

GREEN HR AND MSME SUSTAINABILITY: THE VITAL BRIDGE OF ENVIRONMENTAL PERFORMANCE

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Abstract

This study examines the drivers of sustainability among Micro, Small, and Medium Enterprises (MSMEs) in Indonesia's Surabaya processing industry. Grounded in Stakeholder Theory and the Resource-Based View, the research evaluates the direct impacts of Green Innovation, Green Human Resources, and Green Dynamic Capabilities on MSME sustainability, as well as the mediating role of Environmental Performance. Primary data were collected through questionnaires from a purposive sample of 100 respondents operating across various processing sectors, including food and beverages, textiles, and woodcrafts. Structural Equation Modelling Partial Least Squares (SEM-PLS) via SmartPLS was utilised to analyse the quantitative data. The empirical findings indicate that Green Innovation has an insignificant negative relationship with MSME sustainability due to high adoption costs, while Green Human Resources yields an insignificant positive direct relationship. Conversely, Green Dynamic Capabilities exhibit a significant positive direct effect, making them a critical driver in fast-evolving markets. Mediation analysis reveals distinct pathways: Environmental Performance does not mediate the relationship between Green Innovation and Green Human Resources; however, it fully mediates the impact of Green Human Resources and partially mediates the role of Green Dynamic Capabilities on corporate sustainability. This study provides valuable insights, revealing that environmental management and technical adjustments do not automatically ensure short-term business survival unless backed by unique, adaptive internal capabilities. It emphasises that for manufacturing MSMEs, fostering green dynamic capabilities and translating human awareness into measurable environmental performance are more effective long-term strategies than expensive innovations alone.

Keywords: MSME Sustainability, Green Dynamic Capability, Environmental Performance, Green Human Resource, Processing Industry

INTRODUCTION

Sustainability comprises three mutually reinforcing pillars: environmental, social, and economic (Jun et al., 2019; Kiranantawat & Ahmad, 2022). Environmental sustainability and economic behaviour are linked, as evidenced by the global rise in industrialisation, which has had a significant and rapid impact on environmental and climate change (Jun et al., 2019). Economic behaviour refers to the economic actions and decisions of individuals, households, firms, and governments that influence resource allocation, income distribution, and economic growth (Jun et al., 2019). Furthermore, environmental changes and global warming have a direct impact on life as a whole, as well as on economic damage to infrastructure, agriculture, and tourism (Raharjo, 2019).

The issue of environmental damage continues to be discussed, and the environmental conservation movement has recently become a hot topic in research (Utomo & Pratiwi, 2021). The 2015 Paris Agreement is considered one of the most prominent examples of global recognition of the importance of biodiversity and of global efforts to strengthen environmental protection (Jun et

al., 2019). The problem of environmental degradation requires extraordinary consideration to overcome it. Jun et al. (2021) explain that sustainable economic development includes guaranteed economic growth, increased human welfare, social equality and environmental protection.

Micro, Small and Medium Enterprises (MSMEs) are a priority for Indonesia's national economic development. MSMEs contribute to society, particularly by promoting income equality and economic growth (Kiranantawat & Ahmad, 2022; Raharjo, 2019). This is reflected in the large employment opportunities in the MSME sector. According to a press release from the Coordinating Ministry for Economic Affairs of the Republic of Indonesia, the number of MSMEs in Indonesia in 2022 was 65.4 million. The Indonesian Ministry of Cooperatives and SMEs reported in 2022 that MSMEs absorbed 97% of the workforce and contributed 60% of the country's annual GDP of IDR 8.5 trillion (Anastasya, 2023). MSMEs can act as a strong buffer during a crisis and recover quickly.

Table 1. East Java MSME data

Nu.	City	Amount of UMKM	Nu.	City	Amount of UMKM
1	JEMBER	647.416	20	BANGKALAN	248.664
2	MALANG	600.054	21	SIDOARJO	248.306
3	BANYUWANGI	480.687	22	PAMEKASAN	247.269
4	SUMENEP	401.210	23	TRENGGALEK	246.614
5	KOTA SURABAYA	385.054	24	SAMPANG	229.644
6	KEDIRI	380.056	25	GRESIK	225.242
7	BOJONEGORO	376.316	26	SITUBONDO	217.042
8	BLITAR	373.447	27	MOJOKERTO	216.518
9	PASURUAN	362.230	28	PACITAN	212.197
10	PROBOLINGGO	333.453	29	MADIUN	191.880
11	TUBAN	319.477	30	MAGETAN	181.760
12	LAMONGAN	312.376	31	KOTA MALANG	117.840
13	JOMBANG	299.273	32	KOTA KEDIRI	45.629
14	TULUNGAGUNG	288.371	33	KOTA BATU	44.963
15	NGANJUK	288.119	34	KOTA PROBOLINGGO	43.478
16	LUMAJANG	287.778	35	KOTA MADIUN	36.555
17	PONOROGO	283.967	36	KOTA PASURUAN	35.596
18	BONDOWOSO	271.793	37	KOTA BLITAR	29.123
19	NGAWI	253.870	38	KOTA MOJOKERTO	18.995

Data source: East Java Province Cooperative and SME Service, East Java Province

Cooperative and SME Service stated that the MSME population in East Java in 2022 will exceed 9.7 million units. According to the official website of the East Java Province Communication and Information Service, MSMEs in East Java contribute 57.81% to East Java's GRDP. In terms of MSME growth, Surabaya is one of the regions in East Java that shows great potential.

