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Green Innovation and Competitive Pressure as Drivers of Sustainable Performance in the Fashion Industry

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Abstract

The fashion industry, particularly the fast fashion segment, significantly contributes to environmental degradation through excessive resource use and waste. This study examines how competitive pressure, green product innovation, and green process innovation influence sustainable firm performance among fashion Micro, Small, and Medium Enterprises (MSMEs) in a region. Using the Natural Resource-Based View (NRBV) as a theoretical framework, the research highlights the strategic role of green innovation in building environmentally valuable, rare, inimitable, and non-substitutable (VRIN) capabilities. A quantitative method was employed, with data collected from 100 MSME actors via a structured questionnaire and analyzed using Covariance-Based Structural Equation Modeling (CB-SEM) in AMOS. The findings reveal that competitive pressure, as well as green product and process innovations, have a positive and significant effect on sustainable firm performance. Green product innovation, including eco-friendly materials and circular design, and green process innovation, such as waste-reducing technologies, are identified as crucial strategies for achieving environmental and business goals.

Keywords

Competitive Pressure, Green Product Innovation, Process Innovation, Firm Performance.

1. Introduction

The global fashion industry has come under increasing pressure to adopt sustainable practices due to its significant environmental impact. As awareness of climate change, resource scarcity, and ecological degradation intensifies, both consumers and regulators demand more responsible behavior from businesses. This shift is not only a moral obligation but also a strategic imperative for long-term business viability. Yadav et al. (2024) reports that over 90% of global firms acknowledge that climate change will affect their business by 2050, with 23% already facing its consequences. In response, companies are moving toward sustainability-driven strategies aligned with the green and circular economy paradigms. The fast fashion sector, known for its high-volume production, overconsumption, and waste generation, has emerged as a focal point in this transformation. According to Hameed et al. (2022), the fashion industry contributes to approximately 10% of global carbon emissions and 20% of global wastewater. A joint report by McKinsey & Company and Global Fashion Agenda (2020) suggests the industry may overshoot the 1.5°C climate target unless it accelerates its decarbonization efforts. Moreover, the 2023 Fashion Transparency Index reveals that more than 80% of major brands fail to disclose key environmental and supply chain data, indicating a gap between sustainability rhetoric and actual practices.

In this context, green innovation—which involves the creation of environmentally friendly products and processes—has gained traction as a strategy to improve environmental performance while maintaining competitiveness (Shahzad et al., 2022). The Natural Resource-Based View (NRBV) provides a suitable theoretical lens to understand this phenomenon, positing that firms can achieve sustainable competitive advantages through the development of green capabilities and innovations (Hart, 1995). Braga and Ernst (2023) further emphasize that successful green transitions demand investments in innovation and technology, particularly in resource-intensive industries such as fashion. Competitive pressure also plays a critical role in shaping sustainability strategies. Firms exposed to intense competition tend to adopt green innovation as a means of differentiation and value creation (Sun & Nasrullah, 2024). In addition, evidence from the hospitality and service sectors suggests that market rivalry and consumer expectations can directly encourage Corporate Social Responsibility (CSR) and green practices (Yadav et al., 2024).

Despite the expanding literature, important gaps remain. First, most studies on green innovation and sustainable performance focus on large corporations in developed economies, overlooking the context of Micro, Small, and Medium Enterprises (MSMEs)—which in Indonesia account for 99% of businesses and contribute over 60% of GDP (Kadin, 2024), but also generate around 70% of industrial pollution (Mady et al., 2022). Second, research on fashion MSMEs, particularly in developing countries, remains limited, even though they face mounting pressure to adopt sustainability due to shifts in consumer preferences and global supply chain expectations (Klewitz & Hansen, 2014; Scuotto et al., 2020). Third, the mediating role of green innovation in converting external pressures such as competition into sustainable performance outcomes remains underexplored, particularly through integrated models like NRBV. To address these gaps, this study aims to examine the effects of competitive pressure, green product innovation, and green process innovation on sustainable firm performance among Indonesian fashion MSMEs, using the NRBV framework. Methodologically, the research applies Partial Least Squares Structural Equation Modeling (PLS-SEM) to test the hypothesized relationships. This study contributes theoretically by extending NRBV into the MSME sustainability context, and practically by offering insights for entrepreneurs

and policymakers to foster green innovation within the fashion industry of emerging economies.

