

Data Governance as a Strategic Enabler of ESG Assurance and BRSR Compliance: A Maturity Assessment Framework for Manufacturing Industries

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Abstract:

The growing emphasis on Environmental, Social and Governance (ESG) performance and Business Responsibility and Sustainability Reporting (BRSR) compliance has increased the need for reliable, transparent and assurance-ready sustainability data. Manufacturing industries generate ESG information across multiple operational functions, including environmental management, occupational health and safety, human resources, procurement, compliance, risk management, and corporate governance. However, fragmented data sources, manual reporting practices, unclear ownership, inconsistent methodologies, and weak quality controls often reduce the credibility of ESG disclosures. This study positions data governance as a strategic enabler of ESG assurance and BRSR compliance in manufacturing industries.

The paper proposes a Data Governance Maturity Assessment Framework that integrates Data Governance Theory, Stakeholder Theory and the Resource-Based View. The framework identifies six key dimensions: governance leadership, data ownership and stewardship, data quality management, technology and information security, ESG assurance readiness and continuous improvement. These dimensions collectively support accurate, complete, consistent, timely, secure and verifiable ESG information. A 100-point maturity assessment model is proposed to evaluate organizational readiness, with five maturity levels ranging from Initial to Optimized.

The study argues that ESG reporting quality depends not only on sustainability performance but also on the governance of underlying data assets. Strong data governance improves accountability, traceability, evidence management, assurance preparedness, and regulatory compliance. For manufacturing organizations, the framework provides a practical roadmap to strengthen ESG data systems, improve BRSR reporting, reduce assurance risks, and enhance stakeholder confidence. The study contributes to sustainability reporting literature by conceptualizing ESG reporting as a data governance challenge and offers a structured tool for managers to assess and improve ESG data maturity. Future empirical research may validate the proposed framework across manufacturing sectors and examine how data governance maturity influences ESG reporting quality, assurance outcomes, and sustainable business performance.

Keywords: Data Governance; ESG Assurance; BRSR Compliance; ESG Reporting; Manufacturing Industries; Maturity Assessment Framework.

1.0 Introduction

The increasing emphasis on sustainable business practices has fundamentally transformed the way organizations measure, manage, and communicate their performance. Traditionally, corporate success was assessed primarily through financial indicators such as profitability, return on investment, and shareholder value. However, growing concerns regarding climate change, environmental degradation, workplace safety, social equity, ethical governance, and stakeholder accountability have broadened the scope of organizational performance evaluation. Consequently, Environmental, Social, and Governance (ESG) frameworks have emerged as globally accepted mechanisms for assessing corporate sustainability and long-term value creation (Eccles et al., 2014; Friede et al., 2015).

In recent years, regulators, investors, customers, and other stakeholders have increasingly demanded transparent and reliable sustainability disclosures. This trend has led to the development of several reporting frameworks, including the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB), the Task Force on Climate-related Financial Disclosures (TCFD), the International Sustainability Standards Board (ISSB), and the Integrated Reporting Framework. In India, the Securities and Exchange Board of India (SEBI) introduced the Business Responsibility and Sustainability Reporting (BRSR) framework to strengthen corporate sustainability disclosures and improve the comparability and credibility of ESG information among listed companies.

The implementation of BRSR has significantly increased the volume and complexity of sustainability information that organizations must collect, validate, analyze, and report. Unlike traditional financial reporting, ESG reporting relies on data generated from multiple organizational functions, including environmental management, occupational health and safety, human resource management, procurement, supply chain operations, compliance management, risk management, and corporate governance systems. As a result, organizations frequently encounter challenges associated with fragmented information systems, inconsistent reporting methodologies, unclear accountability structures, and poor data quality.

Although substantial attention has been devoted to ESG performance measurement and sustainability reporting, relatively limited research has focused on the governance of ESG data itself. The reliability of ESG disclosures ultimately depends upon the quality, consistency, traceability, and integrity of the underlying data. Inaccurate or incomplete data can result in misleading sustainability disclosures, regulatory non-compliance, weakened stakeholder confidence, and reputational risks. Consequently, the governance of ESG data has become a critical organizational capability.

Data governance has emerged as a strategic discipline that addresses these challenges by establishing authority, accountability, policies, standards, and procedures for managing organizational data assets. According to Khatri and Brown (2010), data governance provides decision rights and accountability mechanisms that ensure data is managed as a strategic organizational resource. Similarly, DAMA International (2017) emphasizes that effective data governance enhances data quality, regulatory compliance, and organizational decision-making through clearly defined ownership and stewardship structures.

Despite its growing importance, the intersection between data governance and ESG reporting remains underexplored in existing literature. Most ESG studies focus on sustainability performance, disclosure quality, ESG ratings, or financial outcomes, while data governance research primarily examines information management, data quality, and digital transformation. The absence of an integrated framework linking data governance maturity to ESG reporting effectiveness represents a significant research gap,

particularly in manufacturing industries, where sustainability data is generated across diverse operational functions.

