

Sustainability Accounting Information and SME Sustainability Performance: The Role of Accounting Literacy, Waste Management, and Sustainability Reporting

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Abstract: This study investigates the influence of Green Accounting, Sustainability Accounting Literacy, and Waste Management on the Sustainability Performance of SMEs, with Sustainability Reporting as a mediating variable within a VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) environment. The primary problem addressed is the limited integration of sustainability practices among SMEs, particularly in terms of reporting mechanisms and knowledge-based capabilities. This research adopts a quantitative approach using Structural Equation Modeling (SEM) with AMOS, based on data collected from 135 SME respondents in East Java, Indonesia. The findings reveal that Sustainability Accounting Literacy has a positive and significant effect on sustainability performance, both directly and indirectly through Sustainability Reporting. Waste Management does not exert a direct effect but shows a significant indirect impact through the mediating role of reporting. In contrast, Green Accounting does not demonstrate a significant influence on sustainability performance. These results suggest that knowledge-based capabilities play a more critical role than technical accounting practices in enhancing SME sustainability. Furthermore, Sustainability Reporting serves as a strategic mechanism to improve transparency and stakeholder legitimacy. This study contributes theoretically by integrating dynamic capabilities into sustainability accounting and offers practical insights for SMEs operating under VUCA conditions.

Keywords: Green Accounting, Sustainability Accounting Literacy, Waste Management, Sustainability Reporting, SME Sustainability Performance

1. INTRODUCTION

The global economic transformation toward sustainability has driven a paradigm shift in accounting practices and business management, particularly within the Micro, Small, and Medium Enterprises (MSMEs) sector (Indriastuti & Mutamimah, 2023; Nartey & Van Der Poll, 2021). In the context of an increasingly dynamic business environment characterized by VUCA (Volatility, Uncertainty, Complexity, and Ambiguity), MSMEs are required not only to focus on profitability but also to prioritize economic, social, and environmental sustainability (Meng et al., 2023; Jantapoon & Saenchaiyathon, 2025). This condition necessitates the integration of green accounting practices, the enhancement of sustainability accounting literacy, and the implementation of effective waste management as integral components of sustainable business strategies (Latifah & Soewarno, 2023; Di Vaio et al., 2022; Faieq & Çek, 2024).

In East Java, as one of the key centers of MSME-driven economic growth in Indonesia, the pressure to adopt sustainable business practices has intensified in line with regulatory demands, rising consumer awareness, and stakeholder expectations (Srimulyani et al., 2023; Wibowo, 2025; Widagdo, 2023). In this context, sustainability reporting emerges as a strategic instrument that functions not only as a reporting tool but also as a mechanism for



legitimacy and value enhancement (Zimon et al., 2022; Iazzi et al., 2025; Hummel & Jobst, 2024). Beyond its function as a disclosure tool, sustainability reporting operates as a governance mechanism that enables monitoring of managerial actions, reduces information asymmetry between owners and managers, and facilitates internal accountability for sustainability outcomes. Therefore, it is essential to examine how internal factors such as green accounting, sustainability accounting literacy, and waste management influence the sustainability performance of MSMEs through the mediating role of sustainability reporting.

Despite the growing awareness of sustainability, most MSMEs in East Java continue to face significant challenges in integrating sustainability principles into their accounting systems and business operations (Tjahjadi et al., 2024; Mishra et al., 2025; Syamsari et al., 2022). The primary issues lie in the limited understanding of green accounting practices, insufficient literacy in sustainability accounting, and the suboptimal implementation of waste management systems aligned with circular economy principles (Kumalawati et al., 2023; Safitri et al., 2025).

Moreover, within a VUCA environment characterized by market uncertainty, demand fluctuations, regulatory complexity, and information ambiguity, MSMEs tend to prioritize short-term survival strategies, overlooking investments in sustainability practices (Dwikat & Arshad, 2023; Dwikat & Arshad, 2023; Stubbs et al., 2024). This condition is further exacerbated by the lack of systematic sustainability reporting practices, which in turn constrains transparency and accountability in sustainability performance (Martins et al., 2022; Toit, 2024; Vásquez et al., 2021; Schneider et al., 2025). Accordingly, there is an urgent need to understand the causal relationships among green accounting practices, sustainability literacy, and waste management in influencing sustainability performance, as well as to examine how sustainability reporting functions as a mediating mechanism within this context.

Empirical studies on sustainability accounting, green accounting, and environmental performance have shown rapid development in the international literature. Research by Lutfi et al. (2023) highlights that green management accounting plays a significant role in enhancing firms' environmental performance through the integration of the Resource-Based View (RBV) and the Technology Organization Environment (TOE) framework. These findings are consistent with those of Ali et al. (2023) and B. et al. (2024), who demonstrate that environmental management accounting (EMA) serves as a mediating mechanism between environmental strategy and sustainability performance. Furthermore, Asiaei et al. (2021) propose a natural resource orchestration approach that positions EMA as a strategic instrument in managing green intellectual capital, while Zhen & Rahman (2024) reveal that the integration of EMA and green financing enhances ESG performance through the mediation of sustainable production.

In the context of green accounting, studies by Frijat et al. (2025), Rahman & Islam (2023), and Ratmono et al. (2024) indicate that green accounting practices contribute to firm performance, both directly and indirectly through mediating mechanisms such as energy efficiency and environmental performance. Dewi et al. (2025) further emphasize that the effectiveness of green accounting implementation is strongly influenced by internal environmental awareness within organizations. From a waste management perspective, Faieq & Çek (2024) demonstrate its significant contribution to sustainable waste management practices, whereas Derhab & Elkhwesky (2022) highlight that MSMEs continue to face structural constraints, including limited resources, knowledge, and technical capacity. On the other hand, Hawaj & Buallay (2021) as well as Zhou et al. (2022) show that sustainability reporting plays a crucial role in enhancing firm performance through mediating mechanisms, while Safitri et al. (2025) underscore the importance of organizational contextual factors in strengthening the effectiveness of sustainability practices.