2. Literature Review

2.1. Basic theory of Natural Resource Based View (NRBV)

This literature review forms the theoretical foundation of the study *Green Innovation, Competitive Pressure, and Sustainable Performance in the Fashion Industry: An NRBV Approach*. It critically explores the scholarly discourse on sustainability, green capabilities, and competitive strategy, particularly among small and medium-sized enterprises (MSMEs). Central to this review is the Natural Resource-Based View (NRBV), introduced by Hart (1995) and refined by Hart and Dowell (2011), which extends the traditional Resource-Based View (RBV) by integrating environmental concerns into strategic management. NRBV posits that firms can achieve a Sustainable Competitive Advantage (SCA) by developing green capabilities—resources and routines that address environmental issues.

Unlike conventional models that focus solely on economic outcomes, NRBV highlights how environmentally oriented resources—those that are valuable, rare, inimitable, and non-substitutable (VRIN)—can drive both ecological and economic performance (Arya & Lin, 2007; Savino & Shafiq, 2018). Examples include green technologies, eco-efficient production systems, and environmental collaboration with supply chain actors. McDougall et al. (2019) underscore NRBV's growing importance as firms face pressure to reduce their ecological footprint while staying competitive. Rehman et al. (2021) similarly suggest that environmental initiatives, if strategically managed, can fulfill stakeholder demands and enhance firm performance. This creates a reinforcing cycle where sustainability supports innovation, and vice versa (Makhloufi et al., 2022).

NRBV is increasingly applied in research on Green Supply Chain Management (GSCM) and environmental innovation in fashion and manufacturing. According to Çankaya and Sezen (2019), firms that align green resources with their business strategies show improved environmental and financial outcomes. Carbone et al. (2019) also emphasize that partnerships with actors holding VRIN-type green resources strengthen sustainability performance. Recent literature has identified several key determinants that significantly influence sustainable firm performance (SFP), especially among MSMEs adopting environmental innovation.

2.2. Competitive Pressure on Sustainable Firm Performance.

Competitive pressure refers to the extent to which firms are driven by market dynamics including customer expectations and industry rivalry to adopt sustainable practices. Within the Natural Resource-Based View (NRBV) framework, firms facing high competitive intensity are more inclined to implement proactive environmental strategies to stand out and preserve market relevance (Hart, 1995b; Mishra & Yadav, 2021). In the context of the global fashion industry, such pressure has intensified due to the sector's substantial environmental footprint. According to Scuotto et al. (2020), the industry contributes to approximately 10% of global carbon emissions and 20% of global wastewater, making sustainability not only a moral obligation but also a strategic imperative. Widayati et al. (2023) notes that over 90% of global firms recognize climate change will impact their business models by 2050, with nearly a quarter already experiencing its effects.

This heightened awareness has led to greater regulatory and consumer scrutiny, especially targeting fast fashion, known for overproduction, waste, and lack of supply chain transparency (Arinnis et al., 2022). As a result, green innovation—in the form of eco-friendly products and sustainable processes—has become a key mechanism for firms to both meet environmental obligations and maintain competitiveness (Shahzad et al., 2022; Hameed et al., 2022). Bianco et al. (2023) affirm that

competitive pressure drives green innovation adoption, enhancing firm performance. Ngo (2023) similarly finds that external expectations from consumers and regulators accelerate sustainable practices, supporting long-term growth. In line with this, Yadav et al. (2024) and Sun and Nasrullah (2024) observe that firms facing intense competitive and consumer pressure are more active in implementing CSR and green strategies.

H1: Competitive pressure has a positive and significant effect on sustainable firm performance.

