

GREEN SUPPLY CHAIN MANAGEMENT, GREEN DYNAMIC CAPABILITY, AND BUSINESS SUSTAINABILITY: THE ROLE OF GREEN INNOVATION

Muhammad Ali Fikri^{1*}, Wakhid Slamet Ciptono², Muhammad Hamdi¹,
Poppy Laksita Rini¹

¹Universitas Ahmad Dahlan, Indonesia

²Universitas Gadjah Mada, Indonesia

Citation (APA 7th): Fikri, M. A., Ciptono, W. S., Hamdi, M., & Rini, P. L. (2026). Green Supply Chain Management, Green Dynamic Capability, and Business Sustainability: The Role of Green Innovation. *Jurnal Minds: Manajemen Ide Dan Inspirasi*, 13(2), 413–426. <https://doi.org/10.24252/minds.v13i2.63498>

Submitted: 11 December 2025

Revised: 05 July 2026

Accepted: 11 July 2026

Published: 22 July 2026



Copyright: © 2026 by the authors.

ABSTRACT: This study examines the effects of green supply chain management and green dynamic capability on business sustainability through green innovation. It contributes by integrating the resource-based view and dynamic capability theory to explain how green innovation converts organizational resources and capabilities into sustainable outcomes in MSMEs. Using a quantitative design, data were collected from 161 batik MSME owners in Yogyakarta, Indonesia through purposive sampling and analyzed using PLS-SEM. The results show that green supply chain management does not directly affect business sustainability, whereas green dynamic capability has a significant positive effect. Both green supply chain management and green dynamic capability significantly promote green innovation, which subsequently improves business sustainability. Green innovation fully mediates the effect of green supply chain management and partially mediates the effect of green dynamic capability on business sustainability. Managers should strengthen green innovation capabilities to translate environmental practices and adaptive capabilities into sustainable competitive advantage.

Keywords: Green Supply Chain Management; Green Dynamic Capability; Green Innovation; Business Sustainability

*Corresponding Author: muhammad.fikri@mgm.uad.ac.id

DOI: <https://doi.org/10.24252/minds.v13i2.63498>

ISSN-E: 2597-6990

ISSN-P: 2442-4951

<http://journal.uin-alauddin.ac.id/index.php/minds>

Publisher: Management Department, Universitas Islam Negeri Alauddin Makassar, Indonesia

INTRODUCTION

Businesses, companies, and firms are the primary engines of national economic development. While creating value and supporting sustainable economic growth, business activities can also exacerbate social and environmental problems that hinder sustainable development (Ullah et al., 2025). The need for sustainable development is increasingly pressing as human activities cause climate change, rising global temperatures, environmental degradation and extreme events such as floods and droughts (Chaudhary et al., 2018). This situation has encouraged the emergence of green concepts to reduce negative impacts and mitigate environmental damage, including through approaches like as green supply chain management (Stojanoska, 2016; Ahmad et al., 2021). Green supply chain management is a strategic approach to integrating environmental objectives into all supply chain activities, from raw material procurement to final product distribution (Zhu et al., 2013). Akomea et al. (2023) state that various categories of green supply chain management, such as green purchasing, green production and investment recovery, contribute to improved environmental conditions and increased organizational sustainability (Saunila et al., 2020).

Prior studies report inconsistent findings regarding the relationship between green supply chain management and business sustainability. While some studies suggest a direct positive effect (Green Jr et al., 2012; Zhu et al., 2013), others indicate that such practices may not yield significant outcomes without complementary capabilities (Saunila et al., 2020). This inconsistency suggests that the relationship between green supply chain management and sustainability is not straightforward and may depend on intermediate transformation mechanisms. One possible explanation for this inconsistency lies in the role of green innovation. Green supply chain management not only has a direct impact on increasing operational efficiency and reducing waste but also creates a strategic foundation for companies to develop green innovation. Green innovation encompasses the development of new products, processes or practices aimed at reducing environmental impacts while increasing efficiency and corporate value (Dangelico & Pujari, 2010). Green innovation has been shown to play a crucial role in transforming green capabilities into corporate sustainability performance (Chen, 2011). This green innovation further strengthens business sustainability because more environmentally friendly products can improve cost efficiency, regulatory compliance and provide social value to the company (Rahman, 2023). Previous studies have highlighted the importance of innovation in transforming environmental practices into economic and environmental benefits (Chen, 2011; Song & Yu, 2020). Nevertheless, limited research has examined green innovation as the mechanism linking green supply chain management to business sustainability, particularly within the context of Micro, Small, and Medium Enterprises (MSMEs) operating in environmentally sensitive industries.

Green dynamic capability serves as a strategic capability that helps companies detect environmental opportunities, configure green resources and respond adaptively to market changes (Huang et al., 2024; Mugoni et al., 2024). Green dynamic capability is a company's ability to adapt and thrive in a rapidly changing business environment by prioritizing sustainability and environmental responsibility (Huang et al., 2024; Saleem & Bashir, 2024). Companies with green dynamic capability are able to absorb, integrate and reconfigure environmentally-based resources, thus having a greater opportunity to generate sustainable green innovation (Ma et al., 2022; Cheng et al., 2025). Ahmad et al. (2024) confirms that increasing green dynamic capability positively contributes to the development of environmentally friendly technological solutions, ultimately strengthening a company's competitiveness and sustainability performance. Similarly, green dynamic capability reflects a firm's ability to reconfigure resources and respond to environmental changes, but its impact on sustainability may also depend on how effectively it is converted into innovation.

Green innovation acts as a mediating mechanism that bridges the influence of green supply chain management and green dynamic capability on business sustainability. Therefore, companies that consistently implement green supply chain management and possess strong green dynamic capability will be better able to improve business sustainability through the creation of superior green innovations (Song & Yu., 2020). Business sustainability is defined as an organization's ability to survive and thrive in the long term by achieving balanced economic, social and environmental performance (Elkington, 1998). This integrated relationship

demonstrates that green innovation is a strategic path that transforms the implementation of green supply chain management and the utilization of green dynamic capabilities into long-term sustainability advantages (Chang, 2016).

