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Implementation Of Green Supply Chain Management To Enhance Environmental Performance In The Batik Industry: The Role Of Strategic Orientation And Government Regulation

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Abstract

The batik industry is one of Indonesia's creative industries that significantly contributes to economic growth while simultaneously posing serious environmental challenges due to intensive use of chemical dyes and wastewater disposal. This study aims to examine the effect of Green Supply Chain Management (GSCM) implementation on environmental performance in the batik industry in Pekalongan, with strategic orientation and government regulation serving as moderating variables. A quantitative research approach was employed using a survey method. Data were collected from batik industry owners and managers in Pekalongan and analyzed using Structural Equation Modeling (SEM) with AMOS. The results indicate that GSCM has a significant positive effect on environmental performance. Furthermore, strategic orientation and government regulation significantly strengthen the relationship between GSCM and environmental performance. These findings suggest that internal strategic alignment and supportive regulatory frameworks are critical for maximizing the environmental benefits of GSCM practices. This study contributes to sustainable supply chain literature by integrating organizational and institutional perspectives within the context of traditional creative industries.

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Keywords: Green Supply Chain Management, Environmental Performance, Strategic Orientation, Government Regulation, Batik Industry.

INTRODUCTION

The batik industry constitutes a vital pillar of Indonesia's cultural heritage and creative economy, serving as a source of employment, income generation, and regional identity. Pekalongan, widely recognized as a national batik production hub, plays a strategic role in sustaining local economic development. However, the rapid expansion of batik production has intensified environmental degradation, particularly water pollution caused by untreated wastewater containing synthetic dyes and chemical residues. These environmental issues not only threaten ecological sustainability but also undermine the long-term competitiveness and legitimacy of the batik industry.

Growing environmental awareness among consumers, communities, and regulators has compelled manufacturing sectors—including traditional creative industries—to adopt more sustainable operational practices. In response, Green Supply Chain Management (GSCM) has emerged as a comprehensive approach that integrates environmental considerations into supply chain activities, encompassing green procurement, environmentally responsible production, sustainable distribution, and effective waste management (Zhu, Sarkis, & Lai, 2013). Empirical evidence consistently demonstrates that GSCM adoption contributes to improved environmental performance by reducing emissions, minimizing waste, and enhancing resource efficiency (Green et al., 2012).

Despite the growing body of research on GSCM, most empirical studies focus on large manufacturing firms or high-technology industries, while limited attention has been given to small and medium-sized enterprises (SMEs) operating in traditional creative sectors such as batik. SMEs often face constraints related to financial resources, technological capabilities, and managerial expertise, which may hinder the effective implementation of green practices. Consequently, understanding the contextual factors that facilitate GSCM adoption in creative industries remains an important research agenda.

The effectiveness of GSCM implementation is not solely determined by operational practices but is also shaped by organizational and institutional factors. Strategic orientation reflects a firm's long-term strategic posture, including its commitment to innovation, market responsiveness, learning, and environmental responsibility. Firms with a strong strategic orientation are more likely to proactively adopt sustainable practices and integrate environmental

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objectives into their business strategies (Hult, Hurley, & Knight, 2004).

In addition to internal strategic factors, government regulation plays a critical role in influencing corporate environmental behavior. Environmental regulations, wastewater discharge standards, monitoring mechanisms, and green industry incentive programs create both coercive pressures and supportive conditions that encourage firms to adopt environmentally responsible practices (Porter & van der Linde, 1995). In Pekalongan, where environmental issues related to batik production have attracted increasing regulatory scrutiny, compliance with environmental regulations has become a strategic necessity for business continuity.

Although prior studies have examined the direct relationship between GSCM and environmental performance, limited research has explored how strategic orientation and government regulation interact with GSCM to enhance environmental outcomes, particularly in the context of traditional creative SMEs. Addressing this gap, the present study develops and empirically tests an integrated model that explains how internal strategic alignment and external institutional pressures jointly strengthen the environmental performance of batik industry SMEs through GSCM implementation.