Surabaya, the capital of East Java Province, has contributed to economic development through MSMEs and ranks 5th in East Java. Surabaya, a city of students and heroes, is experiencing rapid growth in its MSME sector. The increasing number of MSMEs in recent years proves this. As a student city, Surabaya offers high-quality education, job prospects and a low cost of living. Surabaya's attractiveness stems from ongoing urbanisation, which has increased public demand for economic development. People then take advantage of this situation to launch small businesses. One of the industries that has the most significant impact on the environment is the processing industry. Many operational management decisions directly impact the environment, including policies related to packaging, waste management, and raw materials. The processing industry has high market demand, prompting business actors to develop their businesses through various

innovations. Along with its activities, this sector is considered an active industry that generates large amounts of waste and consumes significant amounts of energy (Rosyanti et al., 2023).

Pollution from production processes in the processing industry is increasing. Indonesia produces an average of 23 to 48 million tons of industrial waste per year. (Universal Eco, 2020). This research specifically examines MSMEs in the processing industry in several sectors, namely food and beverages, textiles and clothing, wood and furniture, crafts and creative, and printing. The environmental conditions and impacts caused by several MSME sectors vary. Food and beverage production can cause problems such as organic waste, large water usage, and high energy usage. The textile and clothing industry often uses pesticides, hazardous chemical dyes, and large amounts of water for dyeing and washing. Textile waste is also a significant environmental problem. The timber industry can cause deforestation, habitat destruction and land degradation. The furniture production process can also produce solid and liquid waste that damages the environment. The craft and creativity industry sector often uses natural materials such as paper, cloth and clay, which can affect the local environment if not managed properly. Lastly, the traditional printing industry uses many chemicals, such as inks and processing materials, that can pollute air, land, and water.

According to Kusumaningtias (2013), CSR in Indonesia still needs to be conceptually differentiated between the legal bases for implementing CSR for MSMEs and large corporations. There is a common misconception that only large companies should adopt CSR. However, MSMEs can also negatively impact the environment and society. In practice, multinational companies have prioritised addressing the causes of environmental pollution and taken an active role in doing so. In contrast, MSMEs have a low level of involvement in environmental protection initiatives, especially in developing countries, and continue to adopt production practices considered harmful (Jun et al., 2019). MSMEs are considered more at risk of pollution than large companies, as they account for around 70% of industrial waste and environmental pollution. This is because MSMEs are more numerous and less responsible for environmental protection. Although the current impact of implementing MSME operations is relatively small, if left unchecked, MSMEs can have a significant environmental impact (Muangmee et al., 2021). By implementing environmentally friendly business practices, MSMEs can help reduce negative environmental impacts. Adopting environmentally friendly practices allows MSMEs to demonstrate their social responsibility. This is not only good for the environment but also for the communities around MSMEs. Corporate governance's commitment to sustainability, especially in the MSME sector, is crucial to maintaining that culture throughout the company. However, this field of study remains underexplored (E-Vahdati et al., 2019; Utomo & Pratiwi, 2021).

The behaviour and activities of MSMEs influence the condition and balance of the surrounding environment (Polas et al., 2021; Raharjo, 2019). A country's economy can be supported by MSMEs in meeting needs and driving development. Still, there are also weaknesses, such as the potential for conflict between the community and company owners. Currently, various negative impacts of MSME activities include environmental damage, water pollution, and the use of low-quality raw materials (Utomo & Pratiwi, 2021). Losses arising from MSME activities that do not consider environmental factors are likely to become major problems that entail high costs to overcome (Usada & Murni, 2020).

To maintain environmental sustainability without compromising the performance of MSMEs, the government, through the Ministry of Industry, issued Law No. 3 of 2014 concerning Industry, which specifically regulates Green Industry (Articles 77-83). According to the official website of the Ministry of Industry, the government advances green industry by formulating policies, strengthening institutions, standardising, and providing incentives. UU no. 3 of 2014 defines green industry as an economic sector that promotes the sustainable use of resources and production efficiency to balance industrial development with the preservation of environmental functions and the provision of societal benefits. In practice, the green industry is expected to carry

out overall operational processes that fulfil the elements of green development, as a step towards improving the economy by reducing environmental pollution.

