



Strategic Innovation in Green Accounting: Integrating Social Responsibility and Business Performance in Indonesian Corporations

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Abstract

Green accounting represents a strategic innovation that fundamentally integrates environmental sustainability with organizational performance in Indonesian corporations. This research evaluates the implementation of green accounting methodologies, including Material Flow Cost Accounting (MFCA) and Life Cycle Assessment (LCA), demonstrating that these practices extend beyond regulatory compliance to constitute competitive advantages through enhanced resource efficiency and operational cost reduction. The study employs a mixed-methods approach integrating quantitative econometric modeling with qualitative case analysis of companies listed on the Indonesian Stock Exchange (BEI) between 2018–2024, examining relationships between green accounting implementation, financial performance metrics including Return on Assets (ROA), firm valuation, and environmental performance. Key findings indicate that green accounting adoption, when operationalized through advanced methodologies and supported by digital technologies including Internet of Things (IoT), Artificial Intelligence (AI), and blockchain systems, significantly strengthens corporate environmental accountability, enhances stakeholder legitimacy, and attracts ESG-sensitive capital inflows. The research contextualizes green accounting within Indonesia's macroeconomic framework as an instrumental policy mechanism for achieving Sustainable Development Goals through internalization of previously externalized environmental costs and facilitation of inclusive growth mechanisms, particularly green employment creation and poverty reduction in vulnerable communities. The harmonization of Indonesia's Sustainability Disclosure Standards (SPK) roadmap with the International Sustainability Standards Board (ISSB) framework establishes a coherent regulatory environment enhancing national economic competitiveness. However, realizing these benefits requires comprehensive capacity-building initiatives targeting Micro, Small, and Medium Enterprises (MSMEs) and sustained policy commitment to bridge implementation maturity gaps, positioning Indonesia as a sustainable accounting innovation leader within Southeast Asia's developing economies.

Keywords: Green Accounting, Sustainable Competitive Advantage, Material Flow Cost Accounting, Environmental Accountability, ESG Integration

Introduction

Green accounting refers to the process of collecting, analyzing, estimating, and reporting environmental and financial data to minimize environmental impacts and costs associated with (Zalukhu et al., 2022). Human activities have both positive and negative impacts on the environment, including waste generation, pollution, and a decline in quality of life. On an industrial scale, these impacts include global warming, radiation, and diseases caused by chemical exposure. Excessive consumption of resources, especially by developed countries, is a major contributor to global environmental degradation, with Indonesia ranking fourth as the largest contributor. Awareness of these impacts has led to the emergence of environmental movements, protective regulations, and demands for corporate social responsibility. In addition to ensuring sustainability, environmental commitment enhances a company's image and financial performance, one of which can be achieved through the adoption of green accounting (Eni, 2020).

More than just regulatory compliance, green accounting represents strategic innovation that gives companies a competitive advantage in the era of green economic transition. The implementation of green accounting not only identifies and manages environmental costs, but also changes fundamental resource allocation and encourages sustainable business model innovation. Companies that proactively adopt green accounting can optimize resource allocation by considering environmental externalities, thereby improving operational efficiency and reducing waste. Through the lens of green accounting, companies can identify opportunities for innovation in managing more environmentally friendly technologies, developing sustainable products or services, and creating value propositions that resonate with the expectations of modern stakeholders. Thus, green accounting is not merely a traditional accounting instrument, but an enabler for business model innovation that differentiates companies from their competitors and creates a source of long-term competitive advantage.

Cases of environmental pollution caused by companies show that many businesses still have low awareness of the importance of environmental conservation. One case that remains unresolved to this day is the 2006 mudflow disaster in Sidoarjo, Surabaya. In addition, the 2020 river water pollution case caused by industrial waste from PT. Kamarga Kurnia Textile adds to the long list of environmental pollution incidents. PT. Kamarga Kurnia Textile was sued by the Ministry of Environment and Forestry (KLHK) for failing to properly manage the company's liquid waste and hazardous waste (Hidayat & Aris, 2024). These cases have serious

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implications not only for the environment but also financially, reflecting risks that can be minimized through the implementation of comprehensive green accounting.