Previous studies have largely relied on either the resource-based view (RBV) or dynamic capability theory independently when examining sustainability outcomes. Consequently, limited attention has been given to understanding how resources and capabilities interact through innovation-based transformation mechanisms to generate business sustainability. Theoretically, this study integrates the RBV and dynamic capability theory to provide a more comprehensive explanation of sustainability achievement. RBV emphasizes the strategic value of valuable, rare, inimitable, and non-substitutable resources in creating competitive advantage (Barney, 1991), while dynamic capability theory explains how firms integrate, reconfigure, and deploy resources in response to environmental changes (Teece et al., 1997). Combining these perspectives enables a deeper understanding of how green resources and dynamic capabilities are transformed into sustainable outcomes through green innovation.

This study also contributes by focusing on batik MSMEs in Yogyakarta, an environmentally sensitive traditional industry that remains underexplored in the green supply chain and sustainability literature (Febriani et al., 2023). Yogyakarta is one of the largest batik industrial centers in Indonesia with a high concentration of MSMEs (Febriani et al., 2023). However, batik production is also associated with significant environmental challenges, particularly the extensive use of synthetic dyes, excessive water consumption, and the generation of waste water that may contaminate surrounding ecosystems (Rahman, 2023; Suroyo et al., 2025). Furthermore, Yogyakarta is known as a cultural city and an international tourist destination, so the implementation of environmentally friendly batik innovations has the potential to increase economic value, product image, and strengthen market appeal (Mardatillah et al., 2024). Thus, research on batik MSMEs in Yogyakarta is crucial to strengthening efforts to realize an innovative and sustainable batik business.

The batik industry plays an important role in preserving Indonesia's cultural heritage and supporting the economic development of MSMEs. At the same time, increasing environmental regulations, growing public awareness of sustainability issues, and rising consumer demand for environmentally friendly products have intensified pressure on batik MSMEs to adopt sustainable business practices. Consequently, achieving business sustainability has become a strategic priority for batik enterprises seeking to remain competitive while minimizing environmental impacts. Therefore, this study extends the existing literature by demonstrating how green innovation functions as a strategic mechanism that transforms green resources and dynamic capabilities into long-term business sustainability within batik MSMEs (Song & Yu, 2020; Serrano-García et al., 2022). At the same time, increasing environmental regulations, growing public awareness of sustainability issues, and rising consumer demand for environmentally friendly products have intensified pressure on batik MSMEs to adopt sustainable business practices. Consequently, achieving business sustainability has become a strategic priority for batik enterprises seeking to remain competitive while minimizing environmental impacts. To address these environmental pressures, many firms have adopted green supply chain management, which integrates environmental considerations into procurement, production, distribution, and waste management activities (Zhu et al., 2013). Green supply chain management has been widely recognized as a mechanism for reducing environmental impacts and improving organizational sustainability (Akomea et al., 2023; Saunila et al., 2020).

However, existing studies have not sufficiently explained how and why green practices and capabilities are transformed into sustainability outcomes, particularly in the context of MSMEs in environmentally sensitive industries. This creates a critical research gap in understanding the mediating role of green innovation as a conversion mechanism. This study proposes green innovation as a mediating mechanism that explains how green supply chain management and green dynamic capability contribute to business sustainability. This perspective suggests that sustainability outcomes are not generated directly from green practices or capabilities, but rather through their transformation into innovation-based solutions that create economic, environmental, and social value. MSMEs in the batik sector increasingly emphasize the importance of the relationship between green supply chain management, green dynamic capabilities, green innovation, and business sustainability in addressing modern

environmental challenges. Therefore, this study aims to examine the effect of green supply chain management and green dynamic capability on business sustainability, with green innovation as a mediating variable.

THEORETICAL REVIEW AND HYPOTHESIS DEVELOPMENT

The resource-based view (RBV) emphasizes that companies gain competitive advantage when they are able to manage valuable, rare, inimitable and non-substitutable resources (Barney, 1991). Green supply chain management practices are viewed as environmentally based strategic resources capable of improving operational efficiency and facilitating the creation of sustainable green innovation (Green Jr et al., 2012; Najmi et al., 2020). Meanwhile, dynamic capabilities theory by Teece et al. (1997) provides a strong foundation for explaining how green dynamic capabilities enable companies to respond to rapid and complex environmental changes. Green dynamic capabilities help companies integrate, build and reconfigure competencies to adapt to environmental opportunities and threats (Huang et al., 2024; Mugoni et al., 2024). Therefore, this theory supports the relationship that green dynamic capabilities drive green innovation through the ability to detect green opportunities and develop sustainable technologies (Ma et al., 2022; Cheng et al., 2025). Green innovation helps companies meet these three dimensions through energy efficiency, waste reduction and increased product social value (Serrano-García et al., 2022; Rahman, 2023).

Green supply chain management and business sustainability

Through dynamic capability theory by Teece et al. (1997), green supply chain management is viewed as a strategic capability that helps companies respond adaptively to environmental changes, regulations and consumer preferences. Achi et al. (2022) stated that green supply chain management offers benefits in the form of savings on waste disposal costs, energy use and other essential needs while reducing negative environmental impacts. Furthermore, elements of green supply chain management, such as eco-design, have been shown to reduce raw material use, reduce emissions and lower production costs (Amin & Sarker, 2023). The implementation of green supply chain management has a direct impact on changing supplier and consumer attitudes toward corporate environmental responsibilities, thereby improving sustainability performance (Geng et al., 2017). Green supply chain management practices, such as eco-design and internal environmental management not only improve environmental performance but also business performance through increased sales, higher profitability and greater market share (Chen & Chang, 2013).

H1: Green supply chain management has a positive effect on business sustainability

Green dynamic capability and business sustainability

Based on the dynamic capability theory perspective by Teece et al. (1997) green dynamic capability is a crucial capability for organizations to respond to environmental changes, develop green innovations and improve sustainability performance. Appiah et al. (2023) emphasized that green dynamic capability a crucial role in formulating environmentally friendly business policies and ensuring compliance with sustainable regulations. Green dynamic capability plays a central role in ensuring that companies are able to develop with an appropriate environmental impact for sustainable growth. A similar sentiment was expressed by Ali et al. (2021), who stated that green dynamic capability is a crucial tool for improving corporate sustainability performance, maximizing resource utilization and promoting green practices.

