

DRIVING SUSTAINABLE OPERATIONAL PERFORMANCE THROUGH GREEN OPERATIONS AND COST EFFICIENCY: THE MEDIATING ROLE OF CORPORATE REPUTATION

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Abstract: This study examines the relationships between green operations, cost efficiency, corporate reputation, and sustainable operational performance within small and medium-sized enterprises (SMEs) in Indonesia. Using a quantitative approach, data were collected from 195 managerial-level respondents across four major cities and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings reveal that green operations have a positive and significant direct effect on sustainable operational performance, highlighting their role as an internal driver of sustainability. In contrast, cost efficiency does not directly influence sustainable performance but significantly affects corporate reputation. Furthermore, corporate reputation is found to have a strong positive effect on sustainable operational performance and mediates the relationship between cost efficiency and performance. However, it does not mediate the relationship between green operations and performance. These results indicate the existence of dual pathways, where green operations enhance performance internally, while cost efficiency operates through reputational mechanisms. The study contributes to the literature by offering a nuanced understanding of how operational strategies translate into sustainability outcomes and provides practical insights for managers in aligning efficiency and environmental initiatives.



INTRODUCTION

The increasing complexity of the global business environment has compelled organizations to move beyond a purely profit-oriented perspective toward a more sustainability-driven operational paradigm (Halik et al., 2026). In recent years, heightened concerns over environmental degradation, climate change, and resource scarcity have intensified pressure from regulators, customers, and stakeholders for firms to adopt environmentally responsible practices (Nurlia et al., 2026). As a result, the concept of *green operations* has emerged as a critical strategic approach for organizations seeking to align operational efficiency with environmental sustainability (Liu et al., 2023; Behl et al., 2022).

Green operations encompass a wide range of practices, including eco-friendly production processes, waste reduction, energy efficiency, and sustainable supply chain management. These practices are not only aimed at minimizing environmental impact but also at enhancing long-term organizational performance. Empirical evidence suggests that firms

adopting green operational strategies tend to achieve superior environmental and operational outcomes, particularly when such practices are integrated into core business processes (Samosir et al., 2025; Setyadi et al., 2025). Moreover, green initiatives have been increasingly associated with innovation capabilities that strengthen a firm's competitive positioning in dynamic markets.

Despite these benefits, the implementation of green operations often presents significant financial challenges. Investments in environmentally friendly technologies, process redesign, and compliance mechanisms typically require substantial upfront costs, which may adversely affect short-term financial performance. Prior studies indicate that the economic returns of green practices are not always immediate, leading to a perceived trade-off between environmental responsibility and cost efficiency (Le & Nguyen, 2024). This tension highlights the importance of integrating *cost efficiency* into sustainability strategies to ensure that environmental initiatives do not undermine operational viability.

Cost efficiency plays a pivotal role in optimizing resource utilization, minimizing waste, and improving productivity. From the perspective of the *Resource-Based View (RBV)*, the ability of firms to simultaneously manage environmental practices and cost structures constitutes a valuable and rare capability that can generate sustained competitive advantage (Barney, 1991; Dubey et al., 2020). Firms that effectively balance green operations with cost efficiency are better positioned to achieve sustainable operational performance, defined as the ability to maintain high levels of efficiency while minimizing environmental impact over time (Abbas, 2026; Setyadi et al., 2025).

However, the relationship between green operations, cost efficiency, and sustainable operational performance is not always direct. One critical mechanism that may explain this relationship is *corporate reputation*. Corporate reputation reflects stakeholders' collective perceptions of a firm's credibility, responsibility, and long-term commitment to sustainable practices. Recent studies have demonstrated that environmentally responsible actions enhance corporate reputation, which in turn strengthens stakeholder trust and supports improved organizational performance (Abbas, 2026; Nurlia et al., 2026). In this sense, corporate reputation can function as a strategic intangible asset that mediates the impact of operational practices on performance outcomes.

Nevertheless, the existing literature reveals several inconsistencies and gaps. First, many studies focus on the direct effects of green innovation or environmental practices on financial or environmental performance, while overlooking the combined role of cost efficiency in shaping operational sustainability. Second, the mediating role of corporate reputation remains underexplored, particularly in models that integrate both environmental and economic dimensions. Third, empirical evidence examining these relationships within a unified framework is still limited, especially in emerging market contexts where resource constraints and institutional pressures differ significantly from developed economies.

Table 1. Key Phenomena and Empirical Evidence on Green Operations, Cost Efficiency, and Sustainable Performance

Phenomenon	Empirical Evidence	Implication
Rising environmental pressures	Firms face increasing regulatory and stakeholder demands for sustainability (Osei et al., 2023)	Necessitates the adoption of green operations
Green practices enhance performance	Green innovation improves environmental and operational outcomes (Samosir et al., 2025)	Supports sustainable operational performance
High implementation costs	Green initiatives may reduce short-term financial performance (Le & Nguyen, 2024)	Requires integration with cost efficiency

Phenomenon	Empirical Evidence	Implication
Reputation driven by sustainability	Environmental responsibility enhances corporate reputation (Tang et al., 2018)	Reputation acts as a strategic mediator
Sustainable supply chain impact	Green supply chain practices improve firm performance (Cheng et al., 2024)	Highlights the importance of operational integration

Source: Adapted from previous literature (2026)

The urgency of this study lies in addressing the strategic dilemma faced by organizations in balancing environmental sustainability with economic efficiency. While green operations are essential for long-term sustainability, their implementation often introduces cost-related challenges that may hinder organizational performance if not managed effectively. Therefore, it is crucial to develop an integrative empirical model that explains how green operations and cost efficiency can be aligned through corporate reputation as a mediating mechanism to achieve sustainable operational performance. This study responds to this need by offering a more comprehensive understanding of how environmental and economic strategies can be synergized within a single analytical framework.

Based on the preceding discussion, this study seeks to examine how green operations and cost efficiency influence sustainable operational performance, and to analyze the extent to which corporate reputation mediates these relationships within the context of organizations striving to achieve long-term sustainability.

LITERATURE REVIEW

Theoretical Foundations: Resource-Based View (RBV)

The *Resource-Based View (RBV)* posits that firms achieve sustained competitive advantage by leveraging valuable, rare, inimitable, and non-substitutable (VRIN) resources (Agus Zainul Arifin, 2020; Barney, 1991). Within the context of sustainability, green operations and cost efficiency can be conceptualized as strategic organizational capabilities that enhance long-term performance. Green operational practices, such as eco-efficient production and sustainable supply chain management, enable firms to optimize resource utilization while reducing environmental impact.

Recent empirical evidence supports the RBV perspective by demonstrating that green innovation enhances both environmental and financial performance when it is embedded in firm capabilities (Liu et al., 2024). Furthermore, integrating green practices into operational strategies contributes to organizational resilience and long-term value creation (Setyadi et al., 2025).

From this perspective, the simultaneous deployment of green operations and cost efficiency represents a strategic capability that enables firms to achieve *sustainable operational performance*.

