

Optimizing Sustainable Environmental Practice in the MSME Sector Through Digitalization, Green Accounting, and Sustainability Awareness with Socioeconomics as a Moderating Variable

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Abstract: This study investigates the influence of digitalization, green accounting, and sustainability awareness on environmentally friendly practices among Micro, Small, and Medium Enterprises (MSMEs) in East Java, with socioeconomic conditions as a moderating variable. Using a mixed-method approach, data were collected through a survey of 207 respondents and semi-structured interviews with 15 informants. The findings reveal that green accounting significantly enhances environmentally friendly practices, while digitalization and sustainability awareness show no direct effect. Furthermore, socioeconomic conditions do not moderate the relationships between the independent variables and environmental practices. These results highlight the persistence of the intention-behaviour gap, where MSMEs acknowledge environmental issues but fail to implement systematic green practices due to limited literacy, resources, and external support. Theoretically, this study contributes to the application of the Theory of Planned Behavior (TPB) in the MSME context. Practically, it provides implications for policymakers to strengthen incentives, regulations, and green literacy programs to foster sustainable MSME development in Indonesia.

Introduction

Micro, Small, and Medium Enterprises (MSMEs) play a strategic role in the Indonesian economy (Astuti & Balqiah, 2020; Inasius, 2019; Kristiningrum et al., 2021; Taneo, Hadiwidjojo, Sunaryo, & Sudjatno, 2020). As of December 2024, there were 65.5 million MSMEs in Indonesia, equivalent to 99.9% of all businesses (Syafitri, 2025). This sector contributes 61% to the gross domestic product (GDP) worth IDR 9,300 trillion and absorbs 96.92% of the workforce or 119 million people (DATA UMKM 2018-2019, n.d.; Syafitri, 2025). The resilience of MSMEs is also reflected in their contribution to maintaining economic

stability during critical times, including the 1998 crisis and the Covid-19 pandemic, when MSMEs remained the main source of livelihood for the community (Cahyaningtyas & Ningtyas, 2020; Kristiningrum et al., 2021).

However, despite their contributions, MSMEs face serious challenges related to environmental sustainability. A number of studies show that MSMEs have a significant impact on environmental degradation, contributing to around 70% of industrial pollution and 60% of carbon emissions globally (Franco & Rodrigues, 2021; Hossain, San, Ling, & Said, 2020; Maniu, Costache, & Dumitraşcu, 2021; Purwandani & Michaud, 2021). Similar cases have also been found in Indonesia, for example, MSMEs in the manufacturing and tourism sectors produce large amounts of waste that has the potential to pollute the environment (Latifah & Soewarno, 2023; Yunita Durman & Nadlifatin, 2024). This confirms that sustainable practices are not only the responsibility of large companies, but must also be adopted by MSMEs.

Three important factors that are often associated with the adoption of environmentally friendly practices are digitization, green accounting, and sustainability awareness. Digitization is considered capable of increasing efficiency, expanding markets, and opening up opportunities for the adoption of green innovations (Bouwman, Nikou, & De Reuver, 2019; Fitri Wahyuningsih & Masiyah Kholmi, 2024). However, several studies show inconsistent results, where digital adoption does not always have a significant impact on environmental practices due to limitations in human resources and infrastructure (Chege & Wang, 2020; Latip & Sharkawi, 2021). Green accounting is seen as an instrument for internalizing environmental costs in business decision-making, thereby promoting efficiency and transparency (Latifah & Soewarno, 2023; Wati, Trishe Silinia Arafah, Rochanda Wiradinata, & Nurul Senja, 2024). However, limited accounting literacy makes some MSMEs view it as an additional burden (Maniu et al., 2021). Meanwhile, sustainability awareness has been shown to encourage green practices in several studies (Hossain et al., 2020; Jabbour, Jabbour, Foropon, & Filho, 2018), but in the context of developing countries, the results are inconsistent due to limited capital and government support (Umar, Khan, Zia-ul-haq, Yusliza, & Farooq, 2021). These inconsistent findings reveal gaps that still need to be explored.

To explain these factors, this study uses the Theory of Planned Behavior (TPB) (Ajzen, 1991). TPB emphasizes that behavior is determined by attitude, subjective norms, and perceived behavioral control (Muhammad Naparin & Basir Achmad, 2024). In this study, sustainability awareness reflects the attitude aspect, socioeconomic conditions represent subjective norms, while digitalization and green accounting are related to perceived behavioral control. With this framework, the study is able to examine the interaction of variables more comprehensively in influencing the environmentally friendly practices of MSMEs.