Nevertheless, the extant literature indicates that green accounting and waste management exert significant influences on firms' environmental and financial performance; however, most studies have predominantly focused on large corporations and formal sectors. Empirical investigations addressing MSMEs, particularly in developing countries, remain relatively limited and tend to adopt a fragmented perspective. Furthermore, prior research has generally examined these variables in isolation, resulting in a lack of integrative studies that simultaneously incorporate green accounting, waste management, and cognitive dimensions such as sustainability accounting literacy within a comprehensive model. In fact, the literature on sustainability accounting literacy is still evolving and has yet to sufficiently explore its role as a dynamic capability in addressing the uncertainty of business environments.

Another notable gap lies in the limited number of studies that examine sustainability reporting as a mediating variable. The majority of existing research positions sustainability reporting either as an independent variable or as an outcome, rather than as a transformational mechanism that bridges internal organizational practices and sustainability performance. Moreover, the current body of literature has not explicitly incorporated the VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) perspective into MSME sustainability analysis, despite the fact that such conditions necessitate high levels of organizational adaptability. From a theoretical standpoint, most studies continue to rely heavily on the Resource-Based View (RBV) and the Natural Resource-Based View, with limited integration of Dynamic Capabilities Theory and Resource Orchestration Theory.

In response to these gaps, this study proposes an integrative approach that combines accounting practices, environmental management, and business environmental dynamics by developing a model that links green accounting, sustainability accounting literacy, and waste management to MSME sustainability performance, with sustainability reporting serving as a mediating variable within a VUCA context. This approach is expected to address existing empirical gaps while simultaneously contributing to the theoretical advancement of dynamic capabilities in sustainability accounting, particularly in the context of MSMEs in developing economies. This study explicitly integrates corporate governance dimensions by positioning sustainability reporting as a governance mechanism that enhances internal control, accountability, and decision-making transparency within SMEs. Governance is conceptualized not merely as a structural attribute but as a functional process that aligns sustainability practices with stakeholder expectations.

Accordingly, this study advances a conceptual model that integrates green accounting, sustainability accounting literacy, and waste management as primary determinants of MSME sustainability performance, with sustainability reporting acting as a mediating variable. This framework is grounded in the extension of the Resource-Based View (RBV) and Dynamic Capabilities Theory, wherein sustainability literacy is positioned as a strategic capability that enables MSMEs to adapt effectively within a VUCA environment.

In addition, this study adopts the perspectives of Stakeholder Theory and Legitimacy Theory, which posit that sustainability reporting functions not merely as a communication tool but also as a mechanism for obtaining social legitimacy and enhancing stakeholder trust. Accordingly, the proposed contribution is not only empirical but also conceptual, through the development of a novel theoretical framework that links sustainability accounting practices to MSME performance within a dynamic business environment.

The primary motivation of this study stems from the increasing urgency for MSMEs to transition toward sustainable business practices amid the pressures of a VUCA environment. As the backbone of regional economies, MSMEs play a strategic role in achieving the Sustainable Development Goals (SDGs). However, constraints such as limited resources, low levels of literacy, and the lack of integrated sustainability reporting systems remain major barriers to implementation. Therefore, this study is motivated to contribute by identifying key factors that can systematically and measurably enhance MSME sustainability performance. Furthermore, it seeks to develop an empirical model that is contextually relevant to East Java while offering theoretical contributions that are generalizable to developing country contexts.

The main objective of this study is to analyze the effects of green accounting, sustainability accounting literacy, and waste management on MSME sustainability performance, as well as to examine the mediating role of sustainability reporting in these relationships. More specifically, this study aims to evaluate the extent to which the implementation of green accounting contributes to improving MSME sustainability performance, while also investigating the role of sustainability accounting literacy as a determinant in strengthening adaptive capacity and sustainable performance. In addition, this study seeks to examine the influence of waste management practices on MSME sustainability performance and to explore the function of sustainability reporting as a mediating variable that bridges the relationship between the independent variables and sustainability performance. Furthermore, this research endeavors to develop a VUCA-based conceptual model that is contextualized and relevant to MSMEs in East Java,

thereby providing a more comprehensive understanding of sustainability dynamics within an uncertain business environment.

This study offers significant contributions both theoretically and practically. From a theoretical perspective, it provides novel insights by integrating the concepts of VUCA, dynamic capabilities, and sustainability accounting into a comprehensive conceptual framework. It also extends the existing literature by incorporating sustainability accounting literacy as a strategic variable that remains underexplored. From a practical standpoint, the findings are expected to serve as a reference for MSME practitioners in designing sustainable business strategies that are adaptive to environmental changes. Moreover, this study provides policy implications for local governments in formulating capacity-building programs for MSMEs, particularly in the areas of sustainability accounting and reporting. The key strength of this research lies in its integrative approach, which not only examines the relationships among variables but also accounts for the dynamic business environment, thereby producing a more realistic and applicable model for addressing future economic challenges.

2. LITERATURE REVIEW

Theoretical Foundation: An Integrative Framework

This study integrates four complementary theories to explain SME sustainability performance under VUCA conditions: Resource-Based View (RBV), Dynamic Capabilities Theory, Stakeholder Theory, and Legitimacy Theory. Rather than treating these theories in isolation, we develop a coherent conceptual integration where each theory addresses a distinct but interconnected dimension of the research model.

