

GREEN ACCOUNTING AND GREEN BUSINESS PROCESS MANAGEMENT FOR SUSTAINABLE PERFORMANCE: EVIDENCE FROM COFFEE AGRIBUSINESS INDONESIA

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Abstract

Sustainable development has become an essential issue for small and medium enterprises (SMEs) centered on agribusiness, such as coffee farming operations, because business performance is no longer simply measured by the economic consequences but also by the environmental and social responsibilities. This study analyzes the effect of green accounting and Green Business Process Management (Green BPM) on sustainable performance through financial performance in coffee producers in Sidikalang, Dairi Regency, North Sumatra. The research was quantitative, causal, and associative. The population were coffee farmers in Sidikalang, with a sample of 294 respondents taken by utilizing the Slovin formula with a 5% margin of error. The data were acquired via questionnaires and analyzed using Structural Equation Modelling-Partial Least Squares (SEM-PLS) using a five-point Likert scale. Results reveal that green accounting has a considerable and positive impact on sustainable performance and financial success. Green BPM also has a beneficial and significant influence on sustainability and financial performance. Moreover, financial performance has a favorable and considerable impact on sustainable performance. The mediation test reveals that financial performance mediates the effect of green accounting and Green BPM on sustainable performance. The results suggest that the sustainability of Sidikalang coffee farming is enhanced when farmers are able to monitor environmental costs, develop green business procedures, and transfer these practices into improved financial outcomes. The study has practical implications for coffee producers, farmer organizations, and local stakeholders to enhance the tracking of environmental costs, resource efficiency, waste management, and financial management to support the long-term sustainability of Sidikalang coffee.

Keywords: Green Accounting, Green BPM, Financial Performance, Sustainable Performance.

1. Introduction

Business sustainability has become one of the key issues in the development of modern business, as companies are no longer assessed solely based on their ability to generate profit, but also on their capacity to maintain a balance among economic, social, and environmental aspects (Nawangsari et al., 2023). This shift in orientation encourages business actors to manage their activities more responsibly, particularly in sectors that are directly related to the utilization of natural resources (Suki et al., 2023). Sustainable performance reflects a business's ability to maintain economic growth, improve operational efficiency, address environmental impacts, and provide social benefits to stakeholders (Vrabcová & Urbancová, 2023). Therefore, the concept of sustainability has

become increasingly relevant for small and medium-sized enterprises seeking to survive in an increasingly competitive market.

Small and medium-sized enterprises play a strategic role in supporting the national economy, as they are able to absorb labor, stimulate local economic activity, and strengthen the competitiveness of products based on regional potential (Ahmad et al., 2024). Nevertheless, SMEs continue to face various limitations, particularly in financial recording, business process efficiency, access to financing, waste management, and the implementation of environmentally friendly business practices (Galli, 2023). These challenges indicate that SME sustainability does not depend solely on the ability to generate revenue, but also on the quality of internal management, the accuracy of decision-making, and awareness of the environmental impacts resulting from business activities (Anwar et al., 2023).

Sustainability issues are becoming increasingly important for agribusiness-based SMEs, including coffee SMEs, because their business activities are directly related to agricultural raw materials, processing activities, energy use, product packaging, distribution, and waste management (Nainggolan et al., 2024). Indonesia is one of the world's important coffee-producing countries. The USDA estimates that Indonesia's coffee production in 2025/2026 will reach 12.5 million bags, indicating that coffee remains a strategic commodity in national trade and the agribusiness economy (Nazifi et al., 2025). In addition, Dairi Regency, particularly the Sidikalang area, is known as one of the coffee-producing regions in North Sumatra, and the Dairi Regency Central Statistics Agency also records robusta coffee as one of the smallholder plantation commodities with economic value for the local community.

Sidikalang coffee has a strong local identity and is recognized as one of the leading products of Dairi Regency. This potential provides opportunities for coffee SMEs to increase product added value, expand market reach, and strengthen regional competitiveness (Ilić, 2024). However, such potential does not fully guarantee business sustainability if SME actors are unable to manage production and financial activities effectively (Zuhri et al., 2024). Several common problems faced by coffee SMEs include simple cost recording practices, the absence of specific identification of environmental costs, inefficient energy use, suboptimal utilization of coffee waste, and business processes that have not been fully directed toward environmentally friendly principles.

The problems faced by Sidikalang coffee SMEs cover several aspects related to the variables of this study. In terms of green accounting, business cost recording remains relatively simple and does not yet separate environmental costs, such as costs related to waste, energy, water, raw materials, and environmentally friendly packaging (Agbadzidah, 2023). In terms of Green Business Process Management (Green BPM), business processes are still more focused on production and sales, while resource efficiency, waste reduction, utilization of coffee grounds, and energy control have not been fully integrated (Said, 2024). This condition affects financial performance, as incomplete cost recording and inefficient processes may lead to cost inefficiencies and difficulties in measuring profit accurately (Tereshchenko et al., 2024). Meanwhile, in terms of sustainable performance, coffee SMEs still face challenges in balancing economic performance, environmental responsibility, and social benefits to support long-term business sustainability.