Manufacturing organizations are especially vulnerable to ESG data management challenges because they operate complex systems involving energy consumption, greenhouse gas emissions, water management, waste generation, occupational health and safety performance, employee welfare, supplier management, and regulatory compliance. The quality of sustainability reporting in such organizations depends not only on operational performance but also on the effectiveness of underlying data governance mechanisms. Therefore, there is a growing need for a structured framework capable of evaluating and improving organizational readiness for ESG assurance and BRSR compliance.

This study proposes a Data Governance Maturity Framework for ESG Assurance and BRSR Compliance in manufacturing industries. The framework integrates concepts from data governance, corporate governance, information management, sustainability reporting, and ESG assurance to establish a comprehensive assessment model for organizational sustainability reporting capability. By positioning data governance as the foundational enabler of the effectiveness of ESG reporting, the study contributes to both the academic literature and industrial practice. The proposed framework is expected to assist organizations in strengthening ESG data quality, improving assurance readiness, enhancing regulatory compliance, and building stakeholder confidence through more reliable sustainability disclosures.

2.0 Theoretical Foundation

The proposed framework is grounded in the Resource-Based View (RBV), Stakeholder Theory, and Data Governance Theory. The Resource-Based View argues that organizations achieve sustainable competitive advantage through the effective management of valuable, rare, inimitable, and non-substitutable resources (Barney, 1991). In the contemporary business environment, data has become one of the most valuable organizational assets. ESG data, in particular, serves as a strategic resource that influences investment decisions, regulatory assessments, stakeholder trust, and corporate reputation. Therefore, the governance of ESG data represents a critical organizational capability that can contribute to sustainable competitive advantage.

Stakeholder Theory further supports the importance of ESG information by emphasizing that organizations are accountable to a broad range of stakeholders beyond shareholders alone (Freeman, 1984). Investors, employees, regulators, customers, suppliers, and communities increasingly rely on sustainability disclosures to evaluate organizational responsibility and long-term sustainability performance. Consequently, organizations must ensure that ESG information is accurate, transparent, and trustworthy. Effective data governance provides the mechanisms necessary to meet these stakeholder expectations.

Data governance theory complements these perspectives by focusing on authority structures, accountability mechanisms, decision rights, data stewardship, and quality management processes. According to Abraham et al. (2019), data governance establishes the organizational framework through which data assets are controlled and utilized to support strategic objectives. In the context of ESG reporting, data governance serves as the bridge between operational sustainability activities and credible external disclosures.

The integration of these theoretical perspectives suggests that organizations can enhance ESG reporting effectiveness through robust governance structures that improve data quality, accountability, transparency,

and assurance readiness. Consequently, data governance maturity becomes an important determinant of sustainability reporting quality and BRSR compliance performance.

3.0 Literature Review

Data governance has evolved considerably over the past two decades as organizations have increasingly recognized data as a strategic asset. Early approaches to data management focused primarily on information technology infrastructure and database administration. However, researchers later acknowledged that technological solutions alone were insufficient to address challenges related to data ownership, accountability, quality, and organizational decision-making. This realization led to the emergence of data governance as a business-driven discipline concerned with managing data across its entire lifecycle (Ladley, 2012).

Khatri and Brown (2010) describe data governance as the allocation of decision rights and accountability for data-related processes. Their work highlights the importance of establishing clear authority structures for data management. Similarly, Otto (2011) emphasizes that effective data governance requires formalized policies, standards, stewardship responsibilities, and performance measurement systems. DAMA International (2017) further identifies data governance as the central coordinating function within enterprise data management, influencing all aspects of data quality, security, integration, and usage.

A key objective of data governance is improving data quality. Wang and Strong (1996) proposed a multidimensional model of data quality that includes accuracy, completeness, consistency, timeliness, accessibility, and relevance. These dimensions remain widely accepted in contemporary data management literature and are particularly relevant for ESG reporting, where stakeholders increasingly demand reliable and auditable sustainability information.

Simultaneously, the field of ESG reporting has experienced substantial growth. Eccles *et al.* (2014) demonstrated that organizations with strong sustainability practices often outperform their peers in terms of operational performance and long-term value creation. Friede *et al.* (2015), through a meta-analysis of more than 2,000 empirical studies, concluded that superior ESG performance is generally associated with positive financial outcomes. More recent studies have highlighted the increasing importance of ESG disclosures in investment decision-making, risk assessment, and stakeholder engagement.

Despite these advancements, significant concerns remain regarding the reliability of ESG information. Berg *et al.* (2022) reported substantial divergence among ESG ratings, largely attributable to differences in measurement methodologies, data sources, and reporting practices. Such findings underscore the importance of robust data governance mechanisms for improving the consistency and credibility of sustainability disclosures.

The introduction of BRSR in India further reinforces the need for effective data governance. BRSR requires organizations to disclose extensive information related to environmental performance, employee well-being, governance practices, stakeholder engagement, and responsible business conduct. Meeting these requirements necessitates integrated data systems, clearly defined responsibilities, and rigorous quality assurance processes. However, the current literature provides limited guidance on the governance structures needed to support BRSR implementation. This gap provides the foundation for the present study.