2.3. Green Product Innovation on Sustainable Firm Performance.

Green Product Innovation (GPI) reflects a firm's effort to redesign or improve products in ways that reduce environmental impact, such as using sustainable materials, biodegradable packaging, or energy-efficient designs (Seman et al., 2018; Tang et al., 2018a). Within the Natural Resource-Based View (NRBV), such innovation represents rare and valuable resources that contribute to both environmental performance and sustainable competitive advantage (Hart, 1995). This is especially relevant in industries like fashion, which face mounting scrutiny over environmental degradation. The fast fashion sector, in particular, is associated with high-volume production, overconsumption, and waste generation, contributing to nearly 10% of global carbon emissions and 20% of wastewater. Yet, more than 80% of major brands fail to disclose key environmental data, revealing a gap between sustainability claims and actions.

As climate change and ecological concerns intensify, green product innovation emerges as both a moral responsibility and strategic necessity. Arinnis et al. (2022) reports that over 90% of global firms expect climate change to affect their business by 2050. Thus, sustainability-driven strategies aligned with circular economy paradigms are gaining traction. Studies by Braga Junior et al. (2018) and Wang et al. (2021) show that implementing green product innovation enhances competitiveness by meeting the rising demands of environmentally conscious consumers. Furthermore, Ch'ng et al. (2021) emphasize that ecological innovation aligns product development with sustainability goals, ultimately improving organizational performance and long-term viability, especially in resource-intensive sectors like fashion.

H2: Green product innovation has a positive and significant effect on sustainable firm performance.

2.4. Green Process Innovation on Sustainable Firm Performance

Green process innovation refers to improvements in operational activities aimed at minimizing waste, reducing emissions, and enhancing resource efficiency. Within the framework of the Natural Resource-Based View (NRBV), such innovations are essential for fostering long-term environmental and financial sustainability (Han & Chen, 2021). In the fashion industry—which contributes approximately 10% of global carbon emissions and 20% of global wastewater process-based innovations are particularly urgent, as overconsumption and inefficient production cycles remain pervasive. This urgency is heightened by increasing global awareness of climate change and environmental degradation. Widayati et al. (2023) highlights that more than 90% of global firms expect climate change to affect their operations by 2050, with 23% already facing its impacts. As a result, companies are transitioning toward circular and sustainability-driven models.

Ahmed et al. (2023) and Li et al. (2023) demonstrate that green process innovation not only reduces production costs and environmental liabilities but also enhances firm performance across economic, social, and ecological dimensions. These innovations help firms meet regulatory requirements, adapt to market

expectations, and gain reputational advantages. Padilla-Lozano and Collazzo (2022) further argue that process-oriented sustainability enables firms to strengthen their competitiveness in highly regulated and environmentally sensitive sectors such as fashion. Moreover, Shahzad et al. (2022) and Hameed et al. (2022) emphasize that adopting environmentally friendly processes can maintain market relevance while fulfilling stakeholder demands. As such, green process innovation is a strategic pathway for firms—especially MSMEs—to align with NRBV principles and respond proactively to both ecological and economic pressures in today’s sustainability-focused business landscape.

H3: Green process innovation has a positive and significant effect on sustainable firm performance.

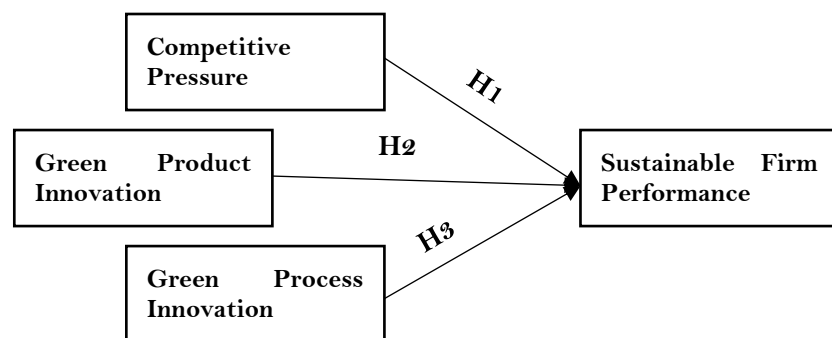


Figure 1. Conceptual Framework

Figure 1 presents a conceptual framework that illustrates the relationship between Competitive Pressure, Green Product Innovation, Green Process Innovation, and Sustainable Firm Performance in the context of business demand. The model shows three main hypotheses. The first hypothesis (H1) states that Competitive Pressure has a direct effect on Sustainable Firm Performance. Meanwhile, Green Product Innovation and Green Process Innovation are considered as two innovative factors that also affect disadvantages, ignored by H2 and H3, respectively. Thus, this model integrates external and internal factors in explaining how firms—especially in the fashion sector—can achieve sustainable performance through competitive pressure and implementing green innovation.

