

GREEN ACCOUNTING READINESS AMONG SMEs IN PONTIANAK: CHALLENGES AND IMPLICATIONS FOR SUSTAINABLE FINANCING

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Abstract: This exploratory study investigates green accounting reporting practices among small and medium enterprises (SMEs) in Pontianak, Indonesia, focusing on readiness, implementation barriers, and implications for access to sustainable financing. Using a qualitative-dominant design with a structured questionnaire (closed-ended readiness items and open-ended questions), data were collected from 12 SMEs across food and beverage, services, and agriculture sectors. Descriptive results indicate limited readiness: 42% of respondents reported low understanding of green accounting, 33% moderate, and 25% high. The main barriers involve financial constraints (higher costs of eco-friendly inputs), knowledge and capacity gaps, supply-chain limitations for sustainable materials, unclear or non-sector-specific guidance, and the perceived complexity of environmental recording systems. Despite these challenges, all respondents expressed high interest in training and practical tools, motivated by environmental responsibility, business reputation, and financing opportunities. The study contributes a context-specific "readiness-adoption-financing" explanation grounded in legitimacy, stakeholder, institutional, and resource-based views, highlighting how local regulation and urban environmental pressures shape SME incentives and constraints. Policy implications include phased guidance, targeted incentives, sectoral templates, and an SME support hub to bridge readiness into financeable sustainability practices.

Keywords: green accounting, SMEs, readiness, barriers, sustainable financing, Pontianak

INTRODUCTION

The global paradigm shift towards environmental sustainability has fundamentally transformed the landscape of business operations and financial reporting practices, positioning environmental accounting as a critical component of contemporary corporate governance. In an era marked by escalating climate concerns and intensifying regulatory pressures, organizations worldwide are increasingly compelled to integrate environmental considerations into their strategic decision-making processes and financial disclosures. This transformation is particularly pronounced among small and medium enterprises (SMEs), which constitute approximately 99% of all businesses globally and contribute significantly to economic development while simultaneously representing a substantial

source of environmental impact (Wildnerova et al., 2024). The adoption of green accounting practices among SMEs has emerged as a pivotal mechanism for achieving sustainable development goals, enhancing corporate reputation, and securing access to sustainable financing opportunities.

Green accounting, conceptualized as the systematic identification, measurement, and reporting of environmental costs and benefits within traditional accounting frameworks, has gained prominence as organizations seek to demonstrate their commitment to environmental stewardship and social responsibility. Research has consistently shown that the implementation of green accounting among SMEs can lead to improved sustainable performance and enhanced access to financing opportunities (Indriastuti & Mutamimah, 2023), although

significant challenges persist in terms of understanding and application. The integration of environmental considerations into accounting practices enables organizations to capture the actual cost of their operations, including externalities that were previously unmeasured and unreported, thereby facilitating more informed decision-making and stakeholder communication. Studies have demonstrated that environmental management accounting has a positive influence on green innovation, which in turn positively affects environmental performance (Hasan et al., 2024).

Internationally, the momentum towards adopting green accounting has been accelerated by various regulatory frameworks, sustainability reporting standards, and market pressures. Financial institutions are increasingly integrating climate considerations into their operations and supporting small and medium enterprises (SMEs) in their transition to a sustainable, low-carbon economy (Jiang et al., 2025). This global direction implies that SMEs will increasingly face both explicit and indirect requirements to demonstrate environmental responsibility, including through supplier relationships, lender expectations, and market-based scrutiny, thereby strengthening the relevance of green accounting implementation.

The significance of SMEs in environmental sustainability cannot be overstated, particularly considering their collective environmental footprint and their role as key drivers of innovation and economic growth. Despite their individual smaller scale, SMEs collectively exert a substantial environmental footprint; OECD evidence indicates that their aggregate contribution to greenhouse gas emissions is

significant—estimated at around 50–70% of business-sector GHG emissions—highlighting that economy-wide decarbonization is not feasible without SME participation (OECD, 2021). However, these enterprises also possess unique characteristics that position them advantageously for the rapid adoption of sustainable practices, including organizational flexibility, shorter decision-making chains, and closer relationships with local communities and stakeholders. Studies have shown that green initiatives and carbon reduction strategies not only contribute to environmental protection but also offer long-term financial benefits, making environmental sustainability practices crucial for the competitiveness of small and medium-sized enterprises (SMEs) (Din et al., 2025). Research indicates that the most significant perceived benefit for firms adopting environmental sustainability reporting is improvement in company image (O'Reilly et al., 2024).

In the Indonesian context, the imperative for green accounting adoption among SMEs has been amplified by the country's vulnerability to climate change impacts, increased government emphasis on sustainable development, and the growing recognition of environmental sustainability as a competitive advantage in global markets. Indonesian SMEs represent a significant portion of the national economy, contributing substantially to employment and economic growth while also presenting opportunities and obligations for environmental reporting. Research suggests that Indonesian SMEs have significant potential to enhance business sustainability, yet they have not fully implemented sustainable accounting practices (Fahmie et

al., 2025). The development of human capital and environmental awareness are critical factors that influence the successful implementation of environmentally responsible business practices, as green human capital has been found to affect organizational performance through employee environmental awareness and sustainable innovation (Pratiwi et al., 2025).

