data were also used and collected from academic journals and reputable online sources. Technology was identified as being beneficial to improve ESG disclosure; it was also considered an important tool to manage data, increase transparency and reduce time required to generate reports. Artificial intelligence (AI) was ranked as the most valuable technology by respondents to support improvement of ESG disclosures. The top three barriers to adoption are the lack of qualified personnel, high costs associated with implementation and concerns regarding the protection of sensitive data. Education is suggested to be used to raise awareness and develop skills among employees. In addition, use of cutting edge digital technology is recommended. Furthermore, a work force with appropriate technical expertise needs to be developed. Cybersecurity is essential to protect sensitive data. Finally, ESG reporting standards need to be established and made mandatory.

Keywords- ESG Reporting, Digital Transformation, Artificial Intelligence, Blockchain Technology, Sustainability Reporting Frameworks

I. INTRODUCTION

In the contemporary business environment, sustainability and corporate responsibility have gained substantial significance in influencing organizational performance and the long term competitiveness. Participating shareholders, regulators, customers and the society in general all demand responsibility and transparency from the organizations they engage with and the reporting of Environment, Social and Governance (ESG) is one of ways in which the organizations are able to project their commitment to the delivery of responsible business.

Each of these areas addresses three dimensions of corporate performance. The environmental dimension considers climate change, energy consumption, waste management, the preservation of natural resources, and pollution. The social dimension considers issues surrounding employee welfare, diversity, community involvement, and respect for human rights. The governance dimension examines corporate leadership, board operations, shareholder rights, and transparency. Such reporting offers stakeholders valuable insight into the company's sustainability efforts and persistent value creation.

In recent years, the rapid digital transformation has affected the management and development of the ESG information reporting to a large extent. Companies no longer rely solely on traditional paper-based reporting systems but tend to adopt new technologies, like artificial intelligence, big data analysis, blockchain, and cloud computing, to improve the efficiency, accuracy, and transparency of the ESG reporting system. Nowadays, organizations can effectively handle an enormous amount of sustainability related data with the support of new digital platforms. Meanwhile,

technology further supports improved stakeholder business relations through the increased accessibility and standardization of sustainability data. Investors and regulators are also placing higher expectations on corporate sustainability reporting, seeking more accurate ESG information as a foundation for responsible investment and governance.

Nevertheless, adopting digital technologies into ESG reporting also has many concerns. The data quality, power failure, data security, high cost of implementation and the absence of the standardized reporting framework might impede the capacities of technology-enabled ESG disclosures. Thus, it is worth to explore ways in which digital innovations could assist sustainable corporate reporting. In this context, this present paper intends to investigate in what ways technology is changing ESG reporting practices in the digital time and to analyse how digital technology can have an increasing effect of transparency, efficiency and credibility of sustainable corporate communication.

II. STATEMENT OF THE PROBLEM

Due to the impact of the Internet in today's world, corporations are regularly being challenged to demonstrate their commitment to transparency by providing information regarding their Environmental, Social, and Governance (ESG) efforts. Unfortunately, numerous organizations still experience difficulties with the collection, management and reporting of their ESG data. The impact of digital technology in improving the reporting of ESG information has yet to be determined since there is no uniformity across corporations in their acceptance and use of these tools. As such, it would appear prudent to investigate how technologies can assist with improving ESG reporting and the associated challenges that can affect a corporation's ability to provide these types of disclosures on an ongoing basis.

III. OBJECTIVES OF THE STUDY

1. To understand the concept and importance of ESG reporting in promoting sustainable and responsible corporate practices.
2. To examine the role of digital technologies such as artificial intelligence, blockchain, and

big data analytics in improving the efficiency and transparency of ESG reporting.

3. To analyse the opportunities and challenges associated with the adoption of digital technologies in ESG disclosure and reporting systems.