A key dependent variable in this study, Sustainable Firm Performance (SFP), refers to the integration of environmental, economic, and social goals within the business model (Stanciu et al., 2014; Han & Chen, 2021a). The Triple Bottom Line (TBL) framework categorizes these dimensions into economic (profitability and productivity), environmental (pollution reduction, eco-efficiency), and social (community impact and stakeholder inclusion) performance (Caldelli & Parmigiani, 2004). The evolving emphasis on green innovation and environmental performance has been crucial for firms responding to global sustainability imperatives (Li et al., 2019). Competitive Pressure is recognized as a primary external driver influencing organizational adoption of green strategies. Market rivalry, changing consumer preferences, and regulatory developments compel firms to innovate to survive and thrive (Estola & Dannenberg, 2017; Sarfraz et al., 2021). Empirical studies suggest that competition leads firms to engage in green innovation and develop green CSR strategies as means to stand out and remain viable (German et al., 2023; Bianco et al., 2023). In the fashion industry, this is particularly relevant as firms compete on both aesthetic appeal and ethical integrity.

Green Product Innovation focuses on redesigning products to minimize environmental impact, including reducing emissions and using renewable materials

(Seman et al., 2018; Tang et al., 2018a). It is regarded as a critical dimension of environmental strategy that aligns ecological goals with consumer value creation (Braga Junior et al., 2018). This capability enables firms to differentiate themselves while contributing to sustainable performance (Ifrim et al., 2018; Han & Chen, 2021). Green Process Innovation, on the other hand, refers to the implementation of environmentally friendly practices throughout operational processes. These may include waste minimization, resource efficiency, and pollution prevention measures (Awan et al., 2021; Khan et al., 2021). Process innovations have shown to improve sustainability outcomes while enhancing operational effectiveness and reducing costs (Padilla-Lozano & Collazzo, 2022; Ahmed et al., 2023).

3. Methods

This study employs a quantitative research design to examine the relationship between green innovation, competitive pressure, and sustainable firm performance within the fashion industry. The investigation is anchored in the theoretical framework of the Natural Resource-Based View (NRBV), which emphasizes the strategic importance of environmentally sustainable capabilities. A structured methodological approach was followed to ensure reliability, clarity, and replicability, with data collected through a standardized process and analyzed using rigorous statistical techniques suitable for hypothesis testing.

The target population includes owners and managers of small and medium-sized fashion enterprises (MSMEs) located in Semarang, Indonesia, who are engaged in sustainability practices within their business operations. The focus on this group stems from the significant role MSMEs play in Indonesia's economy and their notable contribution to environmental issues. Respondents were selected using a purposive non-probability sampling technique, considering the need to involve participants who have knowledge of and experience in sustainability implementation. This method allows researchers to concentrate on specific respondent characteristics that are critical to the study's objectives. In accordance with recommendations for Structural Equation Modeling (SEM) sample size adequacy, the study targeted 100 respondents to ensure sufficient statistical power for model testing.

Data collection was conducted through an online survey using Google Forms, which contained closed-ended questions measured on a 10-point Likert scale, ranging from 1 (strongly disagree) to 10 (strongly agree). This scale facilitated nuanced responses while maintaining consistency and ease of quantification. In addition to primary data, secondary data were sourced from academic journals, government reports, and industry publications to support the contextual background and enrich the interpretation of findings. The questionnaire focused on capturing respondents' perceptions of sustainable practices, innovative efforts, and external competitive dynamics within their firms.

