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Green Manufacturing and CSR in Enhancing Firm Performance: The Mediating Role of Firm Reputation

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Abstract

This study aims to examine the effect of green manufacturing and Corporate Social Responsibility (CSR) on company performance, with company reputation as a mediating variable. The theoretical basis used is the Natural Resource-Based View (NRBV), which states that resources and capabilities oriented towards sustainability can be the basis for long-term competitive advantage. Data were collected through a survey of manufacturing companies in Central Java Province that have implemented Life Cycle Assessment (LCA). The analysis was conducted using Structural Equation Modeling (SEM) to test the direct and indirect effects between variables. The results showed that green manufacturing and CSR had a significant effect on company reputation, which in turn had a positive effect on company performance. In addition, green manufacturing and CSR were also proven to have a direct effect on performance, although the mediating role of company reputation was not statistically significant. These findings emphasize the importance of reputation as a strategic intangible asset, but its effectiveness as a mediator can vary depending on the organizational context. This study recommends a broader application of environmental and social strategies, and encourages further research with a wider sample size and mediating variables.

Keywords

Green Manufacturing, Corporate Social Responsibility, Firm Reputation, Firm Performance, Life Cycle Assessment, Manufacturing Industry.

1. Introduction

The increasing public interest in companies' green actions is a consequence of the growing concern over environmental issues that currently threaten the world (Centobelli et al., 2020). There are so-called Grand Societal Challenges, which are urgent global goals faced by society, particularly concerning the environment (Cappa et al., 2022; Foray et al., 2012; Papa et al., 2017; Pisello et al., 2017). This is because human activities are among the most harmful factors in environmental degradation and the depletion of natural resources, making environmental issues a priority for governments, organizations, and individuals (Ardito & Dangelico, 2018; Buysse & Verbeke, 2003; Michelino et al., 2019). Companies that produce goods are moving toward adopting green manufacturing practices for various reasons: to benefit the environment and, by extension, society as a whole (Porter & Van Der Linde, 1995); to improve their corporate brand image and thus their reputation among consumers (Bird et al., 2007); and to attract customers who prefer environmentally responsible companies, which in turn has the effect of enhancing the economic performance of these companies (Bai & Sarkis, 2017; Böhringer et al., 2012). Green manufacturing involves environmental awareness in manufacturing and related interventions (Rusinko, 2007), such as utilizing various types and amounts of green and renewable energy sources (Lozano et al., 2018) and engaging in green supply chains (Liu & Xiao, 2020).

Green economy is an economic system that aims to improve human welfare and social equity while significantly reducing environmental risks and ecological scarcity. Green economy is characterized by low carbon emissions, resource efficiency, and social inclusiveness. Based on the Greenhouse Gas (GHG) emission reduction program, the verification results for the 2021 reporting year show that until 2020, emissions have been reduced by 2,730,564.26 tons of CO₂e or 99.3% of the industrial sector's NDC (Nationally Determined Contribution) target in 2030 (2.75 million tons of CO₂e) (Ministry of Industry, 2022).

In 2021, a total of 152 companies participated. This number is still relatively small compared to the total number of medium- and large-scale industrial companies in Indonesia. According to the 2021 Manufacturing Industry Directory from Statistics Indonesia, there were around 29,000 medium and large industrial companies in 2021 (Kemenperin, 2022). This means that green industry certification as of last year had only reached 0.15 percent.