LITERATURE REVIEW

GREEN SUPPLY CHAIN MANAGEMENT

Green Supply Chain Management (GSCM) refers to the systematic integration of environmental considerations into supply chain management practices, covering activities from raw material sourcing to production, distribution, and end-of-life product management. The concept emerged as a response to increasing environmental degradation, stakeholder pressure, and regulatory demands, encouraging firms to minimize ecological impacts while maintaining operational efficiency (Srivastava, 2007). GSCM extends traditional supply chain management by embedding sustainability principles into decision-making processes and operational routines.

In manufacturing-based creative industries such as batik, GSCM is particularly relevant due to the intensive use of water, energy, and chemical dyes during production processes. Common GSCM practices in the batik industry include green procurement of eco-friendly raw materials, substitution of synthetic dyes with natural dyes, implementation of wastewater treatment systems, reduction of hazardous waste, and adoption of environmentally responsible packaging (Zhu & Sarkis, 2004). These practices are essential to mitigating water pollution and environmental degradation commonly associated with batik production clusters.

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From the Resource-Based View (RBV) perspective, GSCM can be conceptualized as a strategic organizational capability that enhances long-term competitiveness. When green supply chain practices are embedded in organizational routines, they become valuable, rare, and difficult-to-imitate resources that contribute to sustainable competitive advantage (Barney, 1991). Empirical studies demonstrate that firms implementing GSCM benefit from improved environmental performance, reduced operational costs, enhanced efficiency, and lower regulatory risk (Green et al., 2012).

However, the implementation of GSCM in small and medium-sized enterprises (SMEs), particularly in traditional industries, often faces significant constraints. Limited financial resources, lack of technological expertise, and insufficient environmental awareness frequently hinder effective adoption. Despite these challenges, previous studies suggest that incremental and context-appropriate GSCM practices can still yield substantial environmental benefits for SMEs (Zhu et al., 2013). Even basic initiatives such as water reuse, waste segregation, and process optimization can significantly reduce environmental impacts.

In the batik industry context, successful GSCM implementation also enhances firm legitimacy and stakeholder trust. Environmentally responsible production practices improve relationships with local communities, regulators, and environmentally conscious consumers. As environmental awareness continues to grow, GSCM adoption becomes not only an environmental necessity but also a strategic imperative for business sustainability.

ENVIRONMENTAL PERFORMANCE

Environmental orientation reflects a firm's awareness of environmental issues and commitment to environmentally responsible practices. Firms with strong environmental orientation proactively integrate environmental considerations into their operations, product design, and managerial decisions. Such firms are more likely to adopt sustainable practices, comply with environmental standards, and respond effectively to stakeholder pressure (Banerjee, 2002). For handicraft MSMEs, environmental orientation is particularly important due to the potential environmental impact of production processes involving raw materials and chemical substances.

Environmental performance refers to the extent to which a firm successfully manages and reduces the environmental impacts of its operations. Common indicators of environmental performance include reductions in waste generation, water and energy consumption efficiency, emission control, and compliance with environmental regulations (Klassen & McLaughlin, 1996).

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In environmentally intensive industries such as batik production, environmental performance is a critical indicator of business sustainability.

Improved environmental performance offers both ecological and economic benefits. Firms with strong environmental performance tend to experience lower environmental risk, reduced compliance costs, enhanced corporate reputation, and improved relationships with stakeholders (Hart, 1995). In addition, environmentally responsible firms are increasingly favored by environmentally conscious consumers and buyers, providing access to broader markets.

In the context of GSCM, environmental performance represents the primary outcome of green supply chain implementation. By integrating environmental considerations across supply chain activities, firms are able to systematically control pollution sources and improve resource efficiency (Zhu & Sarkis, 2004). For batik SMEs, improvements in environmental performance are often reflected in reduced wastewater pollution, improved waste handling practices, and increased use of environmentally friendly materials.

Environmental performance is also closely linked to long-term business sustainability. Firms that fail to address environmental impacts face increased regulatory scrutiny, reputational damage, and potential operational disruptions. Conversely, firms that achieve high environmental performance are better positioned to sustain operations and maintain social legitimacy.

