

Digital-Based Green Accounting and Its Impact on Financial Performance

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ABSTRACT

Digital consumer behavior is evolving rapidly alongside the expansion of global e-commerce, pushing firms to strengthen sustainable business practices. This study addresses a research gap regarding limited understanding of how consumer perceptions and stakeholder engagement shape the financial outcomes of green accounting implementation in the e-commerce sector. Using an explanatory quantitative design and Structural Equation Modeling with Partial Least Squares (SEM-PLS), the findings indicate that green accounting has a positive and significant effect on financial performance (path coefficient = 0.435) and also strengthens digital consumer perception. Profitability emerges as the leading indicator of financial performance, while resource efficiency and carbon emission reporting are identified as dominant drivers of consumer perception. These results reinforce the relevance of Signaling Theory and Stakeholder Theory, suggesting that sustainability transparency functions as an effective communication mechanism to build credibility in digital markets. This study contributes to the sustainable accounting and digital marketing literature by providing empirical evidence and offering practical guidance for e-commerce firms to optimize green accounting practices in order to improve financial performance and enhance consumer trust in sustainability claims.

Keywords : **Green Accounting; Financial Performance; Digital Consumer Perception; Sustainability Transparency; E-Commerce**

ABSTRAK

Perilaku konsumen digital berkembang pesat seiring dengan perluasan e-commerce global, mendorong perusahaan untuk memperkuat praktik bisnis berkelanjutan. Studi ini menanggapi kesenjangan penelitian terkait pemahaman yang terbatas tentang bagaimana persepsi konsumen dan keterlibatan pemangku kepentingan memengaruhi hasil keuangan implementasi akuntansi hijau di sektor e-commerce. Menggunakan desain kuantitatif eksplanatori dan Model Persamaan Struktural dengan Partial Least Squares (SEM-PLS), temuan menunjukkan bahwa akuntansi hijau memiliki efek positif dan signifikan terhadap kinerja keuangan (koefisien jalur = 0,435) serta memperkuat persepsi konsumen digital. Keuntungan muncul sebagai indikator utama kinerja keuangan, sementara efisiensi sumber



daya dan pelaporan emisi karbon diidentifikasi sebagai pendorong utama persepsi konsumen. Hasil ini memperkuat relevansi Teori Sinyal dan Teori Pemangku Kepentingan, menunjukkan bahwa transparansi keberlanjutan berfungsi sebagai mekanisme komunikasi yang efektif untuk membangun kredibilitas di pasar digital. Studi ini berkontribusi pada literatur akuntansi berkelanjutan dan pemasaran digital dengan menyediakan bukti empiris dan memberikan panduan praktis bagi perusahaan e-commerce untuk mengoptimalkan praktik akuntansi hijau guna meningkatkan kinerja keuangan dan memperkuat kepercayaan konsumen terhadap klaim keberlanjutan.

Kata Kunci : ***Green Accounting; Kinerja Keuangan; Persepsi Konsumen Digital; Transparansi Keberlanjutan; E-Commerce***

INTRODUCTION

Consumer behavior in the digital era has transformed rapidly due to technological advancements, particularly the widespread adoption of e-commerce, which has become one of Indonesia's fastest-growing industries (Pratiwi, 2022). E-commerce transactions have surpassed Rp400 trillion in the past year (Kementrian Perdagangan RI, 2024), indicating its role as a major driver of the national digital economy (Hadiyati et al., 2023). Within this context, the three core elements of this study's title become increasingly relevant. Green accounting refers to the integration of environmental costs into corporate accounting systems to enhance transparency and environmental responsibility (Lestari, 2024). Digital consumer perception represents how online consumers evaluate a company's sustainability commitment through digital platforms (Cano et al., 2023). Finally, financial performance in this context denotes the profitability and operational efficiency metrics essential for competitiveness in the high-growth e-commerce sector.

Previous research has highlighted several important findings but has not integrated these variables comprehensively. Studies show that green accounting improves corporate image and sustainability practices (Dewi, 2022; Hermiyetti & Usmar, 2024; Stefani, 2024), while other research confirms that digital consumers increasingly emphasize environmental responsibility when evaluating brands (Cano et al., 2023; Štofejová et al., 2023). Additionally, transparency in sustainability reporting has been linked to better reputational outcomes (Dwivedi et al., 2021; Jordan Bar Am et al., 2023; Lomba Nicastro & Dos Santos, 2023; Tolegenov et al., 2024). However, these studies seldom examine the direct connection between green accounting and financial performance or acknowledge the mediating role of digital consumer perception, creating a critical research gap. Therefore, this study positions itself as a response to this gap by proposing a unified model that links the three variables within Indonesia's e-commerce sector, forming the state of the art for this research.

