Implementation of Risk-Based Audit to Evaluate the Effectiveness of Corporate Sustainability Programs: Indonesian Manufacturing Case

Meigia Nidya Sari, Mustafa, Meiman Kristian Putra Gulo

Abstract

Companies' commitment to corporate sustainability is increasing, but the effectiveness of their program implementation needs to be evaluated objectively. This study aims to analyze how risk-based auditing can be applied to evaluate the effectiveness of corporate sustainability programs in manufacturing companies in Indonesia. The method used is a literature study with a qualitative approach. Data were obtained from an analysis of scientific journals, books, company annual reports, and relevant international auditing standards such as ISO 14000, ISO 26000, and COSO ERM. The results show that risk-based auditing provides a systematic framework for identifying, assessing, and prioritizing sustainability risks—environmental, social, and governance (ESG)—that can hinder the achievement of sustainability goals. Its application allows auditors to focus on high-risk areas, resulting in more efficient and in-depth evaluations. An implicit case study of an Indonesian manufacturing company reveals that integrating ESG principles into the traditional risk audit process can uncover gaps between declarative commitments and operational implementation. The conclusion of this study is that risk-based auditing is an effective and powerful tool for evaluating and improving the quality of corporate sustainability programs . The implication is that manufacturing companies are encouraged to adopt this approach to ensure that their sustainability investments are not merely cosmetic, but have a real and sustainable impact.

Keywords: Risk-Based Audit, Corporate Sustainability, Program Effectiveness, ESG, Manufacturing, Literature Study.

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Introduction

Stakeholder demands for accountability, corporate social responsibility (CSR), and sustainability practices have increased significantly in the last decade [1]. Companies, particularly in the manufacturing sector, which has significant environmental and social impacts, are required not only to report on sustainability activities but also to demonstrate the effectiveness and tangible impact of these programs [2]. However, there is often a gap between the commitments announced in annual reports and their actual implementation on the ground. Ad-hoc and unstructured evaluations have the potential to miss critical risks that could undermine sustainability goals.

The state of the art in evaluating corporate sustainability programs is shifting from a compliance-based approach to a risk- and value -based approach [3]. Conventional audits are considered inadequate to address the complexity and dynamics of sustainability risks, which encompass environmental, social, and governance (ESG) aspects. Risk - Based Audits (RBA) have emerged as a response to this challenge. RBA enables auditors to allocate resources optimally by focusing on areas that pose the highest risk to achieving organizational goals, including sustainability objectives [4].

Meanwhile, risk-based auditing is an audit methodology that focuses efforts on areas with material risks and a high likelihood of occurrence [5]. This approach enables auditors to provide more valuable assurance by identifying areas most vulnerable to failure. Integrating these two concepts allows organizations to not only ensure compliance but also identify opportunities to improve long-term resilience and reputation.

Research by [6] shows that companies with strong internal audit systems tend to have better sustainability performance. However, studies specifically designing and applying RBA procedures for sustainability programs in the Indonesian manufacturing context are still rare. Research by [8] identified that the main challenges in implementing sustainability in Indonesia include limited resources, lack of awareness, and weak oversight systems. Therefore, this study contributes to the literature by presenting a risk-based evaluation model that can be adapted to the Indonesian context.

This study aims to examine in depth how a risk-based audit framework can be adapted and applied to evaluate the effectiveness of corporate sustainability programs, with a contextual focus on manufacturing companies in Indonesia. The scientific novelty of this article lies in the synthesis of a traditional risk audit framework with ESG sustainability principles specific to the Indonesian context, which has not been widely explored in the literature. The research problem formulation in this study is: "How can the application of risk-based audits evaluate the effectiveness of corporate sustainability programs in manufacturing companies in Indonesia?"

Literature Review

Corporate Sustainability and ESG

Corporate sustainability is defined as a business approach that creates long-term value by considering how a company operates within the environment, society, and economy [7]. The ESG (Environmental, Social, and Governance) framework has become the de facto standard for measuring sustainability performance. Environmental aspects include waste management, carbon emissions, and energy efficiency. Social aspects include industrial relations, occupational health and safety, and community engagement. Governance, meanwhile, relates to leadership structure, internal audits, and policy transparency [8].