H2: Green dynamic capability has a positive effect on business sustainability

Green supply chain management and green innovation

Ahmad et al. (2021) explain that the implementation of green supply chain management encourages green innovation through production process redesign, product reengineering and more environmentally oriented managerial decision-making. This view aligns with the RBV by Barney (1991), which emphasizes that a company's ability to integrate green resources, such as environmentally friendly production processes and technical knowledge, will create difficult-to-

imitate and strategically valuable innovation capabilities. Pereira et al. (2020) also found that environmental collaboration between companies and suppliers enhances an organization's ability to create competitive green innovations.

H3: Green supply chain management has a positive effect on green innovation

Green dynamic capability and green innovation

Green dynamic capability a crucial role in ensuring sustainable resource utilization while encouraging the creation of green products and technologies (Schaltegger & Wagner, 2011). This view aligns with dynamic capabilities theory by Teece et al. (1997) which emphasizes the importance of an organization's ability to sense, seize and reconfigure resources in response to environmental changes. Green Jr et al. (2012) added that for green innovation to be effective, companies must possess green dynamic capabilities that enable them to adapt and respond to new environmental management strategies and practices. Furthermore, Chen and Chang (2013) found that green dynamic capability significantly increases green innovation in both process and product innovation. Research findings by Osei-Frimpong et al. (2022) also show that a high level of green dynamic capability enables companies to meet consumer demand for green products and evaluate competitors' green progress, thus encouraging green innovation.

H4: Green dynamic capability has a positive effect on green innovation

Green innovation and business sustainability

According to Renwick et al. (2016), green innovation relates to innovations in products, systems, technologies and sustainable behaviors that organizations use to complete tasks with minimal negative impact on the environment. Through the dynamic capability theory by Teece et al. (1997), green innovation functions as an adaptive capability that helps organizations respond to environmental regulations, market changes and stakeholder pressure. Furthermore, green innovation encourages the creation of sustainable products that meet consumer demand and increase market competitiveness (Chen et al., 2018). Mousavi et al. (2018) show that green innovation contributes significantly to improving corporate image and building customer loyalty. As consumers become more concerned about environmental issues, companies that adopt sustainable innovations gain a competitive advantage that ultimately improves brand associations, corporate image and opens opportunities in the eco-friendly market niche (Ismail, 2023).

H5: Green innovation has a positive effect on business sustainability

Green supply chain management and business sustainability: The role of green innovation

Based on the RBV, green supply chain management can be viewed as a strategic environmental resource that enables firms to achieve competitive advantage when effectively transformed into innovation capabilities (Barney, 1991). Green supply chain management encourages firms to implement environmentally friendly practices such as eco-design, green purchasing, waste reduction, and sustainable production processes, which subsequently become the foundation for the development of green innovation (Bossle et al., 2016; Pereira et al., 2020). Through these practices, firms are able to improve operational efficiency, minimize environmental impact, and strengthen their capability to create sustainable products and processes.

Green innovation plays an important role in transforming green operational practices into sustainability outcomes. According to Qiu et al. (2019), green innovation improves organizational efficiency through energy-saving manufacturing systems, waste minimization, and environmentally friendly product development. These innovation outcomes not only reduce environmental impacts but also lower operational costs and improve profitability, thereby supporting long-term business sustainability (Akpan et al., 2021). This indicates that green innovation acts as a strategic mechanism through which firms convert green practices into economic, environmental, and competitive benefits.

This perspective is further supported by dynamic capability theory, which explains that firms capable of integrating, building, and reconfiguring environmentally oriented resources are

more adaptive and competitive in dynamic business environments (Teece et al., 1997). Through green innovation, firms can develop eco-friendly products and sustainable production systems that strengthen market competitiveness and simultaneously improve environmental and economic performance (Burki & Ersoy, 2022). Chen and Chang (2013) further emphasized that sustainability-oriented innovation strengthens brand reputation, market positioning, and long-term profitability. Pereira et al. (2020) found that firms implementing green supply chain practices were more capable of developing environmental innovation, which subsequently improved sustainability performance. Similarly, Serrano-García et al. (2022) confirmed that green innovation acts as an important mechanism through which green practices contribute to sustainable organizational outcomes. Therefore, firms that effectively implement green supply chain management are more likely to generate green innovation, which subsequently enhances business sustainability (Rodrigo-Alarcón et al. 2018) as in Figure 1.

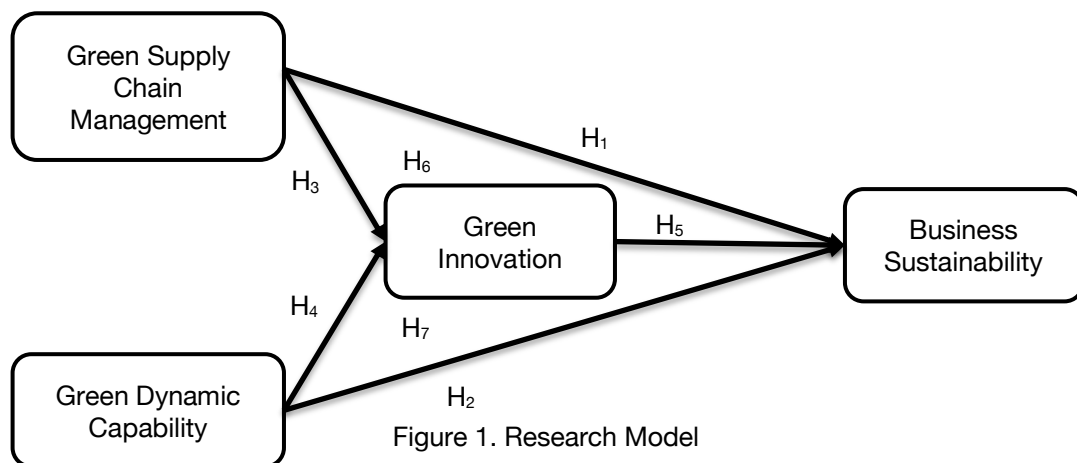
H6: Green innovation mediates the positive influence of green supply chain management on business sustainability.

