The Impact of Green Innovation on Business Sustainability A Case Study of SMEs

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Abstract

Micro, Small, and Medium Enterprises (MSMEs) can be an alternative for the government to increase the country's economic productivity. This enormous economic potential cannot be separated from existing challenges, such as adapting sustainable business practices. This study aims to analyze the relationship between green innovation and business sustainability. Using a quantitative approach, data was collected through questionnaires distributed to 64 knitting and weaving MSMEs in Bandung Regency. The data was analyzed using the Structural Equation Modelling - Partial Least Squares (SEM-PLS) method. The results of the analysis show that Green Innovation has a significant positive effect on Business Sustainability, where 58.5% of the variance in Business Sustainability can be explained by Green Innovation. Based on these findings, it can be concluded that Green Innovation has a significant positive effect on Business Sustainability.

Keywords: *Green Innovation, Business Sustainability, SMEs.*

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A. INTRODUCTION

Micro Small Medium Enterprises (MSMEs) is a business unit that can be used as an alternative for the government to boost its economy's productivity. Because the production of goods and services for SMEs (Hindarsah et al., 2021). While Micro, Small, and Medium Enterprises (MSMEs) are celebrated as engines of macroeconomic growth and societal progress, they also present a significant environmental dilemma. According to (Haryono & Sari, 2023) "Some literature shows that SMEs in European countries contribute around 60% to 70% of all pollution, but the environmental impact of SMEs in developing countries is even more dire and immeasurable." Although SMEs have great potential in supporting the economy, they often face challenges in adopting sustainable business practices. Factors such as limited resources, lack of access to green technology, and minimal awareness and knowledge about sustainability often become barriers for SMEs to switch to more environmentally friendly practices. The implementation of sustainable business practices not only contributes to environmental conservation but can also improve operational efficiency and reduce costs in the long term (Haryono & Sari, 2023).

Green innovation within Small and Medium-Sized Enterprises (SMEs) is influenced by three key contexts: internal organizational factors, the external environment, and technology. The managerial implication of this research is that by deepening their understanding of long-term goals and developing technology to boost efficiency, SMEs can sustain and enhance their innovative performance, leading to

continuous growth. Growth is one of the main goals of an organization. This can be achieved by placing trust in stakeholders, such as the community. Consequently, if an organization's activities inspire confidence, then the organization can build and maintain positive relationships with its stakeholders. Thus, the organization's financial performance will increase. In the current era of globalization, emphasis on economic performance is very important considering the increasing competitiveness in every industry. Some businesses seek to incorporate innovation into their operations to improve their performance. If they improve their performance, they will also be able to compete with other companies (Pinem & Listyorini, 2022). In order for an organization to remain relevant and competitive in the market, it needs to transform product and service innovation by paying attention to the environment and society.

The development of innovative products is contingent upon an organizational culture that actively fosters innovation. Such a culture is characterized by its encouragement of employee initiative, open discussion, and a commitment to continuous improvement. It should also be noted that environmentally friendly innovation can have an associated rebound effect. Ultimately, for an organization to thrive and advance, innovation is considered fundamental to its success (Bowen et al., 2010). Likewise, in terms of sustainability, green innovation helps organizations not only achieve financial benefits but also social and ecological improvements (Suki et al., 2022). The topic of green innovation has gained significant attention recently in both academic and political spheres, spurred by new policies across many nations aimed at mitigating environmental damage (Boons & Lüdeke-Freund, 2012). To understand this concept, it is useful to first define innovation broadly as any new practice an organization adopts, such as new products, processes, or policies. Within this framework, green innovation is considered a subset of general innovation, sharing many of its core characteristics (Wagner, 2008). Specifically, the idea of green innovation is typically analysed through three primary dimensions: process, product, and organization (Arfi et al., 2018).

A rising consumer preference for environmentally friendly products is increasingly influencing customer satisfaction, compelling managers to innovate with green technologies to meet market desires (Arfi et al., 2018). This trend aligns with a broader shift of businesses towards sustainability (Lindgren et al., 2021). Despite these market signals and other drivers for sustainability—such as cost pressures and new regulations (Scott, 2013)—the level of green innovation and patenting is surprisingly low given the scale of environmental challenges. Research by (Fischer et al., 2023). identifies the primary reason for this gap: a low willingness among customers to pay a premium for eco-innovations, largely because most households and companies do not consider environmental costs like energy to be a major financial factor.