4.0 Conceptual Framework Development

The increasing complexity of sustainability reporting has fundamentally transformed the nature of corporate information management. Traditionally, sustainability disclosures were largely voluntary and

focused on communicating selected environmental and social initiatives to stakeholders. However, recent regulatory developments, including the introduction of BRSR in India, have elevated sustainability reporting to a strategic governance function requiring robust data management practices, assurance mechanisms, and organizational accountability.

ESG reporting differs significantly from conventional financial reporting because sustainability information is generated from multiple functional areas across the organization. Environmental indicators originate from energy management systems, environmental monitoring programs, and waste management records. Social indicators are typically derived from occupational health and safety systems, human resource databases, employee welfare programs, and community engagement activities. Governance indicators emerge from compliance management systems, board oversight mechanisms, ethics programs, risk management frameworks, and internal control systems.

The fragmented nature of ESG data creates substantial challenges for organizations attempting to produce reliable and auditable sustainability disclosures. In many organizations, ESG information is collected manually through spreadsheets, departmental reports, and independent databases that operate without common definitions, ownership structures, or quality controls. As a result, sustainability reports frequently suffer from inconsistencies, duplication, incomplete records, and limited traceability.

These challenges indicate that ESG reporting is fundamentally dependent upon effective data governance. Data governance provides the organizational structure through which data ownership, stewardship, accountability, quality management, and decision rights are established. Through these mechanisms, organizations can ensure that ESG data remains accurate, complete, consistent, timely, secure, and verifiable throughout its lifecycle.

The proposed conceptual framework positions data governance as the foundational capability that supports the effectiveness of ESG reporting. Corporate governance establishes the strategic direction and oversight necessary for sustainability reporting, while data governance translates governance objectives into operational controls for managing ESG information. Effective governance structures enhance data quality, thereby improving ESG reporting accuracy, assurance readiness, and regulatory compliance. Ultimately, high-quality sustainability disclosures strengthen stakeholder confidence and contribute to long-term organizational sustainability.

The conceptual relationship proposed in this study is illustrated as follows:

Corporate Governance → Data Governance → Data Quality → ESG Information Management → ESG Assurance Readiness → BRSR Compliance → Stakeholder Confidence → Sustainable Business Performance

This framework suggests that data governance serves as the critical link connecting sustainability activities with credible sustainability disclosures. Without effective governance of underlying data assets, organizations cannot achieve reliable ESG reporting regardless of the quality of their sustainability initiatives.

5.0 Proposed Data Governance Maturity Framework

Building upon the conceptual framework, this study proposes a Data Governance Maturity Framework specifically designed to evaluate organizational readiness for ESG assurance and BRSR compliance within manufacturing industries. The framework is based on the premise that organizations progress through different stages of governance maturity as they develop capabilities related to data ownership,

stewardship, quality management, technology integration, assurance readiness, and continuous improvement.

The framework consists of six interrelated dimensions that collectively influence the effectiveness of ESG reporting.

5.1 Governance Leadership

Governance leadership represents the strategic foundation of the framework. Effective data governance begins with visible commitment from the board of directors and senior management. Corporate governance literature consistently emphasizes the importance of leadership commitment in establishing accountability, allocating resources, and promoting organizational transparency.

Within the context of ESG reporting, governance leadership includes board oversight of sustainability disclosures, approval of ESG strategies, monitoring of sustainability performance indicators, and review of reporting outcomes. Organizations with mature governance systems typically establish dedicated ESG Committees, Sustainability Committees, or Governance Committees responsible for overseeing sustainability-related risks and reporting obligations.

Governance leadership also includes developing formal policies for ESG data management, reporting procedures, assurance requirements, and stakeholder communication. These policies provide the strategic direction necessary for ensuring consistency across organizational functions.

5.2 Data Ownership and Stewardship

One of the most significant challenges in ESG reporting is the absence of clearly defined ownership for sustainability information. ESG data frequently spans multiple departments, creating ambiguity regarding responsibility for data accuracy, validation, and reporting.

Data ownership refers to the assignment of accountability for specific ESG indicators to designated individuals or functions. Data owners are responsible for ensuring that information remains accurate, complete, and aligned with organizational requirements. Data stewardship complements ownership by focusing on operational activities associated with data collection, validation, maintenance, and quality improvement.

For example, environmental managers may serve as owners of greenhouse gas emission data, while safety managers may be responsible for occupational health and safety indicators such as Total Recordable Incident Rate (TRIR) and Lost Time Injury Frequency Rate (LTIFR). Human resource managers may own diversity, training, and employee engagement metrics, while compliance officers may oversee governance-related disclosures.

Clearly defined ownership and stewardship structures enhance accountability and reduce reporting errors by establishing responsibility throughout the ESG data lifecycle.

5.3 Data Quality Management

Data quality is the central objective of data governance and a critical determinant of ESG reporting credibility. High-quality sustainability disclosures depend on the availability of information that is accurate, complete, consistent, timely, and verifiable.