Green dynamic capability and business sustainability: The role of green innovation

According to Habib et al. (2022), dynamic capabilities are crucial, especially in cases of green innovation, if organizations are to develop sustainable business models and achieve competitive advantage. Alawamleh et al. (2023) explain that green dynamic capabilities describe the processes by which organizations influence, respond to integrate and reconfigure resources in support of green innovations for superior sustainability and business performance, so this is in line with dynamic capabilities theory by Teece et al. (1997). Green dynamic capability helps companies expand and reposition internal processes to align with sustainability goals, thereby remaining competitive in an increasingly environmentally sensitive market (García Alcaraz et al., 2022).

Firms should possess green dynamic capabilities to better achieve organizational objectives within the dimensions of sustainability and business performance (Sezen & Çankaya, 2018). With these capabilities, companies gain dual benefits because this ability to innovate sustainably results in a dual benefit: cost savings due to higher operational efficiency and positive changes in environmental performance (Gully et al. 2013; Santini, 2017). Firms with high green dynamic capabilities are also better able to produce green goods and services, thus gaining competitive advantage amidst increasing consumer and stakeholder attention to environmental issues (Assumpção et al., 2023). This condition strengthens market differentiation and brand identification, which are important for a company's long-term revenue (Saunders & Bezzina, 2015). Therefore, green innovation mediates the relationship between green dynamic capability and business sustainability in Figure 1.

H7: Green innovation mediates the positive influence of green dynamic capability on business sustainability.



RESEARCH METHOD

Data were collected through a structured questionnaire distributed directly to batik MSMEs owners in Yogyakarta. All constructs were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Measurement items were adapted from prior validated studies. A pilot test was conducted with 30 respondents to ensure clarity and reliability of the instrument. The criterion “understanding of variables” was operationalized as prior exposure to environmental management practices, while “participation in training” refers to attendance in workshops related to sustainability or green business practices. The sample in this study consisted of 161 respondents, in line with Hair et al. (2021) who explained that the recommended minimum sample size is 100–300 respondents in Structural Equation Modeling-Partial Least Squares (SEM-PLS) parameter estimation (See Table 1 for demographic presentation). The sampling technique used was purposive sampling with several criteria: 1) Owners of MSMEs in the Batik sector in Yogyakarta. 2) MSMEs in the Batik sector have been running their business for at least a year. 3) Owners are directly involved in the production process, supply chain, or operational decision-making; and 4) Owners have experience with environmental management practices, eco-friendly production activities, waste management initiatives, sustainable supply chain decisions, or have participated in training, workshops, or government programs related to sustainability.

Table 1. Description of respondent characteristics

Characteristics	Information	Frequency	Percentage
Gender	Man	51	31.7
	Woman	110	68.3
Age	26-35 years	29	18
	36-45 years	77	47.8
	46-55 years	46	28.6
	>55 years	9	5.6
Last education	Junior high school	21	13
	Senior high school	112	69.6
	Bachelor's degree	28	17.4
Monthly income	IDR 3-5 million	55	34.2
	IDR 6-10 million	85	52.8
	IDR 11-15 million	20	12.4
	IDR >16 million	1	0.6
Business age	1-3 years	1	0.6
	4-6 years	61	37.9
	7-9 years	29	18
	>10 years	70	43.5

Green supply chain management (GSCM) has 6 indicators from Dzikriansyah et al. (2023). Green dynamic capability (GDC) has 5 indicators from Chen and Chang (2013); Chen et al. (2015). Green innovation (GI) has 7 indicators from Chen et al. (2006). Business sustainability (BS) has 4 indicators from Zhu et al. (2008); Paulraj (2011); Laosirihongthong et al. (2013). The data analysis technique used a quantitative approach with the SEM-PLS analysis method. SEM-PLS was chosen because it is able to estimate the relationship between complex latent variables with a relatively small sample size and does not require a strict normal data distribution (Hair et al., 2019). Data processing was carried out by testing validity and reliability through loading factor values, convergent validity, discriminant validity, and composite reliability. According to Ghazali (2021), indicators with correlation values above 0.7 are considered valid. To test the reliability value between indicators of the constructs that form it, composite reliability is used. The evaluation of the SEM-PLS model includes outer loadings, convergent validity (AVE), collinearity. The results of hypothesis testing are from the p-value and if the p-value is less than 0.05, then the hypothesis is declared accepted (Ghazali, 2021).

RESULTS

This study presents the summary of PLS-SEM's validity, and reliability tests. Table 2 reports the loading factor, collinearity, Cronbach's alpha, composite reliability, and AVE. All threshold is satisfied as to the statistical rules.

Table 2. Results of the Validity and Reliability Tests

Construct	Loading	VIF	Alpha	CR	(AVE)
Green Supply Chain Management			0.897	0.921	0.660
GSCM1	0.845	2.822			
GSCM2	0.794	2.058			
GSCM3	0.787	2.019			
GSCM4	0.849	2.527			
GSCM5	0.801	2.058			
GSCM6	0.796	2.118			
Green Dynamic Capability			0.876	0.910	0.670
GDC1	0.805	2.080			
GDC2	0.799	1.949			
GDC3	0.868	2.609			
GDC4	0.777	1.780			
GDC5	0.840	2.204			
Green Innovation			0.893	0.916	0.611
GI1	0.807	2.366			
GI2	0.744	2.086			
GI3	0.799	2.126			
GI4	0.729	1.716			
GI5	0.754	1.872			
GI6	0.825	2.408			
GI7	0.807	2.370			
Business Sustainability			0.843	0.895	0.680
BS1	0.857	1.932			
BS2	0.763	2.141			
BS3	0.779	1.902			
BS4	0.808	2.068			

Source: Adapted Smartpls 4 Output (2025)

