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## Green Manufacturing Practices and Green Innovation and Their Role In Sustainable Business Performance Through Culture Green Organization at Small Industrial Enterprises

**Lukman Nuzul Hakim**

Faculty of Economic and Business, Universitas 17 Agustus 1945 Surabaya, Indonesia  
lukmannuzulhakim@gmail.com

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### Abstract

*Green Manufacturing Practices and Green Innovation have become an important focus in efforts to achieve sustainable business performance in various sectors, including small industrial companies. Green organizational culture plays a significant role in encouraging the adoption of sustainable practices and innovations within the corporate environment. This study aims to investigate the relationship between green manufacturing practices, green innovation, green organizational culture, and sustainable business performance in small industrial firms. This study uses a descriptive-analytical approach by collecting data from related literature and analyzing green manufacturing practices and green innovation and their role in sustainable business performance through green organizational culture in small industrial companies. The study found that small industrial companies that implement green manufacturing practices and green innovation with the support of a strong organizational culture tend to achieve better business sustainable performance. The results of this study provide a better understanding of the importance of green manufacturing practices, green innovation, and organizational culture in achieving sustainable business performance in small industrial enterprises.*

**Keywords:** *Green Manufacturing Practices, Green Innovation, Green Organizational Culture, Sustainable Performance of a Business, Small Industry Companies*

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### INTRODUCTION

Small industries play an important role in the economy, particularly in creating jobs, promoting local economic growth, and improving people's welfare (Amini, 2004). But small industries often face significant challenges in the face of global competition, regulatory changes, and environmental sustainability demands.

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Green manufacturing practices and green innovation have become a major concern in recent years. This practice includes efforts to reduce the industry's negative impact on the environment through more efficient use of resources, good waste management, and emission reduction. In addition, green manufacturing practices and green innovation can improve operational performance, product innovation, and company reputation (Acquah et al., 2021).

In the context of small industries, drivers of green manufacturing practices and green innovation greatly impact organizational culture and sustainable performance in small industries (Aboelmaged, 2018). By doing this, small industries can achieve better resource efficiency, reduce production costs, meet increasingly stringent regulatory requirements, and be environmentally friendly so as to build an image of an economically, socially, and environmentally responsible company.

Green manufacturing practices include the adoption of strategies and actions aimed at reducing environmental impact in production processes. This involves more efficient use of resources, recycling of raw materials, reduction of waste, and use of renewable energy (Alayón et al., 2017). On the other hand, green innovation involves the development of environmentally friendly products, processes, and business strategies. Innovation includes the sustainable use of raw materials, the development of recyclable products, and the application of more efficient technologies in the use of resources (Ranta, 2021).

However, implementing green manufacturing practices and innovation does not depend solely on technical factors or company policies. Green organizational culture also plays an important role in the success and sustainability of these practices (Ahuja et al., 2019). Green organizational culture reflects the values, norms, and beliefs that drive employees to adopt and maintain sustainable practices in their daily work. Green organizational culture includes active participation of employees in sustainable decision-making, training, and education related to green practices, as well as open communication about the goals and achievements of the company's environment (Ahuja et al., 2019).

Therefore, this study aims to analyze the drivers of green manufacturing practices and green innovation and their role in green organizational culture toward sustainable performance in small industries. This analysis will provide a deeper understanding of the importance of green manufacturing practices in the context of small industries and how those drivers affect green organizational culture and sustainable performance.

With a better understanding of the drivers of green manufacturing practices and their impact, it is hoped that this literature review research can provide helpful insights for stakeholders in small industries, including business owners, managers, government, and the wider community. The practical implication of this literature review research is that small industries need to consider implementing green manufacturing practices as a business strategy that can improve their competitiveness, maintain operational

sustainability, and make a positive contribution to the environment and surrounding communities.

## **METHOD**

This research is research with a literature study method or literature study using a descriptive-analytical approach by collecting data from article literature related to Green Manufacturing Practices, Green Innovation, Organizational Culture, and Sustainable Performance that have been published in reputable international journals and national journals, then conducting an analysis of green manufacturing practices and green innovation and their role in sustainable business performance through a green organizational culture in small industrial enterprises.

Research articles that are observed are not limited to the object of research, because the variety of research objects (industries studied), it will further enrich the research results to be analyzed. However, the authors limit their observations to research that emphasizes the driving factors of green manufacturing practices and green innovation and their role in sustainable performance through organizational culture.