Accuracy refers to the extent to which reported information correctly represents actual performance. Completeness ensures that all relevant information has been captured and reported. Consistency requires standardized definitions and methodologies across reporting periods and organizational units. Timeliness

ensures that data is available when needed for reporting and decision-making purposes. Verifiability enables assurance providers to validate reported information through supporting evidence.

Organizations with mature data governance systems implement structured quality management processes, including validation procedures, automated controls, data reconciliation activities, periodic audits, and performance monitoring. These mechanisms reduce the likelihood of reporting inaccuracies and improve confidence in sustainability disclosures.

5.4 Technology and Information Security

Digital technologies play an increasingly important role in ESG data management. Modern organizations generate substantial volumes of sustainability information through environmental monitoring systems, enterprise resource planning platforms, occupational health and safety systems, Internet of Things (IoT) devices, smart sensors, and business intelligence tools.

The integration of these technologies can significantly improve the efficiency and reliability of ESG reporting. Automated data collection reduces manual errors, enhances data consistency, and improves reporting timeliness. Similarly, integrated reporting platforms enable organizations to consolidate sustainability information from multiple sources into centralized databases.

Information security represents an equally important consideration. ESG information often includes sensitive environmental, social, financial, and governance data that must be protected from unauthorized access, modification, or loss. Effective governance therefore requires robust cybersecurity measures, access controls, backup systems, and disaster recovery procedures to ensure data integrity and availability.

5.5 ESG Assurance Readiness

The growing demand for independent assurance of sustainability disclosures has increased the importance of assurance readiness within ESG reporting systems. Assurance readiness refers to an organization's ability to provide verifiable evidence supporting reported sustainability information.

Organizations seeking assurance must demonstrate the existence of documented methodologies, clearly defined reporting boundaries, traceable data sources, validation procedures, and supporting records. Assurance providers evaluate these controls when assessing the reliability of sustainability disclosures.

Data governance contributes directly to assurance readiness by establishing documentation standards, audit trails, evidence management systems, and accountability structures. Mature governance systems facilitate efficient assurance processes by ensuring that information is transparent, traceable, and supported by reliable evidence.

5.6 Continuous Improvement

Data governance should not be viewed as a static compliance exercise. Rather, it represents an ongoing process of organizational learning and capability development. Continuous improvement enables organizations to adapt governance systems in response to changing regulatory requirements, stakeholder expectations, technological advancements, and operational challenges.

Continuous improvement mechanisms include internal audits, management reviews, corrective and preventive action programs, employee training initiatives, benchmarking activities, and periodic maturity assessments. Through these activities, organizations can identify weaknesses, implement improvements, and progressively enhance ESG reporting performance.

6.0 Data Governance Maturity Assessment Model and Scoring Methodology

To operationalize the proposed framework, this study develops a data governance maturity assessment model that enables manufacturing organizations to evaluate their capability to manage ESG information effectively and support BRSR compliance. The model is designed as a practical assessment tool that can be applied by organizations to identify strengths, weaknesses, and improvement opportunities within their ESG data governance systems.

The assessment model is based on the principle that organizations progress through identifiable stages of maturity as governance practices become increasingly formalized, integrated, and optimized. Organizations with low levels of maturity generally rely on fragmented systems, manual reporting processes, and informal accountability structures. In contrast, highly mature organizations operate integrated governance systems supported by clearly defined ownership, standardized processes, automated controls, and continuous improvement mechanisms.

The proposed assessment framework allocates a total score of 100 points across six dimensions of data governance. The weighting of each dimension reflects its relative contribution to ESG reporting effectiveness, assurance readiness, and BRSR compliance.

6.1 Governance Leadership (20 Points)

Governance leadership serves as the foundation of ESG data governance because it establishes organizational commitment, accountability, and strategic direction. Organizations demonstrating mature governance leadership typically incorporate ESG reporting into board agendas, establish dedicated governance committees, allocate resources for sustainability reporting, and periodically review ESG performance.

Assessment criteria include the presence of board oversight mechanisms, ESG governance policies, management review processes, sustainability committees, and executive accountability structures.

Organizations scoring highly in this dimension demonstrate visible leadership commitment to data quality, reporting integrity, and sustainability governance.

6.2 Data Ownership and Stewardship (15 Points)

The second dimension evaluates the extent to which ownership and stewardship responsibilities are clearly defined and implemented throughout the organization. Effective ESG reporting requires that each indicator have a designated owner for accountability and a steward for operational management.

Assessment criteria include documented ownership assignments, stewardship roles, accountability matrices, escalation procedures, and performance monitoring mechanisms.

Organizations with high maturity establish clear responsibility for all material ESG indicators and maintain effective coordination among reporting functions.

6.3 Data Quality Management (20 Points)

Data quality management represents the core objective of data governance and directly influences the reliability of ESG disclosures. This dimension assesses organizational capability to ensure that sustainability information is accurate, complete, consistent, timely, and verifiable.

Evaluation criteria include data validation procedures, quality audits, reconciliation processes, metadata management, standard operating procedures, and quality performance indicators.