The Cronbach's Alpha values for all constructs were above the minimum threshold of 0.70 in Table 2. The composite reliability values for all constructs ranged from 0.895 to 0.921, indicating that each variable had excellent composite reliability. A composite reliability exceeding 0.70 indicates that the indicator has high internal consistency in explaining the latent variable as a whole (Ghozali, 2021). This strengthens the evidence that the model has adequate measurement stability. In the Average Variance Extracted (AVE) aspect, all variables have AVE values above 0.50 ranging from 0.611 to 0.680, meaning that more than 50 % of the indicator's variance can be explained by the latent construct. An AVE that meets the criteria also indicates good convergent validity, so the indicator is deemed appropriate in measuring the concept it represents. This condition is consistent with the recommendation that an AVE ≥ 0.50 indicates a construct has adequate variance explanation capabilities. The collinearity assessment was conducted using the Variance Inflation Factor (VIF) to ensure that multicollinearity does not bias the estimation results in the SEM-PLS model. The results indicate that all VIF values range between 1.716 and 2.822, which are well below the conservative threshold of 5.0. This finding confirms that there is no serious collinearity issue among the indicators used in this study. The absence of multicollinearity implies that the parameter estimates are stable and reliable, thereby strengthening the validity of the structural model analysis. These results support the robustness

of the model and indicate that the relationships among constructs can be interpreted without concern for collinearity bias. These validity, reliability, and collinearity tests pave the presentation of hypothesis testing in our inner model analysis as in Table 3.

Table 3. Hypothesis testing

Hypothesis	Effect	<i>t</i> -value	<i>p</i> -value	Decision
Green Sup. Chain M.→Buss. Sust.	0.056	0.545	0.586	Rejected
Green Dyn. Cap. → Buss. Sust.	0.321	2.812	0.005	Supported
Green Sup. Chain M. →Green Innov.	0.383	4.350	0.000	Supported
Green Dyn. Cap. → Green Innov.	0.551	6.543	0.000	Supported
Green Innov.→ Buss. Sust.	0.471	5.118	0.000	Supported
Green Sup. Chain M.→ Green Innov.→ Buss. Sust.	0.180	2.981	0.003	Supported
Green Dyn. Cap. → Green Innov.→ Buss. Sust.	0.260	4.401	0.000	Supported

Source: Adapted Smartpls 4 Output (2025)

DISCUSSION

Green supply chain management is unable to support business sustainability in Table 3. Green supply chain management does not directly affect business sustainability contrasts with prior studies that report a significant positive relationship (Green Jr et al., 2012; Zhu et al., 2013). However, it is consistent with studies suggesting that green supply chain management alone is insufficient without complementary capabilities such as innovation (Saunila et al., 2020). This inconsistency indicates that the effectiveness of green supply chain management depends on the firm's ability to transform green practices into innovation outputs. Therefore, this study supports the argument that green innovation is a critical mechanism that bridges green supply chain management and sustainability outcomes. Geng et al. (2017) explained that the implementation of green supply chain management only impacts sustainability performance if a company has changed the behavior of suppliers and consumers towards environmental responsibility. Saunila et al. (2020) emphasized that practices such as green purchasing, green production, and investment recovery only contribute to sustainability when the entire supply chain process is integrated. Achi et al. (2022) emphasized that the benefits of green supply chain management, such as savings in waste disposal costs and new energy, can be felt significantly if a company already has an efficient and environmentally oriented operational system. In this study, the insignificant effect of green supply chain management may reflect that the company is still in the process of adopting environmentally friendly systems and therefore has not yet been able to generate strategic benefits that impact sustainability. Arzubagi et al. (2018) explain that companies must first achieve alignment between environmental policies and operational practices to minimize emissions, improve resource management, and mitigate negative environmental impacts. If this integration is not achieved, green supply chain management will struggle to become a significant driver of sustainability. From the RBV perspective, environmental practices represent valuable organizational resources; however, these resources can only generate sustainable advantages when effectively utilized and transformed into strategic outputs (Barney, 1991).

Green dynamic capability can enhance business sustainability. Dynamic capabilities help companies adapt to environmental changes and create sustainable practices that enhance long-term competitive advantage (Teece, 1997). Environmentally oriented dynamic capabilities encourage companies to proactively respond to external pressures such as regulations, green consumer demand, and technological change (Dangelico & Vocalelli, 2017; Teece, 2018). Pereira et al. (2020) demonstrated that companies capable of reconfiguring their production processes in a greener manner were shown to be superior in maintaining business sustainability through energy efficiency and waste reduction. Green dynamic capability is a key factor strengthening companies' adaptation to global environmental changes, ultimately driving higher sustainability performance (Rahman et al., 2023). Green supply chain management influences green innovation. Green supply chain management plays a crucial role as a key driver of environmentally-based innovation through waste reduction, eco-friendly product design, and the application of green technology across all operational activities (Rahman et al., 2023). García Alcaraz et al. (2021) also clarifies that companies that consistently implement green supply chain

management are better able to develop sustainable innovation due to positive pressure from suppliers, customers, and environmental regulations.

Green supply chain management has a positive and significant effect on green innovation. These findings suggest that firms adopting environmentally oriented supply chain practices are more capable of developing sustainable products, processes, and operational systems. Green supply chain management practices such as green purchasing, eco-design, waste reduction, and environmentally friendly production processes encourage firms to improve their environmental capabilities and stimulate innovation activities (Akomea et al., 2023; Dzikriansyah et al., 2023). Firms implementing green supply chain management are able to integrate environmental values into operational activities, thereby strengthening their ability to create green innovation (Rahman et al., 2023). These results are consistent with Ahmad et al. (2021), who stated that green supply chain management encourages green innovation through production process redesign, environmentally friendly managerial practices, and sustainable decision-making.

Green dynamic capability can enhance green innovation. These results emphasize that companies capable of managing environmental change and developing sustainability strategies will be more capable of generating green innovation at both the product and process levels. Dangelico and Vocalelli (2017) explained that companies with dynamic capabilities in identifying environmental changes and market needs are quicker in developing green innovations, both through environmentally friendly product designs and efficient process technologies. Research by Pereira et al. (2020) also shows that organizational capabilities in renewing and mobilizing green resources are a key driver of sustainable environmental innovation. Furthermore, Rahman et al. (2023) found that green dynamic capability increases a company's ability to adopt green technology, reduce waste and design more environmentally friendly solutions, resulting in more competitive product and process innovations. García Alcaraz et al. (2021) also emphasized that companies with dynamic capabilities are more responsive to environmental pressures and regulatory demands and are therefore better able to create sustainable environmental innovations.