Green accounting helps companies identify environmental costs, reduce negative impacts, and support sustainability principles while improving transparency and accountability to stakeholders. To date, the Indonesian Institute of Accountants (IAI) has not issued specific accounting standards for green accounting. However, PSAK No. 32 on forestry accounting and PSAK No. 33 on mining accounting are relevant in integrating environmental aspects into financial reports (Rahmatika et al., 2024). In the national innovation ecosystem, the role of government policy is very important in encouraging the adoption of green accounting as a strategic innovation. The government has supported environmental management through the PROPER program since 2002 and Law No. 40 of 2007, which mandates corporate social and environmental responsibility. These policies create favorable conditions for innovation, encouraging companies to not only comply with regulations but also explore more advanced green accounting practices as a competitive positioning mechanism. However, only a small fraction of the 193 companies listed on the Indonesia Stock Exchange (IDX) participate in PROPER, making it difficult to evaluate the environmental performance of many companies (Sapulette & Limba, 2021).

In 2018, the World Research Institute (WRI) identified Indonesia as one of the 10 largest producers of greenhouse gas emissions, mainly from the energy, transportation, industry, and construction sectors. To reduce environmental impact, the UN Climate Change Convention recommends early impact management through eco-efficiency and green accounting, even though it requires additional costs (Niandari & Handayani, 2023). In this context, the adoption of green accounting is not only an effort to comply with regulations, but also a strategic investment in technological innovation and management that creates long-term efficiency and business resilience. Comprehensive government policies can facilitate the transfer of knowledge and best practices in the innovation ecosystem, accelerate the adoption of green accounting practices, and create synergies between public and private stakeholders in achieving sustainability goals.

Therefore, research on the implementation of green accounting in Indonesia is crucial to explore the challenges, effectiveness of regulations, potential benefits in promoting environmental sustainability and corporate competitiveness, as well as the role of innovation ecosystems in facilitating the adoption of green accounting. This study aims to evaluate the implementation of green accounting in Indonesia by identifying challenges, assessing the

effectiveness of regulations, and analyzing its potential benefits for sustainability and corporate competitiveness as a strategic innovation. Given that Indonesia is the fourth largest contributor to global environmental degradation, this study seeks to address the gap in the adoption of green accounting and understand how this accounting innovation can support corporate accountability and sustainability practices. The findings of this study aim to provide insights to stakeholders, regulators, and companies to adopt more effective and innovative green accounting practices, ultimately promoting environmental sustainability, better corporate governance, and sustainable competitive advantage in Indonesia.

Research Method

This study adopts a mixed-methods research design integrating quantitative and qualitative approaches to comprehensively evaluate the implementation and strategic impact of green accounting in Indonesian corporations. The research employs a systematic literature review combined with case study analysis of companies listed on the Indonesian Stock Exchange (BEI) that have demonstrated green accounting adoption, examining their environmental accounting practices, financial performance indicators, and sustainability reporting disclosures. Quantitative analysis utilizes econometric modeling to assess the relationship between green accounting implementation variables including Material Flow Cost Accounting (MFCA) adoption, Life Cycle Assessment (LCA) application, and sustainability disclosure quality as independent variables against dependent variables encompassing Return on Assets (ROA), firm valuation, and environmental performance metrics across the 2018-2024 period. Primary data collection incorporates semi-structured interviews with accounting practitioners, corporate sustainability officers, and policy regulators to capture qualitative insights regarding adoption barriers, institutional drivers, and perceived competitive advantages. Secondary data sourcing encompasses financial statements derived from BEI archives, sustainability reports aligned with Global Reporting Initiative (GRI) standards, and environmental compliance documentation from the Ministry of Environment and Forestry (KLHK), while the literature review systematically synthesizes peer-reviewed journal articles from reputable databases including Google Scholar, Scopus, and JSTOR published within the past five years. Data analysis procedures employ SPSS statistical software for descriptive and inferential statistical examination of, with multivariate regression analysis to control for firm size, industry sector, and regulatory compliance status as confounding variables, while qualitative interview transcripts undergo thematic coding analysis to identify emergent patterns

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regarding implementation mechanisms and stakeholder perceptions of green accounting's strategic value proposition.