## **RESULTS AND DISCUSSION**

The literature study research that has been collected and then discussed and analyzed Green Manufacturing Practices, Green Innovation, Green Organizational Culture, and Sustainable Performance as follows:

### **Green Manufacturing Practices**

Nowadays maybe we have often heard about green manufacturing which can be called green business, sustainable business, or environmentally friendly business. Both business people and consumers are increasingly aware of the importance of nature conservation. Green business is an environmentally friendly business concept that balances profit and nature sustainability (Wu & Pagell, 2011). This is certainly a positive signal for businesses to enter a new era with environmentally friendly business methods. The move has already been started by many *Brands* by stopping the use of plastic bags. Many of them now use glass made of cardboard, paper, and straw, to avoid materials that can pollute nature.

According to Fernando et al., (2019), The concept of green business is actually very broad, not only regarding environmentally friendly products, but also all business operations that must prioritize environmental balance. As time goes by, it seems that consumers are also paying more attention to environmentally sensitive businesses.

Many sustainable businesses build offices, public facilities, or outlets with the concept of energy efficiency and use environmentally friendly building materials such as wood and bamboo. According to Usón et al., (2013), Sustainable businesses will use water, energy, and raw materials to a minimum while reducing carbon emissions or finding ways to utilize those materials in renewable and environmentally friendly ways

(Barbieri & Santos, 2020). Because the goal of sustainable business is to eliminate negative impacts on the environment, both on a local and global scale. In Table 1 here are some studies related to green manufacturing practices and their role in sustainable performance as follows:

**Table 1 Research on Green Manufacturing Practices and Their Role in Sustainable Performance**

<b>Source</b>	<b>Research Title</b>	<b>Discussion</b>
Sohns et al., (2023)	Green business process management for business sustainability: A case study of manufacturing small and medium-sized enterprises (SMEs) from Germany	The results revealed the level of SME business sustainability based on six Green BPM factors, namely green attitude, strategy, governance, model, monitoring, and optimal. Next, relevant benefits, pressures, and barriers are identified that may encourage or hinder Green BPM practices. Based on the findings, it is recommended how SMEs can accelerate their transition toward higher levels of business sustainability.
Al-Hakimi et al.,(2022)	The influence of green manufacturing practices on the corporate sustainable performance of SMEs under the effect of green organizational culture: A moderated mediation analysis	This article examines the mediating effect of green innovation (GI) between green manufacturing practices (GMP) and corporate sustainable performance (CSP). explores how GMP contributes to CSP through GI, as well as investigates the effects of GOC moderating and moderation-mediating using cross-sectional survey data from selected SMEs in Saudi Arabia. Empirical evidence reveals that GMP adoption has a significant and positive effect on GI, which in turn significantly affects CSP
Ghadimi (2021)	Analysis of enablers on the successful implementation of green manufacturing for Irish SMEs	The findings in the study are revealing that from the perspective of Irish SMEs, strong green supply chain links are the result of successful Green Manufacturing (GM) implementation and not other enabler drivers. Furthermore, lower production costs were found to arise as a result of GM practices in SMEs
Zhai & An (2020)	Analyzing influencing factors of green transformation in China's manufacturing industry under environmental regulation: A structural equation model	This article discusses the factors affecting the green transformation in China's manufacturing industry under environmental regulation. This article uses a structural equation model approach to analyze the relationships between relevant variables in the context of green transformation. The authors have identified and measured variables such as environmental regulation, technological innovation, green investment, and environmental awareness.
Das et al.,(2019)	Green Manufacturing: Progress and Future Prospect	This discussion emphasizes the urgency of implementing green manufacturing as a solution to environmental challenges and sustainable development. Green manufacturing can reduce negative impacts on the environment and produce economically sustainable products. In the face of today's complex global problems, green manufacturing can be one of the effective ways to achieve waste and pollution reduction goals and promote more efficient use of resources
Ma et al (2018)	Pricing decisions for substitutable products with green manufacturing in a competitive supply chain	This discussion provides insight into optimal pricing strategies in the context of competitive supply chains. Through the use of game models and numerical examples, the author illustrates the effectiveness and efficiency of the proposed models. Analysis of factors such as green investment, price elasticity, and cross-price sensitivity provides a deeper understanding of the factors affecting green manufacturing rates. These findings have important implications for practitioners in making decisions about pricing and green manufacturing strategies in their supply chains
(Abdul-Rashid et al., (2017)	The Impact of green manufacturing practices on sustainability performance	Researchers investigate the effect of green manufacturing practices on sustainable performance. The study used a survey approach to collect data from manufacturing companies in India. The results showed that green manufacturing practices have a significant

Based on several research developments that discuss green manufacturing in the table above, it can be concluded that green manufacturing plays an important role in improving sustainable performance in small industrial businesses.