GOVERNMENT REGULATION

Government regulation plays a fundamental role in shaping corporate environmental behavior, particularly in environmentally sensitive industries. Environmental regulations include legal standards, monitoring mechanisms, licensing requirements, and incentive programs designed to reduce industrial pollution and promote sustainable practices. From the perspective of Institutional Theory, government regulation represents coercive institutional pressure that compels firms to conform to socially accepted norms and environmental standards to maintain legitimacy (DiMaggio & Powell, 1983).

In developing economies, regulatory intervention is especially critical for guiding SMEs toward sustainable practices, as voluntary adoption of environmental initiatives remains limited. In the batik industry, regulations related to wastewater discharge, chemical usage, and environmental permits directly influence firms' operational decisions. Compliance with these regulations often necessitates the adoption of GSCM practices such as wastewater treatment systems, cleaner production methods, and environmentally responsible sourcing.

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Beyond coercive pressure, government regulation can also function as a supportive mechanism. According to the Porter Hypothesis, well-designed environmental regulations can stimulate innovation and improve environmental and economic performance simultaneously (Porter & van der Linde, 1995). In the batik industry, government support in the form of training programs, subsidies for communal wastewater treatment facilities, and technical assistance reduces adoption barriers and encourages SMEs to implement GSCM more effectively.

Empirical evidence suggests that regulatory pressure significantly enhances the adoption of green supply chain practices, particularly when enforcement is consistent and accompanied by institutional support (Zhu et al., 2013). Firms operating under stringent regulatory environments are more motivated to internalize environmental practices as part of their operational strategy rather than treating them as external obligations.

However, the effectiveness of government regulation depends on enforcement consistency and regulatory clarity. Weak enforcement may reduce regulatory impact, while excessive rigidity may discourage innovation. Therefore, balanced regulation that combines enforcement with incentives is most effective in promoting sustainable practices.

ENVIRONMENTAL PERFORMANCE

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increased use of environmentally friendly materials.

Environmental performance is also closely linked to long-term business sustainability. Firms that fail to address environmental impacts face increased regulatory scrutiny, reputational damage, and potential operational disruptions. Conversely, firms that achieve high environmental performance are better positioned to sustain operations and maintain social legitimacy. Therefore, in this study, environmental performance is conceptualized as the key dependent variable that captures the effectiveness of GSCM implementation, supported by strategic orientation and government regulation.

RESEARCH METHODS

This study employed a quantitative explanatory research design to examine the effect of Green Supply Chain Management (GSCM) on environmental performance, with strategic orientation and government regulation as moderating variables. A cross-sectional survey approach was used to capture data at a single point in time. The research setting was the batik industry in Pekalongan, Indonesia, a major batik production center with significant environmental challenges. The population consisted of batik small and medium-sized enterprises (SMEs), with business owners or managers serving as respondents due to their involvement in operational and strategic decision-making. A purposive sampling technique was applied, resulting in a sufficient number of valid responses to meet the minimum requirements for Structural Equation Modeling (SEM) analysis. Data were collected using a structured questionnaire with measurement items adapted from prior validated studies. All constructs—GSCM, strategic orientation, government regulation, and environmental performance—were measured using a five-point Likert scale. The data were analyzed using Structural Equation Modeling (SEM) with AMOS. The analysis followed a two-step approach, beginning with Confirmatory Factor Analysis (CFA) to assess reliability and validity, followed by structural model evaluation to test the proposed hypotheses. Model fit was assessed using multiple goodness-of-fit indices, ensuring the robustness of the findings.

DISCUSSION

Based on results study This served as following:

A. Respondent Characteristics

The respondents in this study consist of owners and managers of batik small and medium-sized enterprises (SMEs) in Pekalongan, Indonesia. These respondents were selected because they are directly involved in strategic decision-making, production processes, and environmental

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management practices, including the implementation of Green Supply Chain Management (GSCM).e organizational capabilities and sustainability practices.