The urgency of this study lies in the importance of encouraging coffee SMEs to develop a business model that is not only oriented toward short-term profit, but also toward long-term sustainability. Today's consumers increasingly pay attention to product

quality, safety, authenticity, and environmental responsibility. Therefore, Sidikalang coffee SMEs need to strengthen management practices that support efficiency, cost transparency, and sustainability values. Green accounting and Green Business Process Management are two relevant approaches because both can help SME actors manage resources more wisely, reduce waste, and improve overall business performance.

Previous studies (Muhammad, 2021)(Pramestya et al., 2024)(Xue et al., 2024) (Vinces, 2023) have widely examined the effect of green accounting on sustainable performance; however, most of them still focus on MSMEs in general or on certain business sectors. Studies on Green Business Process Management remain relatively limited, particularly in the context of SMEs based on local commodities such as coffee. In addition, only a limited number of studies have integrated green accounting and Green Business Process Management simultaneously in a single research model by positioning financial performance as a mediating variable. This gap is important to examine because the sustainability of coffee SMEs cannot be explained solely through environmental accounting, but must also be viewed from how business processes are carried out and how both aspects influence business financial performance.

The novelty of this study lies in the integration of two environmentally based managerial approaches, namely green accounting as a mechanism for recording and controlling environmental costs, and Green Business Process Management as an approach to managing green business processes. This study also positions financial performance as a mediating variable to explain how environmentally friendly practices can influence sustainable performance. The focus on Sidikalang coffee SMEs provides a distinct novelty, as this study examines a local commodity with strong regional identity, economic value, and specific sustainability challenges.

2. Theoretical Background

2.1 Sustainable Performance Theory

Sustainable performance is a business performance concept that does not only focus on economic achievement, but also includes environmental responsibility and social contribution (Dura, 2026). In the context of SMEs, sustainable performance reflects a firm's ability to maintain sales growth, cost efficiency, product quality, customer satisfaction, waste management, and sustainable relationships with the surrounding community and environment (Vrabcová & Urbancová, 2023). Sustainable performance is important because SMEs are not only required to generate profit, but also to maintain long-term business continuity through efficient and responsible resource management (Antara et al., 2024). In Sidikalang coffee SMEs, sustainable performance can be seen from the ability of businesses to maintain stable coffee production, increase the added value of local products, reduce production waste, use energy more efficiently, and maintain product competitiveness in the market. Therefore, sustainable performance in this study serves as the dependent variable influenced by green accounting, Green BPM, and financial performance.

2.2 Green Accounting Theory and Its Effect on Sustainable Performance

Green accounting is an accounting approach that incorporates environmental aspects into the process of recording, measuring, reporting, and making business decisions (Murwaningsari, 2021). This concept does not only emphasize the recording of financial transactions, but also considers environmental costs, such as waste management costs, energy and water use, raw materials, environmentally friendly packaging, and activities

aimed at reducing environmental impacts (Agbadzidah, 2023). Through green accounting, business actors can obtain clearer information regarding environmental costs arising from their operational activities (Niandari & Handayani, 2023). Green accounting is related to sustainable performance because environmental cost information can help SMEs manage their businesses more efficiently and responsibly (Fahmie et al., 2025). In Sidikalang coffee SMEs, the recording of energy costs in the roasting process, packaging costs, waste management costs, and the utilization of coffee grounds can serve as a basis for business owners in making more appropriate decisions. The better the implementation of green accounting, the greater the opportunity for SMEs to reduce waste, improve efficiency, and strengthen business sustainability.

H1: Green accounting has a positive and significant effect on the sustainable performance of Sidikalang coffee SMEs.

2.3 Green Accounting Theory and Its Effect on Financial Performance

Green accounting is also related to financial performance because more detailed environmental cost recording can help SME actors identify sources of cost inefficiency in business activities (Fahmie et al., 2025). Previously hidden environmental costs, such as excessive energy use, raw material waste, water consumption, and inefficient packaging, can be identified more clearly through the implementation of green accounting (Rasyid et al., 2025). This information can be used to improve cost structure and enhance business financial efficiency. In Sidikalang coffee SMEs, the implementation of green accounting can help business owners manage production costs in a more measurable manner. For example, controlling energy costs in coffee processing, selecting more efficient packaging, and utilizing coffee waste can reduce operational costs (Y. Dewi, 2025). If costs can be properly controlled, profit, cash flow, and the ability of businesses to develop can also increase.

H2: Green accounting has a positive and significant effect on the financial performance of Sidikalang coffee SMEs.

2.4 Green Business Process Management Theory and Its Effect on Sustainable Performance

Green Business Process Management, or Green Business Process Management, is a business process management approach that emphasizes resource efficiency, waste reduction, energy control, and the reduction of environmental impacts in every stage of business operations (Kania & Bukhori, 2025). Green Business Process Management does not only assess the final product, but also considers how business processes are carried out, starting from raw material procurement, production, packaging, storage, distribution, to waste management (Ali, 2023). Green Business Process Management affects sustainable performance because greener business processes can help SMEs conduct business activities more efficiently and responsibly (Laroibafih & Murniati, 2025). In Sidikalang coffee SMEs, Green Business Process Management can be implemented through optimal raw material use, energy-efficient roasting processes, reduction of packaging waste, separation of coffee waste, and utilization of coffee grounds. These practices can strengthen business sustainability because they support economic efficiency, environmental concern, and the improvement of local product image.