Despite these developments, empirical evidence suggests that the adoption of green accounting among Indonesian SMEs remains limited, with many enterprises still lacking understanding and practical capability to implement comprehensive environmental accounting systems. Studies have identified various barriers to implementation, including limited human resources, insufficient socialization and training, and inadequate understanding of implementation strategies and contextual factors (Agustin & Trisnawati, 2025). Research conducted on SMEs in different Indonesian regions has revealed varying levels of understanding and application, with tempe SMEs in Sikka Regency demonstrating insufficient understanding to implement green accounting comprehensively (Lolan et al., 2024), and tofu and tempe SMEs in Bandar Lampung showing low understanding due to a focus on short-term operating profits rather than environmental considerations (Pentiana, 2019). Conversely, some studies have found stronger awareness among certain SME groups, such as batik SMEs in Madura, which demonstrated concerns and awareness of the importance of environmental accounting practices (Chamalinda et al., 2024). These mixed findings indicate the need for more contextualized investigations to better understand readiness patterns and the mechanisms through which green

accounting can become relevant to business decision-making and sustainable financing.

The city of Pontianak, the capital of West Kalimantan Province, presents a fascinating case study for examining green accounting practices among small and medium-sized enterprises (SMEs) due to its unique environmental context and progressive regulatory framework. Located strategically along the Kapuas River and serving as a central commercial hub for the region, Pontianak faces distinctive environmental challenges, including river pollution, waste management issues, and the environmental impacts of rapid economic development. The local government has demonstrated commitment to environmental sustainability through the implementation of comprehensive regulatory frameworks, including Regional Regulation No. 12 of 2021 on Waste Management and Mayor Regulation No. 6 of 2019 on Reducing Plastic Bag Usage. These regulations explicitly support sustainability practices and provide a foundation for SMEs to implement green accounting by requiring waste reduction planning, environmental cost allocation, and transparent reporting of sustainability initiatives.

The regulatory environment in Pontianak presents both opportunities and challenges for the adoption of green accounting among small and medium-sized enterprises (SMEs). Regional Regulation No. 12 of 2021 comprehensively supports green accounting practices among SMEs through provisions that emphasize the importance of sustainability, social responsibility, and efficient natural resource management, all with an emphasis on environmental awareness. The regulation encourages business actors, including SMEs, to develop waste reduction plans and use environmentally friendly materials, which can serve as sustainability performance

indicators reported transparently. Additionally, incentives for producers using environmentally friendly materials and disincentive mechanisms for non-compliance support motivation and acceleration of sustainable practice adoption in business operations. The infrastructure requirements for waste management and waste sorting facilities strengthen the environmental management database that can be reported within green finance frameworks.

Mayor Regulation No. 6 of 2019 on Reducing Plastic Bag Usage further reinforces the foundation for sustainable practices by requiring an inventory of plastic bag usage, active participation of communities and business actors, and annual action plan development involving various government and private elements, including SMEs, as part of pollution and environmental damage reduction efforts. This regulatory framework demonstrates the local government's awareness of the importance of environmental preservation through structured strategies and supervision, indicating the local ecosystem's readiness to promote the adoption of sustainability reporting practices, including the measurement and reporting of environmentally friendly material usage. The recent Circular Letter No. 43 of 2024, which prohibits the provision of plastic bags by business actors, further strengthens this regulatory momentum. It establishes specific targets for waste management, with 70% of waste to be handled by the government and 30% to be reduced through community-based efforts by 2025.

However, despite these supportive regulatory frameworks and growing awareness of environmental sustainability, there remains a significant gap in understanding the readiness and capability

of SMEs in Pontianak to implement green accounting practices effectively. While regulations provide a foundation for sustainable practices, the actual implementation of green accounting requires sufficient knowledge, resources, and organizational commitment that may not be readily available among SMEs. Additionally, there is limited empirical evidence on how green accounting implementation among Pontianak SMEs could contribute to accessing sustainable financing opportunities, despite growing global and national trends toward green finance and environmentally responsible lending practices (O'Reilly et al., 2024; Indriastuti & Riansyah, 2024). Understanding the barriers and challenges faced by SMEs in implementing green accounting is crucial for developing targeted interventions and support mechanisms that can enhance SME readiness for integrating sustainable finance.

The convergence of regulatory pressure, market demands, and financial opportunities creates a compelling context for investigating green accounting readiness among SMEs in Pontianak. The adoption of green accounting practices could potentially provide SMEs with strategic advantages, including improved reputation, enhanced stakeholder trust, and access to green finance products offered by banks and fintech institutions. Evidence suggests that financial performance remains a primary investor concern in evaluating SME equity financing (Yuan et al., 2025), while government support can create synergistic benefits when combined with fintech solutions to enhance access to finance (Abu et al., 2024). In this sense, green accounting can be positioned not only as a compliance-oriented practice but also as a strategic accounting innovation that may

strengthen both sustainability outcomes and financial performance through improved accounting practices.

Understanding these dynamics is crucial not only for the local context of Pontianak but also for broader implications for SME sustainability practices across Indonesia. By examining the readiness, challenges, and barriers to implementing green accounting reporting practices among SMEs in Pontianak, this research contributes valuable insights into the development of effective strategies for promoting sustainable business practices and supporting SME access to sustainable financing. The findings of this study can inform policymakers, financial institutions, and SME support organizations in designing interventions that address specific barriers and enhance SME capability to implement green accounting practices effectively. This is particularly relevant considering the broader context of sustainable accounting development strategies for small and medium-sized companies across Indonesia (Rasyid et al., 2024).

To strengthen explanatory power beyond a descriptive account of “readiness and barriers,” this study frames SME adoption of green accounting through complementary lenses frequently used in sustainability accounting research: legitimacy theory, stakeholder theory, institutional theory, and the resource-based view (RBV). These perspectives help explain why SMEs may pursue green accounting as a legitimacy signal under local community and regulatory scrutiny, why stakeholder expectations (customers, communities, suppliers, and government) may intensify reporting incentives, why local rules can create coercive and normative institutional pressures, and why limited internal resources (capability, time, and tools) may

hinder implementation even when motivation exists.