Green business in this case is the operational activities of MSMEs, which include aspects of green innovation as the concept of innovation to reduce the impact of environmental damage, green human resource as the availability of human resources committed to the implementation of green business, and green dynamic capability as the ability of an organisation to respond to environmental changes, which will produce environmental performance, which leads to a sustainable direction for MSMEs.

Green innovation is important for MSMEs because it can enhance environmental performance, thereby supporting MSME sustainability (Kiranantawat & Ahmad, 2022). Green innovation adds organisational value to sustainable development by enabling SMEs to produce unique goods and services. Green innovation can increase resource-use efficiency, reduce waste and emissions, and help companies achieve their environmental sustainability targets (Rahayu et al., 2023). According to Kiranantawat & Ahmad (2022), green innovation also enables efficient business management and technological processes, leading to sustainable competitive advantage and delivering social and environmental value to customers and suppliers. The availability of high-quality human resources and the owner's dedication to environmentally friendly business practices are considered the two main drivers of environmental performance, supporting the sustainability of MSMEs. Green human resources have a significant role in MSMEs. (Jun et al., 2019). Human resources who are trained and environmentally aware are more likely to participate in corporate sustainability initiatives, implement green practices, and contribute to improving overall environmental performance (Pramudita & Gunawan, 2023).

Green dynamic capability includes the ability of MSMEs to actively generate, expand, or adapt their resource base in response to dynamic market needs (Kiranantawat & Ahmad, 2022; Singh et al., 2022). Furthermore, Singh et al. (2022) argue that businesses with green dynamic capability respond more quickly to competitor initiatives, have better knowledge of customer desires, are more environmentally conscious, and innovate in the creation of new products. Organisations with strong green dynamic capabilities are more likely to implement green practices and achieve better long-term environmental outcomes (Singh et al., 2022).

These three aspects are the basis for implementing environmental context initiatives in business to be realised. Therefore, research is needed to examine the basis for the implementation initiative green business towards the sustainability of MSMEs in Surabaya, starting from assessing the green innovation aspect as a strategic plan for MSMEs to reduce the impact of environmental deterioration, green human resource as the main resource that can understand and appreciate green culture through technical skills, and green dynamic capability describing the organization's capacity to achieve green concepts and sustainable development in a dynamic environment. The relationship between green innovation, green human resource, and green dynamic capability and environmental performance focuses on how these practices contribute to an organisation's environmental performance.

Based on the explanation provided, the interesting aspect of this research is identifying the natural components within MSMEs that support company sustainability. This will make it easier for MSMEs to assess their business progress. In addition, research on the influence of green innovation, green human resource, and green dynamic capability on the sustainability of MSMEs, which are all interconnected, is less explored and limited (Jun et al., 2019; Kiranantawat & Ahmad, 2022; Raharjo, 2019). Therefore, researchers are interested in researching "The Influence of Green Innovation, Green Human Resource, and Green Dynamic Capability on the Sustainability of Processing Industry MSMEs in Surabaya with Environmental Performance as a Mediating Variable". Managers who adhere to a sustainability mindset have an obligation to consider social and environmental considerations in every strategic decision relating to MSMEs, including those concerning production and innovation to meet customer demand (Puspasari, 2020). Implementing sustainability initiatives

can help MSMEs meet changing customer demands driven by environmental damage. With the hope that the basics of business are a friendly environment, namely MSMEs that focus on their social obligations towards society and environmental sustainability, as well as their owners' efforts to maximise profits, can be realised (Deb et al., 2022). As with the maximisation of the stakeholder concept, a company's existence provides benefits and improves the welfare of all parties involved in the MSME sector, including owners, employees, customers, the government, and local communities (Utomo & Pratiwi, 2021).

LITERATURE REVIEW AND HYPOTHESIS FORMULATION

LITERATURE REVIEW

Stakeholder Theory

Stakeholders are individuals or groups who can affect or be affected by the company's processes and operations as a whole (Freeman et al., 2010). According to stakeholder theory, a business must provide benefits to its stakeholders, which include consumers, suppliers, government institutions, society and shareholders, in addition to serving its own interests (Ghozali & Chariri, 2014). Thus, the support a company receives from its stakeholders significantly affects the organisation's ability to continue operating (Singh et al., 2022). The purpose of stakeholder theory is to explain how a business operates and to build relationships with external groups to increase its competitive advantage (Freeman et al., 2010; Ghozali & Chariri, 2014). In this case, it means that MSMEs will definitely be connected to the surrounding social environment. To increase business productivity, companies must pay attention to all stakeholders involved. According to stakeholder theory, MSMEs have an obligation to consider the welfare of the parties involved in their operations, including in decision-making and related policies, because these parties can have direct or indirect impacts on MSMEs (Riani et al., 2022). Additionally, pressure from stakeholders has recently become a major driver of MSMEs' engagement in corporate social responsibility and sustainability (Singh et al., 2022). Stakeholder theory posits that opinions about an organisation and its environment are shaped by complex, dynamic factors (Riani et al., 2022; Singh et al., 2022). In general, stakeholders can significantly influence an MSME's business continuity. Through green innovation, MSMEs can develop products and processes that are more environmentally friendly and aligned with stakeholders' needs and expectations (Singh et al., 2022). From a stakeholder theory perspective, green human resources emphasises that MSMEs need to pay attention to employees and society as stakeholders who contribute to business success and sustainability (Jun et al., 2019). Through green dynamic capability, MSMEs can strengthen relationships with all stakeholders, improve their business reputation, and improve environmental performance globally (Singh et al., 2022). By using a stakeholder theory-based approach, MSMEs can integrate green innovation, green human resources, and green dynamic capability into their business strategy to achieve sustainability through improving environmental performance. This also allows MSMEs to strengthen relationships with diverse stakeholders and build a sustainable business reputation.