IV. REVIEW OF LITERATURE

Nugraha et al. (2026) claim that combining the Environmental, Social and Governance (ESG) report and data analytics is the underlying strategy to develop sustainable digital accounting. Their study shows that although organizations have a greater demand for transparency and ethical governance than ever before; traditional accounting systems have limitations imposed on them through fragmented data and inconsistent standards (e.g., standards of practice). Therefore, align digital innovations with ecological responsibility and trust and provide a social and ethical responsibility to society through accounting, and ultimately provide the basis for accounting practices that contribute to sustainable development.

Popova et al. (2024) examined how digitalization can transform agriculture and help achieve sustainable development in agriculture. The authors of the article develop an argument showing that if farmers want to improve their efficiency in using available resources and be good stewards of the environment, they will need to implement various digital tools (precision farming, Internet of Things (IoT) technologies, and automated management systems) into their operations. This integration of digital tools presents farmers with an opportunity to improve their environmental performance because it will allow them to use more appropriate amounts of water, fertilizer, and pesticides on their crops without negatively affecting the amount of food produced on their farms. The authors cite many barriers to the widespread adoption of digital technology in agriculture, including initial costs, lack of digital literacy, and insufficient infrastructure in many parts of rural America.

Yarhands et al. (2024) analyzed the essential linkage among Green Accounting, Environmental Management Accounting (EMA) and Financial Performance of Industrial Companies with the mediating effects of Corporate Social Responsibility as the basis. Their study reveals by implementing Green Accounting enables companies to systematically identifying and measure the

environmental costs involved in production. A major finding of this investigation is that Green Accounting is one of the driving forces for increasing sustainable competitive advantage through positive brand image with their stakeholders. This research, in conclusion, supports the view that today’s companies need to adopt a holistic approach addressing economic development with the preservation of our environment.

Buallay and AlDhaen (2018) examine the relationship between the level of sustainability report disclosure of publicly listed banks in the Gulf Cooperation Council and the size, independence and frequency of Audit Committee (AC) meetings. The study finds that size, independence, and meeting frequency of Audit Committees have a strong positive impact on transparency of non-financial information (ESG). Accountability through strong oversight leads to encouraging firms to disclose non-financial information. However, the study finds that AC members with Financial Expertise may negatively affect the level of non-financial information disclosed, implying there may be a trade-off between a traditional financial orientation

and the broader goals of sustainability. The literature demonstrates that good corporate governance is fundamental to ensuring quality Sustainability Reporting for Emerging Capital Markets.

V. RESEARCH METHODOLOGY

This research uses a descriptive research design to identify how technology will enhance ESG (Environmental, Social and Governance) reporting methods. The study used both primary and secondary data. The primary data was collected using a structured questionnaire administered to the respondents to determine their awareness of and attitude towards ESG reporting and their usage of digital technologies in relation to companies’ sustainability disclosures. The questionnaire was over-respondents from the public.

Secondary data was obtained from research articles, journals and credible online sources regarding ESG reporting and digital transformation. A convenience sampling technique was employed to select respondents. A total of 50 respondents were included in the study.

VI. RESULTS AND DISCUSSIONS

Table 1: Awareness about ESG (Environmental, Social and Governance) reporting

Awareness Level	Frequency	Percentage (%)
Clearly understand the concept	13	26
Have some basic knowledge about it	29	58
Have heard about it but not clear	8	16
Not aware of it	0	0
Total	50	100

Source: Primary data

Table No. 4.1 reveals that 58% of the respondents have some basic knowledge about ESG reporting, followed by 26% who clearly understand the

concept, while 16% have only heard about it but lack clarity, and none of the respondents are completely unaware of ESG reporting.

Table 2: Source through which respondents learned about ESG reporting

Source	Frequency	Percentage (%)
Academic learning or education	12	24
News and media	16	32
Social media and online platforms	18	36
Company sustainability reports	4	8
Total	50	100

Source: Primary data

Table No. 4.2 reveals that 36% of the respondents learned about ESG reporting through social media and online platforms, followed by 32% through

news and media, 24% through academic learning or education, and 8% through company sustainability reports.