Table 1. Distribution of Number of Businesses

Sector	Business Field	Number of Businesses
Energy	Supply of Electricity, Gas, Steam/Hot Water and Cold Air	7
	Transportation and Warehousing	74
Forestry	Arts, Entertainment and Recreation	7
	Agriculture, Forestry and Fisheries	38
Agriculture	Supply of Electricity, Gas, Steam/Hot Water and Cold Air	1
	Agriculture, Forestry and Advertising	52
Waste	Water Management, Waste Water Management, Waste Management and Recycling, and Remediation Activities	12
	Government Administration, Land and Mandatory Social Security	4
IPPU	Other Service Activities	4
	Rental and Lease Activities Without Option Rights, Employment, Travel Agents and Other Business Support	9

Sector	Business Field	Number of Businesses
	Professional, Scientific and Technical Activities	5
	Processing Industry	19
	Information and Communication	14
	Arts, Entertainment and Recreation	34
	Construction	39
	Education	1
	Provision of Electricity, Gas, Steam/Hot Water and Cold Air	1
	Transportation and Warehousing	16
	Water Management, Wastewater Management, Waste Management and Recycling, and Remediation Activities	3
Other	Provision of Accommodation and Provision of Food and Beverages	26
	Wholesale and Retail Trade, Repair and Maintenance of Cars and Motorcycles	24
	Mining and Quarrying	42
	Agriculture, Forestry and Fisheries	53
	Real Estate	3
Total number		919

Firm performance is a critical indicator of a company's success, reflecting its ability to achieve strategic goals. Several factors influence firm performance, including green manufacturing and Corporate Social Responsibility (CSR). Green manufacturing contributes to environmental protection, boosts organizational profit, and enhances public image. However, prior research shows mixed findings: while some studies (Hassan & Jaaron, 2021) indicate a positive impact on firm performance, others (Shahzad et al., 2022) found no significant effect. Similarly, CSR—companies' efforts to be socially responsible—also plays a role in influencing firm performance. CSR strengthens relationships with stakeholders, improves public image, and can enhance productivity and financial performance. Yet, as with green manufacturing, findings are inconsistent. Some studies (Ubeda-Garcia et al., 2020) support a positive effect, while others (Flah et al., 2024) found no such impact. This study aims to examine the influence of green manufacturing and Corporate Social Responsibility (CSR) on company performance, with company reputation.

2. Literature Review

2.1. The Role of Green Manufacturing

Green manufacturing is a strategic approach in the production process that emphasizes efficient use of resources and overall reduction of environmental impact. This concept covers various aspects such as compliance with environmental regulations, waste control, natural resource conservation, and management of toxic materials (Zhu & Sarkis, 2004). Through the 6R principles of re-design, recycle, reuse, remanufacture, reduce, and recover, companies are required to redesign their operational systems to be environmentally friendly and sustainable (Rehman et al., 2016). The implementation of green manufacturing not only increases the company's environmental awareness, but also contributes to social performance through support for Corporate Social Responsibility (CSR), and has a positive impact on the company's overall performance. Previous studies have shown that this strategy, if fully integrated with an Environmental Management System (EMS), can improve a

company's reputation, cost efficiency, and competitiveness (Buffa et al., 2018; Wibowo et al., 2018). Therefore, this study adopts indicators from Rehman et al. (2016), which includes the use of life-cycle assessment, recyclable and reusable materials, hazardous material-free products, and the implementation of environmental management systems.

H1: Green manufacturing has a significant effect on corporate social responsibility.

H2: Green manufacturing has a significant effect on firm performance.

2.2. The Role of Corporate Reputation

Corporate reputation is one of the rare intangible assets and has high strategic value in forming a company's competitive advantage (Ghosh, 2017). Corporate reputation is defined as a comprehensive evaluation, both positive and negative, that develops over time and is greatly influenced by stakeholders' direct experiences with the company's activities (Birkey et al., 2016). Philanthropic and environmentally friendly corporate activities are key elements in forming a strong reputation perception (Kumar, 2018). A good reputation can strengthen a company's position in the market by increasing public trust, ease of obtaining funding, and attracting consumers and competent workers (Morales-Raya et al., 2019). In addition to being a tool for product and service differentiation, corporate reputation also functions as an internal mechanism to motivate employees and as a positive signal to investors and business partners. Several studies have stated that corporate reputation has a significant relationship with organizational performance; Sarbutts (2003) emphasized that reputation is a strategic element that can strengthen long-term competitive advantage. Amidst increasing consumer awareness of sustainability and ethical issues, a positive reputation plays a vital role in driving corporate engagement in corporate social responsibility (CSR), while improving overall performance. Bahta et al. (2021) and Tangngisalu et al. (2020) show corporate reputation based on indicators that include positive consumer perceptions, consumer views on the company's success and sustainability, and public recognition received.