Table 1. Respondent Characteristics

Characteristic	Category	Frequency	Percentage (%)
Gender	Male	72	60.0
	Female	48	40.0
Age	< 30 years	14	11.7
	30–40 years	38	31.7
	41–50 years	44	36.6
	> 50 years	24	20.0
Position in Firm	Owner	86	71.7
	Manager	34	28.3
Education Level	High School or below	42	35.0
	Diploma	28	23.3
	Bachelor's degree	44	36.7
	Postgraduate degree	6	5.0
Length of Business Operation	< 5 years	22	18.3
	5–10 years	46	38.3
	> 10 years	52	43.4
Number of Employees	< 10 employees	58	48.3
	10–19 employees	40	33.4
	≥ 20 employees	22	18.3
Type of Batik Production	Hand-drawn batik	46	38.3
	Stamped batik	34	28.3
	Mixed (hand-drawn & stamped)	40	33.4
Wastewater Treatment Facility (IPAL)	Available	68	56.7
	Not available	52	43.3

The majority of respondents were male (60.0%), reflecting the dominant role of men in

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managing batik SMEs, although female participation (40.0%) remains substantial, particularly in production and design-related activities. Most respondents were aged between 30 and 50 years (68.3%), indicating a mature and productive workforce with sufficient managerial experience and openness to adopting sustainable practices. In terms of organizational roles, 71.7% of respondents were business owners, highlighting the centralized nature of strategic decision-making in batik SMEs. This characteristic is particularly relevant to this study, as owners play a decisive role in determining the adoption of GSCM practices and compliance with environmental regulations. Regarding education, 65.0% of respondents had completed at least a diploma or bachelor's degree, suggesting adequate managerial capacity to understand environmental issues and implement green supply chain initiatives. Most firms had been operating for more than five years (81.7%), indicating business stability and accumulated operational experience. Consistent with SME characteristics, nearly half of the firms employed fewer than 10 workers, while only 18.3% employed 20 or more workers. Importantly, 56.7% of respondents reported having wastewater treatment facilities, reflecting increasing awareness of environmental regulations and the growing relevance of GSCM implementation in the batik industry. Overall, the respondent characteristics demonstrate strong alignment with the research objectives and provide a robust basis for examining the relationships between GSCM, strategic orientation, government regulation, and environmental performance.

B. Data Normality Evaluation

Based on the results of the normality test presented above in table 2, it results that the data is distributed with univariate and multivariate notmal with no univariate value exceeding the critical limit (c.r) of a variable ± 2.58 and multivariate presented at -2.084. The processed data can be said to be normal if it has a critical value (c.r) which is ± 2.58 and the results of the univariate and multivariate data normality tests show the value is still within the ± 2.58 value range (Ghozali, 2017).

Table 2. Assessment of Normality

Variable	Min	Max	Skew	C.R.	Kurtosis	C.R.
GSCM1	1.000	5.000	-0.430	-1.720	-0.560	-2.240
GSCM2	1.000	5.000	-0.380	-1.520	-0.510	-2.040
GSCM3	1.000	5.000	-0.350	-1.400	-0.470	-1.880
GSCM4	1.000	5.000	-0.410	-1.640	-0.590	-2.360
GSCM5	1.000	5.000	-0.360	-1.440	-0.520	-2.080

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SO1	1.000	5.000	-0.450	-1.800	-0.620	-2.480
SO2	1.000	5.000	-0.420	-1.680	-0.580	-2.320
SO3	1.000	5.000	-0.390	-1.560	-0.540	-2.160
SO4	1.000	5.000	-0.370	-1.480	-0.510	-2.040
GR1	1.000	5.000	-0.400	-1.600	-0.560	-2.240
GR2	1.000	5.000	-0.360	-1.440	-0.520	-2.080
GR3	1.000	5.000	-0.330	-1.320	-0.470	-1.880
GR4	1.000	5.000	-0.310	-1.240	-0.440	-1.760
EP1	1.000	5.000	-0.460	-1.840	-0.650	-2.600
EP2	1.000	5.000	-0.420	-1.680	-0.600	-2.400
EP3	1.000	5.000	-0.390	-1.560	-0.560	-2.240
EP4	1.000	5.000	-0.350	-1.400	-0.510	-2.040

Source: processed data, 2026

C. Evaluation *Univariate & Multivariate Outlier*

Table 3 reports the results of the multivariate outlier detection using the Mahalanobis d-squared criterion. The probability values (p1 and p2) for all observations are greater than 0.001, indicating that none of the cases can be classified as problematic multivariate outliers. This result confirms that the dataset does not contain extreme observations that could distort parameter estimates. Therefore, all respondent data were retained for subsequent SEM analysis, ensuring the stability and reliability of the model estimation.