Despite growing consumer expectations, stakeholder engagement in promoting green accounting remains low in Indonesia (Asogwa et al., 2024; Widiyana Nurulita et al., 2022, 2022), and the absence of strong regulatory frameworks further limits adoption (Chen, 2019; Ortiz-Martínez et al., 2023). Companies also tend to underestimate how consumer perception affects financial outcomes, which can lead to declining loyalty and reduced competitive advantage (Evanschitzky et al., 2012; Nitin Liladhar Rane et al., 2023). These conditions reinforce the need for an integrated perspective that connects sustainability reporting with consumer psychology and financial results, an approach that previous studies have not sufficiently addressed.

The novelty of this research is threefold. First, it introduces and tests a novel integrated mediation model, proposing digital consumer perception not merely as an outcome but as the essential mechanism that channels the effects of green accounting into financial gains—a pathway underexplored in existing literature. Second, it offers contextual specificity by focusing on Indonesia's e-commerce sector, a high-penetration digital market within an emerging economy where formal adoption of green accounting remains limited despite growing consumer awareness, providing distinct regional insights (Asogwa et al., 2024; Han et al., 2023; Jia et al., 2023). Third, it employs a theoretical synthesis, concurrently applying Stakeholder Theory, which frames green accounting as a response to consumer stakeholders' demands, and Signaling Theory, which conceptualizes it as a strategic cue in a cluttered digital marketplace. This dual-lens approach provides a more comprehensive explanatory framework than studies relying on a single theory.

Based on this foundation, the explicit purpose of this research is to examine the direct effect of green accounting on the financial performance of Indonesian e-commerce

firms and, more significantly, to analyze the extent to which digital consumer perception mediates this relationship. Methodologically, the study employs an explanatory quantitative design. Primary data will be gathered via structured surveys targeting two groups: financial managers of e-commerce companies (to assess green accounting implementation) and active Indonesian digital consumers (to gauge their perceptions). The hypothesized model will be analyzed using Structural Equation Modeling with Partial Least Squares (SEM-PLS), a robust analytical technique suited for testing complex predictive and mediating relationships.

RESEARCH METHOD

This study employed an explanatory quantitative approach using Structural Equation Modeling with a Partial Least Squares (SEM-PLS) technique to analyze the causal relationships among green accounting adoption, digital consumer perceptions, and the financial performance of e-commerce companies. SEM-PLS was selected due to its suitability for complex predictive models, its flexibility in handling reflective indicators, and its robustness with relatively small samples. The final sample consisted of 99 global e-commerce companies that met strict inclusion criteria, including documented green accounting practices, positive profitability, and a minimum annual revenue of USD 100 million (Hair et al., 2017).

Data for this study were collected from secondary sources, including financial statements, sustainability reports, market analytics platforms (such as Yahoo Finance and Bloomberg), and digital consumer review platforms (including Trustpilot and social media channels). Each construct was measured using structured indicators: green accounting (e.g., carbon emissions reporting, renewable energy usage, recycling rates, sustainable project investments, environmental compliance, transparency scores, and efficiency-driven cost savings), digital consumer perception (e.g., percentage of positive reviews, product-fit ratings, trust in green claims, social media engagement, Net Promoter Score, application ratings, information transparency, service responsiveness, and sustainable brand preference), and financial performance (e.g., net profit margin, operating margin, ROE, P/E ratio, revenue, earnings, and market capitalization).

The analysis of data in this study, employing Structural Equation Modeling with Partial Least Squares (SEM-PLS), was conducted in two distinct and sequential stages to ensure the robustness of both the measurement instruments and the hypothesized theoretical model. The first stage focused on evaluating the measurement model, also known as the outer model. This assessment is critical to confirm that the latent constructs, green accounting, digital consumer perception, and financial performance, are accurately and reliably measured by their respective questionnaire items (indicators). Convergent validity was assessed to ensure the indicators of a single construct are highly correlated, primarily through the Average Variance Extracted (AVE), where a value greater than 0.50, such as the 0.572 obtained for green accounting, indicates that the construct explains more than half of the variance in its indicators. Discriminant validity was then tested using the Fornell-Larcker criterion, which verifies that a construct shares more variance with its own indicators than with any other construct, thereby confirming that each variable in the model is truly distinct. Finally, the internal consistency and reliability of the measurement scales were confirmed through composite reliability, with a high value of 0.940 for digital consumer perception demonstrating excellent reliability, and by examining the significance of indicator loadings via t-statistics (values > 1.96), which ensures each question item is a statistically significant contributor to its underlying construct.