Accordingly, the study addresses four operational questions: (RQ1) What is the level of SME readiness for implementing green accounting in Pontianak? (RQ2) What barriers do SMEs face in implementing green accounting reporting practices? (RQ3) How do SMEs perceive the implications of green accounting adoption for access to sustainable financing? (RQ4) What support mechanisms are most needed to enhance readiness and adoption? By articulating these questions explicitly, the introduction aligns the problem context, the local regulatory environment, and the financing relevance into a coherent research focus.

LITERATURE REVIEW

Introduction to Green Accounting and SME Sustainability

The concept of green accounting has emerged as a critical framework for integrating environmental considerations into traditional accounting practices, particularly within the context of small and medium-sized enterprises (SMEs). Green accounting encompasses the identification, measurement, and reporting of environmental costs and benefits, enabling organizations to understand their environmental impact better and make informed decisions regarding sustainable business practices (Agustin & Trisnawati, 2025). As global attention increasingly focuses on sustainable development and environmental responsibility, the role of SMEs in implementing green accounting practices has become paramount, given their significant collective impact on economic development and environmental sustainability.

Current State of Green Accounting Adoption

Research consistently indicates that the majority of SMEs across various regions demonstrate limited understanding and application of green accounting principles. Lolan et al. (2024) found that tempe MSMEs in the Sikka Regency lack a sufficient understanding of how to apply green accounting concepts comprehensively in their financial reporting. This finding is corroborated by Agustin and Trisnawati (2025), who determined that the majority of MSMEs in Indonesia lack understanding and fail to apply green accounting to their financial reports, with primary obstacles being low levels of human resources and insufficient socialization.

The geographical scope of this challenge extends beyond Indonesia, as evidenced by various international studies. However, some regional variations exist in the level of awareness and implementation. Chamalinda et al. (2024) presented a contrasting perspective, noting that batik business actors in the Madura region demonstrate a good understanding and concern for environmental protection as a form of green accounting implementation, evidenced by their ability to understand and allocate business and environmental costs while maintaining separation between personal and business funds.

Knowledge Gaps and Capacity Constraints

The persistent knowledge gap in green accounting among SMEs stems from multiple interconnected factors. Pentiana (2019) identified that SME operators in the tofu and tempe industry in Bandar Lampung City maintain low understanding levels because their primary focus remains on operational profits rather than product

quality and environmental considerations. This profit-centric approach reflects a fundamental misunderstanding of the long-term value proposition that green accounting offers to business sustainability and competitiveness.

The human resource constraint represents another significant barrier to the adoption of green accounting. Agustin and Trisnawati (2025) emphasized that low human resource capacity and inadequate socialization programs contribute substantially to the limited implementation of green accounting practices among Indonesian MSMEs. This finding suggests that addressing the knowledge gap requires systematic capacity-building initiatives and comprehensive educational programs tailored to the specific needs of SMEs.

Resource and Knowledge Constraints

The literature consistently identifies resource limitations and knowledge constraints as primary barriers to the implementation of green accounting among SMEs. O'Reilly et al. (2024) found that a lack of knowledge, resources, and data-capturing tools impede the implementation of environmental sustainability reporting for both SMEs and accounting practitioners. While the most significant perceived benefit of adopting environmental sustainability reporting is improvement in company image, the practical barriers remain substantial.

These constraints are particularly pronounced in developing economy contexts, where SMEs often operate with limited financial resources and basic accounting systems. Fahmie et al. (2025) noted that SMEs in Indonesia have not yet fully implemented sustainable accounting but possess great potential to improve

business sustainability, suggesting that appropriate support mechanisms could facilitate more widespread adoption.

Regulatory and Policy Environment

The regulatory environment has a significant impact on the adoption of green accounting practices by SMEs. While SMEs are not yet required to implement environmental sustainability reporting in many jurisdictions, the anticipation of future regulatory requirements creates both opportunities and challenges for proactive adoption. The absence of mandatory requirements may reduce immediate incentives for implementation, while the potential for future regulations creates uncertainty regarding appropriate preparation strategies.

Government support mechanisms play crucial roles in facilitating SME adoption of sustainable practices. Abu et al. (2024) emphasized the synergistic relationship between government initiatives and fintech solutions in enhancing SME access to finance, survival, and performance. This research highlights the importance of policy frameworks that support both technological innovation and sustainable business practices among small and medium-sized enterprises (SMEs).

Human Capital and Environmental Awareness

The role of human capital in facilitating the implementation of green accounting cannot be overstated. Pratiwi et al. (2025) highlighted the importance of Green Human Capital (GHC) in influencing organizational performance, demonstrating that GHC has a significant impact on employee environmental awareness, sustainable innovation, and overall organizational performance. Their research emphasized that organizations investing in GHC and focusing

on environmental skills and ethics within their workforce can strengthen sustainability efforts and contribute to global sustainable development goals.

The development of environmental awareness among employees serves as a mediating factor between green human capital and organizational sustainability, suggesting that successful green accounting implementation requires comprehensive human resource development strategies that extend beyond technical accounting skills to encompass broader environmental consciousness and sustainability orientation.

Regional Context and Cultural Factors

Research conducted within Southeast Asian contexts provides valuable insights into regional factors that influence the adoption of green accounting among SMEs. The studies from Indonesia (Lolan et al., 2024; Agustin & Trisnawati, 2025; Pentiana, 2019; Chamalinda et al., 2024) reveal both challenges and opportunities specific to the regional context. The manifestation of environmental concern among Indonesian SMEs often focuses on maintaining business continuity, managing business raw materials and waste, utilizing environmentally friendly equipment, and understanding environmental costs.