Stakeholder Theory

Stakeholder theory emphasizes that firms must address the expectations of multiple stakeholders, including customers, regulators, investors, and communities (Ibáñez et al., 2022). In the sustainability context, stakeholders increasingly demand environmentally responsible business practices, making green operations a critical mechanism for maintaining legitimacy and trust.

Empirical studies indicate that firms adopting green innovation strategies are better able to satisfy stakeholder expectations, which in turn enhances their performance outcomes (Liu et al., 2024). Additionally, green supply chain practices have been shown to significantly improve sustainable organizational performance by aligning operational activities with stakeholder demands (Iftikhar et al., 2025).

Thus, stakeholder theory provides a strong foundation for understanding how environmental practices translate into performance through stakeholder support.

Signaling Theory

Signaling theory explains how firms communicate their quality and credibility to external stakeholders through observable actions (Connelly et al., 2011). In this context, green operations and sustainability initiatives serve as signals of corporate responsibility and long-term orientation.

Green innovation, for instance, acts as a positive signal that enhances corporate reputation by demonstrating environmental commitment and ethical responsibility (Iftikhar et al., 2025). However, signaling effectiveness depends on credibility; superficial or symbolic green practices may lead to reputational risks rather than benefits.

Therefore, corporate reputation emerges as a critical intangible asset that mediates the relationship between operational practices and performance outcomes.

Green Operations and Sustainable Operational Performance

Green operations refer to environmentally responsible practices embedded within organizational processes, including waste reduction, energy efficiency, and sustainable production systems. These practices are designed to minimize environmental impact while maintaining operational effectiveness.

Empirical research consistently shows that green operations positively influence sustainability performance. For example, green operations management has a direct and significant impact on environmental and overall corporate sustainability performance (Le & Nguyen, 2024). Similarly, green supply chain management enhances sustainable operational performance by improving resource efficiency and reducing environmental risks (Abbas, 2026). Based on these arguments, the following hypothesis is proposed:

H1: Green operations have a positive effect on sustainable operational performance.

Cost Efficiency and Sustainable Operational Performance

Cost efficiency refers to a firm's ability to optimize resource utilization and minimize operational costs without compromising output quality. In the sustainability context, cost efficiency plays a crucial role in ensuring that green initiatives remain economically viable.

However, the relationship between sustainability practices and financial outcomes is complex. While green practices can improve long-term profitability, they may impose short-term financial burdens due to high implementation costs (Le & Nguyen, 2024). This highlights the importance of integrating cost efficiency into sustainability strategies.

Firms that successfully align cost efficiency with environmental practices are more likely to achieve sustainable operational performance. Therefore:

H2: Cost efficiency has a positive effect on sustainable operational performance.

Green Operations and Corporate Reputation

Green operations play a critical role in shaping corporate reputation by signaling environmental responsibility and ethical conduct. Firms that adopt environmentally friendly practices are more likely to gain legitimacy and trust from stakeholders.

Recent studies confirm that green innovation significantly enhances corporate reputation, particularly when firms demonstrate genuine commitment to sustainability (Iftikhar et al., 2025). Moreover, green practices strengthen stakeholder perceptions and contribute to long-term reputational capital. Thus, the following hypothesis is formulated:

H3: Green operations have a positive effect on corporate reputation.

Cost Efficiency and Corporate Reputation

Although cost efficiency is traditionally associated with internal performance, it also has reputational implications. Efficient resource management signals managerial competence and operational excellence, which can enhance stakeholder confidence (Setyadi et al., 2025).

When firms achieve efficiency without compromising sustainability goals, they are perceived as both responsible and competent, thereby strengthening their corporate reputation (Connelly et al., 2011). However, excessive cost-cutting at the expense of environmental responsibility may negatively affect reputation, indicating a nuanced relationship. Based on this reasoning:

H4: Cost efficiency has a positive effect on corporate reputation.

Corporate Reputation and Sustainable Operational Performance

Corporate reputation is a strategic intangible asset that influences firm performance through stakeholder trust, customer loyalty, and market positioning. A strong reputation enhances a firm's ability to attract resources, reduce transaction costs, and sustain competitive advantage.

Empirical evidence suggests that corporate reputation significantly contributes to organizational performance by strengthening stakeholder relationships and improving market valuation (Iftikhar et al., 2025). Accordingly:

H5: Corporate reputation has a positive effect on sustainable operational performance.

Mediating Role of Corporate Reputation

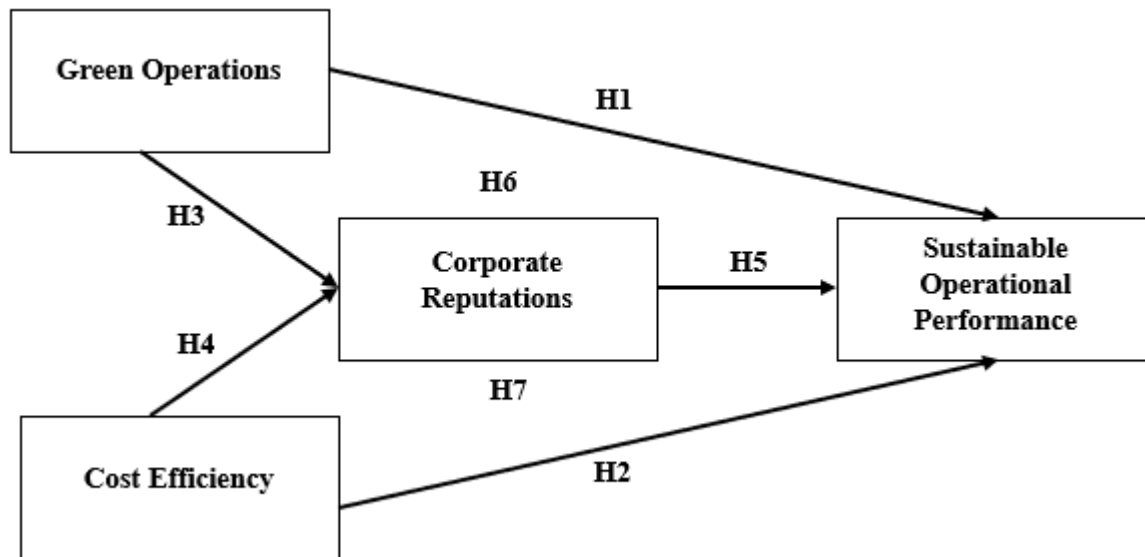
The mediating role of corporate reputation can be explained through the integration of RBV and signaling theory. Green operations and cost efficiency serve as internal capabilities, while corporate reputation translates these capabilities into external performance outcomes.

Prior research highlights that sustainability initiatives enhance performance indirectly through reputation-building mechanisms, indicating that reputation acts as a bridge between operational practices and performance (Le & Nguyen, 2024; Liu et al., 2024). Thus, the following hypotheses are proposed:

H6: Corporate reputation mediates the relationship between green operations and sustainable operational performance.

