

HUMAN RESOURCE DEVELOPMENT STRATEGY TO SUPPORT THE IMPLEMENTATION OF GREEN ACCOUNTING

Ateng Kusnandar Adisaputra

Universitas Al Ghifari Bandung, Indonesia
atengkusnandar@gmail.com

Iwan Ardiansyah

Universitas Al Ghifari Bandung, Indonesia
iwanardi@unfari.ac.id

Taufik Rahmat

Universitas Al Ghifari Bandung, Indonesia
taufiqrahmat@unfari.ac.id

Reza Buchori

Universitas Al Ghifari Bandung, Indonesia
reza.bukhori@unfari.ac.id

Abstract

The implementation of green accounting has become an increasingly important strategic issue in supporting sustainable business practices. However, the success of its implementation depends not only on environmental accounting systems and regulations but also on the quality of human resources (HR) capable of understanding and applying sustainability principles in organizational decision-making. This article aims to analyze HR development strategies that can support the effective implementation of green accounting. The study employs a qualitative approach through a literature review of academic journals, books, regulations, and sustainability reports related to green accounting and HR development. The findings indicate that successful green accounting implementation requires integrated HR development strategies, including competency-based training, strengthening environmental organizational culture, sustainability-oriented performance evaluation, digital capability enhancement, and leadership commitment. Organizations that integrate sustainability competencies into HR management tend to demonstrate more effective environmental cost management, improved environmental reporting quality, and stronger organizational competitiveness. This study contributes theoretically by integrating human resource development and green accounting perspectives and provides practical recommendations for organizations seeking to strengthen sustainability implementation through strategic HR management.

Keywords: *Green Accounting, Human Resource Development, Sustainability, Environmental Accounting, Organizational Competitiveness*

1. Introduction

Climate change, environmental degradation, and increasing demands for sustainable business practices have driven organizations to shift their corporate governance paradigm (Shrivastava and Addas 2014). Companies are no longer solely focused on achieving economic gain (profit), but also on social (people) and environmental (planet) aspects (Wilson and Post 2013). This concept, known as the Triple Bottom Line, is the foundation for the development of sustainable business practices. Thus, companies are required to balance economic interests with social and environmental responsibilities in all their operational activities. This paradigm shift encourages organizations to integrate sustainability aspects into their management systems, including decision-making processes, resource management, and performance reporting (Hammer and Pivo 2017).

One implementation of the sustainability concept in accounting is green accounting. This accounting system integrates costs, benefits, and environmental impacts into a company's recording, measurement, reporting, and decision-making processes (Zik-Rullahi and Jide 2023). Green accounting enables companies to more accurately identify environmental costs, thereby improving operational efficiency and strengthening accountability to stakeholders (Rounaghi 2019). Unlike conventional accounting, which focuses on financial aspects, green accounting broadens the scope of reporting to include information on natural resource use, energy consumption, waste management, emissions control, and environmental recovery costs as part of the information relevant to both management and external parties. This information serves as the basis for evaluating a company's environmental performance and supports more effective, sustainability-oriented decision-making (Greenham 2010).

Furthermore, the implementation of green accounting can help companies identify cost-efficiency opportunities through waste reduction, energy optimization, and the use of environmentally friendly technologies, thus providing not only ecological benefits but also increasing the company's long-term competitiveness (Marota 2024a). Amidst the increasing attention of investors, regulators, and the public towards responsible business practices, green accounting also serves as an instrument to increase corporate transparency and credibility through the presentation of more comprehensive environmental information (Kang et al. 2024). Therefore, the implementation of green accounting is no longer seen as merely a form of regulatory compliance, but has become a business strategy capable of creating added value, strengthening the company's reputation, and supporting the achievement of sustainable development goals (SDGs) (Kang et al. 2024).