Organizations with mature quality management systems implement structured controls throughout the ESG data lifecycle and continuously monitor reporting accuracy.

6.4 Technology and Information Security (15 Points)

The technology and information security dimension assesses the infrastructure that supports ESG data collection, storage, processing, and reporting. Organizations increasingly depend upon digital technologies to manage large volumes of sustainability information generated across operational functions.

Assessment criteria include system integration, automation capabilities, cybersecurity controls, backup and recovery systems, access management procedures, and digital reporting platforms.

Organizations demonstrating high maturity effectively leverage technology to improve reporting efficiency while ensuring the confidentiality, integrity, and availability of ESG information.

6.5 ESG Assurance Readiness (15 Points)

The growing emphasis on sustainability assurance has elevated the importance of evidence-based reporting. This dimension evaluates the extent to which organizations maintain documentation, audit trails, and supporting evidence necessary for internal and external assurance activities.

Assessment criteria include documentation standards, evidence retention systems, traceability mechanisms, assurance protocols, internal audit processes, and corrective action systems.

Organizations with high maturity levels can readily demonstrate the accuracy and reliability of reported sustainability information during assurance engagements.

6.6 Continuous Improvement (15 Points)

Continuous improvement reflects the organization's ability to learn from assessments, audits, stakeholder feedback, and reporting experiences. Sustainable governance systems evolve continuously in response to changing regulatory requirements and organizational priorities.

Assessment criteria include management reviews, internal audits, employee training programs, benchmarking activities, corrective and preventive action systems, and governance performance evaluations.

Organizations exhibiting mature continuous improvement systems consistently strengthen their governance practices and reporting capabilities over time.

6.7 ESG Data Governance Assessment Matrix

The proposed assessment matrix allocates scores across the six dimensions as shown below.

Dimension	Weight (%)	Maximum Score
Governance Leadership	20	20
Data Ownership and Stewardship	15	15
Data Quality Management	20	20
Technology and Information Security	15	15
ESG Assurance Readiness	15	15
Continuous Improvement	15	15

Total	100	100
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The overall ESG Data Governance Maturity Score (EDGMS) can be calculated using the following equation:

$$\text{EDGMS} = \text{GL} + \text{DOS} + \text{DQM} + \text{TIS} + \text{EAR} + \text{CI}$$

Where:

- GL = Governance Leadership Score
- DOS = Data Ownership and Stewardship Score
- DQM = Data Quality Management Score
- TIS = Technology and Information Security Score
- EAR = ESG Assurance Readiness Score
- CI = Continuous Improvement Score

The maximum attainable score is 100 points.

7.0 ESG Data Governance Maturity Levels

The maturity model categorizes organizations into five developmental stages based on their overall assessment score. Each level represents increasing sophistication in governance practices and reporting capabilities.

7.1 Level 1: Initial Stage (0–20 Points)

Organizations at the Initial Stage exhibit limited governance structures and highly fragmented reporting systems. ESG information is typically collected through manual processes and maintained within individual departments without standardized methodologies. Accountability structures are poorly defined, and reporting activities are largely compliance-driven.

At this stage, organizations face significant risks related to data inconsistency, reporting errors, and assurance challenges.

7.2 Level 2: Developing Stage (21–40 Points)

Organizations in the Developing Stage begin to establish basic governance mechanisms and reporting procedures. ESG responsibilities are partially defined, and selected sustainability indicators may be subject to validation processes. However, governance practices remain inconsistent across functions, and data quality controls are often informal.

Although reporting capabilities improve at this stage, organizations continue to rely heavily on manual processes and fragmented information systems.

7.3 Level 3: Defined Stage (41–60 Points)

The Defined Stage is characterized by formal governance structures, documented policies, standardized methodologies, and assigned accountability. Organizations establish designated data owners and stewards for major ESG indicators and implement systematic quality management processes.

Reporting practices become more consistent and reliable, and organizations begin preparing for assurance requirements.

7.4 Level 4: Integrated Stage (61–80 Points)

Organizations at the Integrated Stage demonstrate strong coordination between governance structures, operational systems, and reporting processes. ESG data is managed through integrated digital platforms, supported by automated controls and standardized workflows.

Governance mechanisms are embedded within organizational decision-making processes, and sustainability reporting is closely aligned with corporate strategy. Assurance activities can be conducted efficiently due to strong documentation and traceability systems.

7.5 Level 5: Optimized Stage (81–100 Points)

The Optimized Stage represents the highest level of maturity. Organizations operate fully integrated governance systems characterized by real-time monitoring, predictive analytics, advanced data quality controls, and continuous improvement mechanisms.

At this stage, ESG information is treated as a strategic asset that supports decision-making, risk management, investor communication, and long-term value creation. Organizations demonstrate high assurance readiness, strong stakeholder confidence, and exemplary BRSR compliance performance.

8.0 Research Propositions

Based on the conceptual framework and maturity model, several research propositions are proposed for future empirical validation.

The first proposition suggests that governance leadership positively influences ESG data quality because leadership commitment drives accountability, resource allocation, and policy implementation.