H3: Green Business Process Management has a positive and significant effect on the sustainable performance of Sidikalang coffee SMEs.

2.5 Green Business Process Management Theory and Its Effect on Financial Performance

Green BPM is related to financial performance because efficient business processes can reduce operational costs and increase business productivity (Laroibafih & Murniati, 2025). In SMEs, waste often occurs because production processes are not yet standardized, energy use is not properly controlled, waste is not optimally managed, and workflows are not designed efficiently (Javadi et al., 2025). Through Green Business Process Management, every stage of the business process can be evaluated to ensure more efficient resource use and better economic value. In Sidikalang coffee SMEs, the implementation of Green Business Process Management can improve financial performance through raw material efficiency, reduced energy costs, utilization of coffee waste, and improved consistency in product quality. More efficient business processes can help SMEs reduce production costs, increase profit margins, and strengthen product competitiveness. Thus, Green Business Process Management not only plays a role in reducing environmental impacts, but can also improve business financial performance.

H4: Green BPM has a positive and significant effect on the financial performance of Sidikalang coffee SMEs.

2.6 Financial Performance Theory and Its Effect on Sustainable Performance

Financial performance is a measure of a business's ability to manage financial resources in order to generate revenue, profit, cost efficiency, healthy cash flow, and business growth (Khamis et al., 2026). In SMEs, financial performance is an important indicator because sound financial conditions determine the ability of businesses to maintain operations, innovate, improve product quality, and implement more sustainable business practices (Kayani et al., 2024). Financial performance affects sustainable performance because businesses with strong financial performance have greater capacity to implement sustainability practices (Rahi et al., 2024). In Sidikalang coffee SMEs, increased profit and cost efficiency can support the use of more environmentally friendly packaging, better waste management, improved product quality, and stronger relationships with consumers and the surrounding community. Therefore, financial performance is an important factor in supporting business sustainability in economic, environmental, and social aspects.

H5: Financial performance has a positive and significant effect on the sustainable performance of Sidikalang coffee SMEs.

2.7 Financial Performance as a Mediator between Green Accounting and Sustainable Performance

Financial performance can mediate the effect of green accounting on sustainable performance because the implementation of green accounting first helps SMEs improve cost efficiency and the quality of financial decision-making (Atz et al., 2023). Green accounting enables business actors to identify environmental costs that were previously not clearly recorded, such as waste, energy, water, raw materials, and packaging costs. When these costs can be controlled, business financial performance has the potential to improve (Rasyid et al., 2025). Improved financial performance then strengthens the ability of SMEs to implement sustainability practices consistently (Putri et al., 2022). In Sidikalang coffee SMEs, improved financial performance can support waste management, more efficient raw material use, product quality improvement, and more environmentally responsible business development. Therefore, green accounting does not

only have a direct effect on sustainable performance, but may also have an indirect effect through financial performance.

H6: Financial performance mediates the effect of green accounting on the sustainable performance of Sidikalang coffee SMEs.

2.8 Financial Performance as a Mediator between Green BPM and Sustainable Performance

Financial performance can also mediate the effect of Green BPM on sustainable performance because green business processes can create operational efficiency that leads to improved business financial conditions. Green BPM helps SMEs reduce inefficient activities, save energy, optimize raw materials, reduce waste, and improve the consistency of production processes. These process improvements can reduce costs and increase the economic value of the business.

In Sidikalang coffee SMEs, the implementation of Green BPM, such as managing the roasting process, improving raw material efficiency, utilizing coffee grounds, and reducing packaging waste, can improve financial performance through cost savings and product quality improvement. When financial performance improves, SMEs have greater ability to maintain sustainability practices in the long term. Thus, financial performance becomes an important pathway that explains how Green BPM can enhance sustainable performance.

H7: Financial performance mediates the effect of Green BPM on the sustainable performance of Sidikalang coffee SMEs.

3. Methods

This study employs a causal associative approach with a quantitative method to analyze the effect of Green Accounting and Green Business Process Management on Sustainable Performance through Financial Performance. The quantitative approach is considered appropriate because the study aims to empirically test the proposed hypotheses using statistical analysis of numerical data derived from questionnaire responses. The causal associative design enables the examination of causal relationships between independent variables (Green Accounting and Green Business Process Management), mediating variable (Financial Performance), and dependent variable (Sustainable Performance). The population in this study consists of all coffee farmers in Sidikalang District, Dairi Regency, totaling 1,106 farmers.

The sample was determined using the Slovin formula with a 5% margin of error, resulting in 294 respondents. The sampling technique used is purposive sampling, with criteria including: (1) coffee farmers who are actively engaged in coffee cultivation; (2) farmers who have experience in managing coffee farming activities; (3) farmers who understand production costs, harvest management, and business sustainability; and (4) farmers willing to participate in the survey. Primary data were collected through questionnaires distributed to coffee farmers using a Likert scale ranging from 1 to 5, where 1 indicated "strongly disagree" and 5 indicated "strongly agree." Secondary data were also obtained from official statistics, agricultural reports, and relevant documents from the Dairi Regency Agricultural Office and the Central Bureau of Statistics (BPS).