The context of East Java is relevant because this province has more than 9.7 million MSMEs that contribute 58.36% to the regional economy (Dinkop, 2023). In addition to their economic contribution, MSMEs in East Java also have a significant environmental impact, such as hazardous waste pollution from the tofu industry in Jombang, which has not been adequately managed (Latifah & Soewarno, 2023). Other challenges include low financial literacy, limited access to renewable energy, and high green technology investment costs (JATIM, 2025; Simanjuntak, 2024). These conditions indicate a gap between the economic potential of MSMEs and the implementation of environmentally friendly practices.

Although environmentally friendly practices among MSMEs have been widely studied in other countries, research in Indonesia is still limited and tends to focus on traditional financial aspects of MSMEs without linking them to sustainability issues. This shows

inconsistencies in findings and limitations in local contexts. Therefore, this study aims to analyze the influence of digitalization, green accounting, and sustainability awareness on environmentally friendly practices of MSMEs in East Java, with socioeconomic conditions as a moderating variable. Thus, this study is expected to contribute theoretically to the development of TPB in the context of MSMEs and practically to policies that strengthen the sustainability of the MSME sector in Indonesia.

Research Method

This study uses a quantitative approach with a mixed-methods approach, namely surveys and interviews. The data used is primary data obtained through interviews and questionnaires distributed to MSME actors in East Java. The sample size was determined using purposive sampling. The sampling criteria were based on the definition of MSMEs in Indonesia according to the Central Statistics Agency (BPS) and businesses that met the applicable criteria, namely Law No. 20 of 2008 (Cahyaningtyas & Ningtyas, 2020). The sample size was determined based on Heirs' theory (Memon et al., 2020), using the formula $20 \times$ the largest path in a single construct. In this study, environmentally friendly practices had 6 pathways (H1 to H6), so the sample size was $20 \times 6 = 120$ samples. However, in practice, the researchers managed to obtain 207 valid questionnaires.

There are four constructs in this study, namely three independent constructs, one dependent construct, and one moderating construct. The research instrument is a questionnaire with a 5-point Likert scale covering five variables, namely Digitalization (X1), Green Accounting (X2), Sustainability Awareness (X3), Environmentally Friendly Practices (Y), and Socioeconomics (Z) as a moderating variable (Figure 1). The data analysis technique used is Structural Equation Modeling (SEM-PLS) with the help of PLS software. The analysis includes validity and reliability tests, structural model tests (inner model), and hypothesis testing.

In addition to the questionnaire, this study also included semi-structured interviews to reinforce the quantitative results. Interviews were conducted with 15 informants selected from the questionnaire respondents, taking into account the type of business, length of business, and level of education. The interviews were conducted in person with an average duration of 30-45 minutes, recorded, and partially recorded with the informants' consent.

The interviews aimed to explore in greater depth the perceptions, experiences, and actual practices of MSME actors regarding the implementation of digitalization, green accounting, and sustainability awareness. The interview data was then integrated to explain the quantitative findings, thereby providing a more contextual and in-depth picture of the environmentally friendly practices of MSMEs in East Java. The hypotheses in this study are:

- H1 : Digitalization has a significant effect on Sustainable environmental practice.
- H2 : Green accounting has a significant effect on Sustainable environmental practice.
- H3 : Sustainability awareness has a significant effect on Sustainable environmental practice.
- H4 : Socio-economic conditions strengthen the effect of digitalization on Sustainable environmental practice.
- H5 : Socio-economic conditions strengthen the effect of green accounting on Sustainable environmental practice.
- H6 : Socio-economic conditions strengthen the influence of sustainability awareness on Sustainable environmental practice