Resource-Based View Theory

The Resource-Based View (RBV) states that a company's competitive advantage is determined not only by external factors such as the market or industry but also by the unique and valuable internal resources it possesses (Wernerfelt, 1984). According to emerging theories of strategic management and competitive advantage, companies with reliable resources will achieve excellence (Muangmee et al., 2021). From a Resource-Based View perspective, rare and inimitable organisational characteristics help achieve sustainable competitive advantage (Muangmee et al., 2021). Furthermore, Singh et al. (2022) explain that a company's sustainability performance can be further developed by maximising sustainable competitiveness.

Unique internal and external resources within an organisation are important factors that create competitive advantage. The Resource-Based View perspective divides resources into tangible and intangible assets. Tangible assets include the company's cash reserves and physical resources such as buildings (including factories and offices), equipment, and raw material stocks (Famiola & Wulansari, 2019). Company reputation, technology, and human resources are examples of intangible assets. Famiola & Wulansari (2019); Muangmee et al. (2021); Singh et al. (2022) state that, compared with tangible assets, intangible assets can offer long-term and sustainable competitive advantages. In this study, researchers will explore the extent to which MSMEs perceive sustainable practices and their perceptions can drive decisions to engage in sustainability.

In general, the Resource-Based View creates both internal and external pressures to comply with environmental regulations, thereby prompting companies to implement comprehensive, environmentally friendly strategies (Muangmee et al., 2021; Singh et al., 2022). Through green innovation, MSMEs can create sustainable competitive advantages by meeting increasing market demand for environmentally friendly products and processes (Singh et al., 2022). Through green human resources, MSMEs can create a sustainability-oriented organisational culture, encourage sustainability initiatives, and increase employee participation in green practices (Pramudita & Gunawan, 2023; Rosyanti et al., 2023). Through green dynamic capability, MSMEs can continue to develop and improve their green practices in response to market, regulatory, and technological changes (Singh et al., 2022). By utilising the Resource-based View, MSMEs can identify, develop, and utilise their internal resources, including green innovation, green human resources, and green dynamic capability, to achieve sustainability through improving environmental performance. This helps MSMEs strengthen their market position, increase competitiveness and build a sustainable business reputation.

HYPOTHESIS FORMULATION

The Influence of Green Innovation on Sustainability MSMEs

Green innovation refers to the strategy used by an organisation to produce goods using innovative production methods, systems, practices, and processes, or to change existing ones to reduce environmental degradation, thereby achieving its strategic goals (Dewi & Rahmianingsih, 2020). The green innovation approach incorporated into the company's plan can bring benefits to the organisation, namely the realisation of products that meet stakeholder needs while consuming fewer resources, thereby contributing to business sustainability (Puspasari, 2020). Based on this explanation, a hypothesis can be drawn:

H1: Green innovation has a positive impact on the sustainability of MSMEs

The Influence of Green Human Resources on the Sustainability of MSMEs

Green human resources play an important role for MSMEs because the availability of skilled human resources and the owner's commitment to green business are among the factors that motivate and encourage MSME sustainability (Jun et al., 2019). Participation in training and environmentally friendly innovation initiatives will improve the quality of the company personnel. Furthermore, Jun et al. (2021) stated that rewarding employees for environmentally friendly behaviour can encourage them to implement environmentally friendly practices to support business sustainability. Based on this explanation, a hypothesis can be drawn:

H2: Green human resources have a positive influence on the sustainability of MSMEs

The Influence of Green Dynamic Capability on the Sustainability of MSMEs

Sustainability is a complex problem that requires innovative thinking and solutions. The complexity of environmental challenges, social difficulties, and interconnected economic development problems must be addressed and resolved through innovative perspectives, ideas,

and solutions (Kiranantawat & Ahmad, 2022). Green dynamic capability is very important for MSMEs because the dynamic business environment requires them to respond quickly to changing trends and gain a competitive advantage by fostering MSME sustainability (Kiranantawat & Ahmad, 2022; Raharjo, 2019). Based on this explanation, a hypothesis can be drawn:

H3: Green dynamic capability has a positive impact on the sustainability of MSMEs

The Influence of Environmental Performance as a Mediating Variable between Green Innovation and the Sustainability of MSMEs

Environmental performance enables companies to identify opportunities for growth not only from external sources but also simplifies internal capabilities to pursue environmentally friendly innovations that can improve environmental sustainability (Pol et al., 2021). Environmental performance is influenced by internal factors, such as management's willingness to implement proactive environmental management, and external factors, such as government regulations and media pressure, that support environmental management (Hidayat & Ghofar, 2020). Environmental performance is considered a mediating factor in this context because MSMEs that pay attention to it will demonstrate better environmentally friendly practices, thereby creating business sustainability through efforts to implement green innovation in response to environmental changes (Puspasari, 2020). Based on this explanation, a hypothesis can be drawn:

H4: Environmental performance mediates the relationship between green innovation and MSME sustainability.

The Influence of Environmental Performance as a Mediating Variable between Green Human Resources and the Sustainability of MSMEs

Human resources' strong awareness and technical skills regarding environmental protection are positive factors in a company's adoption of environmentally friendly practices. Environmental performance is considered a mediator in this context because MSMEs that pay attention to it will exhibit more environmentally friendly practices, thereby fostering business sustainability through environmentally friendly human resource practices (Jun et al., 2019). Based on this explanation, a hypothesis can be drawn:

H5: Environmental performance mediates the relationship between green human resources and MSME sustainability.

The Influence of Environmental Performance as a Mediating Variable between Green Dynamic Capability and the Sustainability of MSMEs

Continuous learning in business operations and strategic management is necessary for organisations to acquire essential knowledge and core resources as key competencies (Singh et al., 2022). Green dynamic capability is relevant in the MSME context because MSMEs tend to be more adaptable. Environmental performance is considered a mediator in this context because MSMEs that prioritise it will adopt more environmentally friendly practices, thereby fostering business sustainability by enabling rapid responses to environmental changes (Kiranantawat & Ahmad, 2022). Based on this explanation, a hypothesis can be drawn:

H6: Environmental performance mediates the relationship between green dynamic capability and MSME sustainability.

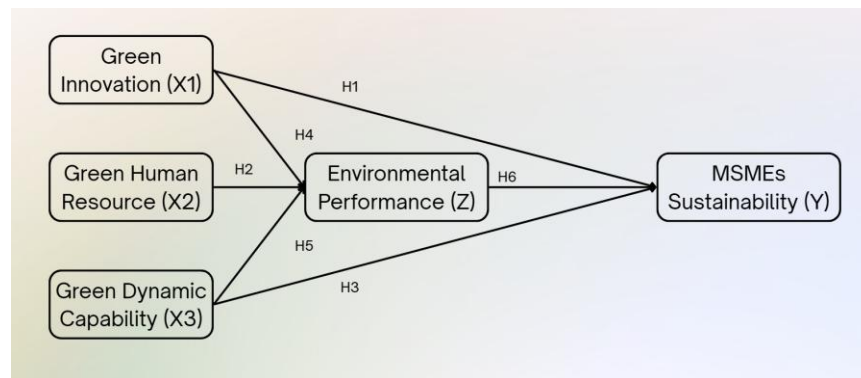


Figure 1. Hypothesis

Source: Processed data, 2024

RESEARCH METHODS

This is associative research. Associative research is carried out to determine the relationship between two or more variables, examining roles, influences, and causal relationships, namely between exogenous variables (exogenous) and endogenous variables (endogenous) (Sugiyono, 2007: 326). This research examines whether green innovation, green human resources, and green dynamic capability influence the sustainability of Processing Industry MSMEs in Surabaya, with environmental performance as a mediating variable.

In this research, a questionnaire was administered to the research sample to collect primary data. Google Forms are used to distribute questionnaires either directly or indirectly (online). This is intended to ensure that the questionnaire responses achieve the research objectives. Data regarding the distribution of the MSME sector is presented in the following table.

Table 2. Distribution of the MSME Sector in Surabaya,

Agriculture, Forestry, and Fisheries	10.521
Mining	16
Processing industry	28.099
Electricity and Gas Procurement	843
Water Supply, Waste Management, and Recycling	1.236
Construction	3.442
Wholesale and Retail Trade; Automobile and Motorcycle Repair	155.684
Transportation and Warehousing	15.072
Provision of Accommodation, Food, and Beverages	112.363
Information and Communication	10.397
Financial Services and Insurance	1.731
Real Estate	4.022
Corporate Services	7.836
Educational Services	5.949
Health Services and Social Activities	2.372
Other services	25.471
TOTAL	385.054