The operational definitions of the variables include Sustainable Performance measured through economic, environmental, and social sustainability indicators; Green Accounting measured through environmental cost recognition, allocation, reporting, and investment disclosure; Green Business Process Management measured through green procurement,

green production, green logistics, waste management, and resource efficiency; and Financial Performance measured through profitability, revenue growth, cost efficiency, and financial stability. Data were analyzed using Structural Equation Modeling-Partial Least Squares (SEM-PLS) with SmartPLS software.

The analysis stages include outer model testing to assess validity (outer loadings >0.7 , AVE >0.5) and reliability (Cronbach's Alpha >0.7), inner model testing to assess predictive power (R^2), and hypothesis testing using bootstrapping procedures to determine the significance of relationships (T-statistic >1.96 , p-value <0.05). Mediation testing was also conducted to determine whether Financial Performance mediates the relationships between Green Accounting and Sustainable Performance, as well as between Green Business Process Management and Sustainable Performance. All hypothesis tests are conducted at a significance level of 5% ($p < 0.05$).

4. Results and Discussion

4.1 Outer Model Testing Results

Outer model testing was conducted to assess the validity and reliability of the research constructs, consisting of Green Accounting (X1), Green Business Process Management/Green BPM (X2), Financial Performance (Z), and Sustainable Performance (Y). The assessment was carried out by examining the values of outer loading, Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE). An indicator is considered valid if it has an outer loading value greater than 0.70, while a construct is considered reliable if the values of Cronbach's Alpha and Composite Reliability are greater than 0.70 and the AVE value is greater than 0.50.

Table 1. Outer Loading Results

Variable	Indicator	Outer Loading	Description
Green Accounting	GA1	0.821	Valid
Green Accounting	GA2	0.846	Valid
Green Accounting	GA3	0.812	Valid
Green Accounting	GA4	0.879	Valid
Green Accounting	GA5	0.794	Valid
Green BPM	GBPM1	0.834	Valid
Green BPM	GBPM2	0.861	Valid
Green BPM	GBPM3	0.828	Valid
Green BPM	GBPM4	0.872	Valid
Green BPM	GBPM5	0.805	Valid
Financial Performance	FP1	0.817	Valid
Financial Performance	FP2	0.849	Valid
Financial Performance	FP3	0.876	Valid
Financial Performance	FP4	0.833	Valid
Sustainable Performance	SP1	0.842	Valid
Sustainable Performance	SP2	0.865	Valid
Sustainable Performance	SP3	0.819	Valid
Sustainable Performance	SP4	0.858	Valid
Sustainable Performance	SP5	0.827	Valid

Source: Compiled by the author (2026)

Based on the table above, all indicators have outer loading values above 0.70. This indicates that all indicators of the Green Accounting, Green BPM, Financial Performance,

and Sustainable Performance variables have met the criteria for convergent validity. Therefore, all indicators are appropriate for use in the subsequent model testing.

Table 2. Reliability and Convergent Validity Test Results

Variable	Cronbach's Alpha	Composite Reliability	AVE	Description
Green Accounting	0.887	0.917	0.687	Reliable and valid
Green BPM	0.901	0.927	0.717	Reliable and valid
Financial Performance	0.866	0.908	0.711	Reliable and valid
Sustainable Performance	0.894	0.922	0.702	Reliable and valid

Source: Compiled by the author (2026)

The results show that all variables have Cronbach's Alpha and Composite Reliability values greater than 0.70. In addition, the AVE values of all variables are also above 0.50. This means that all constructs in this study have met the criteria for internal consistency reliability and convergent validity. Therefore, the research instrument can be considered consistent and capable of measuring the constructs examined in this study.

4.2 Inner Model Testing Results

Inner model testing was conducted to examine the relationships among variables in the research model. This testing includes the assessment of R-Square, path coefficient, t-statistic, p-value, and the mediating effect of Financial Performance. Hypothesis testing was carried out using the bootstrapping procedure in SmartPLS.

Table 3. R-Square Results

Endogenous Variable	R-Square	Adjusted R-Square	Description
Financial Performance	0.512	0.508	Moderate
Sustainable Performance	0.684	0.679	Strong

Source: Compiled by the author (2026)

The R-Square value for Financial Performance is 0.512, indicating that Green Accounting and Green BPM are able to explain 51.2% of the variance in Financial Performance, while the remaining 48.8% is explained by other variables outside the research model. Meanwhile, the R-Square value for Sustainable Performance is 0.684, indicating that Green Accounting, Green BPM, and Financial Performance are able to explain 68.4% of the variance in Sustainable Performance, while the remaining 31.6% is influenced by other variables outside the model.

Table 4. Direct Effect Hypothesis Testing Results

Variable Relationship	Original Sample	T-Statistic	P-Value	Description
Green Accounting → Sustainable Performance	0.214	3.156	0.002	Accepted
Green Accounting → Financial Performance	0.318	4.482	0.000	Accepted
Green BPM → Sustainable Performance	0.268	4.021	0.000	Accepted
Green BPM → Financial Performance	0.371	5.263	0.000	Accepted
Financial Performance → Sustainable Performance	0.402	6.118	0.000	Accepted

Source: Compiled by the author (2026)

Based on the direct effect testing results, all relationships among variables have p-values below 0.05 and t-statistics greater than 1.96. This indicates that Green Accounting has a positive and significant effect on both Sustainable Performance and Financial Performance. Green BPM also has a positive and significant effect on Sustainable Performance and Financial Performance. In addition, Financial Performance is proven to have a positive and significant effect on Sustainable Performance. Therefore, the better the implementation of green accounting and Green BPM, the better the financial performance and sustainable performance of coffee farmers in Sidikalang.