B. LITERATURE REVIEW

1. Green Innovation and Its Importance

Scholarly research identifies green innovations as a specific category within the broader field of innovation, possessing many of the same fundamental characteristics (Wagner, 2008) and share many characteristics with them. According to (Triguero et al., 2013), "there are three major dimensions within the notion of green innovation: process, product, and organization. Concerning the first two, the aim is to combine environmental goals with process innovation (productive efficiency) and product innovations (product quality)." These three dimensions are complementary and interconnected, as they all fundamentally relate to the management of resources—including their sourcing, application, and administration (Arfi et al., 2018). Green innovation or also called green innovation is a strategy for creating new products or developing existing products significantly. Not only focusing on products, but also focusing on significant development and creation of new processes, company methods, marketing methods in business activities (Shahwat on Putra & Utama, 2022).

Green innovation, often referred to as eco-innovation, can be described as the development of new products and technologies with the specific purpose of mitigating environmental hazards, such as pollution and the adverse consequences of resource exploitation. Other research emphasizes that environmentally friendly innovation is an important tool for companies to increase their market share and survive in the long term. According to (Rodrigues & Franco, 2023), adopting environmentally friendly innovation is a key tool for businesses seeking to increase their portion of the market and maintain their operations over the long term. They argue that such innovations can lead to an improved market position, attract a wider customer base, allow for the delivery of green services, and provide a distinct competitive advantage.

Green innovation can be applied in products and processes, including innovation in technology used in energy saving, pollution prevention, waste recycling, product design, or corporate environmental management (Chen et al., 2006). The application of green innovation can add value to the products offered and can further increase productivity and competitive advantage (Chang, 2011). Furthermore, green innovation can form several aspects, namely green brand image, green trust, green satisfaction, green brand equity, and green purchase intention (Madepo, 2022).

Chang (2011) identifies green innovation as a crucial strategic driver for achieving sustainable development, highlighting technological advancements in energy conservation, pollution prevention, and waste recycling. More broadly, it is defined as any action taken by individuals or organizations to advance the creation and application of superior processes, products, or systems that mitigate adverse environmental effects and help achieve ecological targets. Complementing this, research by (Tonay & Murwaningsari, 2022) has found that a company's value is positively influenced by both its green intellectual capital and its engagement in green innovation.

Green innovation (GI) is considered a vital component of agricultural reform, serving the dual purpose of ensuring food security and safeguarding the environment (Sun and Wang, on Khanh Chi, 2022). Moreover, GI is a prerequisite for achieving modernization and sustainable development within the agricultural sectors of emerging nations (Zhu & Li, 2021). Nevertheless, significant challenges persist, as escalating agricultural pollution, including soil degradation and climate changehinders both ecological construction and the overall development of agriculture (Jhariya et al., 2021) (Khanh Chi, 2022).

Based on the previous studies, the researchers proposed the hypothesized model in this study:

H1: Green Innovation has a positive effect on the Sustainability Performance.

2. Sustainability in the Context of Green Innovation

A sustainable business is defined by its efforts to lessen harmful effects on the environment and society, thereby safeguarding resources for the future. In this context, eco-innovation is characterized as the application of novelty to products, services, or business operations. According to sources like ETAP and (Joller, 2012), the explicit purpose of this innovation is to prevent or markedly decrease environmental risks and pollution associated with resource use at every stage of its lifecycle. According to (García, 2022), business sustainability is a topic of rising importance, stemming from a greater recognition among organizations of their social responsibility for the resources they consume. In a related finding, (Kasayanond et al., 2019) discovered in a Malaysian study that increased corporate awareness of the green economy fosters improved environmental sustainability. The bridge between this awareness and its outcome is often green innovation, which comprises innovations in products and processes designed to lower energy use and pollution, promote recycling, and ensure the use of sustainable resources.

a. Environmental Performance

Environmental performance is one of the core components in the sustainability of a business. Environmental performance refers to measuring the interaction between business and the environment, and is related to the efficiency and effectiveness of a company's environment (Wang, 2019).

b. Economic performance

Economic performance in a company has an important role in the sustainability of the business and influences groups and individuals. Economic performance is a company's relative performance which can change from year to year in a similar industry, characterized by the company's annual return (Suratno et al., 2007). Company economic performance is described as the ability of a company to achieve business continuity and economic success by considering the interests of stakeholders (Clarkson, 1995).

c. Social Performance

The sustainability of a company is also influenced by social performance. Social performance includes an expansion of corporate social responsibility factors and

emphasizes the actual results achieved. In particular, it emphasizes the responsibilities of stakeholders or economic stakeholders (Turban & Greening, 1997). The concept of corporate social performance is formed based on an assessment of the company's social and environmental activities. Corporate social performance is a configuration of social responsibility principles and processes of policies, programs, social responses, and other aspects related to corporate social relations (Putra & Utama, 2022).