Data source: East Java Province Department of Cooperatives and SMEs

This research uses a non-probability sampling technique called purposive sampling, which means not every member of the population is given an equal opportunity to participate in the

sample. One way to select samples while still considering certain factors is purposive sampling (Sugiyono, 2007: 68). In this research, the location and sector of MSMEs were considered, namely the MSME Processing Industry in Surabaya. Researchers used the Slovin formula to determine the sample size for this study.

$$n = \frac{N}{1 + Ne^2} \dots\dots\dots (1)$$

n: number of samples
N: population size
e: error tolerance limit

Researchers determined the error rate in this study was 10%, and the accuracy rate was 90%. This is because the population taken by researchers was large, namely 28,099, obtained from data from the East Java Cooperatives and SMEs Service. So the calculation in selecting the sample is as follows:

$$n = \frac{28.099}{1 + 28.099 (0,1)^2} = 99,64 \dots\dots\dots (2)$$

Table 3. Indicator for Each Variable

No	Variable	Indicators	Reference
1	Green Innovation	a. Green product innovation b. Green process innovation	Chen et al., 2006
2	Green Human Resource	a. Organizational support b. Human resource quality	Lin & Ho, 2011; Wu et al., 2012)
3	Green Dynamic Capability	a. Strategic organizational capabilities b. Innovative research and development capabilities c. Organizational management capabilities	Hung et al., 2010; Singh et al., 2022
4	MSMEs Sustainability	a. Increasing economic growth b. Improving environmental quality c. Improving social relations	Kiranantawat & Ahmad, 2022
5	Environmental Performance	a. Emission reduction b. Energy efficiency c. Use of natural resources	Pramudita & Gunawan, 2023

Source: Processed data, 2024

Based on these calculations, the researchers used 100 MSMEs in the processing industry in Surabaya. To account for the distribution of respondents' answer values, questions were asked, and five alternative answers were provided on a Likert scale. Respondents will be asked to indicate the importance of green innovation, green human resources, and green dynamic capability indicators for MSME sustainability, with environmental performance mediating the effects of these indicators. The data analysis method in this research uses PLS-SEM, implemented in SmartPLS. PLS-SE M analysis is often separated into two submodels: the outer model, also known as the measurement model, and the inner model, also known as the structural model (Hair et al., 2011).

RESULTS AND DISCUSSION

RESULTS

The data source for this research is questionnaire responses. Questionnaires were distributed to MSMEs in Surabaya's processing industry.

Table 4. Questionnaire Taking Rate

Criteria	Amount	Percentage
Questionnaires distributed	168	100,00%
Returned questionnaire	104	61,90%
Eligible questionnaire	100	59,62%

Source: Processed data, 2024

The research population consists of MSMEs operating in the processing industry in Surabaya. Purposive sampling was used, and the required sample size for this research was 100 MSME actors. Research respondents were categorised based on location, processing industry sub-sector, MSME criteria, MSME age, and number of employees. Sample characteristics are presented as follows.

Table 5. Sample Characteristics

Sample Characteristics	Amount	Percentage
<u>Location:</u>		
North Surabaya	7	7%
South Surabaya	35	35%
Central Surabaya	11	11%
East Surabaya	27	27%
West Surabaya	20	20%
<u>Manufacturing Industry Sub-sector:</u>		
Food and Beverage Industry	55	55%
Textile and Clothing Industry	5	5%
Wood and Furniture Industry	8	8%
Craft and Creative Industry	16	16%
Printing Industry	10	10%
Other industries	6	6%
<u>MSME Criteria:</u>		
Micro	34	34%
Small	38	38%
Medium	28	28%
<u>Age of MSMEs:</u>		
< 5 years	46	46%
5 – 10 years	42	42%
11 – 15 years	6	6%
16 – 20 years	3	3%
> 20 years	3	3%
<u>Number of employees:</u>		
< 5 employees	62	62%
5 - 20 employees	34	34%
21 - 100 employees	4	4%

Source: Processed data, 2024

Measurement Model Evaluation (Outer Model)

Measurement model evaluation assesses the model's validity and reliability. The validity test used in this research comprises convergent and discriminant validity. This research uses composite reliability as a reliability test.

Convergent validity. The criteria for a value of outer loadings that is significant and meets the requirements are more than 0.7 (Hamid & Anwar, 2019: 42; Savitri et al., 2021: 34). All indicators have an outer loadings value of more than 0.7 (Appendix 1). The AVE values (Appendix 2) for each variable meet the required threshold, namely $AVE > 0.5$ (Hamid & Anwar, 2019: 43; Haryono, 2016: 383). Each research variable can be explained by its indicators and meets the requirements for convergent validity, as evidenced by the outer loadings and AVE.

Discriminant validity. The correlation of the indicator (Appendix 3) with the construct is higher than its correlations with the other block constructs, so the cross-loadings are satisfied. Thus, discriminant validity testing meets the requirements and is valid. Based on the data in the table presented, the value of Cronbach's alpha is more than 0.7, and the value of composite reliability is more than 0.7. Thus, all constructs in this research have met the requirements (see Appendix 4).