The second proposition proposes that effective data stewardship positively influences the accuracy and completeness of sustainability disclosures by establishing responsibility for ESG information throughout the reporting lifecycle.

The third proposition argues that higher levels of data quality positively influence ESG assurance readiness because assurance providers depend upon accurate, complete, and traceable information. The fourth proposition suggests that assurance readiness positively influences BRSR compliance performance by improving the reliability and transparency of sustainability disclosures.

Finally, the study proposes that overall data governance maturity positively influences stakeholder confidence and sustainable business performance by enhancing the credibility and usefulness of ESG information.

These propositions provide a foundation for future quantitative studies examining the relationship between data governance and sustainability reporting outcomes within manufacturing industries.

9.0 Discussion and Managerial Implications

The findings of this study reinforce the growing recognition that ESG reporting is fundamentally dependent upon the quality and governance of underlying organizational data. While existing sustainability reporting frameworks emphasize disclosure requirements, performance indicators, and stakeholder communication, relatively limited attention has been devoted to the governance structures necessary to ensure the reliability and credibility of ESG information. The proposed Data Governance Maturity Framework addresses this gap by positioning data governance as the foundational capability supporting ESG assurance and BRSR compliance.

The framework extends existing data governance literature by integrating principles of corporate governance, sustainability reporting, information management, and ESG assurance into a unified assessment model. Previous studies have highlighted the importance of data ownership, stewardship, accountability, and quality management in improving organizational decision-making (Khatri & Brown, 2010; Abraham et al., 2019). However, these concepts have rarely been examined within the context of sustainability reporting. The present framework demonstrates that ESG reporting quality is not merely a function of sustainability performance but also a consequence of governance maturity.

The proposed framework is particularly relevant in the context of increasing regulatory scrutiny surrounding sustainability disclosures. Recent developments such as BRSR Core, ESG assurance requirements, ISSB standards, and global sustainability reporting regulations indicate a transition from voluntary sustainability communication toward regulated and assurance-based reporting systems. Under such conditions, organizations can no longer rely on fragmented data collection practices or manual reporting processes. Instead, they must establish integrated governance structures capable of producing reliable, traceable, and auditable ESG information.

The study further highlights the strategic role of data governance in strengthening stakeholder trust. Stakeholders increasingly demand transparency regarding climate performance, occupational health and safety outcomes, employee welfare, diversity initiatives, ethical conduct, and governance practices. Inaccurate or inconsistent ESG disclosures can damage organizational reputation and undermine investor confidence. Effective data governance mitigates these risks by ensuring that sustainability information is supported by robust controls, standardized methodologies, and clearly defined accountability structures. From a manufacturing perspective, the proposed framework offers particular significance because sustainability information is generated across numerous operational functions. Environmental indicators originate from energy management systems, emissions monitoring programs, water conservation initiatives, and waste management activities. Social indicators are generated through occupational health and safety systems, employee engagement programs, training records, and human resource databases. Governance indicators emerge from ethics management systems, compliance processes, risk management programs, and board oversight mechanisms.

The diversity of these data sources creates substantial reporting complexity. Organizations frequently encounter difficulties in consolidating information, maintaining consistency across departments, and establishing accountability for reported indicators. The proposed maturity framework provides a structured mechanism for addressing these challenges by integrating governance leadership, stewardship, quality management, technology enablement, assurance readiness, and continuous improvement into a single management system.

9.1 Implications for BRSR Compliance

The proposed framework demonstrates strong alignment with the requirements of the BRSR framework. BRSR requires organizations to disclose comprehensive information across environmental, social, and governance dimensions while ensuring transparency and accountability in reporting practices. Many of the disclosures required under BRSR depend on the availability of high-quality organizational data.

For example, environmental disclosures related to energy consumption, greenhouse gas emissions, water withdrawal, waste generation, and resource efficiency require reliable measurement systems and standardized reporting methodologies. Similarly, social disclosures concerning employee well-being, occupational health and safety, diversity, training, and community engagement depend upon accurate and

timely information generated from human resource and safety management systems. Governance disclosures relating to ethics, compliance, risk management, board oversight, and stakeholder engagement require robust documentation and accountability mechanisms.

The maturity framework directly supports these requirements by establishing governance structures that enhance data quality and reporting consistency. Organizations operating at higher maturity levels are expected to demonstrate greater compliance with BRSR requirements because they possess stronger governance mechanisms, clearer accountability structures, and more reliable information systems.

Furthermore, the introduction of BRSR Core and assurance requirements significantly increases the importance of documentation, traceability, and evidence management. The ESG Assurance Readiness dimension of the framework directly addresses these expectations by emphasizing audit trails, evidence retention, documentation controls, and assurance preparedness.

9.2 Implications for ESG Assurance

One of the most significant contributions of the framework lies in its emphasis on assurance readiness. Historically, many organizations have treated sustainability reporting as a communication exercise rather than an assurance-oriented process. However, the increasing adoption of external assurance standards is changing stakeholder expectations regarding ESG disclosures.