Based on various previous studies, the implementation of green accounting, or Environmental Management Accounting (EMA), depends not only on the availability of accounting systems and environmental regulations, but is also greatly influenced by the quality of the human resources implementing them. Liu et al. (2022) show that Green

Human Resource Management serves as a mechanism linking the implementation of Environmental Management Accounting to the formation of environmentally friendly organizational behavior. In line with this, Saptaria et al. (2022) emphasize that environmental competency-based recruitment, ongoing training, performance appraisal, and employee engagement are critical elements in building an organization's capacity to implement sustainable accounting practices effectively. Pargmann and Berding (2024) emphasize that the transformation towards sustainability accounting requires developing new competencies among accounting and management control staff, so that HR becomes a strategic factor in the successful implementation of green accounting.

In Indonesia, the implementation of green accounting has received increasing attention in line with increasing regulations regarding corporate sustainability, the implementation of Environmental, Social, and Governance (ESG), and sustainability reporting. However, the implementation of green accounting still faces various obstacles. One of the main obstacles is the limited human resources competent in integrating accounting aspects with environmental management. (Sutria et al. 2025). Most organizations still view green accounting as solely the responsibility of the environmental or sustainability division. Yet, its implementation requires cross-functional involvement, from accounting, finance, operations, human resources, to top management. Therefore, human resource development is a strategic factor in building competencies, organizational culture, and leadership that support the success of green accounting. Based on this situation, this article aims to analyze human resource development strategies that can effectively support the implementation of green accounting, so that organizations not only meet regulatory demands but also gain a competitive advantage through sustainable business practices.

2. Literature Review

2.1 Green Accounting

Green accounting is an accounting system that integrates environmental aspects into a company's economic activities (Maama and Appiah 2019). Its goal is to identify, measure, control, and report environmental costs as part of a company's financial and non-financial information. According to Environmental Management Accounting (EMA), green accounting helps companies in:

a. Identifying environmental costs

One of the primary functions of Environmental Management Accounting (EMA) is to help companies identify and classify the various costs arising from operational activities that impact the environment (Jasch 2006a).

b. Reducing production waste

EMA also plays a role in helping companies reduce production waste by providing information on sources of waste during operational processes (Jasch 2006b).

c. Increase the efficiency of resource use

The implementation of EMA encourages companies to use resources more efficiently by monitoring the consumption of raw materials, energy, water, and other resources (Schaltegger et al. 2008).

d. Supporting sustainable decision-making

In addition to serving as a recording and reporting tool, EMA serves as a management information system that provides financial and non-financial data related to environmental aspects to support more comprehensive decision-making (Schaltegger et al. 2008).

2.2 Human Resource Development

Human resource development is a systematic process to improve employee knowledge, skills, competencies, and attitudes to meet current and future organizational needs (Kareem and Hussein 2019). According to Human Capital theory, human resources are a strategic asset capable of generating competitive advantage when developed sustainably. In the context of green accounting, HR competencies include:

a. Knowledge of environmental accounting

In the context of green accounting, a core competency that human resources must possess is knowledge of environmental accounting (Hsiu-Yu et al. 2018). This knowledge encompasses an understanding of the concepts, objectives, principles, and scope of green accounting, including how a company's operational activities can have an impact on the environment that needs to be measured and reported. Furthermore, human resources also need to understand various regulations, sustainability reporting standards, and environmental policies that apply at both the national and international levels (Freihat et al. 2024).

b. Ability to identify environmental costs

The next competency is the ability to identify and measure environmental costs arising from company activities (Yakhou and Dorweiler 2004). Environmental costs include pollution prevention costs, waste management costs, emission control costs, environmental restoration costs, compliance costs with environmental regulations, and investment in environmentally friendly technologies.

c. Sustainability reporting mastery

The implementation of green accounting also requires human resources to have the ability to prepare and manage sustainability reports (Wahyuni Td et al. 2026). This competency includes the ability to collect, process, analyze, and present information regarding a company's economic, social, and environmental performance in a transparent and accountable manner.

d. Environmental, Social, and Governance (ESG) analysis capabilities

The development of sustainability-oriented business practices has made the ability to analyze Environmental, Social, and Governance (ESG) aspects a crucial competency for HR in the accounting field (Moreira et al. 2025).

e. Ability to utilize digital technology in environmental data management

Digital transformation has transformed the way companies manage environmental information, making digital technology competency a necessity. Human resources need to be able to use various accounting information systems, sustainability reporting software, Enterprise Resource Planning (ERP), Environmental Management Information Systems (EMIS), and data analytics technologies to collect, process, and monitor environmental data accurately and in real time (Moreira et al. 2025).