The regional approach to green accounting implementation often involves collaboration with government agencies, as evidenced by the assistance provided by Health Services and Environmental Services in various Indonesian regions. This collaborative approach suggests that successful implementation of green accounting among SMEs may require integrated support systems involving multiple stakeholders and government agencies.

Research Questions and Analytical Mapping

Building on the literature on SME adoption of green accounting and recurring empirical evidence on implementation constraints, this study formulates explicit and operational research questions to strengthen coherence across research objectives, methods, and reported findings. An explicit RQ formulation is necessary to ensure that the instrument design and analytical procedures are aligned from the outset with the intended outputs. Accordingly, this study is guided by the following research questions:

RQ1: What is the level of SME readiness in Pontianak to implement green accounting (including understanding, recording-system preparedness, and resource readiness)?

RQ2: What are the key barriers faced by SMEs in Pontianak in implementing and reporting green accounting (e.g., costs, knowledge capacity, availability of eco-friendly materials, recording complexity, and policy support)?

RQ3: How do SMEs in Pontianak perceive the implications of green accounting adoption for access to sustainable financing (e.g., credibility, reputation, stakeholder trust, and compliance with green-finance requirements)?

To ensure alignment between objectives–methods–results, this study specifies an analytical mapping from the beginning as a bridge between the research questions, the instrument structure, the analysis strategy, and the expected reporting format. This mapping reduces interpretive inconsistency and clarifies how each empirical output directly answers its respective RQ.

Table 1. Research Questions and Analytical Focus

Research Question (RQ)	Analytical Focus (Defined Upfront)
RQ1: What is the level of SME readiness in Pontianak to implement green accounting (including understanding, recording-system preparedness, and resource readiness)?	Readiness dimensions: understanding of green accounting; preparedness of environmental cost recording; HR/capability readiness; procedural and system readiness.
RQ2: What are the key barriers faced by SMEs in Pontianak in implementing and reporting green accounting (e.g., costs, knowledge capacity, availability of eco-friendly materials, recording complexity, and policy support)?	Barrier categories: implementation and transition costs; knowledge and capability gaps; supply constraints for eco-friendly inputs; complexity of measurement and recording; time and workload constraints; limited or unclear guidance and support.
RQ3: How do SMEs in Pontianak perceive the implications of green accounting adoption for access to <i>sustainable financing</i> (e.g., credibility, reputation, stakeholder trust, and compliance with green-finance requirements)?	Financing-related implications: perceived credibility and reputational effects; legitimacy and <i>stakeholder</i> trust; feasibility of documentation and reporting; perceived fit with financing requirements and eligibility for <i>sustainable financing</i> products.

METHODOLOGY

Research Design

This study adopts an exploratory, mixed-methods design with a qualitative-dominant orientation. The quantitative component is descriptive, intended to map SME readiness for implementing green accounting using closed-ended questionnaire items. The qualitative component is interpretive, intended to capture the underlying barriers, contextual constraints, and perceived

financing implications through open-ended responses. This design is appropriate because the research aims to (i) profile readiness levels and (ii) explain why readiness and adoption remain limited in practice.

Population, Sampling Frame, and Random Sampling Procedure

The target population comprises SMEs operating in Pontianak, Indonesia. The final sample includes 12 SMEs ($n = 12$).

To ensure that the claim of random sampling is defensible, the study established a clearly defined sampling frame. Specifically, a consolidated list of SMEs was compiled from available administrative and organizational records of SMEs in Pontianak (e.g., a municipal/agency SME registry and local business listings/associations). The consolidated list was cleaned to remove duplicates and ineligible entries, resulting in the final sampling frame of SMEs that could be contacted for participation.

1. The enterprise operates within the administrative area of Pontianak.
2. The respondent is the owner/manager (or a designated person) who understands operational and bookkeeping practices.
3. The enterprise maintains at least minimal bookkeeping (manual or digital) to enable discussion on recording practices (including environmental-related costs).
4. The enterprise is willing to participate voluntarily and provide responses to both closed- and open-ended questions.

Research Instrument

Data were collected using a structured questionnaire consisting of two parts:

1. **Closed-ended section (Readiness items):** Items measuring readiness for green accounting (e.g., understanding of the concept, perceived feasibility,

readiness to record environmental-related costs, and perceived resource readiness). Responses were captured using ordinal scales (readiness levels).

2. **Open-ended section (Explanatory questions):** Questions exploring (i) perceived barriers (costs, knowledge gaps, supply constraints, recording complexity, time constraints, and policy support), (ii) current environmental-related practices, (iii) support needs (training, templates, incentives), and (iv) perceived implications for access to sustainable financing.

The instrument was designed to align directly with the study's research questions (readiness, barriers, and financing implications), ensuring objective-method-results coherence.

Data Collection Procedure

Data collection followed these steps:

1. The questionnaire was drafted and reviewed internally to ensure clarity and contextual suitability for SMEs.
2. A limited pilot review (or expert review when piloting was not feasible) was conducted to evaluate readability, ambiguity, and the interpretability of key terms related to green accounting.
3. Selected SMEs were contacted based on the random sampling output. Participants were provided with a short study explanation and an informed consent statement.
4. The questionnaire was administered in Indonesian for participant clarity; responses were subsequently organized for analysis. Where English reporting was required, translations were produced and checked for meaning consistency.

Data Analysis Techniques

The analysis combined descriptive and qualitative procedures:

1. Quantitative descriptive analysis:

Closed-ended responses were summarized using frequency distributions and percentages to describe readiness patterns across SMEs.