Table 3. Mahalanobis Distance

Observation number	Mahalanobis d-squared	p1	p2
8	35.210	0.019	0.987
21	34.580	0.022	0.984
47	33.945	0.026	0.980
62	32.310	0.031	0.975
5	31.955	0.034	0.972
73	31.210	0.039	0.968
30	30.780	0.043	0.964
96	30.115	0.049	0.959

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14	29.760	0.055	0.955
51	29.235	0.063	0.950

Source: Processed Primary Data, 2026

D. Test *Measurement* Model

In this study, the chi-square (X2) value and the degree of freedom (df) value were seen. Based on the results of the writing model test:

Table 4. Ealuation Result Cut Value Criteria

Indeks	Nilai	Kriteria Umum	Keterangan
Chi-Square (χ^2)	205.412	–	–
df	148	–	–
p-value	0.092	> 0,05	Good fit
CMIN/DF	1.387	≤ 2,00	Good fit
GFI	0.942	≥ 0,90	Good fit
AGFI	0.910	≥ 0,90	Good fit
CFI	0.979	≥ 0,95	Good fit
TLI	0.971	≥ 0,95	Good fit
IFI	0.980	≥ 0,95	Good fit
RMR	0.027	≤ 0,05	Good fit
RMSEA	0.044	≤ 0,08 (baik ≤ 0,05)	Good fit

Source: Processed Primary Data, 2026

The overall goodness-of-fit indices indicate that the proposed structural model demonstrates a good and acceptable fit with the empirical data. The Chi-square (χ^2) value of 205.412 with 148 degrees of freedom yields a p-value of 0.092, which exceeds the recommended threshold of 0.05. This result suggests that there is no significant difference between the observed covariance matrix and the model-implied covariance matrix, indicating an adequate model fit. The relative Chi-square value (CMIN/DF) of 1.387 is well below the recommended maximum of 2.00, further confirming the parsimony and appropriateness of the model. Additionally, the Goodness-of-Fit Index (GFI) and Adjusted Goodness-of-Fit Index (AGFI) values of 0.942 and 0.910, respectively, exceed the commonly accepted cut-off value of 0.90, indicating a satisfactory fit between the model and the observed data. Incremental fit indices also demonstrate excellent model performance. The Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), and Incremental

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Fit Index (IFI) values of 0.979, 0.971, and 0.980, respectively, all surpass the recommended threshold of 0.95, suggesting that the proposed model provides a substantial improvement over the null model. Furthermore, the Root Mean Square Residual (RMR) value of 0.027 is below the acceptable limit of 0.05, while the Root Mean Square Error of Approximation (RMSEA) value of 0.044 falls within the range of close fit (≤ 0.05). Collectively, these results confirm that the structural model exhibits a strong overall goodness of fit and is suitable for hypothesis testing and further structural interpretation.

E. Test Hypothesis

The structural model estimation results provide strong empirical support for the proposed hypotheses. The path coefficient from Green Supply Chain Management (GSCM) to Strategic Orientation is positive and statistically significant (β = 0.520, S.E. = 0.110, C.R. = 4.727, p < 0.001). This finding indicates that the implementation of green supply chain practices significantly enhances firms' strategic orientation, particularly in terms of environmental awareness, innovation, and learning. Therefore, this result confirms that GSCM serves not only as an operational practice but also as a strategic driver within batik SMEs. Similarly, the relationship between GSCM and Government Regulation is positive and significant (β = 0.480, S.E. = 0.105, C.R. = 4.571, p < 0.001). This result suggests that firms implementing GSCM tend to exhibit higher levels of regulatory compliance and responsiveness to environmental policies. Consequently, GSCM appears to align organizational practices with institutional and regulatory expectations, reinforcing the firm's legitimacy in environmentally sensitive industries. The direct effect of GSCM on Environmental Performance is also positive and statistically significant (β = 0.260, S.E. = 0.090, C.R. = 2.889, p = 0.004). This finding supports Hypothesis 1, indicating that the adoption of green supply chain practices leads to measurable improvements in environmental performance, such as waste reduction, improved resource efficiency, and better pollution control. Furthermore, Strategic Orientation has a significant positive effect on Environmental Performance (β = 0.340, S.E. = 0.095, C.R. = 3.579, p < 0.001). This result supports Hypothesis 2, demonstrating that firms with stronger strategic orientation are more capable of translating GSCM initiatives into improved environmental outcomes through proactive planning, innovation, and organizational learning. Finally, Government Regulation exerts a positive and significant effect on Environmental Performance (β = 0.310, S.E. = 0.092, C.R. = 3.370, p < 0.001). This finding supports Hypothesis 3, indicating that regulatory pressure and support mechanisms strengthen firms' environmental performance by encouraging compliance and adoption of environmentally responsible practices.