H3: Corporate reputation has a significant effect on corporate social responsibility.

H4: Corporate reputation has a significant effect on firm performance.

2.3. Corporate Social Responsibility and Firm Performance

Corporate Social Responsibility (CSR) has become an important element in modern business strategies, especially in relation to improving corporate performance. CSR refers to a company's commitment to carrying out socially and environmentally responsible business activities, beyond mere financial interests. In this context, CSR is not only seen as a form of moral or regulatory compliance, but also as a strategic investment that can strengthen a company's competitive position in the market. Various studies have shown that companies that are active in CSR activities tend to gain a positive reputation, consumer loyalty, and investor trust, which indirectly impacts performance improvement (Afum et al., 2020; Gimeno-Arias et al., 2021). On the other hand, firm performance is a measure of a company's success in achieving its strategic goals, both in financial and non-financial aspects. According to Mulyadi (2007), corporate performance reflects the success in implementing established strategic initiatives. In an increasingly competitive business environment, performance measurement is not only limited to aspects of profit and revenue, but also includes adaptability to market changes and sustainable growth (Nugrahayu & Endang, 2015). Therefore, companies that are able to effectively integrate social responsibility into their operations have a greater chance of creating long-term value and improving overall business performance. This study

measures company performance based on indicators from Afum et al. (2020) and Gimeno-Arias et al. (2021), such as market adaptability, growth, profitability, and increased sales compared to competitors.

H5: Corporate Social Responsibility (CSR) has a significant effect on firm performance.

2.4. Corporate Social Responsibility as a Mediation

Corporate Social Responsibility (CSR) is a form of company commitment to be responsible for the social and environmental impacts of its operational activities. CSR is not only a legal obligation, but also reflects an indirect relationship between companies and communities as partners in sustainable development (Abdelfattah & Aboud, 2022). In this context, CSR becomes an important means for companies to gain social legitimacy through compliance with regulations, environmental conservation, and contributions to local community welfare and national development.

The role of CSR as a mediating variable is increasingly receiving attention because it is able to bridge the influence of internal company factors—such as green manufacturing or corporate reputation—on firm performance. Effective CSR implementation can strengthen a company's reputation, create public trust, and expand relations with stakeholders, including the government and local communities (Firmansyah et al., 2022). In addition, CSR can improve a company's moral image, attract investors, and provide long-term competitive advantages (Balon et al., 2022).

Sanusi and Johl (2022) emphasized that CSR also has a positive impact on the company's internal performance by increasing employee motivation, productivity, and operational efficiency. Therefore, in this study, CSR is measured by indicators from Nguyen et al. (2021), which include: participation in environmental conservation, implementation of negative impact reduction programs, involvement in social campaigns, and provision of transparent product information. With this strategic role, CSR is believed to function as a mediator that strengthens the relationship between corporate sustainability values and overall performance improvement.

H6: Corporate Social Responsibility (CSR) as a mediator of green manufacturing and firm performance.

H7: Corporate Social Responsibility (CSR) as a mediator of corporate reputation and firm performance.