The study operationalized four primary constructs: sustainable firm performance, competitive pressure, green product innovation, and green process innovation. Sustainable firm performance was measured using indicators adapted from Sun and Nasrullah (2024) and Yadav et al. (2024), including environmental achievements, socio-economic contributions, product development, and brand reputation. Competitive pressure was assessed through indicators reflecting market-driven motivations for sustainability, such as environmental positioning, responsiveness to green consumer preferences, and market share enhancement. Green product innovation captured firms' efforts to redesign products and reduce environmental impact through production modifications, while green process innovation included items related to resource efficiency, green technology adoption, and eco-friendly material use.

Construct validity and reliability were evaluated using Confirmatory Factor Analysis (CFA) in AMOS. Convergent validity was confirmed when factor loadings

exceeded 0.50 and the Average Variance Extracted (AVE) met the threshold of ≥ 0.50 . Internal consistency was ensured through Cronbach's Alpha and Composite Reliability (CR), both of which required minimum values of 0.70 for acceptance. For hypothesis testing, the study employed Covariance-Based Structural Equation Modeling (CB-SEM) using AMOS software. CB-SEM was chosen for its ability to test complex theoretical models and evaluate both measurement and structural components simultaneously. This comprehensive methodological design supports the robustness of the findings and facilitates future research replication.

4. Results

This study focuses on business actors in the fashion industry operating in the Semarang City area. The fashion industry was chosen as the object of research due to its significant contribution to the creative economy, as well as its complex environmental challenges, such as the use of non-environmentally friendly raw materials and the generation of textile waste. In recent years, this sector has faced increasing competitive pressure from both local and global market demands, prompting industry players to adopt green innovation strategies in order to maintain competitiveness and achieve sustainable firm performance. Specifically, this study examines the influence of Green Product Innovation, Green Process Innovation, and Competitive Pressure on Sustainable Firm Performance (SFP) using the Natural Resource-Based View (NRBV) approach, which emphasizes the importance of environmentally-based resources and capabilities.

Table 1. Respondents by Job Category

Category	Subcategory	Number of Respondents	Percentage (%)
Position	Business Owner	85	85%
Position	Staff (Marketing/Finance/Administration)	15	15%
Gender	Female	76	76%
Gender	Male	24	24%
Business Scale	Micro	90	90%
Business Scale	Small	10	10%

Based on the Table 1, a total of 100 respondents participated in this study, all of whom were individuals actively engaged in the fashion industry in Semarang, Indonesia. These participants included a mix of business owners, marketing staff, finance personnel, and administrative employees. However, the majority—approximately 85%—were business owners or founders. This composition is particularly valuable, as business owners are typically the key decision-makers responsible for shaping strategic directions related to innovation, environmental practices, and long-term sustainability within their enterprises.

In terms of gender distribution, the study revealed a predominance of female respondents, who made up 76% of the sample. This finding underscores the significant role women play in Indonesia's fashion MSME sector, especially in areas such as design, production, and marketing. The high representation of female entrepreneurs reflects broader trends in the creative industries, where women often lead in business ownership and operational innovation. Furthermore, the scale of businesses represented in this research was predominantly micro in nature. Approximately 90% of respondents operated micro-enterprises with annual turnovers below IDR 300 million. The remaining 10% represented small enterprises, while no participants were categorized as medium enterprises. This distribution

highlights the study’s focus on the grassroots level of Indonesia’s fashion industry, where resource constraints are common but innovation and sustainability initiatives are increasingly being explored in response to competitive and environmental pressures.

Table 2. Respondents by Readiness Level Category

Category	Number of Respondents	Percentage (%)
Level 1 (Potential)	10	10%
Level 2 (Successful Fashion Industry)	60	60%
Level 3 (Digital Success)	25	25%
Level 4 (Export Potential)	5	5%
Total	100	100%

Table 2 show the mapping of business readiness levels shows that 60% of respondents are at Level 2 (Successful Fashion Industry), which refers to businesses that are ready to expand their markets through digitalization and access to financing. About 25% of respondents are at Level 3 (Digital Success), having utilized digital technology in their business processes, while 10% are at Level 1 (Potential), still requiring basic mentoring. The remaining 5% are at Level 4 (Export Potential), indicating readiness to enter international markets. These findings suggest that although most fashion industry players are still in the development phase, there is significant potential for growth and expansion, particularly through sustainable green innovation strategies.