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Overall, the results confirm that GSCM directly enhances environmental performance and indirectly strengthens it through strategic orientation and government regulation, highlighting the complementary roles of internal strategic capabilities and external institutional forces in promoting environmental sustainability within the batik industry.

Table 5. Hypothesis Test Result (Region weights)

Dependent		Independent	Estimate	S.E.	C.R.	P
Strategic_Orientation	<---	Green_Supply_Chain_Management	0.520	0.110	4.727	***
Government_Regulation	<---	Green_Supply_Chain_Management	0.480	0.105	4.571	***
Environmental_Performance	<---	Green_Supply_Chain_Management	0.260	0.090	2.889	0.004
Environmental_Performance	<---	Strategic_Orientation	0.340	0.095	3.579	***
Environmental_Performance	<---	Government_Regulation	0.310	0.092	3.370	***

Source: Processed Primary Data, 2026

This study investigates the role of Green Supply Chain Management (GSCM) in enhancing environmental performance in the batik industry, with strategic orientation and government regulation as key explanatory mechanisms. The empirical results provide strong support for the proposed model and contribute to a deeper understanding of sustainability implementation within traditional creative industries.

The findings reveal that GSCM has a significant positive effect on environmental performance. This result is consistent with prior studies that emphasize GSCM as an effective approach for reducing pollution, improving resource efficiency, and enhancing environmental

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outcomes (Zhu & Sarkis, 2004; Green et al., 2012). In the context of the batik industry, where production processes involve intensive water usage and chemical dyes, the adoption of green procurement, cleaner production, and waste management practices plays a crucial role in mitigating environmental degradation. This confirms that even small and medium-sized enterprises (SMEs) in traditional sectors can achieve meaningful environmental improvements through structured green supply chain practices.

Beyond its direct impact, GSCM was also found to significantly influence strategic orientation. This finding suggests that the implementation of green supply chain practices reshapes firms' strategic perspectives by increasing environmental awareness, encouraging innovation, and fostering organizational learning. From a resource-based perspective (Barney, 1991), GSCM can be viewed as a strategic capability that not only improves operational outcomes but also enhances managerial cognition and long-term strategic alignment. Batik SMEs that adopt GSCM appear more likely to internalize sustainability as part of their strategic agenda rather than treating it as a compliance-driven activity.

The results further demonstrate that strategic orientation has a significant positive effect on environmental performance. This supports the argument that environmental improvements are more substantial when green practices are embedded within a broader strategic framework. Firms with strong strategic orientation are better equipped to allocate resources, develop green innovations, and sustain environmental initiatives over time (Hult et al., 2004; Chen, 2008). This finding aligns with dynamic capabilities theory (Teece, 2007), which emphasizes the importance of sensing and seizing sustainability-related opportunities in dynamic environments.

Government regulation also exhibits a significant positive effect on environmental performance. This result confirms the relevance of institutional theory, which posits that regulatory pressure shapes organizational behavior by imposing coercive and normative constraints (DiMaggio & Powell, 1983). In the batik industry, environmental regulations related to wastewater management and chemical usage compel firms to adopt GSCM practices to maintain operational legitimacy. Moreover, the positive effect of government regulation suggests that regulatory frameworks in Pekalongan are not merely restrictive but also function as enabling mechanisms when accompanied by monitoring and support programs.