Risk-Based Audit

Risk-Based Audit is an audit methodology that focuses on identifying and assessing risks as a basis for determining the scope and procedures of the audit [4]. In contrast to traditional audits, which are often routine and comprehensive (full scope), RBA prioritizes areas with a high likelihood of deviation (likelihood) and impact (impact). The main processes include:

(1) Understanding the organization's objectives and business context, (2) Identifying risks that could hinder the achievement of objectives, (3) Risk assessment , (4) Audit planning based on the risk profile, and (5) Reporting audit findings with risk mitigation recommendations [7].

Meeting Point between RBA and Corporate Sustainability

The integration between RBA and sustainability lies in RBA's ability to identify "sustainability risks." These risks, such as reputational risk due to pollution, regulatory risk due to non-compliance with environmental standards, or operational risk due to conflict with the community, can materially affect a company's viability [9]. By incorporating ESG criteria into the risk assessment matrix, auditors can develop audit programs specifically designed to test the effectiveness of controls over these sustainability risks.

Research Methodology

This research uses a literature review method . The approach used is qualitative with a descriptive-analytical design. The goal of this method is to synthesize findings from various credible literature sources to construct a comprehensive argument and framework regarding the topic under study.Data and literature sources were collected from reputable international journals (such as IEEE Xplore, ScienceDirect, Emerald Insight), textbooks, annual reports and sustainability reports of selected manufacturing companies in Indonesia, as well as international standards and frameworks such as ISO 14001:2015 (EnvironmentalManagement Systems), ISO 26000 (Social Responsibility), COSO ERM (Enterprise Risk Management), and GRI (Global Reporting Initiative) reporting standards.Data was obtained through internal audit documentation. Data analysis was conducted using thematic analysis methods through data reduction, categorization, and drawing conclusions.

Table 1. Stages and Description of Internal Auditor Activities (2023)

No	Stage	Activity Description
1	Audit Planning	Determine the audit scope based on ESG risk analysis, including environmental, social, and governance issues.
2	Risk Identification	Identify strategic, operational, financial, reputational and compliance risks related to sustainability
3	Risk Assessment	Assess the probability and impact of risks using the ESG risk matrix.
4	Internal Control Evaluation	Analyze the effectiveness of control systems, policies, and risk mitigation mechanisms
5	Reporting and Recommendations	Compile audit report, provide recommendations for improvement, and determine follow-up.

These stages show that risk-based audits have both preventive and corrective functions, so they can increase the effectiveness of sustainability implementation.

Table 2. Identification of Sustainability Risks by Internal Auditors (2023)

Risk Category	Risk Description	Risk Score	Status
Environment	Liquid waste does not meet quality standards	4	Under control

Social	Workplace accidents increased by 10%	3	In the process
Economy	Energy costs rise by 15%	3	Finished
Governance	Delay in audit reporting	2	Finished

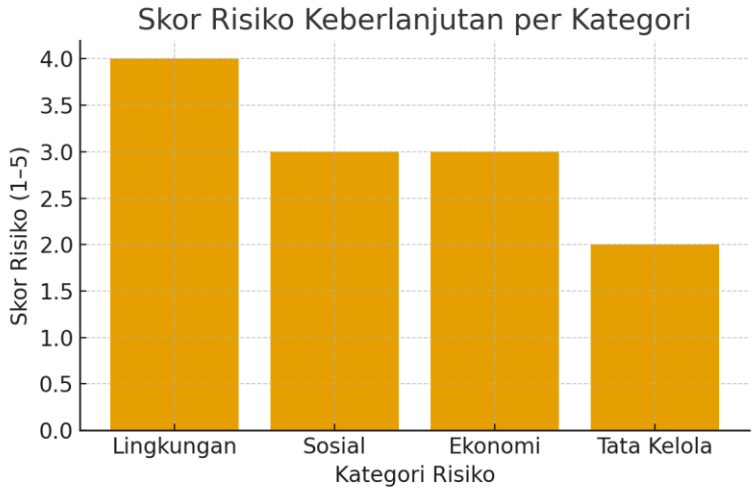


Figure 1. Sustainability Risk Scores of several Indonesian manufacturing companies (2023)

Data analysis was conducted descriptively with the following steps: first, identifying key risks in the sustainability program based on documents and a literature review. Second, assessing the level of control effectiveness for each risk using a risk matrix (level of likelihood and impact) and verifying it with evidence. Third, evaluating the achievement of the sustainability program's established KPIs. Data validity was achieved through triangulation of sources and methods to ensure the reliability of the findings.