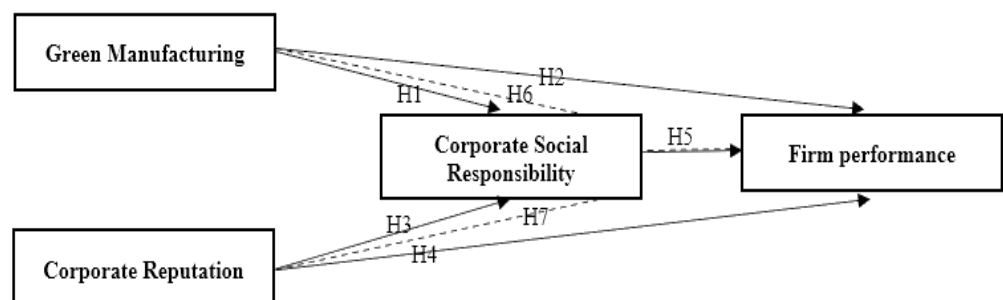


Figure 1. Research Framework

The research framework in Figure 1 is designed to test the direct and indirect effects between green manufacturing, corporate reputation, corporate social responsibility (CSR), and firm performance. This study proposes that green manufacturing not only has a direct impact on firm performance (H2), but also on

corporate social responsibility or CSR (H1), which then acts as a mediator (H6). Likewise, corporate reputation is expected to have a direct effect on CSR (H3) and firm performance (H4), as well as an indirect effect through CSR as a mediating variable (H7). CSR in this model functions as a strategic element that bridges sustainability values and social accountability with business performance achievement (H5). These relationships are designed to illustrate how sustainable practices and positive stakeholder perceptions of the company can make significant contributions to the company's overall performance. By combining operational elements, reputation, social responsibility, and business results, this framework provides a holistic understanding of the value creation mechanism in the context of sustainable business.

3. Methods

This study uses a quantitative approach with a survey method to collect primary data directly from respondents. The main instrument used is a closed questionnaire based on a 7-point Likert scale. This scale is considered effective in reducing measurement bias and increasing the reliability of respondent data. The population in this study were manufacturing companies operating in Central Java Province, especially those that have implemented green manufacturing practices and conducted Life Cycle Assessments (LCA). The sampling technique used purposive sampling with the criteria that the company has implemented LCA for at least the last two years, has an annual report that presents CSR information and company reputation, and is willing to fill out the research questionnaire. Of the 300 questionnaires distributed, 181 questionnaires were declared valid and usable, reflecting a response rate of 60.3%.

The data collected consisted of primary data through questionnaires, as well as secondary data obtained from annual reports, academic journals, official company websites, and government publications. The validity of the instrument content was tested through a feasibility test with a semantic and statistical approach. The semantic test was carried out referring to the concept of Sudaryat (2009) to assess whether the indicators used were in accordance with the meaning and construct of the variables being measured. Statistical tests included convergent validity and reliability tests through outer loading values, Average Variance Extracted (AVE), and Composite Reliability (CR). Data processing was carried out using the Structural Equation Modeling (SEM) method based on Partial Least Squares (PLS) through SmartPLS software. The SEM model was chosen because it is suitable for testing complex latent relationships between independent, mediating, and dependent variables. Basic assumptions of SEM such as data normality are not the main requirements in PLS, but multicollinearity, outliers, and common method bias checks are still carried out to ensure model quality. With this approach, the study aims to test the direct and indirect relationships between green manufacturing, corporate reputation, CSR, and firm performance, as well as examine the mediating role of CSR in the influence of two independent variables on firm performance.

4. Results

The findings of this study indicate several significant positive relationships among the variables studied. Corporate reputation has a positive influence on corporate performance. A strong corporate reputation helps companies adapt to market demands, attract investors, and motivate employees, thus serving as a valuable and scarce resource that contributes to sustainable competitive advantage. Green manufacturing has a positive impact on corporate performance. The adoption of green manufacturing practices plays a significant role in improving organizational profitability and public image. By promoting efficient utilization of resources

including energy, water, raw materials, and waste reuse through reverse logistics, green manufacturing enables companies to meet stakeholder demands for better environmental impact, satisfy customers, and create a potential competitive niche. The study found that green manufacturing also has a positive impact on corporate reputation. Sustainable initiatives, particularly those related to green manufacturing, lead to improved reputation outcomes.