Table 5. Mediation Testing Results

Mediating Relationship	Original Sample	T-Statistic	P-Value	Description
Green Accounting → Financial Performance → Sustainable Performance	0.128	3.021	0.003	Accepted
Green BPM → Financial Performance → Sustainable Performance	0.149	3.457	0.001	Accepted

Source: Compiled by the author (2026)

The indirect effect testing results show that Financial Performance is able to mediate the effect of Green Accounting on Sustainable Performance, with an original sample value of 0.128, a t-statistic of 3.021, and a p-value of 0.003. Financial Performance is also able to mediate the effect of Green BPM on Sustainable Performance, with an original sample value of 0.149, a t-statistic of 3.457, and a p-value of 0.001. These results indicate that the implementation of green accounting and Green BPM can improve sustainable performance through the improvement of financial performance.

4.3 Discussion

4.3.1 The Effect of Green Accounting on Sustainable Performance

The results of the study show that green accounting has a positive and significant effect on sustainable performance, with an original sample value of 0.214, a t-statistic of 3.156, and a p-value of 0.002. The positive coefficient indicates that the better the implementation of green accounting, the higher the sustainable performance of coffee farmers in Sidikalang. This finding explains that environmental cost recording, production cost management, and attention to environmental impacts contribute to improving the sustainability of coffee farming businesses. In the context of coffee farmers, green accounting can help farmers understand that costs related to fertilizers, pesticides, water, energy, post-harvest waste, and processing activities are not merely ordinary operational costs, but also environmental costs that need to be controlled so that farming activities can operate more efficiently and sustainably.

Theoretically, green accounting supports sustainable performance because it places environmental information as part of economic decision-making (Rasyid et al., 2025). Green accounting does not only function as a recording tool, but also as a mechanism for cost control and environmental impact evaluation (Putri et al., 2022). When farmers are able to identify costs arising from production input use, coffee waste, and processing activities, they can assess whether their farming practices are efficient or still generate unnecessary waste (Xue et al., 2024). Therefore, green accounting can strengthen sustainable performance through improved economic efficiency, reduced environmental impacts, and increased farmer awareness of responsible farm management (Lubis et al., 2023).

This finding is consistent with previous studies which explain that green accounting can encourage sustainable performance because it provides more measurable environmental cost information. The study by (Ulhaq et al., 2024)(Badar & Siddiquei, 2025) shows that the implementation of green accounting in MSMEs contributes to improving sustainable performance, particularly when business actors are able to connect environmental cost recording with business efficiency. This finding also strengthens the view that business sustainability is not only influenced by the amount of income generated, but also by the ability of business actors to control costs, manage resources, and reduce environmental impacts (Razaq et al., 2024).

The implication of this finding is that coffee farmers in Sidikalang need to gradually adopt simple environmental cost recording practices. Farmers do not need to immediately use a complex accounting system, but can begin by recording fertilizer costs, pesticide costs, water use, energy use, waste management costs, packaging costs, and post-harvest costs. This recording will help farmers identify which activities absorb the most costs and which parts can be made more efficient. Practically, green accounting can serve as a tool for farmers to improve farming efficiency, protect the environment, and strengthen the long-term economic sustainability of Sidikalang coffee.

4.3.2 The Effect of Green Accounting on Financial Performance

The results of the study show that green accounting has a positive and significant effect on financial performance, with an original sample value of 0.318, a t-statistic of 4.482, and a p-value of 0.000. This finding indicates that the better the implementation of green accounting, the better the financial performance of coffee farmers in Sidikalang. The positive effect suggests that more detailed cost recording, including environmental costs, can help farmers manage their farming finances more effectively. When production costs and environmental costs can be clearly identified, farmers have a stronger basis for controlling expenses, determining selling prices, estimating profits, and managing business cash flow.

Theoretically, green accounting has a strong relationship with financial performance because environmental accounting helps reveal costs that are often invisible in conventional records (H. F. Dewi et al., 2023). In coffee farming activities, environmental costs may arise from the use of fertilizers and pesticides, water management, coffee husk waste, energy use for processing, and packaging costs (Rahman & Islam, 2023). If these costs are not recorded separately, farmers may find it difficult to determine whether the profits earned truly reflect business efficiency (Khamis et al., 2026). Green accounting helps clarify the cost structure so that farmers can evaluate inefficiencies and improve financial efficiency (Wakhyuni et al., 2024).

Previous studies (H. F. Dewi et al., 2023)(Rahman & Islam, 2023)(Rasyid et al., 2025) support this finding by showing that green accounting can improve financial performance through cost control and resource efficiency. Green accounting provides broader information than ordinary financial recording because it includes environmental aspects as part of business decision-making (Fadli, 2021). With this information, business actors can reduce unnecessary costs, improve resource management, and increase the economic value of environmentally friendly activities (Hamzah et al., 2025). In the MSME context, the implementation of green accounting has been shown to help business actors connect environmental practices with improved financial performance (Djohan et al., 2025).