Following the validation of the measurement model, the second stage proceeded to evaluate the structural model, or the inner model. This stage tests the causal relationships and hypotheses posited by the research framework—specifically, the paths from green accounting to financial performance and the mediating role of digital consumer perception. Using a bootstrapping procedure, the significance of the path coefficients was tested. These coefficients represent the strength and direction of the proposed relationships (e.g., the direct effect of green accounting on perception). A path coefficient is considered significant if its associated t-statistic, derived from bootstrapping, exceeds 1.96 for a two-tailed test at a 5% significance level. Furthermore, the model's predictive strength and explanatory power were assessed using key metrics such as the coefficient of determination (R^2), which indicates the proportion of variance in the dependent variables (e.g., financial performance) explained by the independent variables in the model. This two-stage analytical process ensures that the conclusions drawn about the relationships between constructs are based on reliable measurements and statistically sound structural estimates.

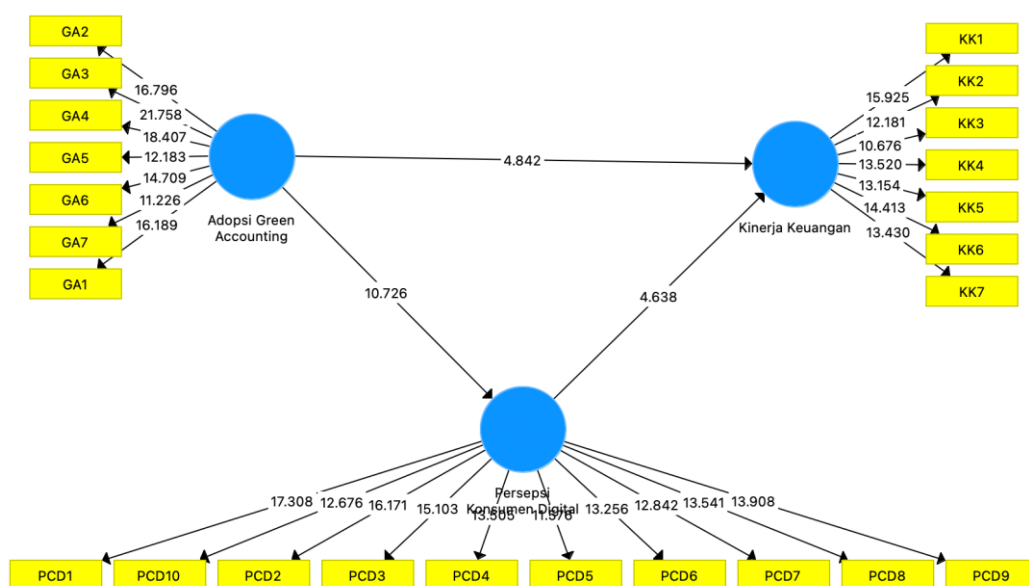
Overall, this methodological framework provides a rigorous approach to understanding how green accounting and digital consumer perception influence financial performance. The use of multi-source secondary data and SEM-PLS enhances the accuracy and validity of the findings, which contribute to the literature on sustainability-oriented financial analysis and offer practical insights for e-commerce firms developing strategic sustainability initiatives.

RESULTS AND DISCUSSION

The results of this study have successfully achieved the planned objectives through systematic stages, starting from data collection to analysis using Partial Least Squares-based Structural Equation Modeling (SEM-PLS). The collected data were analyzed by considering the validity and reliability of the measurement model (outer model) and hypothesis testing (inner model), all of which were presented in tables and figures to ensure transparency of the results.

In this study, a measurement model evaluation, also known as the external model, was conducted. The purpose of this evaluation was to assess the validity and reliability of the indicators that make up the latent construct. Ensuring that each indicator accurately measures the intended construct is why this stage is crucial before conducting structural analysis. To verify the convergent validity and internal consistency of the model, tests included external loading analysis, composite reliability, and average variance extracted (AVE) displayed in Figure 1.