2.3 The Relationship between Human Resource Development and Green Accounting

The quality of its human resources greatly influences the success of green accounting implementation. Organizations with human resources with sustainability competencies tend to be able to:

2.3.1 The Success of Green Accounting Implementation is Influenced by the Quality of Human Resources

The success of green accounting implementation is not only determined by the availability of environmental accounting systems, information technology, and company policies, but also greatly influenced by the quality of the human resources (HR) who implement these systems (Al-Nimer 2025). HR is the primary actor responsible for collecting, processing, analyzing, and reporting environmental information as part of the company's accounting process. Therefore, organizations with HR with sustainability competencies will be more capable of implementing green accounting principles effectively than those without such capacity. These competencies include an understanding of environmental accounting, environmental cost management, sustainability reporting, ESG analysis, and the use of digital technology in environmental data management.

2.3.2 Identifying Environmental Costs Accurately

One of the key contributions of competent human resources is the ability to identify environmental costs accurately. In practice, environmental costs are often hidden within production or operational costs, making them difficult to identify if a company lacks a workforce that understands environmental accounting concepts. Human resources competent in green accounting can classify various environmental costs, such as pollution prevention costs, waste management costs, emission control costs, environmental regulatory compliance costs, and environmental rehabilitation costs (Asiaei et al. 2022a). Accurate cost identification will produce more reliable accounting information, enabling management to develop cost control strategies, evaluate operational efficiency, and make more sustainability-oriented investment decisions.

2.3.3 Improving the Quality of Sustainability Reporting

Human resource competencies also play a crucial role in improving the quality of sustainability reporting (Walaszczyk and Mazur 2024). Sustainability reports are a medium that companies use to communicate their economic, social, and environmental performance to stakeholders. Preparing these reports requires the ability to collect data, conduct analysis, and present information transparently and accurately, in accordance with applicable sustainability reporting standards. Human resources who understand the principles of green accounting will be able to present more comprehensive and accountable environmental information (Marota 2024b). This ensures that sustainability reports not only fulfill reporting obligations but also serve as a means to increase the trust of investors, regulators, customers, and the public in the company's commitment to sustainable business practices.

2.3.4 Supporting Energy Efficiency

In addition to improving reporting quality, human resources with sustainability competencies also contribute to supporting energy efficiency within the company (Gull and Idrees 2022). Through an understanding of resource management and environmental cost analysis, employees can identify operational activities that consume excessive energy and propose more efficient improvements. For example, implementing energy-saving technologies, optimizing production processes, using more environmentally friendly equipment, or changing work procedures can reduce electricity and fuel consumption. This energy efficiency not only reduces the company's operational costs but also lowers carbon emissions and strengthens the company's commitment to environmental preservation.

2.3.5 Reducing Production Waste

Human resources with environmental awareness and competence are also able to support the company's efforts to reduce production waste (Roscoe et al. 2019). By understanding the concepts of resource efficiency and waste management, employees can identify the root causes of waste at each stage of the production process and design more effective alternative solutions. Implementing the principles of reduce, reuse, and recycle (3R), optimizing raw material use, and adopting cleaner production technologies are some steps that can be taken to minimize waste. These efforts not only benefit the environment but also improve production cost efficiency by reducing raw material waste and waste management costs.