Green innovation influences business sustainability. Dangelico and Vocalelli (2017) shows that green innovation encourages companies to develop environmentally friendly products, processes, and technologies, thereby increasing operational efficiency and reducing environmental risks, which ultimately contribute to business sustainability. Green innovation results in cost reductions, increased productivity and optimized resource use, all of which are key elements of business sustainability (Guo et al., 2020). Habib et al. (2022) reinforces the argument that green innovation plays a key role in driving sustainable business practices, especially as companies face increasing environmental and regulatory pressures. Findings by Jabbour and Stefanelli (2021) indicate that implementing green innovation through the use of green technology, eco-design and waste management has been shown to simultaneously improve economic and environmental performance, thus supporting long-term sustainability.

Green innovation significantly mediates the influence of green supply chain management on business sustainability. Akpan et al. (2021) also showed that companies that implement green supply chain management but do not adopt green innovation will not experience significant improvements in sustainability because efficiency and operational cost reductions only emerge when companies implement green technology, eco-design and sustainable production processes. Burki and Ersoy (2022) emphasized that green supply chain management encourages the development of green products and services, which are key drivers of long-term sustainability. Green supply chain management practices may not directly generate sustainability outcomes unless they are transformed into innovation-based capabilities (Schaltegger & Wagner, 2011; Saleem & Bashir, 2024).

Green innovation is proven to mediate the influence of green dynamic capability on business sustainability. Habib et al. (2022) emphasized that green dynamic capabilities are crucial for generating green innovations necessary for building sustainable business models and creating long-term competitive advantages. Alawamleh et al. (2023) demonstrated that green dynamic capabilities help companies integrate and reconfigure green resources, leading to environmental innovations that impact business sustainability. Meanwhile, Jabbour and Stefanelli (2021) emphasized that green dynamic capability enables companies to more quickly seize innovation opportunities and increase resource efficiency, thereby driving sustainability.

CONCLUSION AND FURTHER STUDY

While green supply chain management exhibits no direct relationship with business sustainability, green dynamic capability serves as a potent driver. Notably, both components significantly catalyze green innovation, which subsequently acts as a direct antecedent to enhanced business sustainability. This study demonstrates that green innovation plays a central mediating role in linking green supply chain management and green dynamic capability to business sustainability. The findings extend RBV and dynamic capability theory by showing that sustainability outcomes are not generated directly from resources or capabilities, but through their transformation into innovation. Practically, batik MSMEs should prioritize innovation-based strategies, such as adopting natural dyes, developing water-efficient production processes, implementing waste recycling systems, and creating eco-friendly product differentiation to enhance market competitiveness. This study is limited by its focus on batik MSMEs in Yogyakarta, which may restrict generalizability. For future research, it is recommended to add moderating variables such as environmental turbulence or top management environmental commitment to examine how external conditions and managerial commitment influence the effectiveness of green innovation in improving sustainability. Furthermore, the study could be expanded to other industrial sectors to increase the generalizability of the findings as the industrial context can influence the dynamics of green supply chain management, green capabilities and innovation.

ETHICAL DISCLOSURE

All participants provided written informed consent prior to participation. They were informed about the study's purpose, their voluntary participation, the right to withdraw at any time, and the confidentiality of their responses.

CONFLICT OF INTERESTS

The authors declare no conflict of interest.

REFERENCES

- Achi, A., Adeola, O., & Achi, F. C. (2022). CSR and green process innovation as antecedents of micro, small, and medium enterprise performance: Moderating role of perceived environmental volatility. *Journal of Business Research*, 139, 771–781. <https://doi.org/10.1016/j.jbusres.2021.10.016>
- Ahmad, N., Scholz, M., AlDhaen, E., Ullah, Z., & Scholz, P. (2021). Improving firm's economic and environmental performance through the sustainable and innovative environment: Evidence from an emerging economy. *Frontiers in Psychology*, 12, Article 651394. <https://doi.org/10.3389/fpsyg.2021.651394>
- Akpan, I. J., Soopramanien, D., & Kwak, D.-H. (2021). Cutting-edge technologies for small business and innovation in the era of the COVID-19 global health pandemic. *Journal of Small Business & Entrepreneurship*, 33(6), 607–617. <https://doi.org/10.1080/08276331.2020.1799294>
- Alawamleh, M., Mahadin, B., Nimer, L. A., & Marji, D. S. (2023). Ecopreneurship: A systematic review. *International Journal of Process Management and Benchmarking*, 13(2), 257–281. <https://doi.org/10.1504/IJPMB.2023.128485>
- Ali, W., Wen, J., Hussain, H., Khan, N. A., Younas, M. W., & Jamil, I. (2021). Does green intellectual capital matter for green innovation adoption? Evidence from the manufacturing SMEs of Pakistan. *Journal of Intellectual Capital*, 22(5), 868–888. <https://doi.org/10.1108/JIC-06-2020-0204>
- Amin, M. A., & Sarker, S. (2023). *Jute industry of Bangladesh: Challenges and opportunities* [Bachelor's thesis, Centria University of Applied Sciences]. Theseus. <https://urn.fi/URN:NBN:fi:amk-2023121135922>
- Arzuabiaga, U., Kotlar, J., De Massis, A., Maseda, A., & Iturralde, T. (2018). Entrepreneurial orientation and innovation in family SMEs: Unveiling the (actual) impact of the board of