The implication of this study is that coffee farmers in Sidikalang need to improve their ability to record farming costs more systematically. Farmers should not only record

income from coffee sales and main production costs, but also record costs related to resource use and environmental impacts. Through such recording, farmers can determine production costs per harvest season, calculate profit margins more accurately, and develop cost-saving strategies. Thus, green accounting can serve as an important foundation for improving financial performance, especially for coffee farmers who aim to manage their businesses more professionally.

4.3.3 The Effect of Green Business Process Management on Sustainable Performance

The results of the study show that Green Business Process Management has a positive and significant effect on sustainable performance, with an original sample value of 0.268, a t-statistic of 4.021, and a p-value of 0.000. This finding indicates that the better the management of green business processes, the better the sustainable performance of coffee farmers in Sidikalang. In other words, the sustainability of coffee farming businesses does not depend only on harvest output or coffee selling prices, but also on how business processes are carried out, from cultivation, harvesting, processing, drying, storage, to marketing. More efficient, resource-saving, and low-waste processes will support business sustainability in economic, environmental, and social aspects.

Theoretically, Green Business Process Management emphasizes that sustainability must be built through comprehensive business process management (Adusei, 2026). Green BPM does not only discuss environmentally friendly final products, but also how each process stage can reduce waste, minimize environmental impacts, and generate added value (Alfian Nugroho & Tiarapuspita, 2023). In coffee farming, Green Business Process Management can be reflected in more efficient use of agricultural inputs, better water management, reduction of coffee husk waste, utilization of coffee residues, more effective drying processes, and more environmentally friendly packaging (Nasib et al., 2026). When farming processes are carried out in a more directed and environmentally responsible manner, the possibility of achieving sustainable performance becomes greater (Khairani, Munthe, et al., 2026).

This finding is in line with Green Business Process Management studies which state that green business processes can strengthen business sustainability through strategy, governance, monitoring, and process optimization (Bachri & Susyanti, 2025). Green Business Process Management provides a framework for business actors to evaluate whether their business processes are already efficient or still generate waste (Andra et al., 2025). Previous research on Green Business Process Management in SMEs (Alzoubi et al., 2025) also shows that green process practices can improve business capability in responding to environmental pressures and enhancing business sustainability.

The implication of this study is that coffee farmers in Sidikalang need to gradually improve their farming and post-harvest processes. Farmers can begin with simple practices such as reducing water waste, using agricultural inputs appropriately, separating organic waste, utilizing coffee waste as compost, improving drying processes, and maintaining proper storage quality. In addition, farmer groups or supporting institutions can encourage training on more environmentally friendly coffee production processes.

4.3.4 The Effect of Green Business Process Management on Financial Performance

The results of the study show that Green Business Process Management has a positive and significant effect on financial performance, with an original sample value of 0.371, a t-statistic of 5.263, and a p-value of 0.000. The relatively high original sample value

indicates that Green Business Process Management makes a strong contribution to improving the financial performance of coffee farmers in Sidikalang. This means that the more efficient and environmentally friendly the coffee farming process is, the greater the opportunity for farmers to reduce costs, increase productivity, improve harvest quality, and obtain better income. This finding shows that green business processes are not only related to environmental concern, but also have real economic value.

Theoretically, Green Business Process Management affects financial performance because well-managed business processes can reduce waste and improve operational efficiency (Halbusi et al., 2025). In coffee farming, waste may occur in the use of fertilizers, pesticides, labor, water, energy, and post-harvest processes. Inefficient processes can increase production costs, reduce product quality, and limit the optimal selling value of coffee (Brenya & Zhu, 2023). Through Green Business Process Management, farmers can evaluate every stage of their farming activities so that resources are used more efficiently and greater economic value can be generated. Better processes will lead to lower costs and higher income (Khairani, Djohan, et al., 2026).

Previous studies (Alzoubi et al., 2025)(Javadi et al., 2025) Green Business Process Management show that green business process management can improve operational efficiency and strengthen business competitiveness. Green Business Process Management helps business actors identify non-value-added activities, reduce waste, improve resource use, and enhance output quality (Kania & Bukhori, 2025). In the SME context, Green Business Process Management practices are also considered capable of strengthening business performance because more efficient processes can reduce costs and increase productivity (Ayuni et al., 2026). The findings of this study are consistent with this view, as coffee farmers who manage their business processes in a greener way tend to have greater opportunities to achieve better financial performance (Nurhidayah et al., 2025).

The implication of this study is that improving the financial performance of coffee farmers in Sidikalang should not rely solely on increasing selling prices, but also on improving farming processes. Farmers need to pay attention to efficiency at every stage of activity, starting from seed selection, fertilization, plant maintenance, harvesting, drying, to marketing. Practices such as reducing harvest losses, utilizing coffee waste, improving post-harvest processing, and using energy more efficiently can help reduce costs.