2.3.6 Increasing Transparency to Stakeholders

The implementation of green accounting, supported by competent human resources, will also increase a company's transparency to stakeholders (Marota 2024c). Accurately presented information on environmental costs, resource use, waste management, emissions, and various sustainability programs will provide a clearer picture of a company's environmental responsibilities. This transparency is becoming increasingly

important as investors, regulators, consumers, and the public increasingly consider sustainability aspects when assessing company performance. Therefore, delivering quality environmental information not only strengthens corporate accountability but also enhances the legitimacy, reputation, and trust of stakeholders in the company's commitment to implementing sustainable business practices.

3. Research Methods

This article uses a qualitative research method with a library research approach. Data were obtained from various secondary sources, including reputable scientific articles, books, accounting standards, government regulations, corporate sustainability reports, and international documents discussing green accounting and human resource development. The research stages include: (1) Identification of relevant literature; (2) Selection of literature based on topic suitability; (3) Content analysis; (4) Synthesis of previous research results; (5) Preparation of HR development strategies that support the implementation of green accounting. The analysis was conducted descriptively and analytically by linking various previous research findings to obtain a comprehensive picture of effective HR development strategies.

4. Results and Discussion

4.1 Green Accounting Competency Development

The results of the literature review indicate that the successful implementation of green accounting cannot be separated from the quality of the competency of the organization's human resources (Yong et al. 2020; Benevene and Buonomo 2020). Even if a company has an adequate accounting information system and a clear sustainability policy, implementing green accounting will be difficult to do optimally without the support of human resources who understand environmental accounting and can integrate economic and environmental aspects into business processes. Therefore, a competency development strategy is the first step that organizations must take to ensure that all employees, especially those involved in accounting, finance, operations, and management functions, have a shared understanding of the importance of environmental management in supporting company sustainability.

Based on Asiaei et al. (2022b) these competency development programs are carried out through various training and development programs systematically designed to meet the organization's needs. The training programs focus not only on improving technical accounting skills but also include an understanding of Environmental Management Accounting (EMA) concepts, environmental impact management, environmental cost identification and measurement, product life cycle analysis (Life Cycle Assessment/LCA), sustainability reporting, and understanding Environmental, Social, and Governance (ESG) indicators. Mastery of these materials enables employees to understand the relationship

between a company's operational activities and their environmental impacts, enabling every business decision to consider sustainability aspects in addition to financial ones.

In addition to formal training, organizations also need to develop competencies through ongoing learning activities, such as seminars, workshops, professional certifications, knowledge-sharing programs, and collaborations with academics and institutions working in the sustainability field (Guerreschi et al. 2023). This approach is crucial given that green accounting practices continue to evolve in line with increasing regulatory demands, changes in sustainability reporting standards, and advances in information technology. With continuous learning, human resource competencies will be constantly updated, enabling them to adapt to the dynamics of the business environment and developments in sustainable accounting practices.

This increased competency has a direct impact on the quality of environmental accounting information produced by companies. Human resources with an understanding of green accounting will be better able to identify various environmental cost components, such as pollution prevention costs, waste management and processing costs, energy conservation costs, emission control costs, environmental restoration costs, and investments in environmentally friendly technologies. This capability enables companies to classify environmental costs more systematically and avoid hidden environmental costs within operational costs. As a result, environmental cost information becomes more accurate, relevant, and reliable as a basis for budgeting, evaluating operational efficiency, and making strategic decisions.

Furthermore, highly competent human resources also encourage companies to develop a work culture that is more concerned with sustainability (Guerreschi et al. 2023). Employees not only perform administrative functions, such as recording environmental transactions, but also play an active role in identifying opportunities for energy efficiency, reducing raw material waste, minimizing production waste, and proposing innovations that support the development of more environmentally friendly business processes. Thus, the implementation of green accounting is no longer understood as a mere reporting obligation, but rather as a managerial instrument capable of improving operational efficiency while strengthening the company's competitiveness.