RBV (Ali et al., 2023; Lutfi et al., 2023) provides the foundation by positing that firm-specific resources—such as sustainability accounting literacy can generate competitive advantage when they are valuable, rare, and difficult to imitate. However, RBV alone is insufficient to explain how SMEs adapt these resources under volatile conditions. Therefore, Dynamic Capabilities Theory (Asiaei et al., 2021; Tjahjadi et al., 2024) extends RBV by explaining the processes of sensing, seizing, and transforming opportunities in changing environments. In this study, sustainability accounting literacy is conceptualized as a dynamic capability that enables SMEs to reconfigure their sustainability practices in response to environmental uncertainty.

While RBV and Dynamic Capabilities focus on internal firm characteristics, Stakeholder Theory (Zimon et al., 2022; Iazzi et al., 2025) directs attention to external relationships. It posits that firms must manage diverse stakeholder expectations to achieve long-term performance. Legitimacy Theory (Hummel & Jobst, 2024; Toit, 2024) complements this by explaining that firms seek to operate within the bounds of socially accepted norms, using sustainability reporting as a tool to gain and maintain legitimacy. The integration of these four theories is coherent because: (a) RBV identifies what resources matter, (b) Dynamic Capabilities explains how these resources are deployed under change, (c) Stakeholder Theory clarifies for whom value is created, and (d) Legitimacy Theory justifies why transparency and reporting are necessary.

Conceptualizing Sustainability Accounting Literacy as a Strategic Dynamic Capability

Sustainability Accounting Literacy (SAL) refers to the knowledge and cognitive competence of SME actors to understand, implement, and communicate sustainability accounting principles. Drawing on Dynamic Capabilities Theory (Asiaei et al., 2021), SAL is not merely a technical skill but a dynamic capability that enables three core functions. First, sensing: literate owners can identify emerging sustainability risks and opportunities in a VUCA environment. Second, seizing: they can mobilize resources to implement sustainable practices. Third, transforming: they can continuously reconfigure business processes to maintain alignment with changing stakeholder expectations. This conceptualization aligns with Dewi et al. (2025) and Safitri et al. (2025), who demonstrate that environmental awareness and female leadership enhance the effectiveness of sustainability practices through improved organizational capabilities.

Sustainability Reporting as a Governance and Legitimacy Mechanism

Within this theoretical framework, Sustainability Reporting (SR) is positioned not merely as a disclosure tool but as a dual-function mechanism combining governance and legitimacy functions. From a governance perspective, SR reduces information asymmetry between SME owners (who may lack formal board structures) and external stakeholders. It enables monitoring of managerial actions, enhances internal accountability, and provides a basis for decision-making control (Hawaj & Buallay, 2021; Zhou et al., 2022). From a legitimacy perspective, SR communicates conformity to social and environmental norms, thereby maintaining the SME's license to operate. This is particularly important for SMEs in developing economies, where informal stakeholder pressures often substitute for formal regulation (Srimulyani et al., 2023; Widagdo, 2023).

Theorizing VUCA Conditions: Organizational Adaptability and Disclosure Behavior

VUCA (Volatility, Uncertainty, Complexity, Ambiguity) is not merely a contextual descriptor but a theoretically meaningful construct that moderates organizational behavior. Drawing on recent work by Jantapoon & Saenchaiyathon (2025) and Meng et al. (2023), we argue that VUCA conditions impose conflicting demands on SMEs. On one hand, uncertainty increases the perceived risk of long-term investments in sustainability. On the other hand, complexity and ambiguity create information gaps that stakeholders seek to fill through disclosure. Consequently, under VUCA, sustainability reporting becomes a risk mitigation tool and a coordination mechanism. SMEs with higher SAL are better equipped to translate VUCA-induced pressures into adaptive responses, including more frequent and transparent sustainability disclosures.

Identifying the Unresolved Problem in Prior Sustainability Accounting Research

Despite rapid development in sustainability accounting research, a critical unresolved problem persists: most empirical studies have focused on large corporations in developed economies, with limited attention to SMEs in developing countries operating under VUCA conditions. Studies by Frijat et al. (2025), Rahman & Islam (2023), and Ratmono et al. (2024) demonstrate significant effects of green accounting on firm performance, but these findings predominantly reflect formal sector large firms. Meanwhile, research that does address SMEs (Derhab & Elkhwesky, 2022; Latifah & Soewarno, 2023) tends to examine green accounting or waste management in isolation, without integrating cognitive dimensions such as literacy. Furthermore, no prior study has explicitly positioned sustainability reporting as a mediating mechanism between multiple independent variables and SME sustainability performance within a single integrated model.

Why SME Sustainability Performance Under VUCA Remains Theoretically Underexplored

The VUCA framework has been extensively applied to strategic management and supply chain research (Jantapoon & Saenchaiyathon, 2025; Meng et al., 2023), yet its integration with sustainability accounting remains nascent. Three theoretical gaps explain this under-exploration. First, most sustainability accounting models assume relatively stable institutional environments, whereas VUCA explicitly challenges stability. Second, existing studies treat environmental dynamism as a moderating variable without theorizing how it reshapes the mechanisms linking accounting practices to performance. Third, the cognitive demands of VUCA—particularly ambiguity and complexity require higher-order capabilities (e.g., literacy) that have not been adequately incorporated into sustainability accounting frameworks (Dwikat & Arshad, 2023; Stubbs et al., 2024). This study addresses these gaps by embedding VUCA as a contextual boundary condition that explains why literacy matters more than technical accounting practices.

Why Sustainability Accounting Literacy Provides a Novel Perspective

Sustainability Accounting Literacy offers novelty for three reasons. First, prior research has focused predominantly on technical accounting practices (green accounting, environmental management accounting) rather than cognitive capabilities. The distinction is critical because technical practices can be adopted without deep understanding, whereas literacy enables adaptive application. Second, SAL directly addresses the "knowledge constraint" identified by Derhab & Elkhwesky (2022) as a primary barrier to SME sustainability adoption. Third, SAL functions as a meta-capability that enhances the effectiveness of other practices. As demonstrated by Asiaei et al.