2. Qualitative analysis using thematic analysis:

Open-ended responses were analyzed using thematic analysis with an explicit interpretive workflow:

- a. *Familiarization*: repeated reading of all responses to understand context.
- b. *Initial coding*: assigning codes to meaningful units (e.g., “eco-friendly materials are expensive,” “lack of guidance,” “recording is complicated”).
- c. *Category development*: grouping codes into higher-order categories (e.g., cost barriers, capability barriers, supply constraints, system complexity, time constraints, unclear standards/policy support).
- d. *Theme refinement*: consolidating categories into final themes and checking for internal coherence and distinctiveness across themes.
- e. *Interpretive mapping to RQs*: mapping themes explicitly to RQ2 (barriers) and RQ3 (financing implications), and integrating the descriptive readiness profile (RQ1) to support a coherent narrative.

Validity, Reliability, and Trustworthiness

Several steps were applied to improve rigor:

1. **Instrument clarity checks**: through a limited pilot review or expert review to reduce ambiguity and improve content

relevance.

2. **Method triangulation**: combining closed-ended readiness profiling with open-ended explanatory responses to cross-check patterns.
3. **Analyst cross-check (peer debriefing)**: the coding scheme and final themes were reviewed among co-authors to reduce single-researcher interpretive bias.
4. **Basic audit trail**: key decisions in coding, category merging/splitting, and theme naming were documented to enhance transparency and replicability.

Research Ethics

Ethical safeguards included:

1. Voluntary participation with informed consent.
2. Confidentiality and anonymization (e.g., SME codes R01–R12), with reporting in aggregated form or paraphrased themes to avoid identification.
3. The right to skip any question or withdraw at any time without consequences.

RESULTS AND DISCUSSION

Overview of Survey Findings

This study conducted a comprehensive survey of 12 small and medium enterprises (SMEs) in Pontianak to assess their readiness for green accounting implementation, identify key challenges, and understand their support needs. The survey offers valuable insights into the current state of environmental accounting awareness and adoption among local small and medium-sized enterprises (SMEs).

Respondent Profile and Business Characteristics: Business Demographics and Sectoral Distribution

The survey captured a diverse representation of SMEs across various sectors in Pontianak, reflecting the city's economic landscape and providing insights into different industry perspectives on the implementation of green accounting.

Table 2. Business Demographics

Respondent	Business Sector	Green Accounting Understanding
R01	Food & Beverage (Bakery)	Moderate
R02	Food Service (Canteen)	Low
R03	Food & Beverage	High
R04	Computer Repair Services	Moderate
R05	Laundry Services	High
R06	Coffee Shop & Beverage	High
R07	Snack Food Production	Moderate
R08	Food & Beverage	Low
R09	Educational Services	Low
R10	Nail Salon Services	Low
R11	Palm Oil Plantation	Moderate
R12	Decoration Services	Low

The respondent profile reveals several characteristics that are not only consistent with broader SME patterns but also help explain why environmental reporting

practices are difficult to institutionalize at the micro level. The dominance of food and beverage businesses (58%) implies daily reliance on packaging and waste-generating operational routines, meaning environmental impacts are frequent, visible, and recurring—yet often treated as “operational necessities” rather than reportable cost objects. Service-oriented businesses (33%) show different exposure: their environmental footprint is often less “material-heavy” but can be high in utilities, consumables, or e-waste (e.g., computer repair), which shapes what is perceived as worth recording. The inclusion of a palm oil plantation respondent (8%) adds an important local contrast: while the sector is typically subject to higher external scrutiny, a moderate understanding level may indicate that “awareness” does not automatically translate into green accounting routines without simplified instruments and incentives. These patterns are consistent with evidence that sustainability constraints in SMEs are multi-dimensional—often rooted in limited managerial bandwidth, scale disadvantages, and uneven external pressures rather than purely “lack of willingness” (O’Reilly et al., 2024; Martins et al., 2022; Madrid-Guijarro et al., 2024).

Business Maturity and Organizational Structure

The analysis of business duration indicates that 67% of surveyed SMEs are relatively young enterprises, operating for 1-3 years, which suggests a dynamic entrepreneurial environment in Pontianak. This finding is significant as it indicates that most businesses are still in their formative stages, potentially making them more adaptable to incorporating sustainable practices from the early stages of development. The remaining businesses

exhibit more established operations, with 25% operating for 4-10 years and 8% operating for over 10 years.

Regarding ownership structure, 92% of businesses are individually owned, with only one family-owned enterprise (the palm oil plantation). This ownership pattern reflects typical SME characteristics and suggests that decision-making processes for green accounting adoption would primarily depend on individual entrepreneur attitudes and capabilities rather than complex organizational hierarchies.

Employment Patterns and Scale

The employment analysis reveals that 83% of surveyed SMEs employ 1-5 people, indicating micro-enterprise characteristics that align with global patterns of SMEs. Only 17% employ 6-20 employees, representing slightly larger small enterprises. This employment distribution has significant implications for the implementation of green accounting, as smaller enterprises typically face greater resource constraints and may require different support mechanisms compared to larger SMEs.

Green Accounting Understanding and Awareness Levels: Current Knowledge Distribution

The distribution of understanding levels (42% low, 33% moderate, 25% high) indicates a readiness bottleneck that is best interpreted as a “capability gap” rather than a motivation gap. In SMEs, environmental accounting knowledge is rarely embedded as formal expertise; instead, it competes with survival priorities such as cash flow, production continuity, and customer acquisition. This helps explain why respondents can simultaneously express high interest in training while still reporting

low comprehension: interest signals perceived relevance, but low understanding signals the absence of routinized tools, sector-specific examples, and practical templates that reduce complexity at the point of implementation (Agustin & Trisnawati, 2025; O'Reilly et al., 2024).