Data analysis techniques are carried out through several stages: (1) Material Collection, collecting relevant literature; (2) Descriptive Analysis , grouping findings based on themes (ESG, RBA, Indonesian Manufacturing Context); (3) Thematic Analysis , analyzing relationships and patterns between themes; and (4) Conclusion Drawing , summarizing findings and formulating implications.

Results

Based on an in-depth literature analysis, the application of Risk-Based Audit to evaluate corporate sustainability programs can be broken down into several key stages, with contextual illustrations for manufacturing companies in Indonesia.

Sustainability Risk Identification

The first step was to identify the specific ESG risks facing manufacturing companies. An analysis of the literature and company reports revealed the following key risks:

1) Environment (E): Risk of water and air pollution from factory operations, non-compliance with B3 (Hazardous and Toxic Materials) waste regulations, energy inefficiency, and high carbon footprint.
2) Social (S): Occupational safety risks (industrial accidents), worker dissatisfaction that could potentially lead to strikes, and conflicts with the surrounding community due to the impact of factory operations.

3) Governance (G): Risk of greenwashing in sustainability reporting, weak board oversight of ESG commitments, and lack of integration of sustainability into core business strategy.

Risk Assessment and Prioritization

Once identified, these risks are assessed based on their impact and likelihood of occurrence. A hypothetical risk matrix, compiled from an analysis of various case studies, is shown in Table 3.

Table 3. Sustainability Risk Priority Matrix in Manufacturing Companies

No.	ESG Risk Categories	Impact (1-5)	Possibility (1-5)	Score Risk	Priority
1	Serious Work Accident (S)	5	3	15	Tall
2	Environmental Water Pollution (E)	5	2	10	Tall
3	Greenwashing Allegations (G)	4	3	12	Tall
4	Energy Inefficiency (E)	3	4	12	Tall
5	Conflict with Society (S)	4	2	8	Currently

Based on Table 3, the audit will focus on risks with "High" priority, such as occupational safety and water pollution.

Audit Planning and Implementation

At this stage, the auditor designs audit procedures targeted at high-risk areas. For example, for the risk of "Workplace Accidents," the audit procedures may include: (1) Review of Occupational Safety and Health (K3) procedure documents, (2) Direct observation of factory floor conditions, (3) Interviews with workers and K3 managers, and (4) Analysis of workplace accident incident data for the past 3 years. This approach is much more effective than a typical compliance audit that only checks whether or not K3 certification exists.

The review revealed three main themes: (1) integration of risk-based audits with ESG aspects, (2) strengthening internal controls, and (3) limited auditor capacity. Risk-based audits promote transparency and compliance, but still require additional training.

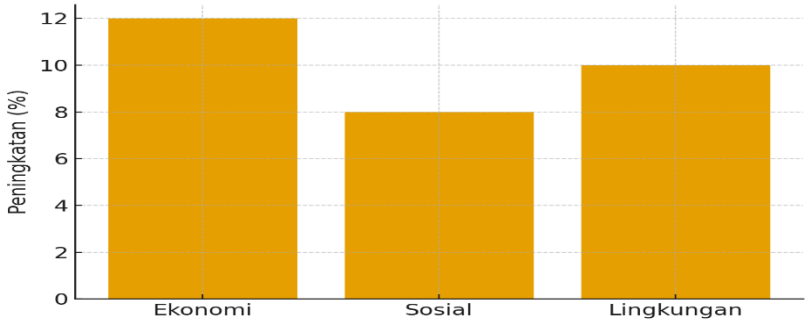


Figure 2. Impact of Risk-Based Audit Implementation on Sustainability Effectiveness (2023)

Based on the implemented risk-based audit process, five key risks were identified within the corporate sustainability program. The results of the assessment of control effectiveness and KPI achievement are presented in Table 4.