H7: Corporate reputation mediates the relationship between cost efficiency and sustainable operational performance.

To synthesize the theoretical foundations and empirical arguments discussed above, this study develops an integrated conceptual framework that explains the relationships among green operations, cost efficiency, corporate reputation, and sustainable operational performance. The model positions green operations and cost efficiency as strategic antecedents, corporate reputation as a mediating mechanism, and sustainable operational performance as the ultimate outcome. Accordingly, the proposed research framework is presented in **Figure 1**.



Source: Author's perception (2026)

Figure 1. Research Conceptual Framework

RESEARCH METHOD

Research Design

This study adopts a quantitative research design with an explanatory approach to examine the causal relationships among green operations, cost efficiency, corporate reputation, and sustainable operational performance (Sugiyono, 2020). The research is grounded in a positivist paradigm, emphasizing objective measurement and statistical analysis to test the proposed hypotheses. A cross-sectional survey method is employed, as data are collected at a single point in time to capture respondents' perceptions of organizational practices and performance.

The unit of analysis in this study is the organization, while the unit of observation consists of managerial-level respondents who possess adequate knowledge regarding operational strategies and sustainability practices within their firms.

Population, Sample, and Sampling Technique

The population of this study comprises small and medium-sized enterprises (SMEs) operating in the manufacturing and service sectors. SMEs are selected as the focus of this research due to their increasing role in economic development and their growing engagement in sustainability practices, despite resource constraints.

Given the absence of a comprehensive sampling frame, this study employs a non-probability sampling approach, specifically purposive sampling. The selection criteria for respondents include:

- (1) individuals holding managerial or supervisory positions,
- (2) having at least two years of work experience, and
- (3) being directly involved in operational or strategic decision-making processes.

The sample size is determined based on the requirements of Partial Least Squares Structural Equation Modeling (PLS-SEM). Following the "10-times rule" and recent methodological recommendations, a minimum sample of 150–200 respondents is considered adequate to ensure statistical robustness (Ghozali, 2021; Hair et al., 2021). In this study, a total of 195 valid responses is collected and analyzed, which satisfies the minimum threshold for SEM-PLS analysis.

Research Location and Time

This research is conducted in four major cities in Indonesia, namely Jakarta, Surabaya, Bandung, and Makassar. These cities are selected due to their high concentration of SMEs and diverse industrial characteristics, which enhance the generalizability of the findings.

Data collection is carried out over a three-month period, from January to March 2026. The survey is administered using structured questionnaires distributed both online and offline to ensure a higher response rate and broader coverage of respondents.

Data Collection Technique

Primary data are collected through a structured questionnaire using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) (Susilana, 2015). The questionnaire is developed based on established measurement scales from prior studies and adapted to fit the context of this research.

Prior to the main survey, a pilot test is conducted with 30 respondents to ensure clarity, reliability, and validity of the measurement items. Necessary revisions are made based on feedback from the pilot study.

Data Analysis Technique

The data in this study are analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with the assistance of SmartPLS software. This approach is particularly appropriate for predictive-oriented research, complex structural models, and studies with relatively limited sample sizes. PLS-SEM is also widely applied in management and sustainability research due to its flexibility in handling non-normal data distributions and its ability to simultaneously assess measurement and structural models (Ghozali, 2021; Hair et al., 2021; Haryono, 2017).

The analysis is conducted in two sequential stages, namely the evaluation of the measurement model (outer model) and the structural model (inner model). The measurement model assessment aims to ensure the reliability and validity of the constructs. Indicator reliability is evaluated based on factor loadings, where values above 0.70 indicate satisfactory convergence. Internal consistency reliability is assessed using Composite Reliability (CR), with a recommended threshold exceeding 0.70. Convergent validity is examined through the Average Variance Extracted (AVE), which should be greater than 0.50 to confirm that the constructs explain more than half of the variance of their indicators. Furthermore, discriminant validity is assessed using the Heterotrait–Monotrait Ratio (HTMT), where values below 0.90 indicate that constructs are empirically distinct and also with Fornell Larcker Criterion (Fornell & Larcker, 1981; Hair et al., 2019, 2021; Henseler et al., 2015).

Following the measurement model evaluation, the structural model is assessed to examine the hypothesized relationships among constructs. This stage involves analyzing path coefficients and their statistical significance using a bootstrapping procedure, which allows for robust estimation without relying on distributional assumptions. The explanatory power of the model is evaluated using the coefficient of determination (R^2), while the effect size (f^2) is used to assess the relative impact of each exogenous construct on endogenous variables. Predictive relevance is further examined using the Stone–Geisser Q^2 value, which indicates the model's out-of-sample predictive capability. In addition, the standardized root mean square residual (SRMR) is used as an approximate model fit index, with values below 0.08 indicating an acceptable model fit (Hair et al., 2021; Haryono, 2017).

To test the mediating role of corporate reputation, this study employs a bootstrapping-based mediation analysis. This approach allows for the estimation of indirect effects and their significance levels, providing a more accurate assessment of mediation compared to traditional methods. The mediation effect is confirmed when the indirect path is statistically significant,

indicating that corporate reputation serves as a mechanism through which green operations and cost efficiency influence sustainable operational performance (Ghozali, 2021; Hair et al., 2021).

Measurement of Variables

All constructs are measured reflectively using four indicators adapted from prior validated studies. The measurement items are modified to align with the context of SMEs and operational sustainability.

Table 2. Measurement Items of Research Variables

Variable	Code	Measurement Items
Green Operations (Abbas, 2026; Le & Nguyen, 2024)	GO1	Our firm implements environmentally friendly production processes
	GO2	Our firm actively reduces waste and emissions in operations
	GO3	Our firm uses energy-efficient technologies in production
	GO4	Environmental considerations are integrated into operational decisions
Cost Efficiency (Connelly et al., 2011; Setyadi et al., 2025)	CE1	Our firm effectively minimizes operational costs
	CE2	Our firm optimizes the use of resources to reduce waste
	CE3	Our firm maintains cost control without compromising quality
	CE4	Our firm continuously improves operational efficiency
Corporate Reputation (Le & Nguyen, 2024; Liu et al., 2024)	CR1	Our firm is perceived as environmentally responsible
	CR2	Our firm has a strong reputation among stakeholders
	CR3	Our firm is trusted by customers and partners
	CR4	Our firm is recognized for its ethical business practices
Sustainable Operational Performance (Thuy & Tam, 2025; Yook et al., 2018)	SOP1	Our firm achieves long-term operational efficiency
	SOP2	Our firm maintains environmentally sustainable operations
	SOP3	Our firm consistently improves operational performance over time
	SOP4	Our firm balances economic and environmental performance

Source: Adapted from previous literature (2026)

RESULTS AND DISCUSSION

Overview of the Research Object

This study focuses on small and medium-sized enterprises (SMEs) operating in both manufacturing and service sectors across four major cities in Indonesia, namely Jakarta, Surabaya, Bandung, and Makassar. These regions were selected due to their significant contribution to national economic activities and their relatively high adoption of sustainability-oriented practices. SMEs in these areas are increasingly facing pressure to enhance operational efficiency while simultaneously addressing environmental concerns.