3. Green Innovation in SMEs

In addition to large corporations, Small and Medium Sized Enterprises (SMEs) have also begun to adopt green innovation to improve their performance. Although SMEs play a vital role in economic development, they are now facing increasing pressure from government and society to undertake green initiatives. However, due to significant constraints on time and resources, it remains difficult for them to implement green innovations while staying competitive. Furthermore, a prevailing view suggests that SMEs are still considerable contributors to environmental degradation (Wong on Mediaty et al., 2023). Green innovation is regarded as a transformative approach for reshaping global development to benefit future generations, with applications for SMEs and a key role in economic stability. In support of this, research by (Riani et al., 2022) posits that novelty and scientific contribution, representing a figure of 61.1% in their analysis, acts as a pillar of national economic growth that accelerates sustainable development.

Small and Medium Sized Enterprises (SMEs) are increasingly adopting and implementing innovative, eco-friendly strategies. It is contended by researchers that through these green innovation methods, SMEs can achieve significant advantages, such as enhanced environmental performance, reduced operational costs, and an improved competitive position in the market.

According to Rodrigues and Franco (2023), Small and Medium-Sized Enterprises (SMEs) face certain obstacles when adopting green innovation. They refer to research by Wang and Li, which identified six key factors that greatly influence this process: (1) characteristics of the innovation itself (complexity, compatibility, and relative advantage), (2) the quality of human capital, (3) internal organizational support, (4) government assistance, (5) consumer demand, and (6) regulatory pressure. However, Rodrigues and Franco (2023) also conclude that broader environmental uncertainty does not have a significant effect on this adoption.

C. METHOD

This study employs a quantitative approach with a survey method. The quantitative approach is used to test the validity of the research hypotheses. The questionnaire was distributed to knitting and weaving MSMEs in Bandung Regency. This study successfully collected the necessary data to analyze the relationship between green innovation and business sustainability.

The research sample was taken from a population of knitting and weaving craft MSMEs in Bandung Regency at the TERADIGDAYA activity, amounting to 64 samples. Data collection was carried out through distributing questionnaires to respondents who met the inclusion criteria. The questionnaire was designed to measure the research variables, namely green innovation and sustainable business. The collected data were then processed and analyzed statistically to test the research hypotheses.

The measurement of constructs in this study was carried out using a Likert scale. The Likert scale is used to measure the level of respondents' agreement with statements related to green innovation and sustainable performance. The tool used to analyze the data is SEM-PLS.