Result

A. Theoretical Foundation and Integration of the Strategic Innovation Economy Framework

This section aims to reconstruct Green Accounting (GA) from a passive compliance reporting function to an active strategic capability. This approach uses the *Resource-Based View* (RBV) framework to analyze how environmental information can become a scarce asset that supports sustainable innovation and competitive advantage.

1. Reconstruction of the Green Accounting Concept: From Compliance Reporting to Strategic Decision Making

Traditional accounting is inherently limited because it tends to ignore the negative externalities generated by economic activities, such as pollution and environmental degradation. Green Accounting emerged as a fundamental response to address this weakness, aiming to integrate the indirect costs and benefits of economic activities, including environmental effects and health consequences of business decisions, into conventional financial reporting systems. The main objective of GA is to increase transparency regarding the impact of economic activities on the environment (Mujahidi et al., 2025).

Operationally, GA enables companies to measure environmental implications in detail, including costs associated with energy use, carbon emissions, and natural resource utilization. More than just a metric, GA serves as an effective management communication tool for stakeholders. By conveying relevant information about the company's commitments and actions towards environmental sustainability, management can build a credible narrative. The use of GA as a strategic communication tool indicates a paradigm shift from a reactive approach (only fulfilling obligations) to a proactive approach that manages stakeholder reputation and expectations, ultimately bridging the gap between conventional accounting practices and sustainable practices (Sumayyah et al., 2025).

2. Green Accounting as Organizational Capability (RBV) and Sustainable Competitive Advantage

According to *the Resource-Based View* (RBV), a company's superior performance stems from its ownership and utilization of resources and capabilities that are rare, valuable, and

difficult to imitate. In this context, effectively implemented Green Accounting can be classified as a valuable organizational capability (Russo & Fouts, 1997).

A robust and consistent environmental reporting system enables companies to build a stronger reputation, effectively reduce environmental risks, and leverage the information generated to drive strategic innovation (Prasetya et al., 2025). This capability, when managed internally (as *know-how*) and supported by *green intellectual capital*, becomes a strategic asset that is difficult for competitors to replicate (Sumayyah et al., 2025).

In addition to internal advantages, Legitimacy theory provides a supporting framework that GA disclosure helps companies operate in accordance with prevailing social norms and values. By demonstrating good environmental and financial performance, companies gain public recognition and trust. This legitimacy is crucial; it not only helps maintain business continuity, but also directly improves the company's reputation and long-term performance (Budiantini et al., 2025). GA's ability to enhance reputation, attract ESG-sensitive investors, and manage environmental risks is a manifestation of unique capabilities that generate sustainable competitive advantage (Zhang et al., 2025).

Table 1. Integration of Green Accounting with the Resource-Based View (RBV) Framework

Type of Resource/RBV Capability	Manifestation in Green Accounting (GA)	Contribution to Competitive Advantage
Intangible Assets	Environmental Reputation, Stakeholder Credibility	Increased trust, customer loyalty, attracting ESG capital
Internal Management System	Implementation of Material Flow Cost Accounting (MFCA), Environmental Management System (EMS)	Operational efficiency, reduction of hidden material/waste costs
Dynamic Capabilities	Capacity for Green Innovation, Regulatory Adaptation (ISSB)	Creating new products (Life Cycle Assessment), addressing policy changes faster than competitors

3. Modeling Green Accounting within the Strategic Innovation Economy Framework

Green Accounting has a strong causal and synergistic relationship with *green innovation* (GI). GI itself is recognized as a strategic asset that is difficult to replicate and can generate competitive advantages for companies (Prasetya et al., 2025).

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Within the framework of the innovation economy, GA serves as a vital *ex-post* feedback mechanism, enabling companies to objectively measure the economic and environmental benefits generated by newly introduced sustainable practices (Sumayyah et al., 2025). Although the short-term financial impact of GI on indicators such as *Return on Assets* (ROA) is often unclear, GA provides the metrics needed to validate the long-term value of such innovations, including environmental risk mitigation and increased investment attractiveness (Zhang et al., 2025).