4.2 Strengthening Organizational Culture Based on Sustainability

The study results show that the success of green accounting implementation is not only determined by individual competency, but also greatly influenced by an organizational culture that supports sustainability values (Tahir et al. 2019; Bin-Nashwan et al. 2021). Organizational culture is a set of values, norms, beliefs, and habits that serve as guidelines for all members of an organization in carrying out their activities. In the context of green accounting, organizational culture serves as a mechanism that ensures that sustainability principles are not only conceptually understood but also consistently applied in every business process. Organizations with a strong culture of sustainability

tend to more easily integrate environmental aspects into their accounting systems, operational processes, and strategic decision-making compared to organizations that are still oriented solely towards achieving financial profit.

Establishing a sustainability-based organizational culture requires a shared commitment from all levels of the organization, from top management to operational employees (Galpin et al. 2015). This commitment is realized through the development of company policies that explicitly integrate economic goals with environmental responsibility. One implementation is the implementation of a waste reduction policy through optimizing raw material use, implementing the principles of reduce, reuse, and recycle (3R), and developing cleaner production processes. This policy aims not only to reduce negative impacts on the environment but also to increase production cost efficiency and strengthen the company's competitiveness.

In addition to waste reduction, a culture of sustainability is also realized through efforts to increase energy efficiency in all company operations (Walton et al. 2020). The organization encourages employees to use energy wisely through various programs, such as the use of energy-efficient equipment, optimization of lighting and air conditioning systems, utilization of renewable energy, and monitoring of electricity and fuel consumption. These efforts provide dual benefits: lowering company operating costs while reducing greenhouse gas emissions from business activities. From a green accounting perspective, energy efficiency is also an important indicator used to measure a company's environmental performance.

Digital transformation is also a crucial part of building a sustainability-oriented organizational culture. Document digitization, the use of electronic accounting information systems, a paperless office, and the application of digital technology in environmental data management can reduce paper use and increase the efficiency of administrative processes. In addition to its positive impact on the environment, digitalization also increases the speed, accuracy, and transparency of environmental accounting information management. Thus, digital technology serves not only as an operational support tool but also as an integral part of the green accounting implementation strategy.

4.3 Integration of Green Performance in Performance Assessment

The study results indicate that green accounting implementation will be more effective if organizations integrate environmental performance indicators (green performance) into their employee performance appraisal systems (Marrucci et al. 2024). To date, performance assessments in many organizations are still dominated by financial indicators, such as sales target achievement, cost efficiency, productivity, or company profits. However, in the sustainable business paradigm, organizational success is measured not only by economic aspects but also by the company's ability to manage social and environmental impacts. Therefore, integrating environmental indicators into the

performance appraisal system is a crucial strategy for aligning individual goals with organizational sustainability objectives. Through this approach, each employee is not only responsible for achieving work targets but also for supporting the implementation of green accounting and the achievement of sustainable development goals.

One indicator that can be used in a green performance system is energy efficiency. Organizations can evaluate the extent to which each work unit can optimize the use of electricity, fuel, and other energy sources in operational activities. The use of energy-efficient equipment, optimization of machine operating hours, and the implementation of more efficient technology are some indicators that can be measured periodically. By including energy efficiency as a performance assessment indicator, companies can encourage employees to be more mindful of energy use while reducing operational costs and carbon emissions from business activities.

The next indicator is carbon emission reduction. As attention to climate change increases, many organizations have begun to make reducing greenhouse gas emissions a strategic goal. In this context, performance assessments can be based on the contribution of individuals or work units to reducing emissions through the implementation of low-carbon technologies, optimizing production processes, using renewable energy, or reducing high-emission activities. Information on the resulting carbon emissions then becomes part of the environmental data recorded in the green accounting system, providing companies with a more accurate basis for evaluating their environmental performance.

Furthermore, reducing production waste is also an important indicator in a green performance system. Organizations can measure employee success in minimizing solid, liquid, and gaseous waste by applying the reduce, reuse, and recycle (3R) principles, optimizing raw material use, and increasing production process efficiency. Assessment of these indicators encourages employees to be more proactive in seeking innovative solutions to reduce resource waste. From a green accounting perspective, reducing production waste will result in lower waste management costs and other environmental costs, thereby improving the company's overall operational efficiency.