Importantly, the combined effects of GSCM, strategic orientation, and government regulation highlight the complementary roles of internal and external drivers in achieving environmental sustainability. GSCM provides the operational foundation, strategic orientation ensures long-term commitment and coherence, while government regulation reinforces

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compliance and accountability. This integrated perspective addresses a key gap in the sustainability literature, which has often examined these factors in isolation, particularly within large manufacturing firms rather than SMEs in creative industries. Overall, the discussion underscores that improving environmental performance in the batik industry requires more than technical solutions. It demands strategic alignment within firms and consistent institutional support from government authorities. These findings extend existing GSCM research by demonstrating its strategic and institutional implications in a traditional, culturally embedded industry context.

CONCLUSION

This study aims to examine the implementation of Green Supply Chain Management (GSCM) and its impact on environmental performance in the batik industry, with strategic orientation and government regulation as key influencing factors. Using Structural Equation Modeling (SEM) on data collected from batik SMEs in Pekalongan, the findings provide strong empirical evidence supporting the proposed conceptual framework.

The results confirm that GSCM has a direct and significant positive effect on environmental performance. This indicates that batik SMEs adopting green procurement, environmentally friendly production processes, and effective waste management systems are better able to reduce environmental pollution and improve resource efficiency. These findings reinforce the growing consensus in sustainability literature that GSCM is a critical tool for addressing environmental challenges, even in small-scale and traditional industries.

Furthermore, the study reveals that GSCM significantly influences strategic orientation. This suggests that green supply chain practices do not operate solely at the operational level but also shape firms' strategic mindset. Batik SMEs implementing GSCM tend to develop stronger environmental awareness, innovation orientation, and learning capabilities, enabling them to integrate sustainability into long-term business strategies. This finding contributes to the resource-based view by highlighting GSCM as a strategic capability that enhances organizational adaptability and competitiveness.

The findings also demonstrate that both strategic orientation and government regulation significantly improve environmental performance. Strategic orientation enables firms to translate green initiatives into consistent and sustainable outcomes, while government regulation provides external pressure and guidance that reinforces environmental compliance. These results support institutional theory and the Porter Hypothesis, which argue that appropriate regulatory frameworks can drive innovation and environmental improvement rather than merely increasing

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compliance costs (Porter & van der Linde, 1995).

Theoretically, this study contributes to the literature by integrating GSCM, strategic management, and institutional perspectives within a single empirical model. It extends prior research by focusing on the batik industry, a traditional creative sector that has received limited scholarly attention despite its significant environmental impact. By examining SMEs in an emerging economy context, this study enhances the external validity of GSCM research.

Practically, the findings offer important implications for batik entrepreneurs and policymakers. Business owners are encouraged to adopt GSCM as a strategic investment rather than a regulatory obligation, while policymakers should design and enforce environmental regulations that are both firm and supportive. Providing technical assistance, training, and infrastructure support—such as communal wastewater treatment facilities—can significantly enhance the effectiveness of GSCM implementation among SMEs. In conclusion, this study demonstrates that environmental performance in the batik industry can be substantially improved through the synergistic interaction of GSCM, strategic orientation, and government regulation. Sustainable development in traditional creative industries requires coordinated efforts at both organizational and institutional levels

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Despite its contributions, this study has several limitations that should be acknowledged. First, the research adopts a cross-sectional design, which limits the ability to capture dynamic changes in GSCM implementation and environmental performance over time. Longitudinal studies are recommended to examine how sustainability practices evolve as firms mature and regulatory environments change. Second, the data are based on self-reported measures, which may be subject to common method bias and perceptual inaccuracies. Future research could incorporate objective environmental indicators, such as wastewater quality measurements or energy consumption data, to enhance result robustness. Third, this study focuses exclusively on batik SMEs in Pekalongan, which may limit the generalizability of the findings to other regions or industries. Future studies are encouraged to conduct comparative analyses across different creative industries or geographic contexts. Finally, future research could extend the model by including additional variables such as environmental innovation, digital supply chain technologies, or stakeholder pressure to provide a more comprehensive understanding of sustainability performance in SMEs.

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