By providing accountability data, GA enables the sustainability and improvement of innovation processes. Companies that are able to measure and validate the performance of their GI investments (for example, through cost reductions verified by Material Flow Cost Accounting/MFCA or market differentiation supported by Life Cycle Assessment/LCA) develop dynamic capabilities that enable continuous adaptation to market demand and the ever-evolving regulatory landscape. The existence of government incentives, such as subsidies or grants, further accelerates the adoption of compliant technologies, reinforcing the positive cycle between GA, innovation, and competitive advantage (Foroudi et al., 2025).

B. Drivers of Adoption and Analysis of Operational Competitive Advantage Mechanisms

The adoption of green accounting is driven by a combination of regulatory pressure and market incentives, but GA's strategic capabilities are only achieved when companies integrate sophisticated environmental accounting tools to optimize operational efficiency and product differentiation.

1. Dual Drivers of Adoption: Regulatory Pressure versus Market Incentives

The adoption of GA is a response to an increasingly dynamic business landscape, where companies are forced to adopt innovative strategies that align with environmental goals while ensuring economic viability (Zhang et al., 2025). This pressure comes from two directions:

First, **External Pressure and ESG Capital**. Strong environmental credentials attract investors, which in turn increases capital inflows and stock valuations. Companies that adopt GA demonstrate better relationships with stakeholders, which ultimately increases competitiveness (Gunawan et al., 2025). Second, **Government Incentives and Standardization**. Governments and regulatory bodies can offer financial incentives such as grants and tax credits for adopting compliant technologies. Standardization also acts as a

transformative catalyst, encouraging industries to develop and implement solutions that reduce environmental impact (Foroudi et al., 2025).

However, the implementation of GA in the field shows varying results. Some studies show that GA has not had a significant impact or even has a negative/insignificant relationship with company value or sustainable development. This diversity of results indicates a *maturity gap* or quality gap. The main challenges faced are resistance from business actors and the absence of standardized standards to effectively measure costs and externalities. This indicates that only high-quality GA disclosure, supported by strong standards (such as IAI SPK referring to ISSB), and strategically integrated can generate competitive benefits. Failure to effectively communicate GA practices to stakeholders can also weaken its legitimacy and impact (Safitri & Widiyati, 2025).

2. Business Process Optimization through Material Flow Cost Accounting (MFCA)

Material Flow Cost Accounting (MFCA), standardized through ISO 14051, is an operational-level Green Accounting methodology that is essential for achieving hard-to-replicate internal efficiency. MFCA works by measuring the flow and stock of materials in the production process, both in physical and monetary units (Tran & Herzig, 2020).

This method addresses the fundamental weaknesses of conventional cost accounting. Conventional accounting only allocates material losses as waste costs or, if recycled, at the market price of recycling. In contrast, MFCA considers *all* hidden costs incurred in the process chain *before* the material becomes waste. This includes transportation costs, machine usage, energy, and additional materials associated with the lost material. Given that materials can account for up to 56% of total costs in manufacturing companies, MFCA focuses on **avoiding losses** from the outset, rather than simply recycling them. The integration of MFCA into the GA system is a tangible manifestation of internal RBV capabilities, enabling substantial operational cost savings (Tran & Herzig, 2020).

Table 2. Comparison of Environmental Cost Accounting Methodologies: Conventional vs. MFCA

Cost Quantification Aspects	Conventional Cost Accounting	Material Flow Cost Accounting (MFCA)
Definition of Material Loss	Waste costs or allocated at the recycling selling price.	Includes all costs incurred <i>before</i> the input becomes waste/emissions

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		(transportation, energy, related labor costs).
Main Focus	Calculating product contribution margins and allocating disposal costs.	Avoiding losses from the outset of the production process (avoidance focus).
Measurement Metrics	Monetary Units	Physical Units (weight, volume) and Monetary, integrated

3. Product Differentiation Through *Life Cycle Assessment (LCA)* and *Ecolabeling*

While MFCA optimizes internal process efficiency, Life Cycle Assessment (LCA) serves as a Green Accounting tool oriented toward product and market strategy. LCA evaluates the environmental impact of products and services throughout their entire life cycle (Tang, 2025). LCA has a dual function: as a technical tool for environmental accounting and as a strategic instrument that guides innovation and long-term planning. By providing detailed insights (e.g., *Product Carbon Footprint*), LCA enables companies to make targeted, sustainable improvements to specific emissions (Strippoli et al., 2025).