In recent years, SMEs have begun to integrate green operational practices into their business processes, driven by regulatory requirements, market competition, and stakeholder expectations. However, the extent of implementation varies considerably depending on organizational capabilities, resource availability, and managerial commitment. In this context,

cost efficiency becomes a critical factor that determines whether sustainability initiatives can be maintained without compromising operational performance.

Moreover, corporate reputation plays a strategic role in shaping how stakeholders perceive SMEs' commitment to sustainability. Firms that successfully integrate green operations with efficient cost management are more likely to build a positive reputation, which in turn supports long-term operational sustainability. Therefore, SMEs provide an appropriate empirical setting to examine the interplay between green operations, cost efficiency, corporate reputation, and sustainable operational performance.

Respondent Characteristics

The respondents in this study consist of 195 individuals who hold managerial or supervisory positions within SMEs. These respondents are considered to have sufficient knowledge and experience related to operational practices and strategic decision-making within their organizations. The demographic profile of respondents is presented to provide a clearer understanding of the data distribution and to ensure the representativeness of the sample.

Table 3. Respondent Characteristics (n = 195)

Characteristics	Category	Frequency	Percentage (%)
Gender	Male	112	57.4
	Female	83	42.6
Age	< 25 years	21	10.8
	25–35 years	86	44.1
	36–45 years	58	29.7
	> 45 years	30	15.4
	Diploma	34	17.4
Education Level	Bachelor's Degree	109	55.9
	Master's Degree	52	26.7
	< 2 years	18	9.2
Work Experience	2–5 years	72	36.9
	6–10 years	65	33.3
	> 10 years	40	20.6
Business Sector	Manufacturing	87	44.6
	Services	108	55.4
Geographical Location	Jakarta	52	26.7
	Surabaya	48	24.6
	Bandung	46	23.6
	Makassar	49	25.1

Source: Primary data processed (2026)

The data indicate that the majority of respondents are male (57.4%), although female participation is also substantial, reflecting a relatively balanced representation in managerial roles within SMEs. In terms of age distribution, most respondents fall within the productive age range of 25–35 years (44.1%), followed by those aged 36–45 years (29.7%). This suggests that the sample is dominated by individuals in their prime working years, who are likely to be actively involved in strategic and operational decision-making.

Regarding educational background, the majority of respondents hold a bachelor's degree (55.9%), indicating a relatively high level of formal education. This is important, as higher educational attainment is often associated with a greater awareness of sustainability

issues and more effective managerial capabilities. Additionally, a significant proportion of respondents possess more than five years of work experience, suggesting that they have adequate practical knowledge of organizational operations.

From an industry perspective, the sample includes both manufacturing (44.6%) and service firms (55.4%), providing a balanced representation of different operational contexts. This diversity enhances the generalizability of the findings and allows for a more comprehensive analysis of sustainable operational practices across sectors.

The inclusion of geographical distribution provides a clearer understanding of the spatial representation of the sample. The respondents are relatively evenly distributed across four major cities in Indonesia, namely Jakarta (26.7%), Surabaya (24.6%), Bandung (23.6%), and Makassar (25.1%). This balanced distribution enhances the external validity of the study by capturing diverse regional characteristics, including differences in economic activity, industrial structure, and sustainability adoption levels.

The representation of Jakarta reflects the role of the capital city as the primary economic hub, while Surabaya and Bandung contribute insights from major industrial and commercial centers in Java. Meanwhile, Makassar represents the eastern region of Indonesia, offering a broader perspective on SME practices beyond the western part of the country. This geographical diversity strengthens the generalizability of the findings and allows the study to better capture variations in green operations and cost efficiency practices across regions.

Descriptive Statistical Analysis

Descriptive statistical analysis is employed to summarize and describe the main features of the dataset in a structured and meaningful way. It provides an initial understanding of the distribution, central tendency, and variability of the data before conducting more advanced inferential analyses. In quantitative research, descriptive statistics are essential for identifying patterns, detecting anomalies, and ensuring data quality, thereby supporting the validity of subsequent statistical testing (Ghozali, 2021; Hair et al., 2019).

Specifically, the mean value reflects the central tendency of respondents' perceptions toward each measurement item, while the standard deviation indicates the degree of dispersion or variability in responses. A higher mean suggests stronger agreement with the statement, whereas a lower standard deviation implies greater consistency among respondents. These metrics are particularly relevant in Likert-scale-based research, as they provide insight into how respondents evaluate each construct (Sekaran & Bougie, 2017).

Table 4. Results of Descriptive Statistical Analysis

Variable	Indicators	Mean (Average)	Standard Deviation (Average)	Interpretation
Green Operations (GO)	GO1–GO4	3.82	1.01	High
Cost Efficiency (CE)	CE1–CE4	3.80	1.07	High
Corporate Reputation (CR)	CR1–CR4	3.84	0.99	High
Sustainable Operational Performance (SOP)	SOP1–SOP4	3.51	0.99	Moderate–High

Source: Processed data with Smart-PLS 4 (2026)

The descriptive results indicate that all variables in this study exhibit relatively high mean values, suggesting that respondents generally agree with the statements representing each construct. However, a more nuanced interpretation emerges when these findings are linked to the measurement items presented in Table 2.

First, green operations (GO) demonstrate a high mean score (3.82), indicating that most firms have begun to adopt environmentally friendly operational practices. Referring to Table

2, indicators such as the implementation of eco-friendly production processes (GO1) and energy-efficient technologies (GO3) receive relatively strong agreement. However, slightly lower values in indicators related to strategic integration (GO4) suggest that while operational practices are present, full strategic alignment may still be evolving.

Second, cost efficiency (CE) also shows a high mean (3.80), reflecting that firms perceive themselves as relatively effective in managing operational costs. Indicators such as resource optimization (CE2) and cost control (CE3) contribute significantly to this result. Nevertheless, the relatively higher standard deviation (1.07) implies that there is greater variability among firms, indicating that not all organizations achieve cost efficiency at the same level.

Third, corporate reputation (CR) records the highest mean (3.84) with relatively low variability, suggesting that firms are generally perceived positively by stakeholders. Based on Table 2, indicators such as trustworthiness (CR3) and ethical practices (CR4) are particularly strong. This finding reinforces the argument that sustainability-related practices contribute to reputational capital.

Finally, sustainable operational performance (SOP) exhibits a slightly lower mean (3.51), although still within the moderate-to-high range. Indicators such as long-term efficiency (SOP1) and environmental sustainability (SOP2) indicate that firms are progressing toward sustainability goals, but not yet achieving optimal performance levels. This gap suggests that while green operations and cost efficiency are present, their integration into sustained performance outcomes may not yet be fully realized.