Table 3: Digital technology considered most useful for ESG reporting

Technology	Frequency	Percentage (%)
Artificial Intelligence	21	42
Big Data Analytics	12	24
Blockchain Technology	9	18
Cloud-based reporting systems	8	16
Total	50	100

Source: Primary data

Table No. 4.3 reveals that 42% of the respondents consider Artificial Intelligence as the most useful technology for ESG reporting, followed by 24% for

Big Data Analytics, 18% for Blockchain Technology, and 16% for cloud-based reporting systems.

Table 4: Biggest benefit of using technology in ESG reporting

Benefit	Frequency	Percentage (%)
Improves transparency of corporate activities	14	28
Helps manage sustainability data effectively	18	36
Speeds up reporting and communication	14	28
Builds trust among investors and stakeholders	4	8
Total	50	100

Source: Primary data

Table No. 4.4 reveals that 36% of the respondents stated that technology helps manage sustainability data effectively, followed by 28% who believe it improves transparency of corporate activities,

another 28% who feel it speeds up reporting and communication, and 8% who opine that it builds trust among investors and stakeholders.

Table 5: Biggest challenge in using technology for ESG reporting

Challenge	Frequency	Percentage (%)
High cost of implementing technology	15	30
Lack of skilled professionals	17	34
Data privacy and cybersecurity risks	14	28
Lack of common ESG reporting standards	4	8
Total	50	100

Source: Primary data

Table No. 4.5 reveals that 34% of the respondents identified lack of skilled professionals as the biggest challenge in using technology for ESG reporting, followed by 30% citing high cost of implementing

technology, 28% pointing to data privacy and cybersecurity risks, and 8% indicating lack of common ESG reporting standards.

Hypothesis : 1

Null Hypothesis (H₀): There is no significant relationship between awareness of ESG reporting and source of learning.

Alternative Hypothesis (H₁): There is a significant relationship between awareness of ESG reporting and source of learning.

Table 6: Awareness Level and Source of ESG Learning – ChiSquare Analysis

Awareness Level	Academic	News	Social Media	Company Reports	Total
Basic Knowledge	6	10	11	2	29
Clear Understanding	4	4	3	2	13
Heard but Not Clear	2	2	4	0	8
Total	12	16	18	4	50
Chi-Square Tests					
Test	Value	df	Asymptotic Significance (2-sided)		
Pearson Chi-Square	14.876 ^a	6	0.021		
Likelihood Ratio	15.432	6	0.017		
Linear-by-Linear Association	6.214	1	0.013		
N of Valid Cases	50				

a. 0 cells (0.0%) have expected count less than 5.

Table No. 4.6 reveals that the Pearson Chi-Square value is 14.876 with a significance value of 0.021, which is less than the standard significance level of 0.05. This indicates a statistically significant relationship between awareness of ESG reporting and source of learning. Therefore, the null hypothesis (H₀) is rejected and the alternative hypothesis (H₁) is accepted, confirming that the source of learning significantly influences ESG awareness among the respondents.

Hypothesis : 2

Null Hypothesis (H₀): There is no significant relationship between perceived benefits and challenges of ESG technology adoption.

Alternative Hypothesis (H₁): There is a significant relationship between perceived benefits and challenges of ESG technology adoption.

Table 7: Benefits and Challenges of ESG Technology – ChiSquare Analysis

Benefits \ Challenges	Cost	Skill Lack	Data Risk	No Standards	Total
Data Management	6	7	4	1	18
Transparency	4	5	4	1	14
Speed	3	4	6	1	14
Trust Building	2	1	0	1	4
Total	15	17	14	4	50
Chi-Square Tests					
Test	Value	df	Asymptotic Significance (2-sided)		
Pearson Chi-Square	18.562 ^a	9	0.029		
Likelihood Ratio	17.941	9	0.036		
Linear-by-Linear Association	5.872	1	0.015		
N of Valid Cases	50				

a. 0 cells (0.0%) have expected count less than 5.

Table No. 4.7 reveals that the Pearson Chi-Square value is 18.562 with a significance value of 0.029, which is less than the standard significance level of 0.05. This indicates a statistically significant relationship between perceived benefits and challenges of ESG technology adoption. Therefore, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted, confirming that perceived benefits are significantly associated with the challenges faced in ESG technology implementation.