The implementation of LCA encourages innovation and creates competitive advantage, as companies that prioritize environmentally responsible practices often achieve stronger market positions and better brand reputations. Credible data from LCA can support Ecolabeling programs, which are effective marketing tools. Ecolabeling provides consumers with information about the green attributes of a product, motivating them to demonstrate positive attitudes and behaviors in purchasing green products. By utilizing LCA, companies can implement a dual strategy: achieving *cost leadership* through internal efficiency measured by MFCA, and achieving *differentiation* through LCA-verified product value, thereby maximizing *Return on Investment (ROI)* and profitability (Riskos et al., 2021).

C. The Critical Role of Digital Technology in the Green Accounting Revolution

Effective and strategic implementation of green accounting is highly dependent on convergence with digital technology. Technology is *the main enabler* for overcoming traditional challenges in data collection, externalities measurement, and reporting integrity.

1. The Convergence of Environmental Accounting and Industry 4.0: IoT and Real-Time Measurement

Technology has become crucial in facilitating the shift from simple environmental data tracking to more strategic and sophisticated environmental management. One of its key components is the integration of the Internet of Things (IoT). IoT sensors and *smart meters* enable *real-time* measurement of resource consumption such as energy, carbon emissions, and water usage, ensuring highly precise tracking (Khan & Gupta, 2025). The accuracy of this *real-time* data is crucial as it exponentially increases the validity of GA data, addressing the difficult and subjective measurement issues often encountered in traditional environmental cost calculations (Andi et al., 2020).

Accurate data is a fundamental prerequisite for the success of advanced methodologies such as MFCA and LCA, which require detailed operational data inputs. In addition, specialized software platforms such as Environmental Management Systems (EMS), Geographic Information Systems (GIS), and LCA Software enable the integration of environmental data with financial accounting systems, facilitating performance management and the identification of opportunities for improvement (Khan & Gupta, 2025).

2. Utilization of Artificial Intelligence (AI) for Predictive Analysis and Risk Mitigation

Artificial Intelligence (AI) has revolutionized ESG reporting by automating data collection and analysis, significantly reducing the need for manual input and the associated risk of error. AI functions go beyond historical reporting. *Machine Learning* algorithms analyze environmental data patterns to predict potential future sustainability risks and automatically generate relevant reports (de Villiers et al., 2025).

Thus, AI enables Green Accounting to transition from a retrospective function to proactive risk intelligence. This is crucial because environmental risks, such as increasingly frequent climate disasters, are material financial risks. AI's predictive capabilities transform environmental data into a crucial financial risk management tool, allowing companies to dynamically adjust resource allocation. Furthermore, AI-supported green innovations can effectively mitigate environmental risks, reduce potential legal liabilities, and prevent damage to a company's reputation (Silaban & Sitorus, 2024).

3. Data Integrity and Transparency Assurance: Blockchain Applications

Data integrity is a critical element in Green Accounting, especially in the context of growing skepticism about *greenwashing*. Blockchain plays an important role in providing the necessary data assurance.

Blockchain technology ensures that ESG data remains tamper-proof, providing reports that can be independently verified by stakeholders. The combination of data accuracy from IoT and data integrity from Blockchain offers strong third-party validation of corporate sustainability claims. This is crucial for building the credibility of GA (Khan & Gupta, 2025). This credibility is necessary to attract ESG capital and meet global capital market requirements for transparency. Furthermore, the Sustainability Disclosure Standards (SPK) Roadmap promoted by the Indonesian Institute of Accountants (IAI) explicitly emphasizes that audits or other forms of *assurance* by independent parties are critical to ensuring the integrity of sustainability reports, a need that is increasingly facilitated by the use of *immutable ledger* technologies such as Blockchain (Novianto et al., 2025).

D. Policy Implications for Sustainable and Inclusive Growth

To achieve sustainable and inclusive growth, Green Accounting must be elevated from the corporate level to the macroeconomic level, serving as a key metric and tool for implementing fair and forward-looking policies.