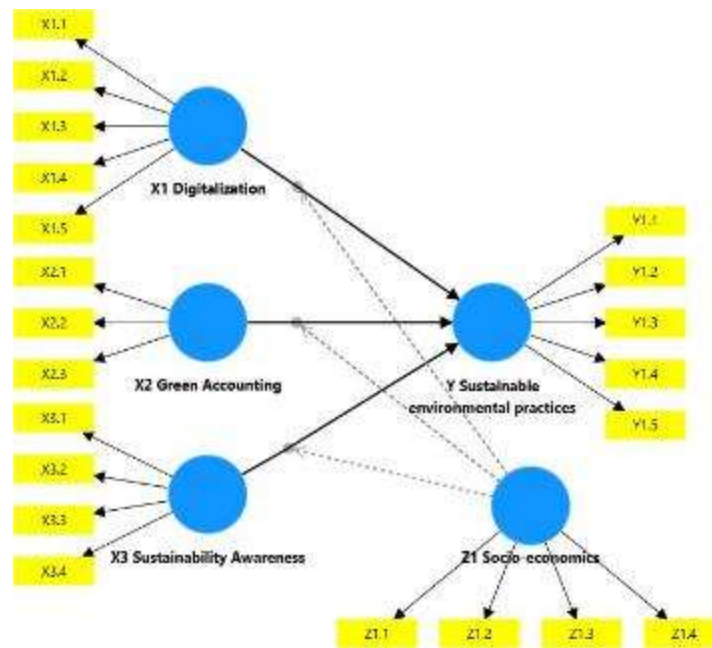


Figure 1: Path Analysis Research Model

Result and Discussion

The questionnaire was distributed digitally via a Google Forms link to MSME actors in East Java. From the results of the questionnaire distribution, both through groups, MSME communities, and by visiting respondents directly, the questionnaire was completed by 207 respondents, resulting in a questionnaire return rate of 173%.

Table 1. Respondent Profile

Classification of Respondents	Respondent Categories	Number	%
Level of Education	SD	10	4,83
	SMP	20	9,66
	SMA	89	43,00
	Diploma	14	6,76
	Sarjana (S1)	68	32,85
	Magister (S2)	6	2,90
Total		207	100
Type of Business	Services	18	8,70
	Trade	29	14,01
	Food and Beverages	139	67,15
	others	21	10,14493
Total		207	100
Business Duration	< 5 years	128	61,84
	5-10 years	41	19,81
	10-15 years	17	8,21
	15-20 years	13	6,28
	>20 years	8	3,86
Total		207	100
Number of Workers	Up to 4 people	161	77,78
	5 s/d 19 people	40	19,32

Classification of Respondents	Respondent Categories	Number	%
Sales Revenue	20 s/d 99 people	6	2,90
		207	100
	≤ Rp 300 million/year	184	88,89
	≤ Rp 2.5 billion/year	22	10,63
	≤ Rp 50 billion/year	1	0,48
Total		207	100

Source: Processed data (2025)

Based on the results of a questionnaire distributed to 207 MSME actors in East Java, the majority of respondents had a high school education (43%), followed by those with a bachelor's degree (32.85%), while the rest had an elementary school, junior high school, diploma, or master's degree. This shows that most MSME actors have a secondary to higher education background.

In terms of business type, the majority of respondents were engaged in the food and beverage sector (67.15%), followed by trade (14.01%), services (8.70%), and others (10.14%). This composition indicates that the food and beverage sector dominates MSME activities in East Java. Furthermore, based on the length of time in business, most respondents have been operating for less than 5 years (61.84%), while 19.81% have been operating for 5-10 years, and only 3.86% have been established for more than 10 years. These findings show that most of the MSME respondents are still classified as new and developing businesses.

Based on the number of employees, respondents were dominated by micro businesses (77.78%) with ≤ 4 employees, while 19.32% were medium-sized businesses with 5-19 employees, and only 2.90% had grown to have 20-99 employees. In terms of turnover, the majority of MSMEs still have a turnover of ≤ IDR 300 million per year (88.89%), 10.63% have a turnover of up to IDR 2.5 billion per year, and only 0.48% have a turnover of up to IDR 50 billion per year.

Overall, the profile of respondents shows that the majority involved in the food and beverage sector are relatively young businesses and are micro-scale in terms of the number of employees and annual turnover. This reflects the general characteristics of MSMEs in Indonesia, which are still dominated by micro-scale businesses with limited resources.

Outer Model

After conducting two outer tests, it can be said that each construct variable is valid, and each latent variable is reliable. The results of the outer test of this research model are shown in Figure 2.