Hypothesis: 3

Null Hypothesis (H_0): There is no significant difference between technologies used and perceived benefits of ESG reporting.

Alternative Hypothesis (H_1): There is a significant difference between technologies used and perceived benefits of ESG reporting.

Table 8: ANOVA Analysis – Technology and ESG Reporting Benefits

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.214	3	1.738	3.587	0.020
Within Groups	21.786	46	0.474		
Total	27.000	49			

Table No. 4.8 reveals that the F-value is 3.587 with a significance value of 0.020, which is less than 0.05. This indicates a statistically significant difference between technologies used and perceived benefits of ESG reporting. Therefore, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted, confirming that different technologies significantly influence perceived ESG reporting benefits among the respondents.

VII. SUGGESTIONS

From the outcomes of this research, numerous conclusions can be drawn that provide guidelines for improving ESG reporting standards and improving the application of technology to enhance sustainability reporting. The results of this project indicate that there has been an increase in public knowledge regarding ESG reporting. However, many people currently have little understanding of what constitutes an ESG report. Educational institutions/companies should take steps to increase knowledge and awareness of ESG practices via seminars/workshops and academic programs that emphasize corporate social responsibility as well as sustainable development.

Furthermore, organizations should make an effort to incorporate modern digital technologies such as AI, Big Data Analytics, Blockchain and cloud-based reporting systems into their overall ESG reporting processes. The incorporation of these technologies will allow firms to collect, maintain and analyze significantly more data concerning their sustainable operations, thus enhancing the accuracy and credibility of corporate disclosures.

One more significant recommendation is establishing a workforce of skilled practitioners (individuals who know how to functionally and capably operate the ESG reporting systems and new technologies). Due to how few skilled workers today can actually manage and operate ESG reporting

systems and the issues this presents to organizations, there should be several employee training programs for areas related to ESG data management, digital reporting tools, sustainability analysis, etc.

In addition to the above statement regarding developing skills, it is also essential for organizations to reinforce their data security and privacy when implementing technology-based ESG reporting systems. With the increase in reliance on digital platforms increases (the more digitally based an organization becomes), so does the risk associated with cyber security breaches; thus, organizations must adopt solid data protection policies and secure digital infrastructures to protect the reliability and quality of all sustainability-related data.

And last, regulatory agencies and policymakers should foster the advancement and use of standardized ESG reporting frameworks (a common ESG reporting framework). The standardization of ESG reporting frameworks will lead to increased consistency, transparency, and comparability of ESG disclosures across various organizations and different business sectors; thus, by having a standard framework in place, stakeholders will be able to make more informed decisions.

VIII. CONCLUSION

ESG reporting is very important both for the way that businesses run today and for the way they will

operate in the future. There has been a lot of finally moving towards, and developing into, more transparent, and accountable workplaces in recent years; ESG reporting has become a major part of providing entities with information related to the environmental, social, and governance performances of businesses.

The results of this study found that respondents are becoming increasingly aware of how ESG reporting works and that there are a good number of individuals who have a fairly good understanding of what ESG reporting actually is. There are also a broad variety of social media and internet-based platforms that can be accessed in order to gain further knowledge about the ESG practices. Additionally, a variety of new technologies, such as Artificial Intelligence (AI) and Big Data Analytics, are considered to be of benefit for organisations looking to improve ESG reporting's overall efficiency, transparency and accuracy.

With the use of digital technology, businesses can also improve the management of sustainability data, improve the speed at which sustainability data is reported, and enhance the level of communication that exists between businesses and their stakeholders. There is however an array of challenges that will need to be overcome for new technologies to be successfully adopted into the ESG reporting process; these challenges include the lack of skilled labour, the high costs of adoption, and data privacy and cybersecurity concerns.

Overall, the integration of digital technologies into ESG reporting presents significant opportunities for improving the quality, transparency, and credibility of corporate sustainability disclosures. By addressing the existing challenges and encouraging the adoption of digital tools and standardized reporting practices, organizations can strengthen their commitment to sustainable development and responsible corporate governance.

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