Using structural equation modeling based on partial least squares (SEM-PLS), this study investigates how the adoption of green accounting and digital consumer perceptions impact the financial performance of e-commerce companies. Before proceeding to structural analysis, the first stage of analysis involves testing convergent validity through outer loading to ensure that the indicators used are able to accurately measure latent constructs. The outer loading (Table 1) results form the basis for assessing the reliability and validity of the model.



Source: Data processed in 2025

Figure 1. PLS Algorithm Results

Table 1. Outer Loading

	Adoption of Green Accounting	Financial Performance	Digital Consumer Perceptions
GA1	0,746		
GA2	0,767		
GA3	0,793		
GA4	0,790		
GA5	0,743		
GA6	0,747		
GA7	0,705		
KK1		0,806	
KK2		0,747	
KK3		0,739	
KK4		0,728	
KK5		0,777	
KK6		0,751	
KK7		0,760	
PCD1			0,807
PCD2			0,805
PCD3			0,787
PCD4			0,766
PCD5			0,772
PCD6			0,765
PCD7			0,783
PCD8			0,738
PCD9			0,793
PCD10			0,798

Source: Data processed in 2025

Based on the SEM-PLS data analysis results in Table 1, all indicators show outer loading values above 0.7, meeting the convergent validity criteria (Joseph Franklin Hair et al., 2022). In the Green Accounting Adoption variable, indicators GA3 (0.793) and GA4 (0.790) have the highest contribution, indicating that environmental reporting and resource efficiency are key aspects in green accounting practices. For Financial Performance, KK1 (0.806) emerges as the most dominant indicator, showing that profitability is the primary benchmark. Meanwhile, PCD1 (0.807) and PCD2 (0.805) in the Digital Consumer Perception variable reflect the importance of trust and ease of use of

digital platforms. The consistency of high outer loading values (>0.7) across all indicators strengthens the construct validity and supports the model's suitability for the next stage of analysis. These findings align with previous research emphasizing a minimum outer loading criterion of 0.7 to ensure indicators adequately represent their latent constructs.

To ensure the discriminant validity of the model, the SEM-PLS analysis in this study conducted cross-loading tests and convergent validity through outer loadings. The results of the cross-loading test (Table 2) are crucial to proving that the constructs in the model are truly distinct and measured accurately by the appropriate indicators. This also indicates that each indicator has a higher correlation with the construct it is intended to measure compared to other constructs.

Table 2. Cross Loading

	<i>Adoption of Green Accounting</i>	<i>Financial Performance</i>	<i>Digital Consumer Perceptions</i>
GA1	0,746	0,492	0,407
GA2	0,767	0,560	0,540
GA3	0,793	0,625	0,507
GA4	0,790	0,597	0,623
GA5	0,743	0,519	0,492
GA6	0,747	0,598	0,462
GA7	0,705	0,527	0,489
KK1	0,610	0,806	0,633
KK2	0,593	0,747	0,475
KK3	0,510	0,739	0,562
KK4	0,590	0,728	0,627
KK5	0,606	0,777	0,641
KK6	0,513	0,751	0,519
KK7	0,503	0,760	0,496
PCD1	0,522	0,569	0,807
PCD2	0,516	0,626	0,805
PCD3	0,502	0,607	0,787
PCD4	0,511	0,608	0,766
PCD5	0,506	0,590	0,772
PCD6	0,612	0,642	0,765
PCD7	0,523	0,539	0,783
PCD8	0,526	0,593	0,738
PCD9	0,504	0,520	0,793
PCD10	0,496	0,552	0,798

Source: Data processed in 2025

All indicators meet the criteria for discriminant validity, with each indicator having the highest loading value on the construct it is supposed to measure, as shown by the cross-loading results shown in the table 2. For example, indicator GA3 shows the highest value on the Green Accounting Adoption construct (0.793) compared to other constructs (0.625 on Financial Performance and 0.507 on Digital Consumer Perception). A similar pattern is observed for indicator KK1, which shows the highest loading value on Financial Performance (0.806) compared to other constructs (0.610 on Green Accounting Adoption and 0.633 on Digital Consumer Perception).

Since no indicator has a higher loading value on another construct than the one it is intended to measure, this finding confirms discriminant validity (Hair et al., 2020). Therefore, this research model is not only convergent, valid, and reliable but also ensures that each construct can be clearly distinguished from the others. These results strengthen the foundation for further analysis of the structural relationships among the model constructs.