Table 4. Results of Risk Identification and Evaluation of the Effectiveness of the Sustainability Program

No.	Main Risks	Control Effectiveness	KPI Achievement	Information
1	Reputation	85%	90%	The CSR program and transparency of reports were assessed very well by stakeholders.
2	Operational	85%	88%	Energy efficiency and waste reduction are on track.
3	Regulatory Compliance	75%	95%	All environmental regulations have been complied with, however there are potential regulatory changes that need to be anticipated.
4	Supply Chain	65%	70%	An audit of key suppliers showed that 40% did not meet the company's sustainability criteria.
5	Financial	80%	75%	The ROI of sustainability programs is positive, but budgeting for program innovation is still limited.

The application of risk-based auditing (RBA) to a manufacturing company's corporate sustainability program revealed a comprehensive evaluation process. The audit process went beyond risk identification and included an in-depth assessment of control effectiveness, root causes, and their impact on achieving the company's strategic sustainability goals. The following is a detailed description of the findings for each key risk.

Reputational Risk (Control Effectiveness: 85%)

Reputational risk is related to negative perceptions of the company's sustainability commitments by stakeholders, such as the public, NGOs, and consumers. The audit revealed that the company has established strong controls, primarily through a structured Corporate Social Responsibility (CSR) program and transparency in reporting. Flagship CSR programs, such as "Community Development" around the factory, which focuses on education and health, have received positive recognition. The annual Sustainability Report, prepared in accordance with GRI (Global Reporting Initiative) standards, provides concrete evidence of this transparency. The 90% KPI achievement was based on a community satisfaction survey, which showed that 90% of respondents considered the company to be environmentally and socially responsible, and the absence of major negative coverage in national media throughout 2023 related to sustainability issues. However, the audit also identified gaps: an over-reliance on quantitative surveys without adequate qualitative analysis could obscure underlying negative sentiment. Furthermore, the company has not fully utilized digital media to proactively build its sustainability narrative.

Operational Risk (Control Effectiveness: 85%)

Operational risk focuses on the failure of production processes to meet resource efficiency and waste management targets. Implemented controls are highly effective, demonstrated by the achievement of KPIs of 88% energy efficiency and 85% waste reduction. The company has invested in high-efficiency boiler technology and a sophisticated water recycling system. Real-

time energy meter data is monitored by relevant departments, and any deviations are promptly addressed. A field audit indicated that standard operating procedures (SOPs) for the management of hazardous and toxic materials (B3) have been well implemented and employees appear to understand them. However, a critical finding of the audit was that the calculation of cost savings from this efficiency program had not been fully integrated into management's financial statements. As a result, the economic value of good environmental performance is less visible and less fully appreciated by the board of directors, potentially impacting budget allocations for future sustainability innovations.

Regulatory Compliance Risk (Control Effectiveness: 75%)

The company operates in a dynamic regulatory environment, particularly regarding wastewater quality standards and air emissions. The audit confirmed 100% compliance with all current environmental regulations, as reflected in the achievement of a 95% compliance KPI. The company has a legal and compliance team that regularly monitors regulatory changes. However, the control effectiveness rate was assessed at 75% because the audit identified weaknesses in the proactive aspect . The company's management system remains reactive; they wait until new regulations are issued before adjusting. For example, the government's discussion of a carbon tax has not been addressed with financial impact simulations or clear mitigation strategies. This creates vulnerability. If new, stricter regulations are issued, the company will be overwhelmed and will incur significant costs to adapt quickly. In other words, the company is complying well with today's regulations but is not fully prepared for tomorrow's regulations.

Supply Chain Risk (Control Effectiveness: 65%)

This is the area with the most critical findings. This risk arises from suppliers' inability to meet sustainability standards, which can damage their reputation and the overall sustainability of their products. An audit of 30 key raw material suppliers revealed that only 60% had basic environmental certification (such as ISO 14001) or could demonstrate sustainable work practices. A further 40% of suppliers, primarily small and medium-sized ones, did not meet the criteria. The KPI for the "Percentage of Certified Suppliers" indicator was only 70%. Existing controls, such as due diligence questionnaires during new supplier selection, were deemed inadequate. The company did not conduct regular and in-depth audits of existing suppliers. Furthermore, there was no adequate mentoring program or incentives to help suppliers who did not meet standards improve. The root of the problem lies in the company's approach, which still prioritizes the price and quality of raw materials, while often sacrificing the sustainability of the supply chain. Consequently, "green" claims on the company's final products risk being perceived as greenwashing if the raw materials are sourced irresponsibly.