Figure 2 shows that all research indicators have factor loadings above 0.70. This indicates that each indicator is able to reflect the measured construct well, so that the model can be declared convergent valid. This convergent validity shows that each indicator in the constructs of digitalization, green accounting, sustainability awareness, environmentally friendly practices, and socio-economics has a strong relationship with its latent variable.

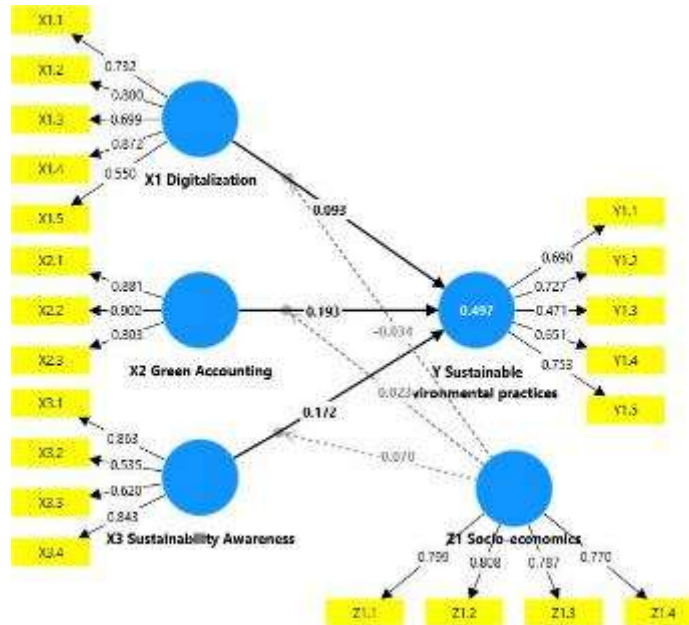


Figure 2: Results of outer model calculations Research
Source: SmartPLS 4.1 output (2025)

Table 2. Validity Indicators (Outer Loadings) and Convergent Validity (AVE) 2

Latent Variables	Construct Variables	Loading (>0.70)	AVE(>0,5)
X1 Digitalization	X1.1	0.728	0.630
	X1.2	0.815	
	X1.3	0.728	
	X1.4	0.892	
X2 Green Accounting	X2.1	0.879	0.745
	X2.2	0.902	
	X2.3	0.806	
X3 Sustainability Awareness	X3.1	0.894	0.812
	X3.4	0.908	
Y Sustainable environmental practice	Y1.1	0.750	0.569
	Y1.2	0.762	
	Y1.5	0.751	
Z1 Socio-economics	Z1.1	0.806	0.626
	Z1.2	0.805	
	Z1.3	0.778	
	Z1.4	0.775	
Z1 Socio-economics x X1 Digitalization		1.000	
Z1 Socio-economics x X2 Green Accounting		1.000	
Z1 Socio-economics x X3 Sustainability Awareness		1.000	

Source: SmartPLS 4.1 output (2025)

Furthermore, Table 2 confirms the results of convergent validity testing through Average Variance Extracted (AVE) values, all of which exceed 0.50. The highest AVE value is found in the construct of sustainability awareness (0.812), followed by green accounting (0.745), while the lowest value is found in environmentally friendly practices (0.569). These findings indicate that the variation in indicators can be adequately explained by the latent

constructs formed. Thus, the four main constructs and moderating variables in this study can be declared to meet the convergence validity requirements.

Table 3. Construk Reliability (Cronbach's Alpha and Composite Reliability) 2

Latent Variables	Cronbach's alpha	Composite reliability (rho_c)	Description
X1 Digitalization	0.804	0.871	Reliable
X2 Green Accounting	0.829	0.898	Reliable
X3 Sustainability Awareness	0.768	0.896	Reliable
Y Sustainable environmental practice	0.622	0.799	Reliable
Z1 Socio-economics	0.801	0.870	Reliable

Source: SmartPLS 4.1 output (2025)

In terms of reliability, the test results shown in Table 3 indicate that all latent variables have Cronbach's Alpha values above 0.60 and Composite Reliability (CR) exceeds 0.70. The digital construct obtained a Cronbach's Alpha value of 0.804 and a CR of 0.871, while green accounting had higher reliability with a Cronbach's Alpha of 0.829 and a CR of 0.898. Sustainability awareness also showed strong reliability with a Cronbach's Alpha of 0.768 and a CR of 0.896. Meanwhile, environmentally friendly practices, despite having a lower Cronbach's Alpha value (0.622), still meet the reliability criteria because the CR value reaches 0.799. Meanwhile, the socioeconomic variable was also tested for reliability with a Cronbach's Alpha of 0.801 and a CR of 0.870.