Outer Model Evaluation

The evaluation of the measurement model (outer model) is conducted to assess the reliability and validity of the constructs used in this study. In the context of PLS-SEM, this step is critical to ensure that the latent variables are accurately measured by their respective indicators before proceeding to structural model analysis. The assessment includes indicator reliability, internal consistency reliability, convergent validity, and discriminant validity (Hair et al., 2019; Henseler et al., 2015).

Indicator reliability is examined through outer loadings, where values above 0.70 indicate that the indicators sufficiently represent their respective constructs. Internal consistency reliability is evaluated using Cronbach's alpha and Composite Reliability (CR), both of which should exceed 0.70. Convergent validity is assessed using the Average Variance Extracted (AVE), with a threshold above 0.50 indicating that the construct explains more than half of the variance of its indicators. Finally, discriminant validity is evaluated using the Heterotrait–Monotrait Ratio (HTMT), where values below 0.90 confirm that constructs are empirically distinct (Hair et al., 2019; Henseler et al., 2015; Santosa, 2018).

Table 5. Outer Model Evaluation

Construct	Code	Outer Loadings	Cronbach's Alpha	CR	AVE	HTMT (Max)
Green Operations	GO1	0.941	0.926	0.943	0.820	0.445
	GO2	0.933				
	GO3	0.926				
	GO4	0.816				
Cost Efficiency	CE1	0.907	0.888	0.912	0.749	0.685
	CE2	0.908				
	CE3	0.846				
	CE4	0.795				
Corporate Reputations	CR1	0.764	0.830	0.850	0.663	0.685
	CR2	0.749				
	CR3	0.885				
	CR4	0.851				

Sustainable Operational Performance	SOP1	0.813	0.856	0.864	0.699	0.659
	SOP2	0.881				
	SOP3	0.792				
	SOP5	0.856				

Note: All values satisfy recommended thresholds: Outer Loadings > 0.70; AVE > 0.50; α & CR > 0.70; HTMT < 0.90 (Hair et al., 2019)

Source: Primary Data Processed with Smart-PLS 4 (2026)

The results presented in **Table 5** indicate that all constructs meet the required criteria for reliability and validity, confirming that the measurement model is robust and suitable for further analysis.

First, in terms of indicator reliability, all outer loading values exceed the recommended threshold of 0.70. The *Green Operations* construct exhibits particularly strong loadings, ranging from 0.816 to 0.941, indicating that its indicators are highly representative of the underlying construct. Similarly, *Cost Efficiency* and *Sustainable Operational Performance* also demonstrate strong indicator reliability, while *Corporate Reputation* shows slightly lower but still acceptable loadings, with the lowest value at 0.749.

Second, regarding internal consistency reliability, all constructs achieve Cronbach's alpha and Composite Reliability (CR) values above 0.70. Notably, *Green Operations* shows the highest reliability ($\alpha = 0.926$; CR = 0.943), followed by *Cost Efficiency* ($\alpha = 0.888$; CR = 0.912). These results indicate a high degree of consistency among the indicators within each construct.

Third, convergent validity is confirmed as all AVE values exceed the minimum threshold of 0.50. The AVE for *Green Operations* (0.820) is particularly high, suggesting that the construct explains a substantial portion of the variance in its indicators. Other constructs, including *Cost Efficiency* (0.749), *Corporate Reputation* (0.663), and *Sustainable Operational Performance* (0.699), also demonstrate satisfactory levels of convergent validity.

Finally, discriminant validity is established based on HTMT values, all of which are below the threshold of 0.90. This indicates that each construct is empirically distinct and captures a unique conceptual domain. The relatively low HTMT value for *Green Operations* (0.445) further reinforces its discriminant strength compared to other constructs.

To further substantiate the discriminant validity of the measurement model, this study applies the Fornell–Larcker criterion. This approach assesses whether each construct shares more variance with its own indicators than with other constructs in the model. Specifically, the square root of the Average Variance Extracted (AVE) for each construct should be greater than its correlations with other constructs (Fornell & Larcker, 1981; Hair et al., 2019).

Table 6. Discriminant Validity with the Fornell and Larcker Criterion

Variable	Green Operations	Cost Efficiency	Corporate Reputation	Sustainable Operational Performance
Green Operations	0.905			
Cost Efficiency	0.161	0.865		
Corporate Reputation	0.208	0.612	0.814	
Sustainable Operational Performance	0.402	0.375	0.556	0.836

Source: Primary Data Processed with Smart-PLS 4 (2026)

The results presented in **Table 6** confirm that the measurement model satisfies the Fornell–Larcker criterion for discriminant validity. The diagonal elements, which represent the square root of AVE for each construct, are consistently higher than the corresponding inter-construct correlations. For instance, *Green Operations* has a square root of AVE of 0.905, which exceeds its correlations with *Cost Efficiency* (0.161), *Corporate Reputation* (0.208), and

Sustainable Operational Performance (0.402). Similar patterns are observed across all constructs.

These findings indicate that each construct captures a distinct conceptual domain and is not overly correlated with other variables in the model. In particular, *Cost Efficiency* and *Corporate Reputation* show a relatively higher correlation (0.612), yet this value remains below the square root of AVE for both constructs (0.865 and 0.814, respectively), confirming adequate discriminant validity.

When combined with the HTMT results presented in Table 5, the Fornell–Larcker analysis provides robust evidence that the constructs in this study are empirically distinct. This strengthens the overall validity of the measurement model and ensures that subsequent structural model analysis can be conducted without concerns of multicollinearity or construct overlap.

Inner Model Evaluation

After establishing the reliability and validity of the measurement model, the next step involves evaluating the structural model (inner model). This stage aims to assess the predictive capability of the model and to test the hypothesized relationships among constructs. In PLS-SEM, inner model evaluation focuses on several key criteria, including the coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and overall model fit using the standardized root mean square residual (SRMR) (Hair et al., 2021).

The coefficient of determination (R^2) reflects the proportion of variance in endogenous constructs explained by their respective exogenous variables. According to Hair et al. (2019), R^2 values of 0.75, 0.50, and 0.25 can be described as substantial, moderate, and weak, respectively. Effect size (f^2) evaluates the contribution of each exogenous variable to the R^2 value of an endogenous construct, where values of 0.02, 0.15, and 0.35 indicate small, medium, and large effects. Predictive relevance (Q^2), obtained through the blindfolding procedure, assesses the model's out-of-sample predictive capability, with values greater than zero indicating predictive relevance. Finally, SRMR is used as an approximate model fit index, with values below 0.08 suggesting a good model fit.

Table 7. Structural Model Evaluation Results

Endogenous Variable	R^2	Q^2	Interpretation
Corporate Reputation	0.386	0.287	Moderate
Sustainable Operational Performance	0.396	0.291	Moderate

Source: Primary data processed using SmartPLS 4 (2026)

The results presented in **Table 7** indicate that the structural model demonstrates a moderate level of explanatory power and predictive relevance for both endogenous constructs, namely corporate reputation and sustainable operational performance.