D. RESULTS AND DISCUSSION

1. Outer Model

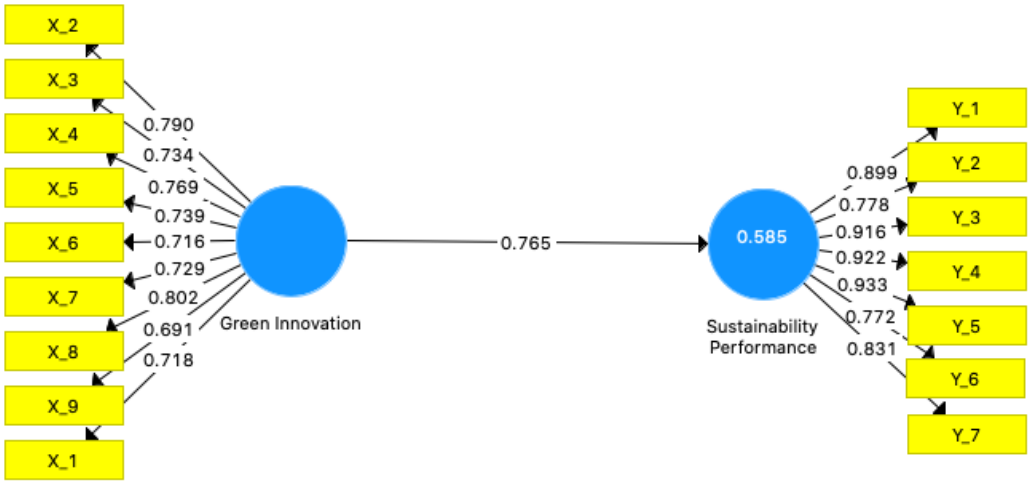

Figure 2. ***Outer Model***

Source: SmartPLS, 2024

Based on the data presented in the table above, it is known that all indicators of the research variables have outer loading values > 0.7. Therefore, the indicators in these variables are declared valid for use in the study and can be used for further analysis.

The next stage is to examine the Average Variance Extracted (AVE) value for each indicator, which is required to be ≥ 0.5. The obtained AVE values indicate that both Green Innovation (X) and Sustainable Business (Y) variables have AVE > 0.5. Furthermore, the constructs are considered reliable as they possess composite reliability values ≥ 0.6 and Cronbach's alpha values ≥ 0.7. Thus, it can be stated that each variable has a high level of reliability and good discriminant validity, as shown in the table below:

Table 1. Cronbach Alpha, Composite Reliability and Average Variance Extracted

	Cut-off Value	GI	SB
Cronbach's Alpha	>0,7	0,900	0,944
Composite Reliability	>0,6	0,917	0,955
Average Variant Extraced	>0,5	0,553	0,575

Source: SmartPLS, 2024

2. Inner Model

This stage explains the results of the goodness of fit test and hypothesis testing. The goodness of fit test utilizes R-square as a benchmark, where R-square values of 0.75, 0.50, and 0.25 indicate a strong, moderate, and weak model, respectively.

Table 2. R-*Square* Value

Variable	R Square
Sustainability Business (Y)	0,585

Source: SmartPLS, 2024

Based on the data presented in the table above, the R-square value for the Sustainable Business (Y) variable is 0.585 (moderate category). This value indicates that 58.5% of the variance in Sustainable Business (Y) can be explained by Green Business (X).

Furthermore, hypothesis testing was conducted by examining the T-statistics and P-values. The research hypothesis is accepted if the P-value is < 0.05. The following are the results of the hypothesis test obtained in this study through the inner model:

Table 3. Statistics dan P-Values

Effect	T-Statistics	P-Values	Result
X on Y	14,930	0,000	Significant Effect

Source: SmartPLS, 2024

Based on the data presented in the table above, it is evident that the P-value (0.000) is < 0.05, or the T-statistic (14.930) is > 1.96, indicating that H1 is accepted. Therefore, it is concluded that Green Business has a significant positive effect on Sustainable Business.

This study found that Green Innovation and Sustainability Business exhibited considerably high values. The research involved 64 respondents who were micro, small, and medium enterprise (MSME) artisans engaged in weaving and knitting in Bandung Regency. Data collection employed a questionnaire to assess and understand how Green Innovation influences Sustainability Business. Data analysis was conducted using SmartPLS (SEM-PLS) software and methodology.

The results indicate that Green Innovation has a significant positive effect on Sustainability Business. The high values for Green Innovation and Sustainability Business were derived from valid data with a high degree of reliability, as ascertained through the evaluation of the outer model. A variance of 58.5% in Sustainability Business can be explained by Green Innovation, indicating a strong relationship

between the independent and dependent variables. The remaining 41.5% is attributed to factors outside the scope of this research model. Hypothesis testing further confirmed these findings, leading to the conclusion that Green Innovation exerts a significant positive influence on Sustainability Business.

E. CONCLUSION

Based on the results of data analysis from 64 weaving and knitting MSMEs in Bandung Regency, it was concluded that Green Innovation has a significant and positive effect on business sustainability. This is evidenced by a hypothesis test showing a p-value of 0.000 (< 0.05) and a T-statistic value of 14.930 (> 1.96), thus accepting the alternative hypothesis (H1). This research model is able to explain 58.5% of the variation in business sustainability, indicating a moderate relationship. Meanwhile, the remaining 41.5% is influenced by other variables outside the model. All indicators used have been tested for validity and reliability through external model evaluation. These findings confirm that the adoption of green innovation, whether in products, processes, or technology, is a crucial factor for MSMEs to achieve financial benefits, improve social and ecological performance, and ensure long-term business continuity.

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