Overall, these validity and reliability tests show that the measurement model in this study has met the requirements to proceed to the inner model and hypothesis testing stages. These findings reinforce the belief that the instruments used are appropriate and capable of presenting the research constructs consistently, so that the results of further analysis can be interpreted with a high level of confidence.

Discriminant Validity Heterotrait Monotrait (HTMT)

Table 4. Heterotrait Monotrait (HTMT)

Path coefficient Latent variable	Heterotrait-monotrait ratio (HTMT)	Description
X2 Green Accounting <-> X1 Digitalization	0.433	Fit
X3 Sustainability Awareness <-> X1 Digitalization	0.692	Fit
X3 Sustainability Awareness <-> X2 Green Accounting	0.568	Fit
Y Sustainable environmental practice <-> X1 Digitalization	0.602	Fit
Y Sustainable environmental practice <-> X2 Green Accounting	0.722	Fit
Y Sustainable environmental practice <-> X3 Sustainability Awareness	0.829	Fit
Z1 Socio-economics <-> X1 Digitalization	0.515	Fit
Z1 Socio-economics <-> X2 Green Accounting	0.496	Fit
Z1 Socio-economics <-> X3 Sustainability Awareness	0.805	Fit
Z1 Socio-economics <-> Y Sustainable environmental practice	0.852	Fit

Source: SmartPLS 4.1 output (2025)

The results of the discriminant validity test using HTMT in Table 4 show that all HTMT values are below the threshold of 0.90, so it can be concluded that each construct in this study has good discriminant validity. Relatively low HTMT values, such as in the relationship between green accounting and digitization (0.433), indicate clear construct differences, while higher values, such as environmentally friendly practices and sustainability awareness (0.829) and socio-economics (0.852), indicate strong but still acceptable correlations. These findings confirm that all research constructs can be conceptually distinguished while having relevant relationships in accordance with the proposed theoretical framework.

Inner Model

Table 5. Calculation of Gof Test Values

AVE average	mean R-squared	Gof	Description
0.676	0.514	0.590	High

Source: SmartPLS 4.1 output (2025)

Table 5 shows the results of the Goodness of FIT (GoF) test with a value of 0.590. This value is in the high category (≥ 0.36), so the research model can be said to have a good level of feasibility in explaining the relationship between variables. Thus, the model built has met the Goodness of Fit criteria and is feasible for use in further analysis. Table 6 shows the results of the Collinearity assessment test with all construct VIF values below the threshold of 5, ranging from 1.366 to 2.990. This indicates that there are no multicollinearity issues in the model, so that each construct can be analyzed independently without being influenced by excessive correlations.

Tabel 6. Collinearity Assessment VIF

Path coefficient Latent variable	VIF	multikoleniaritas
X1 Digitalization -> Y Sustainable environmental practice	1.583	No
X2 Green Accounting -> Y Sustainable environmental practice	1.366	No
X3 Sustainability Awareness -> Y Sustainable environmental practice	2.175	No
Z1 Socio-economics -> Y Sustainable environmental practice	1.750	No
Z1 Socio-economics x X2 Green Accounting -> Y Sustainable environmental practice	1.605	No
Z1 Socio-economics x X1 Digitalization -> Y Sustainable environmental practice	2.768	No
Z1 Socio-economics x X3 Sustainability Awareness -> Y Sustainable environmental practice	2.990	No

Source: SmartPLS 4.1 output (2025)

Table 7 shows that the variables of digitization, green accounting, sustainability awareness, and socioeconomic status are able to explain 51.4% of the variable of environmentally friendly practices. The Adjusted R-Square value of 49.7% confirms the consistency of the model, while the large category indicates that the model has a strong explanatory power for the independent variables.