Another indicator is water efficiency, given that water is a resource with significant economic and ecological value. Companies can evaluate water consumption levels in each work unit, identify potential waste, and develop various water conservation programs, such as water recycling, improved water distribution systems, and water-saving technologies. These efforts not only support natural resource conservation but also reduce the company's operational costs. Information on water efficiency is one component that can be integrated into green accounting reporting as a form of corporate accountability for natural resource management.

4.4 Digital Competency Development

The development of digital technology has brought significant changes to accounting practices and corporate sustainability management (Barreto et al. 2025). In the context of green accounting, digital transformation no longer serves merely as an administrative support tool but has become a strategic factor determining the quality of environmental information management. As the complexity of business activities and the demands for transparency from stakeholders increase, companies require information systems capable of integrating financial and environmental data quickly, accurately, and sustainably. Therefore, the success of green accounting implementation depends not only on the availability of technology but also on the ability of human resources to utilize it optimally. The application of various digital technologies, such as Enterprise Resource Planning (ERP), Environmental Management Accounting (EMA) Information Systems, Environmental, Social, and Governance (ESG) dashboards, the Internet of Things (IoT), cloud computing, big data analytics, and artificial intelligence (AI), enables companies to manage environmental information in a more integrated manner (Husda and Senoaji 2025). These systems are capable of connecting operational data, energy consumption, water usage, carbon emissions, waste management, and environmental costs into a single database that can be accessed in real time. This integration produces more accurate information and makes it easier for management to monitor environmental performance, evaluate operational efficiency, and make data-driven decisions.

One of the primary benefits of digital transformation is increased accuracy in the environmental cost recording process. In conventional systems, environmental cost recording is often done manually, making it prone to errors, late reporting, and data inconsistencies between work units. Through an integrated digital system, data collection, processing, and presentation can be automated, reducing the potential for human error and increasing the reliability of the resulting information. Data on waste management costs, energy consumption, raw material use, and environmental investments can be systematically documented and serve as the basis for preparing sustainability reports and management reports.

In addition to improving accuracy, digital technology also supports business process efficiency through the automation of various administrative activities. The use of ERP and EMA systems allows companies to reduce repetitive work, accelerate data reconciliation processes, and improve coordination between departments, such as accounting, operations, production, and environmental management. Meanwhile, the implementation of the Internet of Things (IoT) allows companies to monitor energy consumption, water usage, air quality, and emission levels directly through digital sensors. This real-time information provides early warnings of resource waste or deviations from the company's established environmental targets.

The use of an ESG dashboard also adds value to the implementation of green accounting (Tanchangya et al. 2025). This dashboard presents various sustainability indicators visually, making it easier for management to monitor the development of a company's environmental, social, and governance performance. With this information presented quickly and comprehensively, companies can evaluate the achievement of sustainability targets, identify areas for improvement, and develop strategies that are more responsive to changing internal and external conditions. In addition to supporting decision-making, the ESG dashboard also increases the company's transparency in communicating information to investors, regulators, and other stakeholders.

4.5 Sustainability-Based Leadership

The results of the literature review indicate that leadership is one of the most crucial factors in determining the success of green accounting implementation in an organization (Liem and Hien 2026). Even if a company has an environmental policy, an adequate accounting information system, and competent human resources, the implementation of green accounting will not run optimally without a strong commitment from the leadership. This is because leadership plays a strategic role in setting policy direction, allocating resources, building organizational culture, and ensuring that all company activities align with sustainable development goals. In other words, the success of green accounting implementation is greatly influenced by the extent to which leadership can integrate sustainability into the company's business strategy and governance.

Leaders with a sustainability orientation view environmental management not as a cost center, but as a long-term investment that can increase the company's value (Avery and Bergsteiner 2011). This perspective encourages leaders to integrate economic, social, and environmental aspects into the planning, implementation, and evaluation of company policies. Through this commitment, the implementation of green accounting is no longer seen as an administrative obligation to comply with regulations, but rather as a strategic instrument that supports increased operational efficiency, environmental risk management, the strengthening of the company's reputation, and the creation of a sustainable competitive advantage.