The R^2 value for corporate reputation (0.386) suggests that approximately 38.6% of its variance is explained by green operations and cost efficiency. According to established benchmarks (Hair et al., 2021), this value falls within the moderate category, indicating that while the model captures a meaningful portion of the determinants of corporate reputation, there remains a considerable proportion (61.4%) influenced by other factors not included in the model. This implies that corporate reputation is a multidimensional construct, likely shaped by additional elements such as corporate governance, branding strategies, and stakeholder engagement.

Similarly, the R^2 value for sustainable operational performance (0.396) indicates that 39.6% of its variance is explained by green operations, cost efficiency, and corporate reputation. This also falls within the moderate explanatory range, suggesting that the model provides a

reasonably strong foundation for explaining sustainable performance, although it does not fully capture all influencing variables. This is consistent with prior research, which highlights that sustainable performance is affected by a wide range of internal and external factors, including innovation capability, organizational culture, and environmental uncertainty.

From a predictive standpoint, the Q^2 values for both constructs are greater than zero, with corporate reputation (0.287) and sustainable operational performance (0.291). These values indicate that the model has adequate predictive relevance, meaning it is capable of accurately predicting data points not used in model estimation. In particular, the Q^2 value for sustainable operational performance suggests that the model has relatively strong predictive capability in explaining future outcomes related to sustainability.

Effect Size (F^2). Effect size analysis (f^2) is conducted to evaluate the magnitude of the contribution of each exogenous construct to the R^2 value of an endogenous variable. While path coefficients indicate the direction and significance of relationships, they do not capture how much each predictor contributes to the explanatory power of the model. Therefore, f^2 provides a more nuanced understanding of the practical importance of each relationship within the structural model (Ghozali, 2021; Hair et al., 2021).

According to established guidelines, f^2 values of 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively (Hair et al., 2019). This classification allows researchers to distinguish between statistically significant relationships that are substantively meaningful and those that have only marginal explanatory impact.

Table 8. Effect Size (f^2)

Variable	Green Operations	Cost Efficiency	Corporate Reputations	Sustainable Operational Performance
Green Operations			0.020	0.141
Cost Efficiency			0.559	0.002
Corporate Reputations				0.224
Sustainable Operational Performance				

Source: Primary Data Processed with Smart-PLS 4 (2026)

The results in **Table 8** reveal varying levels of effect size across the relationships, providing important insights into the relative importance of each construct within the model.

First, the effect of green operations on corporate reputation ($f^2 = 0.020$) is categorized as small, indicating that while green practices contribute to shaping reputation, their impact is relatively limited. This suggests that environmental initiatives alone may not strongly influence stakeholder perceptions unless supported by other organizational capabilities.

However, the effect of green operations on sustainable operational performance ($f^2 = 0.141$) falls within the medium category, implying that green practices play a meaningful role in enhancing sustainability outcomes. This indicates that environmental initiatives are more directly linked to operational performance than to reputational gains.

Second, cost efficiency demonstrates a contrasting pattern. Its effect on corporate reputation ($f^2 = 0.559$) is categorized as large, indicating that cost efficiency is a dominant driver of reputation in this model. This finding suggests that stakeholders may perceive efficient resource management as a strong signal of organizational competence and credibility.

In contrast, the effect of cost efficiency on sustainable operational performance ($f^2 = 0.002$) is negligible, indicating that cost efficiency alone does not directly contribute to sustainability outcomes. This implies that efficiency gains may not automatically translate into sustainable performance unless they are aligned with environmental practices or mediated through other mechanisms.

Third, corporate reputation has a medium effect ($f^2 = 0.224$) on sustainable operational performance, highlighting its strategic importance as a bridging variable. This finding supports the argument that reputation functions as a key mechanism through which operational practices are translated into performance outcomes.

Model Fit. Model fit assessment is conducted to examine how well the proposed model reproduces the observed data. Although PLS-SEM is primarily prediction-oriented and does not emphasize global goodness-of-fit measures to the same extent as covariance-based SEM, several fit indices have been developed to provide additional diagnostic insights into model adequacy. Among these, the standardized root mean square residual (SRMR), normed fit index (NFI), and discrepancy measures such as d_ULS and d_G are commonly reported in SmartPLS outputs (Hair et al., 2021; Henseler et al., 2015).

SRMR represents the difference between the observed correlation matrix and the model-implied correlation matrix. A value below 0.08 is generally considered indicative of a good model fit. Meanwhile, NFI compares the proposed model with a null model, with values closer to 1 indicating better fit. Although there is no strict cutoff in PLS-SEM, values above 0.80 are typically regarded as acceptable in exploratory research. The discrepancy measures (d_ULS and d_G) are used to assess the degree of model misspecification, where smaller values indicate better fit.

Table 9. Model Fit Result

	Saturated Model	Estimated Model
SRMR	0.063	0.063
d_ULS	0.535	0.535
d_G	0.303	0.303
Chi-square	327.752	327.752
NFI	0.849	0.849

Source: Primary Data Processed with Smart-PLS 4 (2026)

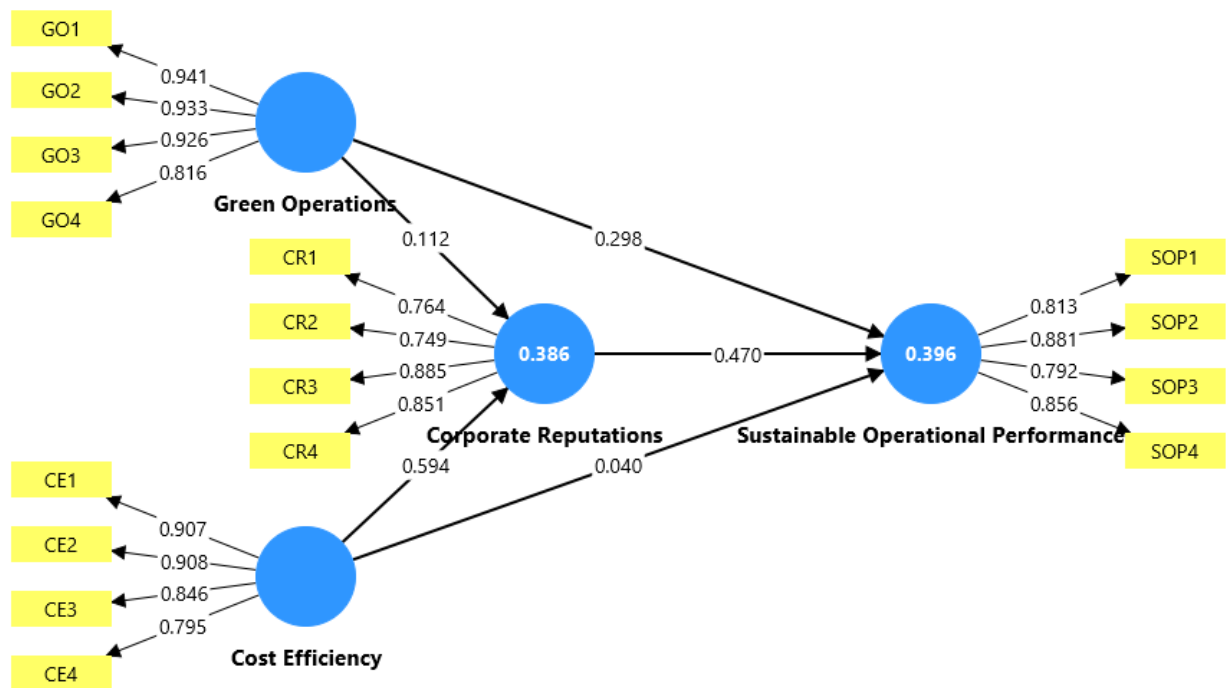
The results in **Table 9** indicate that the model demonstrates an acceptable level of fit. The SRMR value of 0.063 for both the saturated and estimated models is below the recommended threshold of 0.08, suggesting that the discrepancy between the observed and predicted correlations is minimal. This provides strong evidence that the model adequately represents the empirical data.