Table 7. Coefficient of Determination (R2)

Latent variable	R-square	R-square adjusted	Description
Y Sustainable environmental practice	0.514	0.497	Big

Source: SmartPLS 4.1 output (2025)

Hypothesis Testing

Table 8. Hypothesis Testing

<i>Hypothesis</i>	<i>Koefisien Jalur</i>	<i>Original Sample (O)</i>	<i>T Statistics (O/STDEV)</i>	<i>P Values</i>	<i>Description</i>
H1	X1 Digitalization -> Y Sustainable environmental practice	0.069	0.921	0.357	Rejected
H2	X2 Green Accounting -> Y Sustainable environmental practice	0.279	4.329	0.000	Accepted
H3	X3 Sustainability Awareness -> Y Sustainable environmental practice	0.142	1.463	0.143	Rejected
H4	Z1 Socio-economics x X1 Digitalization -> Y Sustainable environmental practice	0.019	0.240	0.811	Rejected
H5	Z1 Socio-economics x X2 Green Accounting -> Y Sustainable environmental practice	0.002	0.037	0.970	Rejected
H6	Z1 Socio-economics x X3 Sustainability Awareness -> Y Sustainable environmental practice	-0.135	1.583	0.113	Rejected

Source: SmartPLS 4.1 output (2025)

The Impact of Digitalization on Sustainable environmental practice

The results of hypothesis testing in Table 8 show that digitization does not have a significant effect on Sustainable environmental practice. This finding indicates that although digitization is believed to improve business efficiency and market access, its implementation has not directly encouraged environmentally friendly behavior among MSME actors in East Java. In other words, the adoption of digital technology is still mostly utilized for increasing sales, promotion, and operational efficiency rather than for implementing environmentally oriented strategies.

The interview results also reinforce this finding. Most respondents said that the use of digital platforms was still limited to marketing. As Informant Pempek Charly said:

"I use social media such as WhatsApp and Instagram, only for promotion and customers.

There are also Gofood and Shopeefood"

In addition, the informant "Bakso Seger 22" stated:

"Payments are now made using QRIS, which makes it easier for customers and convenient for me, as the money goes straight into my account. It's more efficient"

Based on the respondents' statements above, it can be seen that digital transformation at the MSME level is still more focused on commercial strategies rather than sustainability strategies.

In theory, these results are in line with previous studies that emphasize that digitization does not always have a significant impact on environmental sustainability, especially when human resource readiness, organizational culture, and technological infrastructure are inadequate (Chege & Wang, 2020; Latip & Sharkawi, 2021). In the context of East Java MSMEs, the majority of which are still micro-scale with limited capital and managerial capacity, digitization is more often seen as a survival strategy than a means to achieve environmental sustainability goals.

However, literature also shows that digitization has great potential in supporting environmentally friendly practices when integrated with green innovation and sustainability awareness. Previous studies emphasize that digital transformation can strengthen energy efficiency, reduce resource use, and open access to green financing that supports the adoption of environmentally friendly technologies. Therefore, the low impact of digitization in this study reflects implementation gaps in the field rather than the weak potential of the technology itself.

The Impact of Green Accounting on Sustainable environmental practice

The results of the hypothesis test show that green accounting has a significant effect on Sustainable environmental practice in MSMEs in East Java. These results show that green accounting plays an important role in encouraging SME actors to pay more attention to environmental aspects in their business activities. In theory, green accounting functions as a mechanism for internalizing environmental costs (such as electricity, water, and sanitation costs, etc.), thereby encouraging more sustainability-oriented business decisions.

However, the interview findings reveal a gap between awareness and actual practice. Most informants are aware of the importance of recording environment-related costs, but in practice, such recording is rarely done, as stated by the informant Nasi Goreng Erik:

"I realize the importance of the environment, but I haven't written it down yet"

A similar sentiment was expressed by informant RM Ampera Hijau:

"I usually give leftover food to my neighbors to feed their livestock. I sell plastic and used bottles to collectors, but I never keep track of the sales"

The above phenomenon reflects the existence of an intention-behavior gap, which is the distance between intention and actual behavior. According to the Theory of Planned Behavior, a positive attitude and awareness of a behavior do not necessarily result in action, as they are also influenced by perceived behavioral control factors, such as skills, resources, and external support (Ajzen, 1991). In the context of MSMEs, limited accounting literacy, micro-scale businesses, and a lack of incentives mean that awareness of the need for environmental recording has not yet been translated into consistent practice.