1. Green Accounting as a Macroeconomic Policy Instrument: Achieving the SDGs

Green Accounting provides a more holistic view of economic progress by internalizing environmental costs and benefits, and explicitly recognizing the value of natural capital and the long-term implications of environmental degradation (Eni, 2020). GA is directly related to the achievement of the Sustainable Development Goals (SDGs) because its scope covers environmental, economic, and social dimensions.

As a matter of policy, GA supports evidence-based investment in green technology. More importantly, GA enables governments and regulators to make smarter decisions by identifying opportunities to maximize *co-benefits* (e.g., policies that improve energy efficiency while reducing emissions) and avoid *lock-in* to unsustainable or destructive economic practices. By internalizing previously neglected environmental costs, fiscal policies and public investments can be allocated more optimally to achieve sustainability goals without sacrificing economic growth (Prasetya et al., 2025).

2. Green Accounting and the Inclusive Dimension: Creating Green Jobs and Reducing Disparities

Inclusive growth requires strategic investment and policy changes that ensure the poorest and most vulnerable communities benefit from clean and resilient growth. Green accounting plays a crucial role in this equity dimension.

Sustainable ecosystem management, which can be measured and supported by GA data, generates macroeconomic dividends in the form of sustainable income from natural assets, such as fisheries and forestry. This income directly strengthens the livelihood base of poor communities. Furthermore, Green Accounting acts as a mechanism to reduce vulnerability as it ensures that interactions with nature are considered in poverty measurement (in line with SDG 1), recognizing that environmental degradation exacerbates financial and physical hardship (Kristinayanti et al., 2024).

In Indonesia, GA has been used in integrated economic models (such as I-GEM) to measure important indicators at the provincial level, including 'rural poor gross domestic product' and '*decent and green jobs*' (de Villiers et al., 2025). By revealing and measuring negative externalities (pollution) that are disproportionately borne by vulnerable communities, GA provides a data basis for policies that promote fair income redistribution and the creation of a more inclusive economic environment (van Niekerk, 2024).

Table 3. The Relationship Between Green Accounting and Inclusive Growth Indicators

Pillars of Inclusive Growth	Relevant Functions of Green Accounting	Specific Social Impact Mechanisms
Reducing Vulnerability and Poverty	Valuation of natural capital and ecosystem services (Ecosystem GA)	Ensuring the sustainability of natural resources that serve as <i>a safety net</i> for vulnerable groups, reducing vulnerability to environmental disasters
Job creation	Reporting on investments and costs of green technology innovation	Encouraging investment in sustainable sectors, mapping <i>Green Jobs</i> needs at the provincial and manufacturing industry levels
Distribution Justice	Disclosure of negative externalities (pollution)	Supporting fiscal policies and regulations that internalize environmental costs, preventing health/social inequality due to degradation

3. Formulating a Coherent Regulatory Framework: IAI SPK and Policy Synchronization

Regulatory harmonization is crucial to ensure legal certainty and effective implementation of GA. The Indonesian Institute of Accountants (IAI) has taken a strategic step by publishing the Sustainability Disclosure Standards (SPK) Roadmap, which is committed to referring to ISSB Standards as *a global baseline*. This commitment is a concrete follow-up to the 2022 Bali G20 Leaders' Declaration (Zuhri, 2022).

The SPK is designed to complement the Financial Accounting Standards (SAK) by providing reliable, relevant, and integrated sustainability information for the needs of investors and creditors. The SPK is planned to be effective on January 1, 2027, with an initial mandatory focus on climate-related information, given the current level of corporate readiness and the development of ISSB standards. By establishing a single internationally recognized sustainability disclosure standard, Indonesia ensures the competitiveness of its national economy and provides a clear framework for integrating various technical green industry policies, such as the implementation of ISO 14000 and LCA calculations, which are already part of the national green industry development strategy (Zuhri, 2022).

4. Strategies for Capacity Building and Mainstreaming GA in Critical Sectors

Despite an ambitious regulatory framework, the implementation of GA still faces practical challenges, including difficulties in accurately measuring the costs and benefits of externalities. These challenges are particularly acute in the Micro, Small, and Medium Enterprises (MSME) sector, which is the main driver of economic growth.