- directors. *Journal of Business Venturing*, 33(4), 455–469. <https://doi.org/10.1016/j.jbusvent.2018.03.002>
- Assumpção, J. J., Campos, L. M. S., Vazquez-Brust, D. A., & Carvalho, M. M. (2024). The orchestration of green supply chain management practices to enable performance measurement and evaluation. *Production Planning & Control*, 35(14), 1706–1725. <https://doi.org/10.1080/09537287.2023.2214526>
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>
- Bossle, M. B., de Barcellos, M. D., Vieira, L. M., & Sauvée, L. (2016). The drivers for adoption of eco-innovation. *Journal of Cleaner Production*, 113, 861–872. <https://doi.org/10.1016/j.jclepro.2015.11.033>
- Burki, U., & Ersoy, P. (2022). Top management pledge, an essential component of sustainable manufacturer-customer relationships. *Journal of Sustainable Marketing*, 3(2), 98–117. <https://doi.org/10.51300/jsm-2022-61>
- Chang, C. (2016). Environmental sustainability in supply chain management: A review and future direction. *Sustainability*, 8(12), Article 1277. <https://doi.org/10.3390/su8121277>
- Chaudhary, A., Gustafson, D., & Mathys, A. (2018). Multi-indicator sustainability assessment of global food systems. *Nature Communications*, 9, Article 848. <https://doi.org/10.1038/s41467-018-03308-7>
- Chen, X., Yi, N., Zhang, L., & Li, D. (2018). Does institutional pressure foster corporate green innovation? Evidence from China's top 100 companies. *Journal of Cleaner Production*, 188, 304–311. <https://doi.org/10.1016/j.jclepro.2018.03.257>
- Chen, Y. S. (2011). Green organizational identity: Sources and consequence. *Management Decision*, 49(3), 384–404. <https://doi.org/10.1108/00251741111120761>
- Chen, Y. S., & Chang, C. H. (2013). The determinants of green product development performance: Green dynamic capabilities, green transformational leadership, and green creativity. *Journal of Business Ethics*, 116(1), 107–119. <https://doi.org/10.1007/s10551-012-1452-x>
- Chen, Y. S., Lai, S. B., & Wen, C. T. (2006). The influence of green innovation performance on corporate advantage in Taiwan. *Journal of Business Ethics*, 67(4), 331–339. <https://doi.org/10.1007/s10551-006-9025-5>
- Chen, Y. S., Lin, Y. H., Lin, C. Y., & Chang, C. W. (2015). Enhancing green absorptive capacity, green dynamic capacities, and green service innovation to improve firm performance: An analysis of structural equation modeling (SEM). *Sustainability*, 7(11), 15674–15692. <https://doi.org/10.3390/su71115674>
- Cheng, J., Xu, N. R., Khan, N. U., & Singh, H. S. M. (2025). The impacts of artificial intelligence literacy, green absorptive capacity, and green information system on green innovation. *Corporate Social Responsibility and Environmental Management*, 32(2), 2375–2389. <https://doi.org/10.1002/csr.3017>
- Dangelico, R. M., & Pujari, D. (2010). Mainstreaming green product innovation: Why and how companies integrate environmental sustainability. *Journal of Business Ethics*, 95, 471–486. <https://doi.org/10.1007/s10551-010-0434-0>
- Dangelico, R. M., & Vocalelli, D. (2017). “Green marketing”: An analysis of definitions, strategy steps, and tools through a systematic review of the literature. *Journal of Cleaner Production*, 165, 1263–1279. <https://doi.org/10.1016/j.jclepro.2017.07.184>
- Dzikriansyah, M. A., Masudin, I., Zulfikarijah, F., Jihadi, M., & Jatmiko, R. D. (2023). The role of green supply chain management practices on environmental performance: A case of Indonesian small and medium enterprises. *Cleaner Logistics and Supply Chain*, 6, Article 100100. <https://doi.org/10.1016/j.clscn.2023.100100>
- Elkington, J. (1998). *Cannibals with forks: The triple bottom line of 21st century business*. New Society Publishers.
- Febriani, R., Knippenberg, L., & Aarts, N. (2023). The making of a national icon: Narratives of batik in Indonesia. *Cogent Arts & Humanities*, 10(1), Article 2254042. <https://doi.org/10.1080/23311983.2023.2254042>
- García Alcaraz, J. L., Díaz Reza, J. R., Arredondo Soto, K. C., Hernández Escobedo, G., Happonen, A., Puig I Vidal, R., & Jiménez Macías, E. (2022). Effect of green supply chain