In addition, the interview findings also show that MSME actors who have started simple record keeping find it easier to control their expenses and realize the potential for energy savings. An informant from Kaori Laundry revealed that:

"I have a liquid waste treatment business. I sort some of the solid waste. There is also a liquid waste treatment fee, usually Rp 150,000/month. Yes, I record the expenses, but I don't separate the records"

The informant's statement indicates that although statistically, green accounting has been proven to significantly influence environmentally friendly practices, its application at the MSME level is still very limited. Low green accounting literacy and simple recording habits mean that many MSMEs are unable to utilize environmental records as a basis for reducing energy use or managing waste systematically. This is in line with previous studies which confirm that limited resources and understanding often lead to green accounting being seen as an additional burden rather than a sustainability strategy (Chege & Wang, 2020).

The Impact of Sustainability Awareness on Sustainable environmental practice

Based on the hypothesis results in Table 8, it shows that sustainability awareness does not have a significant effect on Sustainable environmental practice. This means that even though MSME actors have a high level of concern and understanding of sustainability issues,

this awareness has not been fully internalized in the form of environmentally oriented behavior or business strategies.

However, the interview results showed a gap between awareness and actual implementation (intention-behavior gap). Some informants showed a positive attitude towards the environment, such as Mr. Chandra, a meatball business owner, who said:

"Provide separate trash bins for plastic waste and food scraps so they don't get mixed together"

The owner of the iced tea shop, Cemal Cemil, expressed a similar sentiment:

"Dispose of trash directly at the nearest public place, but there is no specific record of cleaning expenses yet"

The quote illustrates that some MSME actors have realized the importance of protecting the environment and have begun to take practical steps, albeit simple ones that are not yet integrated into their business management systems.

However, the interview results also revealed quite contrasting variations. Some business owners actually engage in practices that harm the environment. For example, the owner of Erik Fried Rice revealed that:

"Dispose of kitchen waste directly into the trash can behind the house, and reuse cooking oil several times"

This phenomenon confirms that not all MSME actors who are aware of sustainability issues actually implement environmentally friendly behaviors. This condition shows that even though awareness exists, the perceived behavioral control factor as described in the Theory of Planned Behavior (Ajzen, 1991) is still weak, so that awareness does not automatically transform into concrete actions.

This finding is in line with previous research stating that sustainability awareness does not necessarily have a significant impact on environmentally friendly practices without adequate support in terms of facilities, capital, and regulations (Umar et al., 2021). In the context of East Java MSMEs, which are mostly micro-scale, financial constraints, low sustainability literacy, and strong old habits mean that sustainability practices are still not a top priority.

The Effect of Digitalization on Sustainable environmental practice with Socioeconomic Moderating Variables

The results of the hypothesis test in Table 8 show that socioeconomic status does not moderate the relationship between digitization and environmentally friendly practices. The p-value (0.811), which is well above 0.05, indicates that regardless of the socioeconomic status of MSME actors (better education and income) or MSMEs with lower status, digitization is still not being utilized for sustainability purposes.

Empirically, the interview results show that digital transformation by MSME players is more directed at business and marketing efficiency, rather than environmentally friendly strategies, as stated by the owner of Tela Telo Echo:

"Orders are usually placed via WhatsApp and payment can be made via QR code"

Meanwhile, the owner of Papadonat added:

"We already use cashier applications and social media to communicate with customers, and there are also GoFood and ShopeeFood"

Both statements above emphasize that digitization is viewed as a practical means to facilitate transactions and expand markets, not to manage waste, conserve energy, or reduce carbon

footprints. Therefore, socio-economic factors are not sufficient to strengthen the link between digitization and environmentally friendly practices.

From the perspective of the Theory of Planned Behavior (Ajzen, 1991), these results indicate that subjective norms and perceived behavioral control have not been adequately established. MSME actors tend to view digitalization as a market necessity and as an easily controllable tool for increasing turnover, but do not see it as an instrument for achieving sustainability goals. Socioeconomic conditions are not sufficient to change this perception, so the moderating effect is insignificant.

These results differ from previous studies, which confirm that education and financial capacity can increase the tendency of MSMEs to adopt sustainable practices, including through the use of digital technology (Durrani, Raziq, Mahmood, & Khan, 2024; Iqbal, Nooney, Al Ghafri, & Daniel, 2025). Other studies have found that access to information and innovation networks strengthen SMEs' readiness to adapt to technology-based sustainability strategies (Kannan & Gambetta, 2025). However, this study shows a discrepancy, where even though the majority of respondents are high school and college graduates and have varying turnover, socioeconomic aspects are unable to drive the orientation of digitalization towards environmentally friendly practices.