The observed sectoral variation also suggests that “market visibility” may shape learning incentives. Service businesses with more direct consumer contact (e.g., laundry, coffee shops) may experience stronger reputational pressure and more immediate feedback loops (complaints, reviews, customer preferences), encouraging earlier exposure to sustainability concepts. By contrast, traditional food service actors facing intense price competition may view environmental recording as an added burden unless it is tied to clear cost savings, compliance signals, or financing access. This mechanism is consistent with cross-study evidence that SMEs engage more readily when sustainability practices are framed as operationally feasible and reputationally valuable, not merely normative ideals (Martins et al., 2022; O'Reilly et al., 2024).

Sector-Specific Knowledge Patterns

The analysis reveals distinct patterns in green accounting awareness across different sectors. Food and beverage businesses exhibit a mixed understanding level, ranging from low to high, suggesting that sector affiliation alone does not determine environmental accounting awareness. This variation may reflect differences in customer base, competitive pressures, or individual entrepreneur characteristics rather than systematic sector-wide factors.

Service sector businesses demonstrate diverse levels of understanding, with technology-related services (such as

computer repair) showing a moderate level of understanding, possibly due to awareness of electronic waste management issues. Despite their potential role in promoting environmental awareness, educational services demonstrate low understanding, indicating a gap between educational mission and internal sustainability practices. This finding contrasts with research highlighting higher education's role as a driver of green innovation and entrepreneurship (Nguyen et al., 2025).

The palm oil plantation business demonstrates a moderate understanding, which is noteworthy given the significant environmental impact of agricultural operations and the increasing regulatory scrutiny of palm oil production. This moderate level suggests potential for improvement through targeted interventions.

Implementation Challenges and Barriers: Financial and Economic Constraints

The survey identifies financial constraints as the most significant barrier to implementing green accounting among SMEs in Pontianak. These constraints manifest in multiple dimensions that collectively create substantial barriers to implementation.

Table 3. Challenges and Barriers

Challenge Category	Detailed Description
Financial Constraints	High transition costs for switching to environmentally-friendly materials (e.g., replacing plastic packaging with biodegradable alternatives). Premium pricing of sustainable materials like bamboo cutlery and custom paper bags compared to conventional options creates significant cost barriers for small businesses.

Challenge Category	Detailed Description
Knowledge & Capacity Gaps	Limited understanding of green accounting concepts, lack of practical implementation guides, and insufficient human resources with competency in environmental reporting. Many respondents expressed a need for sector-specific training programs.
Supply Chain & Technology Limitations	Limited availability of affordable eco-friendly material suppliers with adequate variety in local areas. Technology gaps in accessing modern sustainable production methods and equipment.
Regulatory & Standards Issues	Absence of clear, accessible regulations and standardized frameworks, particularly for service sectors that differ significantly from manufacturing industries. Need for sector-specific guidelines and compliance frameworks.
Reporting System Difficulties	Challenges in recording and evaluating environmental impact due to lack of standardized, accessible systems for micro-enterprises. Complexity of existing environmental reporting frameworks not suited for small business operations.
Time & Resource Management	Limited time and personnel capacity to focus on environmental recording while prioritizing daily operations and production. Small business owners often wear multiple hats, making additional reporting burdensome.
Data Access & Infrastructure	Insufficient facilities and data access that would enable effective green accounting implementation. Limited access to environmental monitoring tools and measurement systems.

Financial constraints emerge as the dominant barrier because many Pontianak SMEs operate under thin margins and high price sensitivity, so even small unit-cost increases from biodegradable packaging or sustainable inputs can materially reduce competitiveness. In practical terms,

sustainable substitutes are not only more expensive per unit, but also introduce higher transaction costs: searching for suppliers, adjusting procurement routines, experimenting with product fit, and managing customer acceptance. For micro-enterprises, these “hidden” adoption costs are amplified by low economies of scale—bulk discounts are limited, and the ability to pass costs to customers is constrained. This interpretation aligns with evidence that sustainability barriers in SMEs are often driven by resource constraints and scale-related disadvantages rather than a lack of intent (Agustin & Trisnawati, 2025; Madrid-Guijarro et al., 2024).

Pontianak adds a contextual layer: the city’s waste and plastic-related policies create a clearer normative direction, but without parallel market infrastructure (affordable suppliers, standardized templates, and accessible financing), regulation can be experienced as “pressure without tools.” This is precisely where sustainable finance can act as an enabling mechanism by converting environmental compliance and reporting efforts into tangible benefits (lower-cost credit, preferential products, or supplier support), rather than purely an added burden (Jiang et al., 2025; Appiah-Kubi et al., 2024).

Knowledge and Capacity Limitations

The knowledge gap reported by respondents mirrors broader Indonesian findings (Lolan et al., 2024; Pentiana, 2019) and can be explained by the absence of translation mechanisms from concept to practice. Many SMEs are familiar with “environmental responsibility” at the value level, but lack operational guidance on how to identify environmental cost objects, how to record them in simplified formats, and

how to turn records into finance-relevant disclosures. This is consistent with accounting practitioners’ perspectives that the practical constraints are rooted in limited tools, weak data capture routines, and insufficient implementation guidance rather than a purely attitudinal barrier (O’Reilly et al., 2024).

Human resource limitations intensify this gap because micro-enterprises rarely have dedicated finance staff; owners often act as operator, marketer, and bookkeeper simultaneously. Under such conditions, any reporting framework perceived as complex will be deferred unless it is simplified into short routines, checklists, and templates that can be executed with minimal time cost. This logic supports the argument that effective interventions must focus on “low-friction adoption”: sector-specific templates, short training cycles, and coaching support embedded in existing SME ecosystems (O’Reilly et al., 2024; Martins et al., 2022).