Assurance providers require organizations to demonstrate the reliability of reported information through documented methodologies, source records, validation controls, and supporting evidence. Weak governance systems often result in assurance findings related to data quality deficiencies, incomplete documentation, inconsistent methodologies, and inadequate traceability.

The proposed framework addresses these challenges by integrating assurance requirements into the governance architecture itself. Rather than preparing for assurance activities at the end of the reporting cycle, organizations are encouraged to embed assurance readiness throughout the ESG data lifecycle. This approach not only improves reporting credibility but also reduces assurance costs and enhances organizational confidence in reported information.

9.3 Managerial Implications for Manufacturing Organizations

The framework provides several practical implications for managers responsible for sustainability reporting, ESG compliance, corporate governance, information management, and operational performance.

First, organizations should formally recognize ESG data as a strategic organizational asset rather than merely a reporting requirement. Such recognition requires leadership commitment, governance structures, and resource allocation comparable to those applied to financial information management.

Second, organizations should establish clear ownership and stewardship responsibilities for all material ESG indicators. Each sustainability metric should have a designated owner accountable for data integrity and a steward responsible for operational management. This approach reduces ambiguity and strengthens accountability throughout the reporting process.

Third, manufacturing organizations should invest in integrated information systems capable of consolidating ESG data from environmental, health and safety, human resource, procurement, finance, and governance functions. Digital integration improves reporting efficiency, reduces manual errors, and enhances data consistency.

Fourth, organizations should develop comprehensive data quality management programs focusing on accuracy, completeness, consistency, timeliness, and traceability. Periodic audits, validation procedures, reconciliation activities, and performance monitoring systems can significantly improve reporting reliability.

Fifth, managers should view ESG assurance as a continuous governance process rather than a periodic compliance exercise. Building assurance readiness into daily operations enhances transparency and reduces the risk of reporting deficiencies.

Finally, organizations should conduct periodic maturity assessments using the proposed framework to identify governance gaps and prioritize improvement initiatives. Such assessments can support strategic planning, regulatory compliance, and sustainability performance enhancement.

9.4 Theoretical Contributions

From a theoretical perspective, this study contributes to the emerging literature at the intersection of data governance and sustainability reporting. While previous studies have examined ESG reporting quality, sustainability assurance, and corporate governance independently, few studies have integrated these concepts through a data governance lens.

The framework extends Data Governance Theory by demonstrating its relevance within sustainability reporting contexts. It also contributes to Stakeholder Theory by explaining how governance mechanisms improve the reliability of information communicated to stakeholders. Furthermore, the framework supports the Resource-Based View by conceptualizing ESG data governance capability as a strategic organizational resource capable of enhancing sustainability performance and competitive advantage.

By integrating these theoretical perspectives, the study provides a foundation for future empirical research examining the relationship between governance maturity, ESG reporting quality, assurance outcomes, and organizational performance.

10. Conclusion and Future Research Directions

The increasing importance of Environmental, Social, and Governance (ESG) reporting has fundamentally transformed the role of information management within contemporary organizations. Sustainability disclosures are no longer viewed as voluntary communications intended solely to enhance corporate reputation; rather, they have evolved into strategic governance instruments that influence investor decisions, regulatory compliance, stakeholder trust, risk management, and long-term organizational value creation. As regulatory expectations continue to expand through frameworks such as the Business Responsibility and Sustainability Reporting (BRSR) framework, International Sustainability Standards Board (ISSB) standards, Global Reporting Initiative (GRI) standards, and sustainability assurance requirements, organizations are under growing pressure to demonstrate the reliability, transparency, and accountability of their ESG disclosures.

Despite substantial progress in sustainability reporting practices, many organizations continue to encounter significant challenges in managing ESG information effectively. Sustainability data is often generated across multiple organizational functions, including environmental management, occupational health and safety, human resources, procurement, supply chain operations, finance, compliance, and corporate governance systems. The decentralized nature of these information sources frequently results in fragmented reporting processes, inconsistent methodologies, unclear ownership structures, weak accountability mechanisms, and deficiencies in data quality. Consequently, organizations may struggle to

produce ESG disclosures that are accurate, complete, consistent, timely, traceable, and suitable for assurance purposes.

The findings of this study suggest that many of these challenges stem not from weaknesses in sustainability performance itself but from inadequacies in the governance of underlying data assets. While previous research has extensively examined ESG performance, sustainability disclosures, and corporate governance practices, comparatively limited attention has been devoted to the role of data governance as an enabling capability for sustainability reporting. This study argues that effective ESG reporting is fundamentally dependent upon effective data governance. Without robust governance structures, organizations cannot ensure the reliability and credibility of sustainability information regardless of the quality of their environmental, social, or governance initiatives.

To address this gap, the study developed a Data Governance Maturity Framework for ESG Assurance and BRSR Compliance specifically tailored to manufacturing industries. The framework integrates principles from Data Governance Theory, Stakeholder Theory, Resource-Based View, Corporate Governance, and Sustainability Reporting literature to establish a comprehensive assessment model for ESG information management. By positioning data governance as the foundational capability supporting ESG reporting effectiveness, the framework provides a structured mechanism for evaluating organizational readiness for sustainability assurance and regulatory compliance.