One concrete manifestation of leadership commitment is allocating a budget for human resource competency development. Implementing green accounting requires human resources with an understanding of environmental accounting, sustainability reporting, Environmental, Social, and Governance (ESG) analysis, and the ability to utilize digital technology in environmental data management. Therefore, leaders need to allocate adequate resources to support various training programs, professional certifications, seminars, workshops, and continuing education for employees. Investing in this competency development is a strategic step to ensure that all personnel have the skills needed to meet the demands of green accounting implementation.

Table 1. Human Resource Development Strategy with the successful implementation of Green Accounting

Human Resource Development Aspects	The Role of Human Resources	Impact on Green Accounting	Benefits for Organizations
Green Accounting Competency Development	Improve knowledge of environmental accounting, environmental cost identification, sustainability reporting, ESG, and Life Cycle Assessment (LCA).	Improve the ability to identify environmental costs accurately and produce more relevant and reliable environmental information.	Decision-making becomes more accurate, environmental cost efficiency increases, and the quality of accounting information improves.
Strengthening Organizational Culture Based on Sustainability	Instilling sustainability values through waste reduction policies, energy efficiency, document digitization, resource conservation, and green innovation.	Green accounting is used not only as a reporting tool but also as part of the company's work culture and decision-making process.	Increasing environmental awareness of all employees, strengthening sustainability implementation, and improving operational efficiency.
Integration of Green Performance in Performance Assessment	Incorporate environmental indicators into individual and work unit performance evaluations.	Encourage every employee to be responsible for achieving environmental targets and support the consistent implementation of green accounting.	Increase accountability, productivity, and employee engagement in achieving the company's sustainability goals.
Digital Competency Development	Improving HR capabilities in utilizing ERP, EMA, ESG dashboards, IoT, big data analytics, and environmental information systems.	Accelerate the real-time recording, processing, analysis, and reporting of environmental data, accurately and transparently.	Increased business process efficiency, improved sustainability reporting quality, and support for data-driven decision making.

Sustainability-Based Leadership	Leaders allocate training budgets, build a green culture, integrate ESG into corporate strategy, lead by example, and ensure sustainability is the organization's vision.	Ensuring that green accounting implementation runs in an integrated and sustainable manner through policy support, resources, and management commitment.	Strengthening corporate governance, enhancing organizational reputation, and creating sustainable competitive advantage.
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5. Conclusions

The implementation of green accounting requires a broader approach than simply providing an environmental accounting system. The study found that the quality of human resources is a key factor in determining the success of green accounting implementation. Effective human resource development strategies include improving competency through ongoing training, establishing an organizational culture that supports sustainability, integrating environmental indicators into the performance assessment system, strengthening digital competencies, and fostering sustainability-oriented leadership. The synergy of these five strategies enables organizations to produce more accurate environmental information, improve the efficiency of environmental cost management, strengthen the quality of sustainability reporting, and create a sustainable competitive advantage.

Theoretically, this article enriches the literature by integrating the perspectives of human resource development and green accounting as two mutually supportive aspects in realizing organizational sustainability. Practically, the study results provide recommendations for companies to incorporate sustainability competencies into HR management policies, from recruitment processes, training, career development, to performance evaluation. Universities also need to strengthen their accounting curricula with materials on green accounting, ESG, and sustainability reporting so that graduates have competencies that align with the needs of the workplace. This article uses a literature study approach, so the resulting findings are conceptual and have not been supported by empirical testing using primary data. Furthermore, this study does not differentiate the characteristics of green accounting implementation based on industrial sector or company size, so the generalizability of the results is still limited. Future research is recommended to use a quantitative or mixed-methods approach involving empirical data from various industrial sectors. Other variables, such as organizational culture, transformational leadership, accounting digitalization, and Environmental, Social, and Governance (ESG), can be analyzed as mediating or moderating variables to gain a more comprehensive understanding of the factors influencing the success of green accounting implementation.

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