Regulatory and Standardization Issues

The reported regulatory and standardization issues reflect a common mismatch between “macro-level sustainability agendas” and “micro-level implementation capacity.” Respondents’ call for sector-specific guidelines indicates that generic environmental frameworks may not translate well into the operational realities of service-based and micro-scale enterprises. Pontianak’s context is a key contribution here: local regulations can strengthen environmental expectations, but SMEs still need standardization that is proportionate—simple indicators, phased compliance, and a minimal dataset that is feasible to produce. International developments point in the same direction: multiple policy and standard-setting

initiatives emphasize reducing complexity and administrative burden for SMEs by creating simplified reporting and finance-assessment approaches (UNCTAD, 2025; EU Platform on Sustainable Finance, 2024/2025; IFRS Foundation, 2025).

This implies that local governments and financial institutions should coordinate around a “common minimum disclosure package” for SMEs—a short, standardized set of indicators that support both policy monitoring and financing assessments, instead of fragmented reporting requests that increase compliance cost without improving decision usefulness.

Support Requirements and Intervention Strategies: Comprehensive Support Framework

The survey results indicate that successful implementation of green accounting among Pontianak SMEs requires a comprehensive support framework that addresses multiple intervention areas simultaneously.

Table 4. Support Framework

Support Type	Comprehensive Description
Financial Incentives	Subsidy programs or zero/low-interest credit facilities specifically for SMEs implementing sustainable practices. Tax relief or performance-based environmental incentives. Government-backed financing for green transitions.
Training & Education Programs	Practical training on recording, managing, and reporting green accounting tailored to specific business sector characteristics. Ongoing educational support with real-world case studies and implementation examples.
Tools & Templates	Provision of standardized report templates, simple digital systems, and easily accessible practical guides for SME operators. User-friendly software solutions designed for small business environmental reporting needs.

Access to Eco-friendly Materials	Government cooperation with suppliers to provide affordable packaging materials and environmentally-friendly alternatives. Bulk purchasing programs to reduce costs for sustainable materials.
Gradual Regulatory Framework	Clear but realistic regulations adapted to small business capacities and implemented in phases. Flexible compliance timelines that consider business size and sector differences.
Recycling Programs	Access to recycling programs, especially for electronic waste and specialized materials. Community-based waste management solutions for small businesses.
Technical Assistance	Regular mentoring to help with practical green accounting implementation without burdening business operations. On-site consultation and ongoing technical support services.

Financial Support Mechanisms

The request for government-backed financing for green transitions indicates that respondents perceive sustainability adoption as an investment decision with uncertain short-term returns—precisely the type of situation where blended mechanisms (public support + private finance + fintech distribution) can reduce risk and improve uptake. Practically, banks and fintech providers can convert green accounting efforts into a lending advantage by offering (1) step-up credit lines tied to incremental adoption milestones, (2) preferential pricing for verified sustainable procurement, and (3) simplified reporting templates embedded in digital onboarding. This aligns with evidence that green financing can strengthen sustainability reporting behaviors and that complementary mechanisms can help transform sustainability efforts into measurable financing signals (Abu et al., 2024; Appiah-Kubi et al., 2024).

For local governments, the implication is equally concrete: subsidies and incentives are most effective when designed to reduce

the “first-mover cost” (e.g., packaging transition grants, supplier development programs, bulk purchasing facilitation) and when paired with coaching support so that funds translate into durable accounting routines rather than one-off compliance actions.

Capacity Building and Education

The demand for practical training programs tailored to specific business sector characteristics reflects the diversity of SME operations and the inadequacy of generic environmental training approaches. Respondents emphasized the need for ongoing educational support with real-world case studies and implementation examples, suggesting that effective capacity building requires sustained engagement rather than one-time training interventions.

Higher education institutions can play a crucial role in this capacity building, as research demonstrates their positive impact on green innovation and entrepreneurship through university-industry collaboration and comprehensive support systems (Nguyen et al., 2025).

Technology and Infrastructure Support

The request for standardized report templates, simple digital systems, and easily accessible practical guides suggests that SMEs require user-friendly technological solutions specifically designed for their environmental reporting needs. This finding suggests that existing environmental reporting frameworks may be too complex for typical SME operations and capabilities. Indonesian research confirms that companies can develop awareness of social and environmental responsibility through appropriate frameworks and support systems (Afni et al., 2019).

Training Interest and Motivation Analysis: High Engagement Levels

The analysis of training interest reveals exceptionally high engagement levels among surveyed SMEs, with all respondents expressing either high or very high interest in green accounting training. This universal interest contrasts sharply with the current low to moderate understanding levels, indicating significant unmet demand for appropriate training opportunities.

Table 5. Training Interest and Motivation

Respondent	Interest Level	Motivation and Reasoning
R01	Very High	Enhance environmental responsibility, build customer trust, access financing opportunities, and discover innovative ways to reduce operational environmental impact through systematic approach.
R02	High	Develop structured understanding of environmental impact recording, improve competitive positioning, and access green financing opportunities while building sustainable business practices.
R03	High	Learn systematic methods for recording, reporting, and evaluating environmental impact in accordance with sustainability policies and best practices for long-term business viability.
R04	Very High	Understand business sustainability optimization, build customer confidence through environmental responsibility, and leverage technology to reduce environmental footprint while

Respondent	Interest Level	Motivation and Reasoning
		maintaining service quality.
R05	High	Recognizes importance for business development and practical implementation of sustainable practices that can reduce operational costs and improve environmental performance.
R06	High	Believes green accounting can influence sustainable behavior patterns and support responsible business practices while potentially attracting environmentally-conscious customers.
R07	High	Expand knowledge base, enhance business image and reputation, access financing opportunities, and support long-term business sustainability through environmental stewardship.
R08	High	Reduce negative environmental impact of waste disposal and create a business model that is not only profitable but also environmentally responsible and socially conscious.
R09	High	Ensure business continuity and gain a deeper understanding of the urgency behind sustainable business practices, particularly in the educational sector where environmental awareness is crucial.
R10	High	Learn proper bookkeeping methods and understand the applicability and relevance of green accounting principles specifically for salon and beauty industry operations.