### **Green Innovation**

Green innovation is an increasingly important concept in the modern era marked by increasing concern for environmental and sustainability issues. Green innovation involves the development and implementation of environmentally sound products, processes, and business practices with the aim of reducing negative impacts on the environment and increasing the efficiency of resource use (Hsu et al., 2016).

In recent decades, environmental issues such as climate change, pollution, and depletion of natural resources have become a global concern. Customers, buyers, communities, and governments are increasingly demanding that companies be environmentally responsible. This encourages companies to look for innovative solutions that can reduce their negative impact on the environment.

Green manufacturing is a term for green innovation methods aimed at reducing adverse environmental impacts through waste reduction, waste recycling, better utilization of natural resources, and other related measures. According to Haleem et al (2023), The Green Manufacturing approach goes beyond the "reduce, reuse, recycle" (3R) strategy to the 5R approach: "repair, reuse, update, rebuild, and recycle", leading to much better resource utilization and longer product life. This concept allows for achieving "zero waste". The reduction of harmful emissions in product production and support for employees and local communities have helped companies reflect their efforts globally with the help of Green Manufacturing. Studies related to the role of green innovation on sustainable performance have attracted the attention of several studies. In research, Junaid et al., (2022), Produce findings on the importance of sustainable supply chain integration in driving green innovation in companies. Green managerial innovation can contribute positively to a company's financial performance, while green process innovation can have a negative impact on a company's performance if not managed properly. Then Shahzad et al., (2020), Found that green product innovation has an effect on sustainable performance. Ghazilla (2015), Researching companies in Malaysia have carried out green product innovations so that companies can bring sustainable performance. While in this study, small industry players are assumed to have not considered green innovation to bring sustainable performance. Sezen & Çankaya (2013), Produce findings that green manufacturing and eco-innovation affect the company's sustainable performance (economic, environmental, social). Innovations that lead to much better resource utilization and longer product life and zero waste.

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### **Green Organizational Culture**

Green organizational culture refers to values, norms, beliefs, and practices that promote sustainability and care for the environment in all aspects of organizational operations and decision-making. This culture creates a work environment that promotes the responsibility of work environment that promotes environmental responsibility, awareness of the impact of business on the environment, and collaboration to create more environmentally friendly solutions. When an organization's culture adopts a green approach, it can have a positive impact on the organization's sustainable performance (Zaid et al., 2018).

The human factor plays a central role in the realization of environmental practices. Ensuring environmental sustainability depends on environmentally friendly employee behavior (Norton et al., 2015). But in the literature on the environment and sustainability of hospitality organizations, the human factor has been ignored except for a few studies Karatepe et al.,(2022); Cop et al (2020); Kim et al., (2019); Okumus et al., (2019); Su & Swanson, (2019). This hospitality literature includes rare knowledge about green employee behavior. For example Kim et al., (2019) It has been found that green behavior improves environmental performance. Su & Swanson, (2019) has revealed that social responsibility and corporate well-being promote green behavior. Cop et al (2020) It has been established that green training promotes the behavior of the organization's citizens towards the environment. Karatepe et al.,(2022) revealed that green transformational leadership positively affects green work engagement.

### **Continuous Performance**

Sustainable performance refers to the ability of an organization to achieve its long-term goals by taking into account economic, environmental, and social aspects (Kuzma et al., 2020). It involves efficient management of resources, environmental protection, community empowerment, and creating long-term value. Some important aspects related to sustainable performance are economic performance, environmental performance, social performance, innovation, and research, as well as reporting and transparency. Sustainable performance is not just about meeting legal or ethical obligations, but also about creating long-term value and ensuring future business continuity (Le et al., 2021).