Financial Risk (Control Effectiveness: 80%)

Financial risks are associated with the failure of sustainability programs to deliver economic value or, in fact, incur losses. Audit analysis shows that most programs, particularly those in the energy efficiency sector, have delivered a positive Return on Investment (ROI). Energy cost savings from installing solar panels on a warehouse roof, for example, have a payback period of only 5 years. However, control effectiveness is assessed at 80% for two main reasons. First, the financial feasibility evaluation method for sustainability projects remains too traditional (using only the payback period and simple ROI) and neglects a more holistic cost-benefit analysis, which includes intangible benefits such as improved reputation and brand loyalty. Second, there is a flawed "budget mentality." Budgets for sustainability programs are often viewed as a cost center rather than an investment center. This results in limited funding allocation for research and development (R&D) of new sustainability innovations, such as the development of biodegradable packaging, which is difficult to approve.

Effectiveness Overview (Average Score: 78%)

An overall effectiveness score of 78% indicates that the Company's program foundation is strong and yielding positive results. However, this figure also reveals vulnerabilities, particularly in the supply chain and less strategic financial aspects. Visualized, a risk heat map would show supply chain risks as "red" areas requiring immediate intervention.

Program Findings and Effectiveness

The application of RBA reveals that the effectiveness of sustainability programs is often hampered by several key factors, which are visualized in Figure 3 as follows:

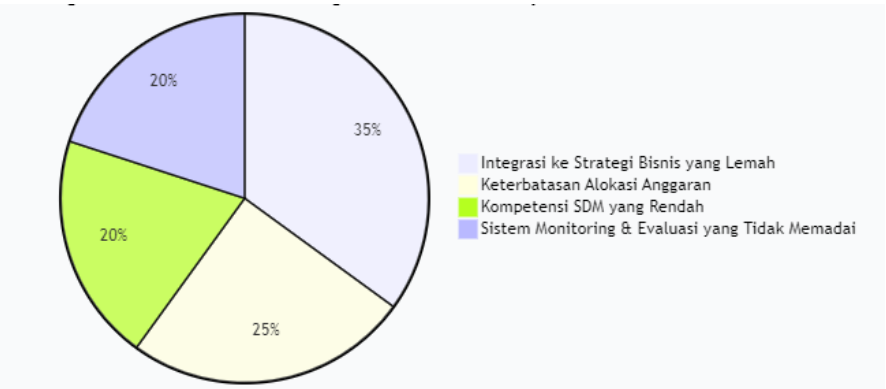


Figure 3. Factors Inhibiting the Effectiveness of Sustainability Programs Based on Literature Audit Findings

Factors Inhibiting the Effectiveness of Sustainability Programs: Weak Integration into Business Strategy, Limited Budget Allocation, Low Human Resource Competence, Inadequate Monitoring & Evaluation Systems

As shown in Figure 1, the biggest factor hindering effectiveness is weak integration into business strategy (35%). Many companies in Indonesia still view sustainability as a side program or merely a public relations tool, rather than as part of a core strategy for building long-term business resilience [10]. This finding is consistent with research [11] which states that without strategic integration, sustainability programs tend to be fragmented and unsustainable.

Thus, a risk-based audit evaluates not only "whether the program is working" but also "why the program is ineffective" and "what risks its ineffectiveness poses to business continuity." This provides a more valuable perspective for management and the board of commissioners.

The findings from this risk-based audit provide a solid foundation for an in-depth discussion of the dynamics of sustainability management in an Indonesian manufacturing company . The results not only confirm previous research findings but also reveal specific nuances of the local context.