The normality test in this study was conducted to ensure that the data used met the assumption of normal distribution, which is a crucial requirement in parametric statistical analysis. According to the guidelines provided by Kliner (2011) and Finney and DiStefano (2006), univariate normality can be assessed through skewness and kurtosis values, particularly based on the critical ratio (c.r) values. A dataset is considered normally distributed if the skewness c.r is below 3 and the kurtosis c.r is below 7, with a significance level of 0.01

Table 3. Normal Test Results

Variable	Min	Max	Skew	c.r.	Kurtosis	c.r.
SFP3	6.000	10.000	0.285	1.162	-0.206	-0.421
SFP2	6.000	10.000	0.042	0.170	-0.399	-0.813
SFP1	6.000	10.000	0.069	0.282	-0.458	-0.934
PSI1	6.000	10.000	0.155	0.634	-0.885	-1.807
PSI2	6.000	10.000	0.160	0.655	-0.359	-0.733
PSI3	6.000	10.000	0.187	0.764	-0.901	-1.840
CP1	6.000	10.000	0.329	1.344	-0.966	-1.972
CP2	6.000	10.000	0.418	1.705	-0.899	-1.836
CP3	6.000	10.000	0.337	1.376	-1.198	-2.446
PDI1	6.000	10.000	-0.108	-0.440	-0.597	-1.218
PDI2	6.000	10.000	0.167	0.683	-0.681	-1.390
PDI3	6.000	10.000	0.295	1.206	-0.856	-1.748

The test results based on Table 3 showed that all variables in Group 1 met the normality criteria. The skewness c.r values for all variables ranged from 0.042 (SFP2) to 1.376 (CP3), indicating that none of the variables exhibited extreme skewness. Meanwhile, the kurtosis c.r values ranged from -2.446 (CP3) to -0.206 (SFP3), which also fell within the acceptable range. This indicates that the data distribution peaks did not significantly deviate from the normal distribution.

Furthermore, the multivariate kurtosis value of 8.234 with a c.r of 2.246 also indicated that the data did not exhibit significant multivariate deviations, as it

remained within the defined threshold (< 7). Therefore, it can be concluded that the data in this group met the assumptions of both univariate and multivariate normality, making it suitable for further analysis such as Structural Equation Modeling (SEM) or linear regression analysis.

Based on the results of the Structural Equation Modeling (SEM) analysis using AMOS software, hypothesis testing was conducted by referring to the values of the Critical Ratio (C.R) and P-Value. According to Ghozali (2015), a relationship between variables is considered significant if the C.R value is greater than 1.96 and the P-Value is less than 0.05.

Table 4. Hypothesis Testing Results

Hypothesis	Path	Estimate	C.R	P-Value / Note
H1	SFP ← PDI	0,225	2.737	0.006 (Significant)
H2	SFP ← CP	0,15138889	3.348	< 0.001 (***) Significant
H3	SFP ← PSI	0,24791667	3.460	< 0.001 (***) Significant

Table 4 explains that in the first hypothesis (H1), the path from Green Product Innovation (PDI) to Sustainable Firm Performance (SFP) had an estimate value of 0.324, a C.R value of 2.737, and a P-Value of 0.006. Since the C.R > 1.96 and P < 0.05 , it can be concluded that there is a significant positive relationship between green product innovation and sustainable firm performance. This means that the higher the level of green product innovation implemented by a company, the better its performance in terms of sustainability. In the second hypothesis (H2), the path from Competitive Pressure (CP) to SFP had an estimate value of 0.218, with a C.R of 3.348 and a highly significant P-Value (***) below 0.001. This indicates that competitive pressure significantly and positively influences sustainable firm performance. In other words, the more intense the competition perceived by fashion industry players, the greater the drive for firms to enhance their sustainability performance to maintain a competitive edge. This finding aligns with institutional pressure theory, which states that external pressures can motivate organizations to improve their performance, including in the area of sustainability.