The proposed framework comprises six interrelated dimensions: Governance Leadership, Data Ownership and Stewardship, Data Quality Management, Technology and Information Security, ESG Assurance Readiness, and Continuous Improvement. Collectively, these dimensions represent the critical organizational capabilities required to generate reliable, transparent, and auditable sustainability disclosures. The framework further introduces a five-level maturity model that enables organizations to assess their current governance capability and identify pathways for progression toward more advanced levels of governance maturity.

One of the most significant contributions of this study is the conceptualization of ESG reporting as a data governance challenge rather than merely a sustainability reporting exercise. Traditional approaches to ESG reporting often emphasize disclosure requirements, reporting indicators, and communication strategies. While these elements remain important, the present study demonstrates that disclosure quality ultimately depends upon the governance structures supporting data generation, validation, storage, analysis, and reporting. Consequently, organizations seeking to improve sustainability reporting performance must invest not only in sustainability initiatives but also in governance systems capable of ensuring data integrity throughout the reporting lifecycle.

The study also contributes to the growing discourse on ESG assurance. As stakeholders increasingly demand independent verification of sustainability disclosures, assurance readiness has become a critical organizational capability. Assurance providers require evidence that reported information is supported by documented methodologies, traceable records, validation controls, and effective governance mechanisms. The proposed framework explicitly incorporates assurance readiness as a core dimension of governance maturity, thereby strengthening the relationship between data governance and sustainability assurance practices.

From a regulatory perspective, the framework offers practical relevance for organizations seeking compliance with BRSR and other emerging sustainability reporting requirements. The increasing emphasis on BRSR Core disclosures, value-chain reporting, and sustainability assurance highlights the need for integrated governance systems capable of managing large volumes of ESG information.

Organizations operating at higher levels of governance maturity are likely to be better positioned to satisfy regulatory expectations, respond to stakeholder demands, and demonstrate credible sustainability performance.

The framework is particularly relevant for manufacturing industries due to the complexity of sustainability data generated across operational functions. Manufacturing organizations must manage diverse indicators related to energy consumption, greenhouse gas emissions, water usage, waste generation, occupational health and safety performance, employee well-being, ethical conduct, supply chain sustainability, and governance effectiveness. The proposed maturity model provides a structured approach for integrating these diverse information streams within a unified governance architecture, thereby enhancing reporting efficiency and reliability.

The theoretical contributions of this study are equally important. By integrating Data Governance Theory, Stakeholder Theory, and Resource-Based View, the study expands current understanding of how governance capabilities influence sustainability reporting outcomes. The framework extends traditional data governance literature by demonstrating its applicability within ESG reporting environments and contributes to sustainability reporting literature by identifying governance maturity as a key determinant of disclosure quality and assurance readiness.

Notwithstanding its contributions, the study has certain limitations. First, the proposed framework is conceptual in nature and has not yet been empirically validated. Although it is grounded in established theories and existing literature, empirical testing is required to evaluate the strength of relationships among governance maturity, data quality, assurance readiness, and ESG reporting effectiveness. Second, the framework has been developed primarily for manufacturing industries and may require adaptation before application in service, healthcare, banking, or technology sectors. Third, the assessment model relies on predetermined weighting factors that may vary according to organizational context, industry characteristics, and stakeholder expectations.

Future research should focus on empirical validation of the proposed framework using quantitative and qualitative methodologies. Survey-based studies involving sustainability professionals, governance practitioners, data managers, and assurance providers could be conducted to examine the relationships proposed in the conceptual model. Structural Equation Modeling (SEM) may be employed to test the influence of governance maturity on ESG reporting quality, assurance readiness, and BRSR compliance performance. Longitudinal studies could further investigate how governance maturity evolves over time and influences organizational sustainability outcomes.

Additional research opportunities exist in the development of industry-specific maturity models for sectors such as automotive manufacturing, pharmaceuticals, consumer goods, chemicals, energy, and infrastructure. Future studies may also explore the role of emerging technologies such as Artificial Intelligence, Machine Learning, Blockchain, Internet of Things (IoT), and Advanced Analytics in strengthening ESG data governance capabilities. Furthermore, comparative studies examining governance maturity across different countries and regulatory environments may provide valuable insights into global sustainability reporting practices.

In conclusion, this study argues that data governance represents the critical missing link between sustainability performance and sustainability reporting. As ESG disclosures become increasingly regulated, assurance-oriented, and stakeholder-driven, organizations must move beyond fragmented reporting practices and adopt integrated governance systems capable of managing sustainability information as a strategic asset. The proposed Data Governance Maturity Framework provides a

comprehensive roadmap for strengthening ESG assurance, enhancing BRSR compliance, improving stakeholder confidence, and supporting sustainable business performance. By embedding governance principles into the management of ESG data, organizations can transform sustainability reporting from a compliance obligation into a strategic capability that contributes to long-term value creation and corporate sustainability excellence.

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