Based on the results of the Fornell-Larcker Criterion in the table 3, it can be concluded that this research model meets the criteria for discriminant validity. The square root AVE values for each construct—Green Accounting Adoption (0.757), Financial

Performance (0.759), and Digital Consumer Perception (0.782)—are higher than the correlations between other constructs. For example, the AVE square root of Green Accounting Adoption (0.757) is higher than its correlation with Financial Performance (0.743) and Digital Consumer Perception (0.670). A similar pattern is also seen in other constructs, where the AVE square root value is always greater than the correlation with other constructs.

Table 3. Fornell-Lacker Criterium

	<i>Adoption of Green Accounting</i>	<i>Financial Performance</i>	<i>Digital Consumer Perceptions</i>
<i>Adoption of Green Accounting</i>	0,757		
<i>Financial Performance</i>	0,743	0,759	
<i>Digital Consumer Perceptions</i>	0,670	0,751	0,782

Source: Data processed in 2025

These results indicate that each construct in the model has good discriminant validity; in other words, each construct in the model is unique and can be distinguished from other constructs (Fornell & Larcker, 1981). Therefore, this research model can be used to conduct further analysis of the structural relationships between constructs.

In this study, Cronbach's Alpha, rho_A, Composite Reliability, and Average Variance Extracted (AVE) (Table 4) values were used to test the validity and reliability of the model. The purpose of this testing is to ensure that the model constructs have good internal consistency and can reliably measure latent variables. Before proceeding to structural analysis, these values are important indicators for evaluating the convergent validity and reliability of the model.

Table 4. Composit Cronbach's Alpha, rho_A, Composite Reliability, AVE

	<i>Cronbach's Alpha</i>	<i>rho_A</i>	<i>Composite Reliability</i>	<i>Average Variance Extracted (AVE)</i>
<i>Adoption of Green Accounting</i>	0,875	0,879	0,903	0,572
<i>Financial Performance</i>	0,877	0,880	0,905	0,576
<i>Digital Consumer Perceptions</i>	0,929	0,930	0,940	0,611

Source: Data processed in 2025

The entire model structure meets the criteria for reliability and convergent validity, according to the results of the analysis shown in the table 4. All constructs have Cronbach's Alpha and rho_A values above 0.7, indicating very good internal consistency (Joseph Franklin Hair et al., 2022). The Digital Consumer Perception construct, for example, has a Cronbach's Alpha value of 0.929 and a rho_A value of 0.930. These values indicate a very high level of reliability. Additionally, the composite reliability values for all constructs also exceed 0.7. Digital Consumer Perception receives the highest value (0.940), followed by Financial Performance (0.905) and Green Accounting Adoption (0.903). This indicates that the indicators have very good composite reliability within each construct.

The AVE values for all constructs exceed 0.5 for convergent validity, meeting the criteria set by (Fornell & Larcker, 1981). The Digital Consumer Perception construct has the highest AVE value (0.611), followed by Financial Performance (0.576) and Green Accounting Adoption (0.572). This indicates that the relevant constructs can explain more than 50% of the variance in the indicators, demonstrating the convergent validity of the model.

Therefore, this research model meets all reliability and convergent validity requirements, enabling it to proceed to the structural analysis stage to examine the relationships between constructs.

In this study, R-squared analysis was used to measure the extent to which exogenous variables influence the endogenous variables in the model. The R-squared value indicates the proportion of variation in the endogenous variables that can be explained by the exogenous variables in the model. Additionally, adjusted R-squared (Table 5) was used to make more accurate estimates by adjusting the number of predictors in the model. This test is very important for assessing the predictive power and explanatory power of the model on the dependent variable.

Table 5. R Square

	<i>R Square</i>	<i>R Square Adjusted</i>
<i>Financial Performance</i>	<i>0,668</i>	<i>0,661</i>
<i>Digital Consumer Perceptions</i>	<i>0,449</i>	<i>0,443</i>

Source: Data processed in 2025

It can be concluded that this research model has fairly good predictive capabilities, based on the analysis results shown in the table 5. The adjusted R-squared value for the Financial Performance variable of 0.668 indicates that the exogenous variables in the model, such as the adoption of green accounting and digital consumer perception, account for 66.8% of the variation in financial performance. On the other hand, the adjusted R-squared value of 0.661 indicates that this model is stable and not overly adjusted.