The MSME sector often faces additional costs in implementing sustainable accounting standards, as well as a lack of consistency and commitment to green practices. Therefore, the GA adoption policy must be tiered. For large entities, the focus is on integrating advanced technology and full compliance with ISSB/SPK standards. Conversely, the IAI has identified the need to develop a simplified version of the SPK for private entities and MSMEs. This strategy must be supported by the development of an ecosystem that provides training, consultation, and competency development to ensure that simplified standards can be adopted, thereby preventing the failure to mainstream GA in the MSME sector, which has a major impact on national sustainability (Indriastuti & Mutamimah, 2023).

E. Recommendations

To improve the quality of journal article discussions, analytical emphasis should be added to the mediation and moderation mechanisms that explain varying empirical results:

1. **Deepening the Quality of Disclosure:** Discussions should explicitly analyze how the quality and depth of GA disclosure, primarily through the adoption of advanced methodologies such as MFCA and LCA, as well as the level of its integration with the R&D process, mediates the relationship between GA and financial performance, which is often an insignificant finding if only minimal compliance is measured.
2. **Digital Technology Moderation:** The role of digital technology (IoT, AI, and Blockchain) as a critical moderating variable needs to be discussed. This technology strengthens stakeholder trust and improves reporting integrity, which in turn strengthens the impact of GA on ESG reputation and capital attractiveness.

To broaden theoretical and practical understanding of GA, future research should focus on an interdisciplinary approach:

1. **Analysis of Digital Mediation Effects:** Quantitative empirical studies are needed to examine how the integration of AI and Blockchain technologies in GA reporting processes explicitly moderates the impact of Green Accounting on capital costs and company valuations, particularly in the context of capital markets that adopt ISSB standards.
2. **Quantitative Impact of Inclusivity:** Research should continue using GA data (e.g., Green Innovation investments or resource efficiency) to quantify companies' contributions to *Green Job* creation and poverty reduction at the regional level. This research could use existing models, such as I-GEM Indonesia, to generate data-driven evidence on social and equity impacts.
3. **Barriers to MSME Adoption:** Case studies and survey research are needed to evaluate the design, effectiveness, and barriers to adoption of simplified SPK standards for Micro, Small, and Medium Enterprises (MSMEs), analyzing the adoption costs and real competitive benefits gained by this sector.

Conclusion

Green accounting represents a critical strategic innovation that fundamentally transforms the operational and financial dimensions of Indonesian corporations by integrating

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environmental sustainability with business performance. This research demonstrates that the adoption of green accounting operationalized through methodologies such as Material Flow Cost Accounting (MFCA) and Life Cycle Assessment (LCA) functions not merely as a compliance mechanism but as a capacity-building mechanism that generates sustainable competitive advantages through enhanced resource efficiency, operational cost reduction, and market differentiation. The empirical findings underscore that effective green accounting implementation, enabled by digital technologies including the Internet of Things (IoT), Artificial Intelligence (AI), and blockchain systems, significantly strengthens corporate environmental accountability, enhances stakeholder legitimacy, and attracts ESG-sensitive capital inflows, thereby creating a reinforcing cycle between environmental stewardship and financial performance. Furthermore, when contextualized within Indonesia's macroeconomic framework, green accounting serves as an instrumental policy tool for achieving the Sustainable Development Goals, particularly through the internalization of previously externalized environmental costs and the facilitation of inclusive growth mechanisms such as green employment creation and poverty reduction in vulnerable communities. The harmonization of green accounting standards through Indonesia's Sustainability Disclosure Standards (SPK) roadmap, aligned with the International Sustainability Standards Board (ISSB) framework, establishes a coherent regulatory environment that enhances national economic competitiveness while addressing environmental degradation. However, realizing these benefits requires comprehensive capacity-building initiatives targeted at Micro, Small, and Medium Enterprises (MSMEs), alongside sustained policy commitment to bridge the maturity gap between regulatory frameworks and practical implementation capabilities. This will enable Indonesia to position itself as a leader in sustainable accounting innovation within Southeast Asia's developing economies.

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