To maintain this enhanced reputation, companies must view green manufacturing as an integral and non-negotiable part of their operations. Such environmentally conscious practices tend to enhance a company's reputation, making it more attractive to various stakeholders. Corporate social responsibility (CSR) has a positive impact on company performance. This significant relationship suggests that ignoring business ethics can have a negative impact on company performance. Companies that strategically engage in CSR activities consistently improve their public image and build strong relationships with stakeholders, which in turn improves overall company performance. Finally, this study reveals that CSR has a positive impact on company reputation. Companies that actively engage in CSR initiatives strengthen their competitive position by increasing employee CSR engagement and commitment. Positive perceptions of CSR tend to increase employee trust in their leadership, as it signals that the company serves the interests of all stakeholders and is, therefore, more trustworthy as can be seen in Table 2.

Table 2. Path Coefficient Test Results

Indicator	Model	CSR	Green Manufacturing	Corporate Reputation	Firm Performance
Direct Effect	Corporate Reputation	0.170	0.167	0.000	0.000
	Firm Performance	0.228	0.169	0.299	0.000
Indirect Effect	Corporate Reputation	0.000	0.000	0.000	0.000
	Firm Performance	0.051	0.050	0.000	0.000
Total Effect	Corporate Reputation	0.170	0.167	0.000	0.000
	Firm Performance	0.278	0.219	0.299	0.000

The results of the analysis in Table 2 show that the most dominant variable directly influencing company performance (Y) is company reputation (Z) with an influence coefficient of 0.299, followed by corporate social responsibility (CSR/X2) of 0.228, and green manufacturing (X1) of 0.169. This finding confirms that positive public perception of company reputation is the most significant factor in improving performance, reflecting the strategic value of intangible assets. CSR also plays an important role because of its contribution to social legitimacy and good relations with stakeholders. Meanwhile, although green manufacturing has a positive impact, its influence is relatively smaller than the other two variables. This shows that the adoption of environmentally friendly practices has not been fully internalized as a major competitive advantage, so it still needs to be encouraged to produce a more optimal impact on company performance.

Corporate reputation (Z) is directly influenced by two main variables, namely corporate social responsibility (CSR/X2) with a coefficient of 0.170 and green manufacturing (X1) of 0.167, both of which have a positive and almost balanced influence. This indicates that both social commitment and environmentally friendly practices significantly shape public perception of the company. In addition to the direct influence, CSR also shows an indirect influence on company performance (Y) through reputation of 0.051, while green manufacturing has an indirect influence of 0.050. Although the value is relatively small, this indirect influence strengthens the role of reputation as a strategic mediating variable. Thus, corporate reputation is

proven to be an important bridge connecting social responsibility and operational sustainability with the improvement of overall company performance.

The results of the total effect test show that company performance (Y) is most influenced by company reputation (Z) with a total effect of 0.299, followed by CSR (X2) of 0.278, and green manufacturing (X1) of 0.219. This finding underlines the importance of reputation as a strategic asset that provides the greatest contribution to improving performance. CSR also plays a significant role, both directly and through reputation, indicating that a company's social commitment drives positive perceptions as well as performance. Although green manufacturing has the lowest total effect among the three, its value is still substantial, reflecting its contribution to sustainability and operational efficiency. Meanwhile, on company reputation (Z), CSR provides the largest total effect of 0.170, slightly higher than green manufacturing of 0.167, indicating that a company's social contribution has a greater influence on public perception than technical environmental efforts.