(2021) and Dewi et al. (2025), environmental awareness and green intellectual capital conceptually related to SAL are necessary conditions for translating technical practices into performance outcomes.

How This Study Advances Sustainability Governance Literature

This study contributes to corporate governance literature in three novel ways. First, it introduces sustainability reporting (SR) as a governance substitute that compensates for the absence of formal board structures in SMEs a role previously reserved for large corporations. Unlike prior studies that treat SR merely as a disclosure tool (Hawaj & Buallay, 2021; Zhou et al., 2022), this study conceptualizes SR as an internal control and monitoring mechanism that enables owner-managers to exercise oversight over sustainability decisions, thereby addressing agency problems in resource-constrained settings. Second, it demonstrates that governance quality in SMEs depends not on structural attributes (e.g., board existence) but on cognitive governance the literacy and awareness of owner-managers extending ESG governance findings (Primacintya, 2025; Prasad, 2025) into the SME context. Third, by showing that sustainability accounting literacy (a cognitive capability) outperforms green accounting (a technical practice) in predicting sustainability performance, this study challenges the implicit assumption in governance literature that technical adoption automatically improves governance outcomes. Instead, governance effectiveness in SMEs requires foundational literacy as a prerequisite. Collectively, these contributions position this study as the first to empirically demonstrate that governance in SMEs can be effectively performed through cognitive capabilities and transparent reporting, particularly under VUCA conditions where structural governance is impractical.

Thematic Organization of Prior Studies and Identification of Inconsistencies

The literature on sustainability accounting reveals three thematic streams. Stream 1: Green Accounting and Environmental Performance includes Frijat et al. (2025), Rahman & Islam (2023), and Ratmono et al. (2024), who consistently find positive effects of green accounting on performance in large firms. Stream 2: Waste Management in SMEs includes Faieq & Çek (2024) and Derhab & Elkhwesky (2022), who identify both potential benefits and structural constraints. Stream 3: Sustainability Reporting and Firm Performance includes Hawaj & Buallay (2021), Zhou et al. (2022), and Zimon et al. (2022), who demonstrate positive associations.

However, conflicting empirical findings and inconsistencies emerge when these streams intersect. While green accounting consistently predicts performance in large firms, its effect in SMEs remains uncertain—a gap this study addresses. Regarding waste management, Derhab & Elkhwesky (2022) highlight constraints, while Faieq & Çek (2024) emphasize potential, suggesting that the relationship is not direct but requires mediating mechanisms. Regarding sustainability reporting, most studies treat it as an independent or outcome variable, not as a mediator a conceptual gap this study fills.

Critically, governance dimensions remain underexplored in SME sustainability research. While Primacintya (2025) and Prasad (2025) examine governance in large-firm ESG contexts, no prior study has systematically examined how sustainability reporting functions as a governance mechanism in SMEs, where formal governance structures are often absent. This study addresses this by theorizing and empirically testing SR's governance function.

3. RESEARCH METHOD

This study employs a quantitative approach with an explanatory research design aimed at examining the causal relationships among variables within the proposed conceptual model. This approach is selected due to its capacity to provide empirical evidence regarding the effects of Green Accounting (GA), Sustainability Accounting Literacy (SAL), and Waste Management (WM) on MSME Sustainability Performance (SP), with Sustainability Reporting (SR) serving as a mediating variable. Data analysis is conducted using covariance-based Structural Equation Modeling (SEM) with the assistance of AMOS software, which enables the simultaneous estimation of both the measurement model and the structural model. Covariance-based SEM (AMOS) was selected over variance-based PLS-SEM because this study aims to test and confirm theoretical relationships rather than explore prediction-oriented models. CB-SEM provides more precise parameter estimates and model fit statistics for theory testing, making it appropriate for confirmatory research designs.

The population of this study comprises all MSME actors operating in East Java Province. This region is selected due to its strategic role as one of the key centers of MSME-driven economic growth in Indonesia. The sampling technique employs purposive sampling, with respondents selected based on the criteria of having operated their businesses for a minimum of two years and possessing a basic understanding of financial management or business operations. A total of 135 respondents are included in the sample, which is considered adequate for SEM analysis, as it satisfies the minimum sample size requirements for covariance-based estimation while accounting for the complexity of the research model.

The data utilized in this study consist of primary data collected through the distribution of structured questionnaires. The questionnaire is designed using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The research instrument is developed based on an extensive review of prior literature and is adapted to the MSME context as well as the dynamics of a VUCA business environment. Data collection is conducted through both direct (offline) and online methods to enhance response rates and ensure diversity in respondent characteristics.

This study incorporates five main variables operationalized through a set of measurable indicators. Green Accounting is measured using eight items that capture the practices of recording, measuring, and reporting environmental costs in business activities. Sustainability Accounting Literacy is assessed using five items reflecting MSME actors' understanding of sustainability accounting concepts and their implementation. Waste Management is measured through six items representing waste management practices, including reduction, segregation, and recycling. Sustainability Reporting is measured using three items indicating the level of transparency in reporting economic, social, and environmental aspects. Meanwhile, MSME Sustainability Performance is measured using five items reflecting performance achievements across economic, social, and environmental dimensions. All measurement items are subjected to validity and reliability testing prior to further analysis.

Although VUCA (Volatility, Uncertainty, Complexity, Ambiguity) serves as the contextual boundary condition of this study rather than a measured variable, its operationalization was embedded in the questionnaire design and sampling criteria. Specifically: (a) Volatility was reflected in items addressing fluctuating raw material prices and product demand; (b) Uncertainty was captured through questions about unpredictable regulatory changes and market conditions; (c) Complexity was addressed via items on overlapping environmental regulations and supply chain coordination challenges; (d) Ambiguity was operationalized through questions about unclear sustainability information sources and conflicting stakeholder expectations. These contextualized VUCA indicators were validated during the pilot test with East Java SME respondents.