For the Digital Consumer Perception variable, the R-squared value of 0.449 indicates that the related exogenous variables account for 44.9% of the variation in Digital Consumer Perception. The adjusted R-squared value (0.443) is also nearly identical to the R-squared value, indicating that the model has good stability.

The R Square value of 0.668 for Financial Performance and 0.449 for Digital Consumer Perception fall into the moderate category according to the criteria (Cohen, 1988). This indicates that this research model has good predictive ability, especially when it comes to variations in financial performance. Therefore, this model is suitable for further analysis and can provide useful insights into how each variable interacts with the others.

Hypothesis testing (Table 6) was conducted to evaluate the direct influence of the variables that make up the model. Path coefficients, t-statistic values, and p-values were calculated to determine the significance of the relationships between variables using the SEM-PLS method. The results of this testing will statistically indicate whether the proposed hypotheses can be accepted or not. This testing is an important step in answering the research questions and revealing how exogenous and endogenous variables influence each other. H¹, H², H³

Table 6. Hypothesis Testing Results

<i>Hypothesis</i>	<i>Effect</i>	<i>Path Coef Jalur</i>	<i>t-statistic</i>	<i>p-value</i>	<i>Decision</i>
<i>H1</i>	<i>Adoption Green Accounting -> Financial Performance</i>	<i>0,435</i>	<i>5,281</i>	<i>0,000</i>	<i>Accepted</i>
<i>H2</i>	<i>Adoption Green Accounting -> Digital Consumer Perception</i>	<i>0,670</i>	<i>10,723</i>	<i>0,000</i>	<i>Accepted</i>
<i>H3</i>	<i>Digital Consumer Perception -> Financial Performance</i>	<i>0,459</i>	<i>4,943</i>	<i>0,000</i>	<i>Accepted</i>

Source: Data processed in 2025

All of the research hypotheses were proven to be significant, according to the hypothesis test results shown in Table 6, with a p-value < 0.05 and a t-statistic value greater than 1.96. Each hypothesis is explained in detail below:

Hypothesis 1 (H1) indicates a relationship between the adoption of green accounting and financial performance, with a path coefficient of 0.435 and a t-statistic of 5.281 ($p=0.000$). This shows that green accounting methods have a positive and significant effect on the financial performance of e-commerce businesses. Better financial performance is associated with better adoption of green accounting.

Hypothesis 2 (H2) shows a relationship between the adoption of green accounting and digital consumer perceptions, with the highest path coefficient (0.670) and the highest t-statistic coefficient (10.723, $p=0.000$). The results confirm the theory that the implementation of green accounting significantly changes digital consumer perceptions of the company.

Hypothesis 3 (H3) shows that the influence of digital consumer perceptions on financial performance is also significant, with a coefficient of 0.459 ($t=4.943$; $p=0.000$). This means that positive beliefs from digital customers also help improve financial performance.

CONCLUSION

This study concludes that the adoption of green accounting plays a significant role in improving both digital consumer perceptions and the financial performance of e-commerce companies in Indonesia. The empirical results demonstrate that green accounting has a direct positive effect on financial performance and strongly enhances digital consumer perceptions, which subsequently contribute to improved financial outcomes. These findings confirm that sustainability transparency functions as an effective signal to consumers and aligns with the core principles of Stakeholder and Signal Theory. Overall, the study shows that digital consumer perception is a crucial mechanism linking green accounting practices to financial performance, filling the research gap identified in earlier studies. By proving that resource efficiency and carbon emission reporting are influential perception drivers, this research highlights that sustainable business practices are not only environmentally beneficial but also strategically advantageous. The study thus contributes to the growing body of literature on sustainability in digital industries and offers practical insights for e-commerce firms seeking to strengthen competitive value through transparent and responsible environmental reporting.

RECOMMENDATION

This study has several limitations, one of which is that the sample is limited to 99 e-commerce companies that meet specific criteria. As a result, the results must be generalized with caution. In addition, the study does not consider other contextual aspects, such as consumer cultural differences or local policies, but focuses only on secondary data. For future research, the sample should be expanded to include SMEs. Furthermore, primary data should be integrated for a more in-depth analysis. Additionally, it would be interesting to examine how digital technologies such as blockchain enhance the transparency of green accounting. Therefore, future research is expected to build on these findings by employing more diverse and creative methods.

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