5. Discussion

The results of this study indicate that all alternative hypotheses (Ha) proposed are accepted, indicating that the relationship between variables in this research model is statistically significant. First, company performance is proven to be significantly influenced by company reputation, in line with the findings of Sarbutts (2003) and Bahta et al. (2021) which emphasize that reputation is a very strategic intangible asset in building long-term competitive advantage. Companies with a good reputation tend to attract investors, increase customer loyalty, and strengthen employee motivation (Morales-Raya et al., 2019; Ajayi & Mmutle, 2021). The results of this study also show that green manufacturing has a positive effect on company reputation. This finding is in line with the Natural Resource-Based View theory (Hart, 1995) which states that sustainability-based business practices can be a source of competitive advantage. The implementation of green manufacturing increases the public's positive perception of the company's environmental responsibility (Bai & Sarkis, 2017; D'Angelo et al., 2023). Green manufacturing is also considered as a concrete form of a company's commitment to resource efficiency and reducing negative impacts on the environment (Rehman et al., 2016; Ghazilla et al., 2015).

Corporate Social Responsibility (CSR) has been proven to have a positive influence on both corporate reputation and corporate performance. This supports previous findings stating that CSR contributes to building public trust and strengthening corporate image (Balon et al., 2022; Abdelfattah & Aboud, 2022). In addition, CSR can increase employee commitment and customer loyalty because it is seen as a form of the company's moral responsibility towards stakeholders (Ali et al., 2023; Hunjra et al., 2020). CSR also increases the company's social legitimacy which in turn can strengthen overall business performance (Ubeda-Garcia et al., 2020; Miller et al., 2020). Corporate reputation is the most powerful key variable in influencing performance achievement, and CSR as a corporate strategy also plays an important role both directly and indirectly. These findings confirm previous studies by Flanagan & O'Shaughnessy (2005) and Feng et al. (2022) which emphasize the importance of reputation as a connecting mechanism between social responsibility and financial performance.

However, interesting findings also emerged from the mediation analysis, where it was found that corporate reputation did not significantly mediate the effect of CSR and green manufacturing on corporate performance. Although CSR and green manufacturing directly affect reputation, and reputation affects performance, the mediation path was not proven significant. These results indicate that the impact of CSR and green manufacturing on performance is stronger through the direct path than through reputation as an intermediary. This is slightly different from previous findings by Bahta et al. (2021) and Sakkaf et al. (2022), which stated that reputation

has a mediating role in the relationship between CSR and performance. This difference can be explained by the context of the manufacturing industry in Indonesia which is still in the early stages of adopting sustainability practices, so that reputation has not fully become the main channel in building performance perceptions. This finding emphasizes that companies need to integrate CSR and green manufacturing as the main strategy, not only to build reputation, but also to directly increase efficiency, productivity, and competitiveness. In the context of the Indonesian manufacturing industry, especially in Central Java, strengthening this sustainability strategy is important amidst global pressures for more responsible business practices. The government and stakeholders are also expected to provide regulatory support and incentives so that the adoption of CSR and green manufacturing becomes more widespread.

6. Conclusion

Green manufacturing, Corporate Social Responsibility (CSR), and corporate reputation are important factors in improving the performance of manufacturing companies in Central Java. The implementation of green manufacturing, especially through Life Cycle Assessment (LCA), allows companies to evaluate the environmental impact of the company's products, processes, and activities as a whole. Production that uses recycled, reusable, and hazardous material-free materials not only significantly reduces environmental risks but also improves efficiency and corporate image. CSR has also been shown to have a positive impact on corporate reputation and performance. Participation in environmental conservation activities, implementation of social programs, and involvement in community welfare campaigns contribute to public acceptance and social legitimacy of the company. This strengthens the company's relationship with stakeholders, which ultimately increases competitive advantage. Corporate reputation plays an important role in shaping consumer perceptions. Companies that are seen as successful, sustainable, and responsible tend to gain market trust and have a greater chance of achieving strong long-term performance. These findings strengthen the Natural Resource-Based View (NRBV) approach by showing that sustainable and socially responsible resources can be the foundation of competitive advantage. The practical implication is that companies need to integrate green practices and CSR as part of their core strategy, not just as additional activities. Further research is recommended to expand the sample coverage across regions or other industrial sectors, as well as explore alternative mediating variables such as innovation, customer trust, or ethical orientation in strengthening the relationship between sustainability strategy and corporate performance

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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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