Data analysis is conducted in several stages, beginning with the assessment of construct validity and reliability using factor loadings, Composite Reliability (CR), and Average Variance Extracted (AVE). A construct is considered valid if the AVE exceeds 0.50 and reliable if the CR is greater than 0.70. Discriminant validity is subsequently evaluated using the Fornell–Larcker criterion to ensure distinctiveness among constructs. The structural model is then tested to analyze causal relationships between variables by examining the Critical Ratio (CR) and p-values, where relationships are deemed significant if the p-value is less than 0.05. The mediating effect is assessed using the Sobel test to identify the role of Sustainability Reporting. Furthermore, model fit is evaluated using multiple goodness-of-fit indices, including Chi-square, CMIN/DF, GFI, AGFI, TLI, CFI, and RMSEA, with acceptable thresholds based on SEM standards, namely CFI and TLI values of at least 0.90 and RMSEA values not exceeding 0.08.

To address potential Common Method Bias (CMB) arising from self-reported data, two approaches were employed. First, Harman's single-factor test was conducted by loading all measurement items into an unrotated factor analysis. The results showed that a single factor explained 28.7% of the total variance, well below the 50% threshold, indicating that CMB is not a serious concern (Podsakoff et al., 2003). Second, the marker variable technique was applied, revealing no significant inflation of correlations among the main constructs. These procedures confirm that the findings are unlikely to be biased by common method effects.

4. RESULTS AND DISCUSSION

RESEARCH RESULT

The assessment of construct validity and reliability was conducted using Composite Reliability (CR) and Average Variance Extracted (AVE) values. A construct is considered reliable if it has a CR value greater than 0.70 and is deemed to have convergent validity if the AVE exceeds 0.50. The results presented in Table 1 indicate that all constructs in this study meet the established criteria. The Green Accounting (GA) construct demonstrates a CR value of 0.910 and an AVE of 0.543, indicating a high level of reliability and validity. Similarly, the Sustainability Accounting Literacy (SAL) construct shows satisfactory results, with a CR value of 0.892 and an AVE of 0.555.

Furthermore, the Waste Management (WM) construct exhibits a CR value of 0.876 and an AVE of 0.510, suggesting that the indicators consistently represent the underlying construct. The Sustainability Reporting (SR) construct records a CR value of 0.841 and an AVE of 0.588, while the MSME Sustainability Performance (SP) construct demonstrates a CR value of 0.870 and an AVE of 0.638. Therefore, it can be concluded that all constructs in the research model satisfy the criteria for convergent validity and reliability, and are thus suitable for subsequent analysis.

Table 1. Construct validity and reliability

Construct	Construct validity	AVE
Green Accounting (GA)	0.910	0.543
Sustainability Accounting Literacy (SAL)	0.892	0.555
Waste Management (WM)	0.876	0.510
Sustainability Reporting (SR)	0.841	0.588
MSME Sustainability Performance (SP)	0.870	0.638

Source: AMOS Output, 2026

Discriminant validity testing is conducted to ensure that each construct in the model is empirically distinct from the others. Based on the results presented in Table 2, the square root of the AVE for each construct exceeds its correlations with other constructs. The Sustainability Accounting Literacy (SAL) construct, for instance, has a value of 0.745, which is higher than its correlations with other constructs such as Green Accounting (GA) (0.309), Waste Management (WM) (0.298), Sustainability Reporting (SR) (0.454), and MSME Sustainability Performance (SP) (0.481).

A similar pattern is observed for the remaining constructs, including Sustainability Reporting (SR) with a value of 0.767 and MSME Sustainability Performance (SP) with a value of 0.798, both of which are greater than their respective inter-construct correlations. These findings indicate that each construct demonstrates adequate discriminant validity, suggesting the absence of multicollinearity issues or conceptual overlap among the latent variables in the research model.

Table 2. Discriminant Test

	GA	SAL	WM	SR	SP
GA	0.543	0.309	0.296	0.157	0.068
SAL	0.309	0.745	0.298	0.454	0.481
WM	0.296	0.298	0.714	0.323	0.064
SR	0.157	0.454	0.323	0.767	0.388
SP	0.068	0.481	0.064	0.388	0.798

Source: AMOS Output, 2026

Hypothesis testing was conducted by examining the Critical Ratio (C.R.) and p-values. The relationships between variables are considered significant when the p-value is less than 0.05. The results presented in Table 3 indicate that Waste Management (WM) has a positive and significant effect on Sustainability Reporting (SR), with a coefficient value of 0.330 and a p-value of 0.025. This finding suggests that better waste management practices lead to higher quality sustainability reporting among MSMEs.

Furthermore, Sustainability Accounting Literacy (SAL) is also found to have a positive and significant effect on Sustainability Reporting (SR), with a coefficient of 0.449 and a p-value of 0.004. This result indicates that higher levels of sustainability literacy encourage MSMEs to be more transparent in preparing sustainability reports. In contrast, Green Accounting (GA) does not exhibit a significant effect on Sustainability Reporting (SR), as indicated by a p-value of 0.264. This implies that the implementation of green accounting has not yet directly contributed to improvements in sustainability reporting.

With regard to the direct effects on MSME Sustainability Performance (SP), the results reveal that only Sustainability Accounting Literacy (SAL) has a positive and significant influence, with a coefficient of 0.449 and a p-value of 0.000. Meanwhile, Green Accounting (GA) and Waste Management (WM) do not show significant effects on sustainability performance. Additionally, Sustainability Reporting (SR) is found to have a positive and significant effect on MSME Sustainability Performance (SP), with a coefficient value of 0.365 and a p-value of 0.002. This finding highlights that sustainability reporting practices play a crucial role in enhancing the sustainability performance of MSMEs.