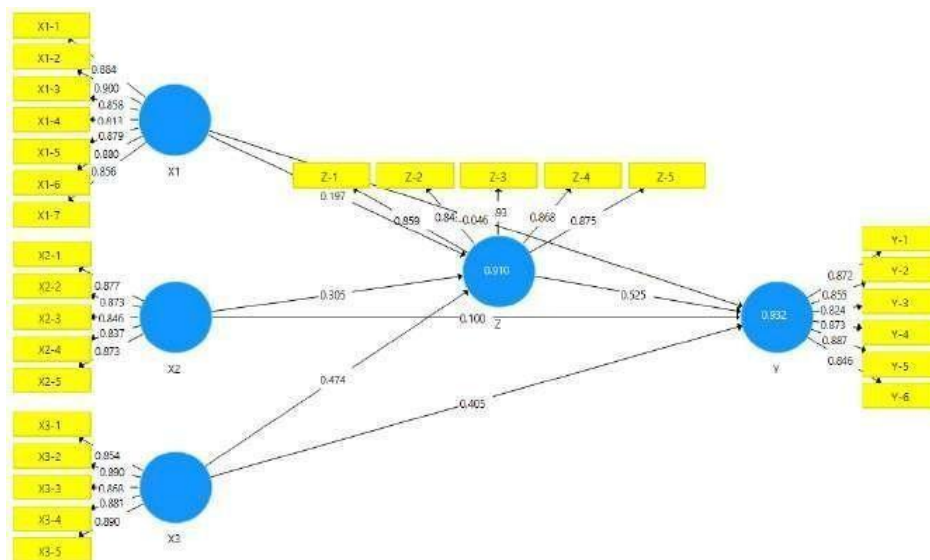


Figure 2. Outer Model Test Results

Structural Model Evaluation (Inner Model)

Based on the data in the table presented (Appendix 5), the MSME sustainability variables and environmental performance have strong R² category values. The R² value of the MSME sustainability variable (Y) is 0.932, which explains that the strength of the variables green innovation (X1), green human resource (X2), green dynamic capability (X3), and environmental performance (Z) in predicting the sustainability of MSMEs (Y) is 93.2%. Other constructs outside this research explain the remaining 6.8%. The R² value for the variable environmental performance (Z) is 0.910, indicating that the variables green innovation (X1), green human resource (X2), and green dynamic capability (X3) explain 91% of the variance in environmental performance (Z). The remaining 9% is explained by other constructs outside this research.

It can be concluded that the GoF value from this research falls within the large category (Appendix 7). SRMR values can also be used to assess the model's goodness. If the SRMR value is less than 0.10, the PLS model meets the Goodness-of-Fit requirement; if it is less than 0.08, it is considered a perfect fit. Based on the data in the table presented in Appendix 8, the direct analysis of the relationship between variables (direct effect) is explained as follows:

1. Green innovation (X1) has no effect and has a negative impact on the MSME sustainability variable (Y). Green innovation (X1) does not affect the variable environmental performance (Z) and has a positive impact on it. Green human resource (X2) does not affect the MSME sustainability variable (Y) and has a positive impact on the MSME sustainability variable (Y). Green human resource (X2) has a positive effect on the variable environmental performance (Z). Green dynamic capability (X3) has a positive effect on the sustainability variable (Y) of MSMEs. Green dynamic capability (X3) positively affects the environmental performance variable (Z). Environmental performance (Z) positively affects the MSME sustainability variable (Y).
2. In the direct effect results, the Green Innovation variable (X1) does not affect the MSME Sustainability (Y) and Environmental Performance (Z) variables, nor does the result of the indirect effect have any effect. This indicates that the Environmental Performance (Z) variable is not mediating, as there is no significant path, either direct or indirect, providing no evidence of mediation.
3. In the results of direct effect, the variable Green Human Resource (X2) has no effect on the variable UMKM Sustainability (Y), and Green Human Resource (X2) affects the variable Environmental Performance (Z). In contrast, the results in the indirect effect are influential. This indicates that the variable Environmental Performance (Z) mediates completely; in other words, the exogenous variable (Green Human Resource) cannot influence the endogenous variable (UMKM Sustainability) directly, but only through the mediating variable (Environmental Performance).
4. In the results of direct effect, the variable Green Dynamic Capability (X3) affects the variables of UMKM Sustainability (Y) and Environmental Performance (Z); likewise, the results of the indirect effect also have an effect. This indicates that the variable Environmental Performance (Z) partially mediates because the exogenous variable (Green Dynamic Capability) can influence the endogenous variable

DISCUSSION

Green Innovation Has a Positive Influence on the Sustainability of MSMEs

Based on the data in Appendix 8, the variable green innovation (X1) has an effect of -0.046; the P-value is $0.784 > 0.05$, and the T-statistic is $0.2751 < 1.96$. The results of the analysis show that the green innovation variable has no effect and a negative impact on the MSME sustainability variable (Y). Thus, hypothesis 1 is rejected.