Furthermore, the third hypothesis (H3), which examined the influence of Green Process Innovation (PSI) on SFP, also showed significant results. The path estimate was 0.357, with a C.R of 3.460 and a highly significant P-Value (***) below 0.001. This suggests that the better a company is at implementing environmentally friendly process innovations—such as energy efficiency, waste reduction, and the use of green technologies—the higher its sustainable performance will be. Overall, these test results confirm that all three independent variables in the research model—Green Product Innovation, Competitive Pressure, and Green Process Innovation—have a significant positive effect on Sustainable Firm Performance. This conclusion is further supported by the data analysis results presented in Table 4.7. The implication of these findings is that environmentally driven strategies and external pressures can encourage companies, particularly in the fashion industry, to enhance their sustainability practices in business operations.

Table 5. Hypothesis Testing Results

Path	Estimate	S.E.	C.R.	P	Label
SFP ← PDI	0.324	0.118	2.737	0.006	par_9
SFP ← CP	0.218	0.065	3.348	***	par_10
SFP ← PSI	0.357	0.103	3.460	***	par_11
PDI3 ← PDI	1.000	—	—	—	—
PDI2 ← PDI	1.164	0.188	6.198	***	par_1
PDI1 ← PDI	1.040	0.185	5.630	***	par_2
CP3 ← CP	1.000	—	—	—	—

Path	Estimate	S.E.	C.R.	P	Label
CP2 ← CP	0.878	0.102	8.602	***	par_3
CP1 ← CP	0.836	0.097	8.605	***	par_4
PSI3 ← PSI	1.000	—	—	—	—
PSI2 ← PSI	0.893	0.141	6.328	***	par_5
PSI1 ← PSI	0.910	0.149	6.092	***	par_6
SFP1 ← SFP	1.000	—	—	—	—
SFP2 ← SFP	1.090	0.116	9.404	***	par_7
SFP3 ← SFP	1.060	0.111	9.586	***	par_8

Table 5 presents the results of regression weights from the structural model tested using Covariance-Based Structural Equation Modeling (CB-SEM). The results show that all main paths in the model are statistically significant. Competitive Pressure (CP), Green Product and Process Innovation (PDI and PSI) have a positive and significant influence on Sustainable Firm Performance (SFP), each with coefficient estimates of 0.218 ($p < 0.001$), 0.324 ($p = 0.006$), and 0.357 ($p < 0.001$). All latent indicators also show good construct validity, as seen from the Critical Ratio (C.R.) value which exceeds the threshold value of 1.96 and significance ($p < 0.001$). For example, indicators PDI2 and PDI1 have estimates of 1.164 and 1.040 with C.R. of 6.198 and 5.630, respectively. Similarly, the CP2 and CP1 indicators show a strong contribution to the CP variable, with C.R. of 8.602 and 8.605, respectively. These results indicate that the overall model has reliable measurements and support the hypothesis that competitive pressure and green innovation contribute positively to the sustainable performance of fashion companies.

5. Discussion

The findings of this study affirm that competitive pressure, green product innovation, and green process innovation significantly contribute to the sustainable performance of fashion MSMEs in Semarang, thereby validating the theoretical underpinnings of the Natural Resource-Based View (NRBV). According to Hart (1995) and Hart and Dowell (2011), firms can achieve a sustainable competitive advantage by leveraging green capabilities and environmentally oriented strategies. This study's results support that perspective, showing how external pressures and internal innovation drive sustainability outcomes. Notably, the influence of competitive pressure underscores the role of market dynamics in compelling firms to embrace green practices, consistent with the observations of Bianco et al. (2023) and German et al. (2023), who highlighted that firms adopt green strategies in response to stakeholder and institutional demands.