Respondent	Interest Level	Motivation and Reasoning
R11	High	Gain deeper understanding of green accounting concepts and implement them effectively within plantation operations, considering the unique environmental challenges of agricultural businesses.
R12	High	Develop comprehensive understanding of green accounting concepts for decoration business expansion while incorporating sustainable materials and practices in service delivery.

Diverse Motivational Drivers

The motivational findings are important because they indicate that the adoption barrier is not primarily psychological resistance, but implementation feasibility. Respondents' motivations converge on three adoption levers: (1) values-based stewardship (environmental responsibility), (2) market-based incentives (reputation and customer trust), and (3) finance-based incentives (access to funding). This triangulation suggests a defensible pathway for accelerating adoption: pair simplified green accounting routines with reputational rewards (certification, supplier recognition, public procurement preference) and finance rewards (preferential credit). Such a mechanism is consistent with broader SME sustainability evidence showing that firms engage more actively when sustainability practices generate recognizable market or financial benefits and when barriers are reduced through practical tools and external support (O'Reilly et al., 2024; Martins et al., 2022; EU Platform on Sustainable Finance, 2024/2025).

Financing Access Motivations

Multiple respondents specifically mentioned access to financing opportunities as a key motivation for green accounting training, indicating awareness of the relationship between environmental reporting and sustainable financing access. This finding supports research demonstrating positive correlations between corporate green innovation and digital inclusive finance (Jiang et al., 2025) and suggests that SMEs recognize the strategic value of environmental reporting for financial sustainability.

CONCLUSION

1. SMEs in Pontianak show uneven readiness to implement green accounting: interest and willingness are relatively strong, yet practical capability (knowledge, tools, and routines) remains limited, resulting in low-to-moderate readiness levels across many respondents.
2. The most dominant implementation barriers are financial constraints (higher costs of eco-friendly inputs and transition costs) and knowledge/capacity gaps, which jointly increase perceived complexity and reduce feasibility for day-to-day adoption.
3. Pontianak's local sustainability direction—supported by municipal waste and plastic reduction policies—creates a supportive normative context, but the study indicates a persistent implementation gap where regulations and aspirations are not yet matched by affordable inputs, simple reporting templates, and scalable support mechanisms.

4. SMEs generally perceive that adopting green accounting can strengthen credibility, reputation, and stakeholder trust, and may therefore improve the perceived likelihood of accessing sustainable financing; however, this perceived benefit is conditional on the availability of simplified documentation standards and supportive financial products.
5. Overall, the evidence suggests that accelerating green accounting adoption among SMEs requires an enabling ecosystem that lowers adoption costs, reduces reporting burden, and translates sustainability practices into finance-relevant signals.

Practical Recommendations

1. Local government and regulators
 - a. Develop phased, SME-friendly guidance for green accounting implementation, including sector-specific templates (e.g., food and beverage vs. services).
 - b. Provide targeted incentives to reduce first-mover costs, such as subsidies for eco-friendly packaging, procurement facilitation, and support for waste-sorting infrastructure.
 - c. Establish an SME support hub (or city-level program) that offers coaching, standardized templates, and monitoring assistance to reduce adoption friction.
2. Banks and fintech providers
 - a. Design tiered sustainable finance products that match SME capacity, using scaled documentation requirements (light requirements for micro-enterprises, progressively

stronger requirements for larger SMEs).

- b. Embed simplified green accounting templates in digital onboarding and bookkeeping tools so SMEs can generate auditable records with minimal additional effort.
- c. Partner with local government and SME support institutions for blended programs (training + financing + verification) to reduce risk and increase adoption.

3. SME support institutions (universities, business associations, consultants)

- a. Deliver short, sector-specific training modules focused on “how to record” environmental costs and “how to use” the resulting records for decision-making and financing applications.
- b. Provide hands-on clinics and mentoring to help SMEs establish simple routines and documentation practices, especially for cost allocation and waste-related records.
- c. Support the development of a standardized local toolkit for micro-SMEs to reduce complexity and enhance comparability.

Limitations

This study has several limitations that should be considered when interpreting the findings:

1. Small sample size ($n = 12$) limits generalizability and may not represent the broader population of SMEs in Pontianak or other Indonesian cities.
2. Sector coverage is limited and uneven (dominated by food and beverage and services, with minimal representation of other sectors), which may influence the observed barrier patterns.

3. Findings rely on self-reported perceptions, creating potential perception bias and social desirability bias, and the study does not independently verify environmental practices or accounting records.

Directions for Future Research

Future studies may strengthen and extend these findings by:

1. Expanding the sample size and sector representation across Pontianak and comparative cities to improve external validity.
2. Applying a more explicit mixed-methods design with quantitative modeling to test determinants of adoption and readiness.
3. Testing the readiness–financing access relationship empirically (e.g., whether SMEs with higher green accounting readiness are more likely to obtain sustainable financing products), including potential mediators such as documentation quality, reputation, and lender trust.
4. Incorporating objective indicators (e.g., verified waste reduction actions, documented eco-procurement, or lender evaluation outcomes) to reduce reliance on perception-based measures.

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