The results of this study are in line with two previous studies which state that digital adoption does not automatically have an impact on environmentally friendly practices when human resource readiness, green literacy, and infrastructure support are not yet adequate (Chege & Wang, 2020; Latip & Sharkawi, 2021). In other words, the socioeconomic conditions of MSME actors in East Java are not yet sufficient to be a driving factor for environmentally-oriented digitalization.

The Effect of Green Accounting on Sustainable environmental practice with Socioeconomic Moderating Variables

Based on Table 8, it can be seen that the hypothesis results show that socioeconomic status is not significant in moderating the relationship between green accounting and environmentally friendly practices. This means that differences in the socioeconomic status of MSME actors do not result in meaningful differences in the relationship between green accounting and environmentally friendly practices. Therefore, even though some MSMEs have relatively better financial capacity and education, this does not necessarily encourage them to adopt more formal green accounting-based recording as the basis for sustainability practices.

This is also reflected in the interview results, where a number of MSME players are actually aware of the importance of recording environment-related costs, but have not yet made it a business habit. The owner of Nasi Goreng Erik revealed::

"I realize the importance of the environment, but I haven't written it down yet"

This is reinforced by a statement from the owner of Warung Bismillahh, who said:

"I don't have any specific records for environmental costs"

The above statements illustrate the existence of an intention-behavior gap, where positive attitudes toward the environment are not necessarily realized due to low perceived behavioral control, for example, as a result of limited accounting literacy or external incentives.

These results differ from two previous studies, which found that education and financial capacity can strengthen the implementation of sustainable practices, including green accounting (Durrani et al., 2024; Iqbal et al., 2025). However, the results of this study are in

line with other studies, which confirm that many MSMEs only use simple record-keeping, so that socioeconomic factors are not sufficient to encourage the consistent implementation of green accounting (Chege & Wang, 2020; Latip & Sharkawi, 2021; Maniu et al., 2021).

The Effect of Sustainability Awareness on Sustainable environmental practice with Socioeconomic Moderating Variables

The results of Table 8 show that socioeconomic status is not significant in moderating the relationship between sustainability awareness and environmentally friendly practices. The negative coefficient (-0.135), although not significant, indicates a tendency that socioeconomic conditions may actually weaken this relationship.

Furthermore, the interview results showed variations in practice. Some MSME actors attempted to implement environmentally friendly behaviors. For example, the owner of Kang Hari's Javanese meatball stall stated:

"Used oil from frying meatballs is sold to collectors, and I get extra money"

However, on the contrary, there are also those who engage in practices that harm the environment, such as the owner of Ayam Goreng Geprek Peda, who stated:

"I still dispose of oil waste carelessly, I still haven't found a solution"

This confirms that even though awareness exists, perceived behavioral control is still limited, so that sustainability awareness is not always manifested in actual behavior.

These findings do not support previous studies, which confirm that sustainability awareness usually increases green practices (Hossain et al., 2020; Jabbour et al., 2018). Instead, it aligns with other earlier studies, which state that for MSMEs in developing countries, limitations in capital, technology, and external support mean that awareness does not always translate into action (Umar et al., 2021). Thus, socioeconomic factors in this study not only fail to strengthen but potentially weaken the relationship between sustainability awareness and environmentally friendly practices.

Conclusion

This study concludes that green accounting has a significant effect on environmentally friendly practices among MSMEs in East Java, while digitization and sustainability awareness have not yet shown a significant direct effect. In addition, the socioeconomic conditions of MSME actors are unable to moderate the relationship between independent variables and environmentally friendly practices. These results confirm the gap between intentions and actual behavior among MSME actors, which is influenced by limitations in literacy, capital, and external support. The implications of this study indicate that more targeted policies are needed to promote green accounting literacy, provide incentives, and provide regulatory support so that MSMEs are more encouraged to internalize environmental aspects into their business strategies. The limitations of this study lie in its geographical scope, which only focuses on East Java, and its use of cross-sectional data, which does not capture the dynamics of MSME behavior change in the long term. Therefore, further research is recommended to expand the geographical scope, use a longitudinal approach, and explore other factors such as government support, green technology, and organizational cultural aspects that have the potential to strengthen environmentally friendly practices among MSMEs.

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