The significant impact of competitive pressure on sustainable firm performance aligns with prior research suggesting that competitive environments push businesses toward green innovation as a differentiating factor (Estola & Dannenberg, 2017; Mishra & Yadav, 2021). In the context of fashion MSMEs, where brand positioning and customer perceptions are crucial, the ability to demonstrate environmental responsibility enhances competitiveness. Sun and Nasrullah (2024) and Yadav et al. (2024) further argue that external environmental pressures—such as consumer preferences and regulations—are key triggers for sustainability transformation. This study corroborates those insights, revealing that firms exposed to higher competitive intensity tend to invest more in sustainable capabilities, not merely to comply with regulations but also to secure long-term market relevance.

Green product innovation, as found in this study, also plays a pivotal role in enhancing sustainable performance. By redesigning products with lower environmental impact and greater customer value, firms can simultaneously achieve ecological and economic objectives. This finding is echoed in previous research by Braga Junior et al. (2018), Ifrim et al. (2018), and Wang et al. (2021), who

demonstrate that eco-conscious product design can lead to increased brand equity, customer loyalty, and overall firm performance. Tang et al. (2018a) similarly emphasize the importance of integrating sustainability at the product development stage to align with consumer expectations. The study also confirms the NRBV proposition that innovation in products can act as a valuable, rare, and inimitable resource contributing to long-term advantage (Arya & Lin, 2007; Savino & Shafiq, 2018).

Moreover, green process innovation was found to have a strong positive effect on firm performance. This supports the view that sustainable operational changes—such as resource efficiency, waste reduction, and clean technology adoption—can simultaneously reduce costs and environmental harm. Previous studies by Padilla-Lozano and Collazzo (2022), Ahmed et al. (2023), and Li et al. (2023) have similarly shown that green process innovation improves performance across environmental, social, and economic dimensions. Awan et al. (2021) also note that in the age of Industry 4.0, green processes are essential for modernizing production and meeting stakeholder demands. In the case of fashion MSMEs, which often operate under limited resources, such innovations offer a practical and impactful path to sustainable development.

Collectively, these findings make a notable contribution to the literature on green innovation and sustainability in emerging economies. While most prior studies have focused on large corporations in developed countries (Klewitz & Hansen, 2014; Ch'ng et al., 2021), this research provides new empirical evidence from the MSME sector in Indonesia. It underscores that even micro and small businesses are capable of adopting green strategies and benefiting from them—provided they face the right market stimuli and possess innovation capability. Thus, beyond confirming theoretical expectations, the study highlights practical pathways for fashion MSMEs to achieve sustainable performance, reinforcing the importance of integrating green innovation as both a reactive and proactive business strategy.

6. Conclusion

This study finds that competitive pressure, green product innovation, and green process innovation significantly influence the sustainable performance of fashion industry MSMEs in a region. Using the Natural Resource-Based View (NRBV) framework, the research demonstrates that environmentally oriented capabilities are key drivers of sustainable competitive advantage. These findings highlight that MSMEs, although often constrained by limited resources, can enhance sustainability and performance through innovation in both products and processes. The practical implications of these results are particularly relevant for MSME actors, policymakers, and industry stakeholders. For MSMEs, integrating green innovation into business strategies can improve market competitiveness while responding to increasing environmental and consumer pressures. In industries with high environmental impact, such as fashion, this approach is essential not only for environmental compliance but also for brand differentiation and long-term resilience.

Theoretically, this study reinforces and extends the NRBV framework in the context of developing countries, particularly among micro and small enterprises. It confirms that green capabilities—when supported by external pressures—can function as strategic assets that influence firm performance. The findings contribute to the growing literature on sustainability-oriented innovation by applying NRBV in the underexplored context of creative industry MSMEs. However, the study has several limitations. The use of a purely quantitative approach may not capture nuanced behavioral or motivational factors influencing green innovation. Additionally, data collection was limited, which restricts the generalizability of findings to other regions or sectors. Future research should consider a mixed-

method approach to explore deeper insights into the behavioral and institutional factors behind green adoption. Expanding the research to other regions, sectors, and types of enterprises would also strengthen the generalizability of the findings. Moreover, examining the role of external actor such as government policy, consumer behavior, and industry associations can enrich understanding of the broader ecosystem supporting MSMEs' green transformation.

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Data Disclosure Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.



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