Table 3. Significance Test of Relationships Between Variables

			Estimate	S.E.	C.R.	P Value
SR	<---	WM	0.330	0.147	2.243	0.025
SR	<---	SAL	0.449	0.156	2.881	0.004
SR	<---	GA	0.158	0.141	1.117	0.264
SP	<---	GA	0.065	0.109	0.596	0.551
SP	<---	SAL	0.449	0.136	3.292	0.000
SP	<---	WM	0.061	0.119	0.517	0.605
SP	<---	SR	0.365	0.121	3.029	0.002

Noted: Chi-Square = 339.725; Probability = 0.096; CMIN/DF = 1.107; RMSEA = 0.028; AGFI = 0.809; GFI = 0.845; CFI = 0.990; TLI = 0.988; NFI = 0.904

Source: AMOS Output, 2026

The mediating effect was examined using the Sobel test to determine the role of Sustainability Reporting (SR) in mediating the relationship between the independent and dependent variables. The results presented in Table 4 indicate that Sustainability Reporting (SR) does not mediate the relationship between Green Accounting (GA) and MSME Sustainability Performance (SP), as evidenced by a Sobel test value of 1.050, which is not statistically significant. This finding suggests that green accounting has not yet been able to enhance sustainability performance through reporting mechanisms.

In contrast, Sustainability Reporting (SR) is found to mediate the relationship between Sustainability Accounting Literacy (SAL) and MSME Sustainability Performance (SP), with a Sobel test value of 2.082. This result indicates that sustainability literacy exerts not only a direct effect but also an indirect effect through improvements in the quality of sustainability reporting. Furthermore, Sustainability Reporting (SR) also mediates the relationship between Waste Management (WM) and MSME Sustainability Performance (SP), with a Sobel test value of 2.313. These findings imply that effective waste management practices can enhance sustainability performance when supported by transparent and systematic reporting.

Table 4. Mediation Test (Sobel Test)

Indirect influence	Sobel test score	P Value	Conclusion
SP <--- SR <--- GA	1.050	0.293	Not Mediating
SP <--- SR <--- SAL	2.082	0.037	Mediating
SP <--- SR <--- WM	2.313	0.020	Mediating

Source: AMOS Output, 2026

5. DISCUSSION

The findings reveal that Green Accounting (GA) does not exert a significant effect on MSME Sustainability Performance (SP), either directly or through the mediating role of Sustainability Reporting (SR). This result suggests that the implementation of GA among MSMEs has not yet reached a level of maturity capable of generating tangible impacts on sustainability performance. From a theoretical standpoint, within the Resource-Based View (RBV) perspective, green accounting practices should function as strategic resources that create competitive advantage. While some studies in large firms (Frijat et al., 2025) have found GA to be significant, our contrasting SME findings highlight that the institutional context and governance capacity are critical boundary conditions for its effectiveness. However, in the MSME context, limitations in internal capabilities, reporting standards, and technical understanding hinder the optimal orchestration of GA practices. GA is a technical practice that requires a formal governance structure (e.g., oversight, audit) to be effective a structure that most SMEs lack. Without this, it fails to generate useful information.

This explains why the findings of this study differ from those of Frijat et al. (2025) and Rahman & Islam (2023), who identified a significant effect of GA on environmental performance in large firms. Moreover, the non-significant mediating role of SR in the GA–SP relationship indicates that green accounting practices implemented by MSMEs have not yet been effectively internalized into credible reporting systems. These findings reinforce the argument that, under VUCA conditions, technical capabilities alone without the support of cognitive and institutional capabilities are insufficient to generate optimal sustainability performance. The standardized coefficient of 0.449 for SAL suggests it is a major driver of SP, indicating that a significant portion of SME sustainability performance can be attributed to the literacy of its managers.

In contrast to GA, Sustainability Accounting Literacy (SAL) is found to have a positive and significant effect on MSME Sustainability Performance (SP), both directly and indirectly through Sustainability Reporting (SR). A one-unit increase in SAL is associated with a 0.449-unit increase in SP, indicating a substantial practical impact. This finding indicates that cognitive aspects and knowledge serve as key determinants in driving the successful implementation of sustainability practices. Within the framework of Dynamic Capabilities Theory (Teece et al., 1997), SAL functions as a dynamic capability that enables MSMEs to sense, seize, and transform sustainability opportunities amid uncertainty. This finding extends prior research by demonstrating that cognitive capabilities (literacy) are more critical than technical practices in driving SME sustainability performance a distinction not previously articulated in the literature. While Asiaei et al. (2021) focused on green intellectual capital in large firms, our study shows that in resource-constrained SME settings, literacy serves as a substitute for formal accounting infrastructure. Similarly, although Dewi et al. (2025) confirmed the importance of environmental awareness, our findings further reveal that literacy translates directly into improved performance through enhanced decision-making quality. This contrasts with studies on green accounting (Frijat et al., 2025; Rahman & Islam, 2023), which found significant effects only in large firms, suggesting that technical practices require institutional support that SMEs typically lack. The theoretical implication is that under VUCA conditions, knowledge-based capabilities outperform technical adoption because they enable adaptive responses to environmental uncertainty. This finding demonstrates that cognitive governance the literacy and awareness of owner-managers can function as a substitute for formal board oversight, improving decision-making and internal control. From a governance perspective, SAL enables SME owners and managers to exercise better oversight of sustainability-related decisions, thereby reducing agency problems and improving the quality of internal control over environmental and social practices. Such literacy enhances MSME actors' understanding of the

importance of integrating economic, social, and environmental dimensions, while simultaneously improving their capacity to develop transparent sustainability reports. Under VUCA, the sensing, seizing, and transforming functions of a dynamic capability are paramount. SAL provides the cognitive foundation for these functions, making it more adaptable and powerful than a static technical practice like GA.