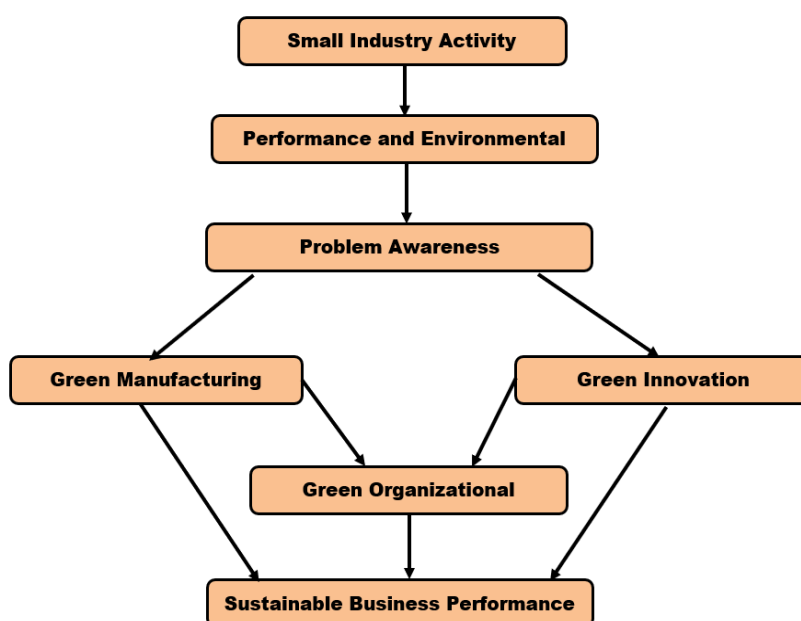
Sustainable performance is also relevant for small industrial enterprises. Despite the relatively small size of such companies, their contribution to sustainable development can be significant (Eikelenboom & de Jong, 2019). Aspects of sustainable performance relevant for small industry companies are Resource efficiency, waste management, environmental regulatory compliance, stakeholder engagement, sustainable innovation, and social responsibility.

In small industries today, the majority of businesses face difficulties and stability concerns in the future due to increased environmental damage due to industrial activities. Although small industries have an important role in driving the national economy,



adopting the environment becomes a demand and necessity and will also be a big challenge for small industrial businesses to run their business. The role of managers in steering companies on the path of sustainability is considered very important to drive green growth and sustainable performance. Therefore, the extent to which company managers care about environmental conditions largely determines success in sustainable development practices and the improvement of company performance.

From this literature review, the author describes the general line of thinking in the context of small industries to achieve sustainable performance by driving green manufacturing practices and green innovation through a green organizational culture in the figure below:



**Figure 1 Thinking Flow of Green Manufacturing Practices and Green Innovation to Sustainable Performance through Organizational Culture**

Bosma et al.,(2020) quoting the Global Entrepreneurship Monitor (GEM) Indonesia noted that awareness and use of green technology in business is still low among entrepreneurs in Indonesia, including in small and medium industries. This indicates that most small industries in Indonesia have not actively adopted green innovation practices.

Support of green manufacturing practices is essential to achieving successful implementation of innovation. In addition, Wang (2019) shows that the more support for innovation by management, the more willing companies are to implement green manufacturing practices and green innovation. Empirical research has also found that green organizational culture is the most important driver for the adoption of green practices (Chen et al., 2020). The role of management in the implementation of green manufacturing practices and green innovation will affect the green organizational culture which can ultimately be transformed into company performance and cannot be ignored

(Soewarno et al., 2019). Next, Maniatis (2016) argues that considering environmental aspects from the beginning is a critical factor for the success of green product development.

## **CONCLUSION**

Research shows that green manufacturing practices and green innovation will affect green organizational culture which can ultimately be transformed into company performance cannot be ignored (Al-Hakimi et al., 2022). Next Maniatis (2016), argues that considering environmental aspects from the beginning is a critical factor for the success of green product development. Green manufacturing practices and green innovation play an important role in driving sustainable business performance in small industrial companies. Green manufacturing practices involve strategies and actions aimed at reducing the environmental impact of production processes, such as energy efficiency, waste reduction, and the use of more environmentally friendly raw materials. Green innovation on the other hand involves the development of new products, processes, or business models that focus on aspects of sustainability.

Green organizational culture has a significant role to play in driving the adoption of green manufacturing practices and green innovation (S. Wang et al., 2022). Green organizational culture reflects the values and norms accepted within the company regarding sustainability and the environment. When an organization's culture prioritizes sustainability, green manufacturing practices, and green innovation tend to be encouraged and implemented more effectively. Small industry companies can leverage green manufacturing practices and green innovation and build an organizational culture that supports sustainability to improve their competitiveness.

Suggestions for future research directions that can be explored include analysis of organizational culture factors, measurement of sustainable business performance, the role of technological innovation, comparative studies, and case studies between small industrial companies that implement green manufacturing and innovation practices and companies that do not. Through research in this area, there will be a better understanding of how green manufacturing practices, green innovation, and green organizational culture can contribute to the sustainable business performance of small industrial companies.

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