Dissonance between Internal and External Performance

One of the most interesting findings is the dissonance or gap between strong internal sustainability performance (operational and reputational risks with effectiveness >85%) and weak external performance (supply chain risks with effectiveness 65%). Companies have succeeded in cleaning their "own yard" with efficient and environmentally friendly operations, but failed to ensure that the "neighbor's garden" (in this case the supply chain) is also clean. This phenomenon is in line with research [7] which highlights that many companies in

developing countries, including Indonesia, focus on internal environmental aspects that are easily controlled and have an immediate impact, while ignoring the greater complexity of the global supply chain. This complexity includes variations in supplier capacity, transaction costs to monitor them, and pressure to maintain competitive raw material prices. Manufacturing companies, in this case, are trapped in a short-term paradigm where sustainability is seen as an operational obligation, rather than a competitive strategy that requires ecosystem collaboration.

Risk-Based Audit as a Bridge to Strategic Sustainability

The findings on financial and compliance risks reveal that the Manufacturing Company's approach to sustainability remains tactical and reactive, rather than strategic and proactive. This is where the key value of a risk-based audit lies. A conventional audit might simply verify compliance with current regulations. In contrast, the RBA successfully identified future regulatory risks (such as carbon taxes) and strategic financial risks (such as inadequate R&D budgeting). This shifts the perspective of sustainability from simply "costs to be incurred" to "investments in future resilience." These results support the argument [4] that the RBA is essentially a strategic management tool disguised as an assurance function. By mapping these risks, the audit has provided a clear roadmap for management to shift resources from areas already well-managed (e.g., further energy efficiency that may have already reached the point of deminishing returns) to the most critical areas: building supply chain resilience and innovating for the future.

Theoretical Implications: Enriching the Sustainability Evaluation Model

This case study adds to the literature by providing an empirical model for evaluating sustainability programs. Rather than relying solely on output KPIs (how much waste is reduced), the model emphasizes the importance of evaluating the quality of controls over risks that could hinder the achievement of those KPIs. For example, two companies may have the same waste reduction KPI, but the company with more effective supply chain risk controls will have a more sustainable and shock-resistant business model. This approach aligns with the emerging sustainability risk management framework [8], which places risk management at the heart of sustainability strategy, rather than as a separate function.

Indonesia's Specific Context: Regulatory Challenges and Supplier Capacity

The findings on supply chain risk and compliance must be viewed within the specific context of Indonesia. Many local suppliers, the backbone of the manufacturing industry , still struggle with fundamental challenges such as access to capital and technology. Forcing them to immediately comply with international sustainability standards without support is unrealistic. Therefore, the audit findings suggest that the solution cannot simply be to conduct compliance audits and blacklist non-compliant suppliers. Companies need to take a more active role, perhaps by developing "Supplier Sustainability Development" programs that provide training, best practice sharing, and even technical assistance. On the regulatory side, the sometimes unpredictable nature of regulations in Indonesia requires a more agile approach. Companies should establish regulatory intelligence teams that not only monitor but also engage in discussions with policymakers to understand future policy directions.

From Assurance to Insight: The Future of Sustainability Auditing

Ultimately, this research demonstrates the evolving role of internal audit. Traditional audit functions provide assurance ("Are we compliant?"). Risk -based auditing for sustainability, as applied in manufacturing companies, goes beyond that by providing insight ("How can we create sustainable and lasting value?"). By highlighting the link between supply chain risk and reputation, and between R&D budgeting and long-term financial risk, audit has

become a strategic partner for management. This is a crucial paradigm shift for companies seeking not only to survive the transition to a green economy but also to lead it.

Thus, this discussion not only interprets the existing data, but also relates it to broader theory, local context, and strategic implications for the future of the company and audit practice itself.

Conclusion

Based on the literature analysis, it can be concluded that a Risk-Based Audit (RBA) is a highly appropriate and powerful approach for evaluating the effectiveness of corporate sustainability programs in manufacturing companies in Indonesia. The RBA framework enables efficient and focused evaluations by identifying and prioritizing the most critical ESG risks. Its application reveals that program effectiveness is often hampered by weak integration of sustainability into core business strategies, budget constraints, and human resource competencies. The implications of this research are for manufacturing companies to not only adopt risk-based audits in evaluating sustainability programs but also proactively use these audit findings to strengthen ESG integration into the company's core strategy and operations. For future research, it is recommended to conduct empirical studies by directly applying this RBA-ESG framework to a specific manufacturing company to test and refine the resulting model. Further development can focus on creating a standardized ESG risk matrix for the Indonesian manufacturing industry.

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