- management practices on environmental performance: Case of Mexican manufacturing companies. *Mathematics*, 10(11), Article 1877. <https://doi.org/10.3390/math10111877>
- Geng, R., Mansouri, S. A., & Aktas, E. (2017). The relationship between green supply chain management and performance: A meta-analysis of empirical evidences in Asian emerging economies. *International Journal of Production Economics*, 183, 245–258. <https://doi.org/10.1016/j.ijpe.2016.10.008>
- Ghozali, I. (2021). *Partial least squares: Konsep, teknik, dan aplikasi menggunakan program SmartPLS 3.2.9 untuk penelitian empiris* (3rd ed.). Badan Penerbit Universitas Diponegoro.
- Green, K. W., Jr., Zelbst, P. J., Meacham, J., & Bhadauria, V. S. (2012). Green supply chain management practices: Impact on performance. *Supply Chain Management: An International Journal*, 17(3), 290–305. <https://doi.org/10.1108/13598541211227126>
- Gully, S. M., Phillips, J. M., Castellano, W. G., Han, K., & Kim, A. (2013). A mediated moderation model of recruiting socially and environmentally responsible job applicants. *Personnel Psychology*, 66(4), 935–973. <https://doi.org/10.1111/peps.12033>
- Guo, Y., Wang, L., & Chen, Y. (2020). Green entrepreneurial orientation and green innovation: The mediating effect of supply chain learning. *SAGE Open*, 10(1), Article 2158244019898798. <https://doi.org/10.1177/2158244019898798>
- Habib, M. A., Balasubramanian, S., Shukla, V., Chitakunye, D., & Chanchaichujit, J. (2022). Practices and performance outcomes of green supply chain management initiatives in the garment industry. *Management of Environmental Quality: An International Journal*, 33(4), 882–912. <https://doi.org/10.1108/MEQ-08-2021-0189>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Castillo Apraiz, J., Cepeda Carrión, G., & Roldán, J. L. (2019). *Manual de partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). OmniaScience. <https://doi.org/10.3926/oss.37>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). SAGE Publications.
- Ismail, I. J. (2023). The influence of green dynamic capabilities on brand sustainability among manufacturing enterprises in Tanzania: Mediation of green technology innovation. *Technological Sustainability*, 2(4), 388–403. <https://doi.org/10.1108/TECHS-03-2023-0016>
- Jabbour, C. J. C., & Stefanelli, N. O. (2021). Fifteen years of green supply chain research. *Revista de Administração da UFSM*, 14(1), 202–212. <https://doi.org/10.5902/1983465961861>
- Laosirihongthong, T., Adebajo, D., & Tan, K. C. (2013). Green supply chain management practices and performance. *Industrial Management & Data Systems*, 113(8), 1088–1109. <https://doi.org/10.1108/IMDS-04-2013-0164>
- Mardatillah, A., Angraini, L. M., & Yuliani, S. (2024). Enhancing marketing performance in batik Malay industry: Optimization competitive advantage by leveraging augmented reality marketing. *Cogent Business & Management*, 11(1), Article 2431187. <https://doi.org/10.1080/23311975.2024.2431187>
- Mousavi, S., Bossink, B., & van Vliet, M. (2018). Dynamic capabilities and organizational routines for managing innovation towards sustainability. *Journal of Cleaner Production*, 203, 224–239. <https://doi.org/10.1016/j.jclepro.2018.08.215>
- Mugoni, E., Kanyepe, J., & Tukuta, M. (2024). Sustainable supply chain management practices (SSCMPS) and environmental performance: A systematic review. *Sustainable Technology and Entrepreneurship*, 3(1), Article 100050. <https://doi.org/10.1016/j.stae.2023.100050>
- Osei-Frimpong, K., McLean, G., Islam, N., & Otoo, B. A. (2022). What drives me there? The interplay of socio-psychological gratification and consumer values in social media brand engagement. *Journal of Business Research*, 146, 288–307. <https://doi.org/10.1016/j.jbusres.2022.03.057>
- Paulraj, A. (2011). Understanding the relationships between internal resources and capabilities, sustainable supply management, and organizational sustainability. *Journal of Supply Chain Management*, 47(1), 19–37. <https://doi.org/10.1111/j.1745-493X.2010.03212.x>
- Qiu, L., Jie, X., Wang, Y., & Zhao, M. (2020). Green product innovation, green dynamic capability, and competitive advantage: Evidence from Chinese manufacturing enterprises. *Corporate Social Responsibility and Environmental Management*, 27(1), 146–165. <https://doi.org/10.1002/csr.1780>

- Rahman, H. U., Zahid, M., & Al-Faryan, M. A. S. (2023). ESG and firm performance: The rarely explored moderation of sustainability strategy and top management commitment. *Journal of Cleaner Production*, 404, Article 136859. <https://doi.org/10.1016/j.jclepro.2023.136859>
- Renwick, D. W., Jabbour, C. J., Muller-Camen, M., Redman, T., & Wilkinson, A. (2016). Contemporary developments in green (environmental) HRM scholarship. *The International Journal of Human Resource Management*, 27(2), 114–128. <https://doi.org/10.1080/09585192.2015.1105844>
- Rodrigo-Alarcón, J., García-Villaverde, P. M., Ruiz-Ortega, M. J., & Parra-Requena, G. (2018). From social capital to entrepreneurial orientation: The mediating role of dynamic capabilities. *European Management Journal*, 36(2), 195–209. <https://doi.org/10.1016/j.emj.2017.02.006>
- Santini, C. (2017). Ecopreneurship and ecopreneurs: Limits, trends, and characteristics. *Sustainability*, 9(4), Article 492. <https://doi.org/10.3390/su9040492>
- Saunders, M. N. K., & Bezzina, F. (2015). Reflections on conceptions of research methodology among management academics. *European Management Journal*, 33(5), 297–304. <https://doi.org/10.1016/j.emj.2015.06.002>
- Saunila, M., Ukko, J., Rantala, T., Nasiri, M., & Rantanen, H. (2020). Preceding operational capacity as antecedents for productivity and innovation performance. *Journal of Business Economics*, 90(4), 537–561. <https://doi.org/10.1007/s11573-019-00963-0>
- Schaltegger, S., & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: Categories and interactions. *Business Strategy and the Environment*, 20(4), 222–237. <https://doi.org/10.1002/bse.682>
- Sezen, B., & Çankaya, S. Y. (2018). Green supply chain management theory and practices. In M. Khosrow-Pour (Ed.), *Operations and service management: Concepts, methodologies, tools, and applications* (pp. 118–141). IGI Global. <https://doi.org/10.4018/978-1-5225-2036-8.ch005>
- Stojanoska, S. (2016). Green supply chain management and environmental sustainability: Challenges and opportunities. *Journal of Sustainable Development*, 9(4), 230–242. <https://doi.org/10.5539/jsd.v9n4p230>
- Suroyo, Soedjiwo, N. A. F., Entas, D., & Putra, B. M. (2025). Javanese batik in Yogyakarta goes viral: Social media's impact on the commercialization and global reach of local textile and cultural identity of Javanese. In L. Khan (Ed.), *Oxford intersections: Social media in society and culture*. Oxford University Press. <https://doi.org/10.1093/9780198945253.003.0039>
- Teece, D. J. (2018). Business models and dynamic capabilities. *Long Range Planning*, 51(1), 40–49. <https://doi.org/10.1016/j.lrp.2017.06.007>
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533.
- Ullah, S., Lin, B., & Zhu, R. (2025). Developing a new sustainable policy perspective for Pakistan: An intricate nexus between green innovation, financial structure, and ecological footprint. *Energy*, 316, Article 134496. <https://doi.org/10.1016/j.energy.2025.134496>
- Zhu, Q., Sarkis, J., & Lai, K. H. (2008). Confirmation of a measurement model for green supply chain management practices implementation. *International Journal of Production Economics*, 111(2), 261–273. <https://doi.org/10.1016/j.ijpe.2006.11.029>
- Zhu, Q., Sarkis, J., & Lai, K. H. (2013). Institutional-based antecedents and performance outcomes of internal and external green supply chain management practices. *Journal of Purchasing and Supply Management*, 19(2), 106–117. <https://doi.org/10.1016/j.pursup.2012.12.001>