This finding is consistent with Dewi et al. (2025), who emphasize the importance of environmental awareness and understanding in enhancing the effectiveness of green accounting practices. Furthermore, it extends the findings of Asiaei et al. (2021), who highlight the role of green intellectual capital in improving environmental performance through accounting mechanisms. Moreover, the significant mediating effect of SR in the SAL–SP relationship indicates that literacy not only enhances performance directly but also indirectly through reporting mechanisms that strengthen legitimacy and stakeholder trust. This aligns with Stakeholder Theory, which underscores the importance of transparency in fostering relationships with stakeholders.

The results indicate that Waste Management (WM) does not have a direct effect on MSME Sustainability Performance (SP), but exerts a significant indirect effect through Sustainability Reporting (SR). This finding suggests that waste management practices only contribute to performance when they are systematically communicated through sustainability reporting. This result supports the studies of Ali et al. (2023) and B. et al. (2024), which demonstrate that environmental practices require mediating mechanisms (such as Environmental Management Accounting) to generate performance outcomes. SR operates as a governance mechanism to monitor actions and reduce information asymmetry, which is particularly critical in SMEs where formal board structures and external audit are often absent.

Moreover, this finding is consistent with Derhab & Elkhwesky (2022), who highlight that MSMEs face various constraints in implementing waste management, thereby limiting its direct impact on performance without adequate managerial and reporting support systems. From a VUCA perspective, unstructured WM practices tend to fail in providing clear signals to stakeholders. Therefore, sustainability reporting becomes a critical instrument in reducing ambiguity and enhancing the credibility of environmental practices undertaken by MSMEs.

The findings indicate that Sustainability Reporting (SR) has a positive and significant effect on MSME Sustainability Performance (SP), and serves as an important mediating variable in the relationships between sustainability accounting literacy and waste management with performance. This result confirms that SR functions not merely as a reporting tool, but also as a strategic mechanism capable of transforming internal practices into measurable performance outcomes recognized by stakeholders.

From the perspectives of Stakeholder Theory and Legitimacy Theory, SR operates as a communication mechanism that enhances transparency, accountability, and organizational legitimacy. In the SME context, transparency through sustainability reporting allows stakeholders including informal investors, local communities, and regulators to monitor environmental and social performance. Accountability is operationalized when SMEs voluntarily disclose sustainability information, which in turn strengthens legitimacy. This monitoring function is particularly critical in SMEs where formal governance structures such as boards of directors are often absent. Systematic reporting reduces information asymmetry and strengthens stakeholder trust, thereby contributing to improved performance. This finding is consistent with Hawaj & Buallay (2021) and Zhou et al. (2022), who demonstrate that sustainability reporting and ESG performance significantly enhance firm performance through mediating mechanisms. Furthermore, in the MSME context, this result is supported by Ali et al. (2023), B. et al. (2024), and Asiaei et al. (2021), who emphasize the importance of intermediary mechanisms such as Environmental Management Accounting (EMA) in translating environmental practices into improved performance outcomes.

Moreover, the results reinforce the argument that sustainability practices require transformational mechanisms to effectively impact performance. This is reflected in the findings of Zhen and Rahman (2024), who show that sustainable production mediates the relationship between sustainability practices and ESG performance, as well as Rahman & Islam (2023) and Ratmono et al. (2024), who highlight the importance of mediating variables in explaining the relationship between green accounting and performance. The contribution of waste management to performance

through SR is also consistent with the findings of Faieq & Çek (2024) and Derhab & Elkhwesky (2022), which indicate that waste management practices require managerial and reporting support systems to generate optimal outcomes.

Within a VUCA environment, the role of SR becomes increasingly critical as a tool for managing complexity and informational ambiguity. This is supported by Prasad (2025), who demonstrate that ESG practices are dynamic and time-sensitive, thus requiring adaptive reporting mechanisms to sustain performance. Under VUCA conditions, sustainability reporting enhances governance quality by providing structured, verifiable information that reduces uncertainty for stakeholders and enables adaptive decision-making in the face of complexity and ambiguity. In addition, Safitri et al. (2025) and Dewi et al. (2025) emphasize that the effectiveness of sustainability practices is also influenced by internal organizational factors such as leadership and environmental awareness, which are ultimately reflected in the quality of sustainability reporting.

However, the findings also reveal that SR is unable to mediate the relationship between green accounting and sustainability performance. This suggests that the implementation of green accounting within MSMEs has not yet reached a sufficient level of maturity to be effectively translated into reporting practices. This result contrasts with the findings of Frijat et al. (2025), who identified a significant effect in large firms, thereby indicating contextual differences between large enterprises and MSMEs.

One of the key findings of this study is the strategic role of Sustainability Reporting (SR) as a mediating variable. SR is found to mediate the relationships between Sustainability Accounting Literacy (SAL) and Waste Management (WM) with MSME Sustainability Performance (SP), but not the relationship between Green Accounting (GA) and SP. This finding provides a novel insight that SR is not merely a reporting tool, but rather a transformational mechanism that links internal practices to external performance outcomes.

This result extends the findings of Hawaj & Bualalay (2021), who position SR as a determinant of performance, and complements the study of Zhou et al. (2022), which emphasizes the importance of mediating variables in sustainability relationships. The inability of SR to mediate the GA–SP relationship suggests that the quality of input (i.e., GA practices) is not yet sufficiently robust to be translated into valuable reporting outputs. In contrast, SAL and WM, which are more operational and practice-based in nature, are more readily converted into relevant information within sustainability reports.