The NFI value of 0.849 further supports the model's adequacy. Although it does not reach the more stringent threshold of 0.90 typically associated with covariance-based SEM, it is considered acceptable within the context of PLS-SEM, particularly for exploratory and predictive research models. This indicates that the proposed model achieves a reasonably good improvement over the null model.

Additionally, the discrepancy measures d_ULS (0.535) and d_G (0.303) are relatively low, indicating a limited degree of model misspecification. The identical values between the saturated and estimated models suggest consistency in the model structure and reinforce the robustness of the estimation.

The Chi-square value (327.752), while reported, is not the primary criterion for model fit in PLS-SEM due to its sensitivity to sample size. Therefore, its interpretation is secondary compared to SRMR and predictive-oriented indices.

To provide a comprehensive visualization of the hypothesized relationships and the overall structural configuration, the results of the inner model estimation are presented in the form of a Structural Equation Model (SEM). This diagram illustrates the direct and indirect relationships among green operations, cost efficiency, corporate reputation, and sustainable operational performance, along with their respective path coefficients. Accordingly, the structural model is depicted in **Figure 2**.



Source: Primary Data Processed with Smart-PLS 4 (2026)

Figure 2. Structure Equation Model

Hypothesis Testing

The bootstrapping procedure available in Smart-PLS 4.0 was utilized to test the proposed hypotheses. In the context of economic and management research, a significance level between 5 and 10 percent is commonly accepted. A hypothesis is considered supported when the T-statistic exceeds the critical value of 1.960 and the corresponding p-value is equal to or less than 0.050, indicating a statistically significant relationship between the exogenous and endogenous variables (Ghozali, 2021; Hair et al., 2019; Santosa, 2018).

Conversely, if the p-value exceeds 0.050 and the T-statistic is below 1.960, the hypothesis is rejected, suggesting that the relationship between the constructs is not statistically significant. The results of the hypothesis testing are presented in **Table 10** below.

Table 10. Path Coefficient and Hypotheses Testing

Hypothesis	Relation	Original Sample	Mean	SD	T-Statistics	P-Values	Description
H1	GO → SOP	0.298	0.301	0.064	4.682	0.000	Supported
H2	CE → SOP	0.040	0.036	0.076	0.522	0.602	Not Supported
H3	GO → CR	0.112	0.114	0.065	1.708	0.088	Not Supported
H4	CE → CR	0.594	0.598	0.058	10.256	0.000	Supported
H5	CR → SOP	0.470	0.472	0.076	6.171	0.000	Supported
H6	GO → CR → SOP	0.053	0.054	0.033	1.594	0.111	Not Supported
H7	CE → CR → SOP	0.279	0.283	0.058	4.816	0,000	Supported

Note: GO = Green Operations, CE = Cost Efficiency, CR = Corporate Reputations, SOP = Sustainable Operational Performance.

Source: Data processed with Smart-PLS 4 (2026)

The results of hypothesis testing reveal several important findings regarding the relationships among the constructs.

First, green operations have a positive and significant effect on sustainable operational performance (**H1 supported, $\beta = 0.298$, $p < 0.001$**). This indicates that firms implementing environmentally friendly operational practices are more likely to achieve sustainable performance outcomes. This finding aligns with prior studies emphasizing the direct contribution of green practices to operational sustainability.

In contrast, cost efficiency does not have a significant effect on sustainable operational performance (**H2 not supported, $\beta = 0.040$, $p = 0.602$**). Despite being theoretically important, cost efficiency alone does not directly enhance sustainability outcomes. This suggests that efficiency gains may not automatically translate into sustainable performance unless integrated with other strategic factors.

Furthermore, green operations do not significantly influence corporate reputation (**H3 not supported, $\beta = 0.112$, $p = 0.088$**). Although the relationship is positive, it does not reach statistical significance, indicating that environmental practices alone may not be sufficient to shape stakeholder perceptions. This challenges the common assumption that sustainability initiatives inherently improve reputation.

Conversely, cost efficiency has a strong and significant effect on corporate reputation (**H4 supported, $\beta = 0.594$, $p < 0.001$**). This result suggests that stakeholders place considerable value on operational efficiency, perceiving it as a signal of managerial competence and organizational reliability.

In addition, corporate reputation significantly influences sustainable operational performance (**H5 supported, $\beta = 0.470$, $p < 0.001$**). This finding highlights the strategic role of reputation as an intangible asset that enhances organizational outcomes through stakeholder trust and legitimacy.

Regarding the mediation effects, corporate reputation does not mediate the relationship between green operations and sustainable operational performance (**H6 not supported, $\beta = 0.053$, $p = 0.111$**). This indicates that the influence of green operations on performance is primarily direct rather than transmitted through reputation.

However, corporate reputation significantly mediates the relationship between cost efficiency and sustainable operational performance (**H7 supported, $\beta = 0.279$, $p < 0.001$**). This suggests that cost efficiency contributes to sustainable performance indirectly by enhancing corporate reputation, which then drives performance outcomes.

DISCUSSION

The Effect of Green Operations on Sustainable Operational Performance

The results confirm that green operations have a positive and significant effect on sustainable operational performance. This finding suggests that environmentally oriented practices, such as energy efficiency, waste reduction, and eco-friendly production processes, directly enhance firms' ability to achieve long-term operational sustainability.

This outcome can be explained through the *Resource-Based View (RBV)*, where green operations function as strategic capabilities that improve resource utilization and operational efficiency. Firms that integrate environmental considerations into their operational processes are better positioned to reduce inefficiencies and enhance performance outcomes. This finding is consistent with prior studies indicating that green practices contribute directly to both environmental and operational performance (Le & Nguyen, 2024; Setyadi et al., 2025).

However, the strength of this study lies in demonstrating that the impact is primarily direct, rather than mediated by corporate reputation. This challenges the common assumption that environmental initiatives necessarily translate into reputational gains before affecting performance.