4.3.5 The Effect of Financial Performance on Sustainable Performance

The results of the study show that financial performance has a positive and significant effect on sustainable performance, with an original sample value of 0.402, a t-statistic of 6.118, and a p-value of 0.000. This finding indicates that financial performance is a very important factor in supporting the sustainable performance of coffee farmers in Sidikalang. The coefficient value, which is the highest among the direct relationships, shows that strong financial conditions are a key foundation for the sustainability of coffee farming businesses (Vrabcová & Urbancová, 2023). Farmers with better financial performance are more capable of maintaining production, improving product quality, managing business risks, and implementing more environmentally friendly practices.

Theoretically, financial performance affects sustainable performance because sustainability requires sufficient financial capacity (Khairani et al., 2025). Sustainability practices often require costs, time, and changes in work methods (Egbunike & Okerekeoti, 2018). Farmers with stable income and the ability to manage costs will find

it easier to improve processes, use higher-quality inputs, improve post-harvest facilities, and manage waste more effectively (Noviana, 2025). Conversely, farmers with weak financial conditions tend to focus more on short-term needs, making it difficult to implement sustainability practices consistently (Azman et al., 2026).

Previous studies (Ongkodjojo & Juniarti, 2023), (Atz et al., 2023) support this finding by showing that financial performance is closely related to sustainable performance. Businesses with good financial performance tend to have greater capacity to develop innovation, maintain product quality, meet consumer demands, and carry out environmental responsibility (Ayuni et al., 2026). In MSMEs, financial performance is also an important factor because limited capital often becomes a major barrier to implementing sustainability practices (Sabihaini et al., 2024). Thus, this finding strengthens the view that sustainable performance cannot be achieved without a strong financial foundation (Harianto, Fali, et al., 2025).

The implication of this study is that sustainability strategies for coffee farmers in Sidikalang should begin with strengthening financial performance. Farmers need to improve their ability to calculate production costs, manage income, reduce waste, and increase the added value of coffee products. Local governments, cooperatives, or supporting institutions can also assist farmers through financial management training, access to financing, and marketing assistance. When financial performance improves, farmers will have greater capacity to implement sustainable farming practices from economic, environmental, and social perspectives.

4.3.6 Financial Performance Mediates the Effect of Green Accounting on Sustainable Performance

The results of the study show that financial performance mediates the effect of green accounting on sustainable performance, with an original sample value of 0.128, a t-statistic of 3.021, and a p-value of 0.003. This finding indicates that green accounting does not only directly affect sustainable performance, but also has an indirect effect through improved financial performance. The cost recording can first improve farmers' financial performance, and this improved financial performance then encourages the sustainability of coffee farming businesses. Thus, financial performance becomes an important pathway that explains how green accounting produces sustainability outcomes.

Theoretically, the mediating role of financial performance can be explained through the cost efficiency mechanism (Abdelwahed et al., 2025). Green accounting helps farmers identify costs that were previously not clearly recorded, such as water, fertilizer, pesticide, energy, waste, and post-harvest activity costs (Marini et al., 2023). When this cost information is available, farmers can evaluate wasteful activities and improve business decisions (Harianto, Azman, et al., 2025). Improved recording then affects financial performance through cost reduction, increased margins, and better cash flow management. Once financial performance improves, farmers have greater ability to implement practices that support sustainable performance (Hou, 2023).

Previous studies (Putra et al., 2024), (Rasyid et al., 2025) support this finding by showing that financial performance can act as an intermediary in the relationship between green accounting and sustainable performance. Green accounting provides environmental information that is useful for decision-making, while financial performance reflects the ability of a business to transform this information into economic benefits (Putri et al., 2022). If green accounting information does not improve financial performance, its impact on sustainability may be weaker (Harianto et al., 2024). Therefore, this finding

reinforces the view that green accounting should not only be directed toward compliance or recording, but also toward improving efficiency and business outcomes (Razaq et al., 2024).

The implication of this study is that coffee farmers in Sidikalang need to view green accounting as a strategic tool rather than merely an administrative activity. Environmental cost recording should be used to evaluate production costs and determine efficiency strategies. For example, farmers can record fertilizer and pesticide costs and compare them with harvest yields, record drying and storage costs and assess their impact on coffee quality, and record waste that can still be reused.

4.3.7 Financial Performance Mediates the Effect of Green Business Process Management on Sustainable Performance

The results of the study show that financial performance mediates the effect of Green Business Process Management on sustainable performance, with an original sample value of 0.149, a t-statistic of 3.457, and a p-value of 0.001. This finding indicates that Green BPM can improve sustainable performance through improved financial performance. In other words, greener and more efficient coffee farming processes first improve financial performance, and this financial performance then strengthens farmers' ability to achieve business sustainability. This finding confirms that green business process practices will be more effective in supporting sustainability when they produce real economic benefits for farmers.

Theoretically, Green Business Process Management affects financial performance through process efficiency (Gao et al., 2026). When farmers are able to manage business processes more effectively, such as optimizing input use, reducing harvest losses, improving drying processes, utilizing coffee waste, and minimizing resource waste, production costs can be reduced and product quality can improve (Daisy Marthina Rosyanti, 2023). Better product quality has the potential to increase selling prices, expand market opportunities, and improve farmers' income (Ayuni et al., 2025). Improved financial performance then enables farmers to maintain green practices in the long term (Salqaura & Nasib, 2026).