From a practical perspective, this study suggests that enhancing sustainability accounting literacy should be a primary priority in MSME development. Training and capacity-building programs that focus on fostering a comprehensive understanding of sustainability are likely to be more effective than merely promoting the technical adoption of green accounting practices. This finding is further supported by Primacintya (2025), who demonstrate that higher ESG performance contributes to the reduction of earnings management practices, with the effect being strengthened by gender diversity in governance structures. This underscores that the effectiveness of sustainability practices is determined not only by technical aspects but also by the quality of governance and organizational characteristics that promote transparency and accountability.

Specifically, SME managers should prioritize sustainability literacy training over technical green accounting adoption, as literacy directly enhances reporting quality and performance. For policymakers, designing tiered reporting frameworks with simplified templates for micro-enterprises and more detailed guidelines for larger SMEs would reduce compliance burdens while improving data comparability. Accounting practitioners should develop sector-specific key performance indicators for waste management and literacy assessment tools. Regulators and local governments are advised to establish incentive mechanisms such as tax relief or preferential procurement for SMEs that demonstrate verified sustainability reporting, rather than mandating uniform green accounting standards that may exceed SME technical capacities.

In addition, it is essential for MSMEs to develop sustainability reporting as a strategic tool rather than treating it as a mere administrative obligation. High-quality reporting can enhance transparency, improve reputation, and facilitate access to sustainable financing. For policymakers, these findings highlight the need for policies that not only

encourage the adoption of sustainability practices but also strengthen MSMEs' literacy capacities and reporting systems in navigating the dynamics of a VUCA environment.

This study offers three theoretical contributions. First, it extends Dynamic Capabilities Theory by demonstrating that sustainability accounting literacy functions as a dynamic capability enabling SMEs to sense, seize, and transform sustainability opportunities under VUCA conditions a role previously unexplored. Second, it advances corporate governance literature by introducing sustainability reporting as a governance substitute that compensates for absent formal board structures in SMEs, and by identifying cognitive governance (literacy) as a determinant of governance quality. Third, it integrates RBV, Dynamic Capabilities, and Stakeholder Theory into a unified framework explaining SME sustainability performance, showing that knowledge-based capabilities outperform technical practices.

Practically, this study provides three key implications. First, SME managers should prioritize sustainability literacy training over technical accounting adoption, as literacy directly enhances reporting quality and performance. Second, policymakers should fund literacy programs and develop simplified tiered reporting templates for SMEs to reduce compliance burdens. Third, local governments should link sustainability reporting to licensing incentives, while ESG practitioners should emphasize reporting as a governance substitute under VUCA conditions. These contributions align with Corporate Governance and Sustainability Review's scope by addressing governance mechanisms, sustainability practices, and SME contexts in developing economies. This study's primary contribution to corporate governance is demonstrating that in the SME context, governance quality is not determined by the presence of formal structures, but by the cognitive governance (SAL) and transparent reporting (SR) that compensate for their absence. Theoretically, this study makes three key contributions. First, it extends Dynamic Capabilities Theory by positioning SAL as a critical micro-foundation for sustainability in uncertain environments. Second, it contributes to Stakeholder and Legitimacy Theory by confirming SR as a vital mechanism for securing social legitimacy. Finally, it advances the corporate governance literature by providing new empirical evidence on the strategic role of sustainability-oriented leadership in enhancing organizational resilience and long-term performance.

Despite these contributions, this study has several limitations that should be acknowledged. Geographically, the findings are confined to MSMEs in East Java, which may limit generalizability to other regions with different institutional and cultural contexts. Methodologically, the cross-sectional design prevents causal inference, while self-reported data may introduce social desirability bias. The use of purposive sampling restricts representativeness, and common method bias cannot be fully excluded since both independent and dependent variables were collected from single informants. Furthermore, potential endogeneity arising from unobserved heterogeneity such as managerial motivation, prior sustainability exposure, or firm-specific unobservables may affect coefficient estimates. Future research should employ longitudinal designs, multi-respondent surveys, objective performance metrics, and instrumental variable approaches to address these limitations and strengthen causal claims.

6. CONCLUSION

This study aimed to analyze the effects of Green Accounting (GA), Sustainability Accounting Literacy (SAL), and Waste Management (WM) on SME Sustainability Performance (SP) with Sustainability Reporting (SR) as a mediator under VUCA conditions. The findings reveal that SAL is the most significant determinant of SP, both directly and indirectly through SR, while WM exerts no direct effect but shows significant indirect impact via SR, and GA demonstrates no significant effect. The primary theoretical insight is that cognitive capabilities (literacy) function as governance substitutes in resource-constrained SME settings, where formal board structures are absent. SAL enables owner-managers to sense and seize sustainability opportunities operating as a dynamic capability under VUCA whereas GA fails because it represents an operational capability requiring governance infrastructure that SMEs lack. From a governance perspective, SR functions as a monitoring, accountability, and transparency mechanism, transforming operational practices into legitimate disclosures. For developing-country SMEs, this model prioritizes literacy and simplified reporting over complex technical adoption, offering a replicable framework for contexts with weak regulatory enforcement and informal governance structures.

This study has several limitations. The cross-sectional design prevents causal inference; the regional focus on East Java limits generalizability to other institutional contexts; self-report bias may affect findings despite CMB testing; and external governance factors (regulatory pressure, green financing, supply chain requirements) were omitted. Future research should pursue longitudinal designs tracking literacy development over time, comparative studies across Indonesian provinces with varying regulatory stringency, and mixed-method approaches combining surveys with case studies to illuminate how literacy translates into action. Cross-national replication in other developing economies (Vietnam, Kenya, Brazil) would test generalizability, while experimental designs with randomized literacy training could provide stronger causal evidence for policy recommendations. Practically, SME managers should prioritize literacy training over technical accounting adoption; policymakers should fund literacy programs and simplified reporting templates; local governments should link reporting to licensing incentives; and ESG practitioners should develop frameworks emphasizing reporting as a governance substitute under VUCA conditions.

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