The Effect of Cost Efficiency on Sustainable Operational Performance

The results reveal that cost efficiency does not have a significant direct effect on sustainable operational performance. This finding appears counterintuitive, given that efficiency is typically associated with improved performance.

A closer examination suggests that cost efficiency alone may not be sufficient to generate sustainability outcomes. While efficiency reduces operational costs, it does not inherently ensure environmental responsibility or long-term sustainability. In some cases, aggressive cost-cutting may even conflict with sustainability goals if it leads to reduced investment in environmentally friendly technologies.

This finding aligns with emerging literature suggesting that the relationship between efficiency and sustainability is conditional rather than direct (Irdawati & Nurlia, 2025; Le & Nguyen, 2024). The result also highlights a critical distinction: efficiency is necessary but not sufficient for achieving sustainable performance.

The Effect of Green Operations on Corporate Reputation

Contrary to expectations, green operations do not significantly influence corporate reputation. Although the relationship is positive, it fails to reach statistical significance.

This finding challenges the dominant narrative in sustainability literature, which often assumes that environmental initiatives automatically enhance stakeholder perceptions (Abbas, 2026; Andrade et al., 2025). One possible explanation is that stakeholders may perceive green practices as symbolic or compliance-driven, rather than as genuine strategic commitments. In such cases, green operations fail to generate strong reputational signals.

From a *signaling theory* perspective, this suggests that not all sustainability actions are equally observable or credible. Stakeholders may require more visible or externally validated signals, such as certifications or public disclosures, before forming positive reputational judgments.

This result contributes to the literature by highlighting a credibility gap between internal environmental practices and external stakeholder perceptions.

The Effect of Cost Efficiency on Corporate Reputation

The findings indicate that cost efficiency has a strong and significant effect on corporate reputation. This suggests that stakeholders interpret efficient resource management as a signal of organizational competence and managerial effectiveness.

Unlike green operations, which may be less visible, cost efficiency is often reflected in pricing, service quality, and operational consistency, making it more observable to stakeholders. As a result, efficiency serves as a credible and tangible signal of firm capability (Irdawati & Nurlia, 2025; Nurlia et al., 2026).

This finding supports signaling theory, where stakeholders rely on observable indicators to evaluate organizational quality. It also extends prior research by demonstrating that economic performance signals may have a stronger reputational impact than environmental initiatives in certain contexts.

The Effect of Corporate Reputation on Sustainable Operational Performance

Corporate reputation is found to have a positive and significant effect on sustainable operational performance. This confirms its role as a strategic intangible asset that enhances organizational outcomes.

A strong reputation fosters stakeholder trust, facilitates access to resources, and strengthens market positioning. These advantages enable firms to sustain operational

performance over time. This finding is consistent with prior research emphasizing the performance-enhancing role of reputation (Iftikhar et al., 2025; Setyadi et al., 2025).

Importantly, this result reinforces the idea that sustainable performance is not driven solely by internal capabilities but also by external stakeholder perceptions.

The Mediating Role of Corporate Reputation

The mediation analysis reveals a nuanced pattern. Corporate reputation does not mediate the relationship between green operations and sustainable operational performance, but it significantly mediates the relationship between cost efficiency and sustainable operational performance.

This asymmetry is theoretically important. It suggests that green operations influence performance through internal efficiency mechanisms, while cost efficiency influences performance through external reputational pathways.

In other words, green operations work “inside the firm,” improving processes and reducing environmental impact, whereas cost efficiency works “outside the firm,” shaping stakeholder perceptions and enhancing reputation.

This dual-path mechanism represents a key contribution of the study. It moves beyond traditional linear models and provides a more refined understanding of how different operational strategies translate into sustainable outcomes.

Theoretical Implications

This study offers several important contributions to theory. **First**, it extends the *Resource-Based View* by demonstrating that green operations and cost efficiency represent distinct strategic capabilities with different pathways to performance. While both are valuable resources, their mechanisms of influence differ significantly.

Second, the findings refine *signaling theory* by showing that not all organizational signals carry equal weight. Cost efficiency emerges as a more credible and observable signal compared to green operations, which may be perceived as less tangible or more symbolic.

Third, the study contributes to sustainability literature by identifying a dual-mechanism model, where operational practices influence performance through both direct and mediated pathways. This provides a more nuanced understanding of sustainable operational performance.

Practical Implications

From a managerial perspective, the findings offer several actionable insights. **First**, firms should recognize that implementing green operations alone is not sufficient to enhance reputation. To maximize reputational benefits, environmental initiatives should be accompanied by transparent communication and external validation mechanisms.

Second, managers should leverage cost efficiency as a strategic tool not only for reducing costs but also for building corporate reputation. Efficient operations signal competence and reliability, which are highly valued by stakeholders.

Third, organizations should adopt an integrated approach that combines green operations and cost efficiency. While green practices improve internal performance, efficiency enhances external perceptions. The synergy between these elements is essential for achieving sustainable operational performance.

Finally, firms should actively manage corporate reputation as a strategic asset. Reputation is not merely an outcome but a mechanism that translates operational capabilities into long-term performance advantages.

CONCLUSION

Three key findings emerge from this study. (1) Green operations function as a direct operational driver of sustainable operational performance, indicating that environmentally oriented practices primarily create value through internal efficiency improvements rather than through external perception mechanisms. (2) Cost efficiency does not directly enhance sustainable performance but operates as a reputational catalyst, significantly shaping corporate reputation, which in turn drives performance outcomes. (3) Corporate reputation acts as a selective mediator, effectively transmitting the impact of cost efficiency but not that of green operations, revealing the existence of distinct internal and external pathways toward sustainability.

These findings suggest that sustainable operational performance is not the result of a single strategic approach, but rather the outcome of complementary mechanisms, where internal capabilities and external perceptions interact in different ways. The study thus highlights the importance of distinguishing between operational effectiveness and stakeholder visibility when designing sustainability strategies.

Sustainable operational performance is not merely achieved by adopting green practices or improving efficiency in isolation. It emerges from a strategic alignment between what firms do internally and how those actions are perceived externally. Organizations that recognize and manage this duality will be better positioned to transform sustainability from a compliance requirement into a sustained competitive advantage.

Research Limitations and Future Research Directions

This study is subject to several limitations that should be acknowledged. First, the use of a cross-sectional design restricts the ability to capture dynamic changes in sustainability practices and their long-term effects. Future research is encouraged to adopt longitudinal approaches to better understand causal relationships over time. Second, the model explains a moderate proportion of variance, indicating that other relevant variables, such as innovation capability, environmental uncertainty, or organizational culture, may further enrich the explanatory power of the framework. Third, the focus on SMEs in selected Indonesian cities may limit generalizability, suggesting the need for comparative studies across industries, firm sizes, or countries.

Future studies should also consider incorporating moderating variables to explore boundary conditions, as well as expanding the conceptual model into a **moderated mediation framework**. Additionally, qualitative or mixed-method approaches could provide deeper insights into how stakeholders interpret sustainability signals, particularly in contexts where green practices are not immediately visible.

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