Previous studies (Ulhaq et al., 2024), (Ongkodjojo & Juniarti, 2023), on Green Business Process Management explain that green business processes can strengthen business sustainability through strategy, governance, monitoring, and process optimization (Sihombing et al., 2024). This finding is also consistent with the view that sustainability cannot be achieved merely through environmental awareness or intention, but must be realized through efficient business processes that generate economic value (Alzoubi et al., 2025). In the context of coffee farmers in Sidikalang, Green Business Process Management is important because coffee farming involves many process stages that may generate waste if not properly managed (Nasib et al., 2023).

The implication of this study is that the implementation of Green Business Process Management among coffee farmers in Sidikalang should be directed toward practices that provide both economic and environmental benefits. Farmers can improve cultivation and post-harvest processes through efficient input use, organic waste management, reduction of harvest losses, improved drying quality, and better packaging. Local governments, cooperatives, and farmer groups can also provide support through training on sustainable coffee production processes, simple technology assistance, and market access for coffee products with sustainability value.

5. Conclusion

This study examines the effect of Green Accounting and Green Business Process Management (Green BPM) on Sustainable Performance through Financial Performance as a mediating variable among coffee farmers in Sidikalang District, Dairi Regency. Using Structural Equation Modeling-Partial Least Squares (SEM-PLS) on 294 coffee farmers selected through purposive sampling, the results show that Green Accounting has a positive and significant effect on Financial Performance, indicating that better environmental cost recording and environmental investment disclosure improve cost efficiency and business income. Green Business Process Management has a positive and significant effect on Financial Performance, suggesting that efficient resource use, waste reduction, and greener farming and post-harvest processes enhance operational efficiency and profitability. Financial Performance has a positive and significant effect on Sustainable Performance, demonstrating that stronger financial conditions enable farmers to maintain production quality, manage environmental impacts, and develop more sustainable farming practices. Green Accounting has a positive and significant effect on Sustainable Performance, indicating that environmental cost management and reporting contribute directly to long-term business sustainability. Green Business Process Management has a positive and significant effect on Sustainable Performance, confirming that environmentally friendly business processes support economic, environmental, and social sustainability. Furthermore, the indirect effect results confirm that Financial Performance mediates the relationship between Green Accounting and Sustainable Performance, as well as between Green BPM and Sustainable Performance. The coefficient of determination (R^2) values indicate that the model explains a substantial portion of the variance in Financial Performance and Sustainable Performance, confirming that the research model has strong predictive power.

The theoretical implications extend Stakeholder Theory, Legitimacy Theory, and the Triple Bottom Line framework to the context of coffee farming sustainability in Indonesia. The positive effect of Green Accounting supports the Triple Bottom Line framework by confirming that integrating environmental costs into accounting practices enhances both economic and environmental performance. The positive effect of Green BPM supports Stakeholder Theory by demonstrating that environmentally friendly business processes create value for multiple stakeholders, including farmers, communities, and the environment. The mediating role of Financial Performance extends the theory by showing that green practices translate into sustainability outcomes through improved financial conditions, providing empirical evidence that economic viability is a prerequisite for environmental and social sustainability in agricultural contexts.

From a practical perspective, coffee farmers should strengthen environmental cost recording and reporting practices to improve cost efficiency and support sustainable decision-making. Farmer groups and agricultural cooperatives should facilitate the adoption of Green BPM practices, including resource efficiency, waste reduction, and environmentally friendly cultivation and post-harvest processes. Financial management capacity should be enhanced through training and access to financial services to enable farmers to translate green practices into improved financial performance and long-term business resilience. Local stakeholders, including the Dairi Regency Agricultural Office and extension workers, should develop programs that integrate environmental awareness with financial management capacity building to support the sustainable development of Sidikalang coffee as a local commodity with strong economic and environmental value. Policymakers should consider providing incentives for farmers who adopt green

accounting and green business practices, as these practices contribute to both farm-level profitability and broader environmental sustainability goals.

This study has several limitations. First, the analysis is limited to coffee farmers in Sidikalang District, Dairi Regency, restricting generalizability to other agricultural commodities or regions with different characteristics. Second, the study employs a cross-sectional design, which limits the ability to capture changes in practices and performance over time. Third, the study focuses on three main variables, excluding other potential determinants of sustainable performance such as market access, government policies, and climate conditions. Fourth, the reliance on self-reported questionnaire data may introduce response bias, as farmers may overstate their adoption of green practices or their financial performance. Fifth, the study does not distinguish between different types of coffee farming systems (organic vs. conventional) which may have different sustainability outcomes.

Future research should broaden the scope to include other agricultural commodities or regions to test the generalizability of findings. Researchers should employ longitudinal designs to capture changes in practices and performance over time and assess the long-term effects of green accounting and green business practices on sustainability outcomes. Future studies should integrate additional variables such as market access, government policies, climate conditions, and farmer characteristics to develop a more comprehensive model of sustainable agricultural performance. Researchers should consider incorporating objective measures of environmental performance alongside self-reported data to reduce response bias. Comparative studies between organic and conventional coffee farming systems could provide insights into how different production approaches influence the relationships among green practices, financial performance, and sustainable performance. Finally, future research could employ qualitative approaches such as case studies or in-depth interviews to provide richer insights into the mechanisms through which green accounting and green business practices translate into sustainable performance in agricultural contexts.

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