Green innovation comprises two basic types: green product innovation and green process innovation. In its implementation, substantial costs are required to adopt green products or modify sophisticated equipment to prevent environmental pollution (Amalia, 2023). This, of course, entails high costs, so increasing green innovation tends to reduce the sustainability of MSMEs (Budi & Sundiman, 2021).

The stakeholder theory states that a company is not an entity that operates solely for its own interests but must provide benefits to its stakeholders (Ghozali & Chariri, 2014). Green innovation is not significant to the sustainability of MSMEs, suggesting that green innovation efforts have not sufficiently influenced stakeholders' sustainability expectations and needs. Stakeholder MSMEs have not fully demanded green innovation, so MSMEs' efforts in green innovation do not directly increase their sustainability. If MSMEs do not effectively communicate the benefits of green innovation, stakeholders will not recognise the added value it generates.

MSMEs do not yet have sufficient internal capabilities to implement green innovation effectively. Resources such as finance, knowledge, technology, and management skills required to support green innovation remain lacking. This is in line with the data description, which shows that the majority of respondents in this study were from MSMEs meeting the micro and small criteria.

Even though MSMEs strive to implement green innovation, if investment in these resources is insufficient or poorly managed, the results may not be seen as significant in the short term.

This research contrasts with research by Soewarno et al. (2018) and Kiranantawat & Ahmad (2022), which find that green innovation has a significant positive effect on MSME sustainability. The results of this research are consistent with research by Budi & Sundiman (2021) and Amalia (2023), which indicate that green innovation requires significant changes in the production process, the adoption of more expensive facilities, and an emphasis on continuous innovation.

Green Human Resources Has a Positive Influence on the Sustainability of MSMEs

Based on the data in Appendix 8, the variable green human resource (X2) has an effect of 0.100; the P-value is $0.225 > 0.05$, and the T-statistic is $1.138 < 1.96$. The analysis results show that the green human resource variable does not affect the MSME sustainability variable (Y), and that there is a positive impact on the MSME sustainability variable (Y). Thus, hypothesis 2 is rejected.

The green human resource implementation is not sufficient to secure full stakeholder support. According to Citrahartani & Dewi (2023), if MSME owners or employees do not perceive green initiatives as affecting their welfare or are not accompanied by adequate incentives, their participation may be low. Customers also do not perceive the direct impact of green human resource practices, so they do not provide significant support for MSME sustainability.

From an RBV Perspective, the test results indicate that MSMEs lack sufficient capacity or resources to implement green human resource practices effectively. Capabilities related to green human resources, such as adequate environmental knowledge, clear environmental policies, and employee participation in green initiatives, are either insufficient or not prioritised in MSME business strategies (Utami & Emilia, 2024). This research contrasts with Jun et al. (2019), which found that green human resources had a significant positive effect on business sustainability. On the other hand, the results of the analysis from this research support research from Citrahartani & Dewi (2023) and Utami & Emilia (2024), which explains that the quality of human resources, such as a lack of knowledge, skills and motivation, can reduce productivity and efficiency in business operations, which has an impact on business growth or sustainability.

Green Dynamic Capability has a positive influence on the sustainability of MSMEs

Based on the data in Appendix 8, the variable green dynamic capability (X3) has an effect of 0.405, a P-value of $0.001 < 0.05$, and a T-statistic of $3.219 > 1.96$. The analysis shows that the green dynamic capability variable has a positive effect on the MSME sustainability variable (Y). Thus, hypothesis 3 is accepted.

Green dynamic capability enables MSMEs to adapt quickly to environmental and consumer changes, leading to more environmentally friendly products and processes (Singh et al., 2022). Green dynamic capability refers to MSMEs' ability to identify and respond to environmental issues important to stakeholders proactively. By developing green dynamic capability, MSMEs can meet the expectations of stakeholders who are increasingly concerned about environmental issues. This can increase customer loyalty and strengthen relationships with the community and government. In line with research by Kiranantawat & Ahmad (2022) and Singh et al. (2022), which provides evidence that when MSMEs feel they have adequate capabilities to adapt quickly to environmental and market changes, this leads to business sustainability.

According to the RBV, green dynamic capability reflects MSMEs' ability to continue adapting and innovating to address environmental challenges. Green dynamic capability is a unique resource that is difficult for competitors to imitate, providing a significant competitive advantage. Through green dynamic capability, MSMEs can increase operational efficiency by reducing resource use, reducing waste, and adopting environmentally friendly practices (Kiranantawat & Ahmad, 2022). This can reduce operational costs and increase long-term profitability.

Environmental Performance Mediates the Relationship between Green Innovation and MSME Sustainability

Based on the data in Appendix 9, the influence of the variable green innovation (X1) on the sustainability of MSMEs (Y) through environmental performance (Y) is 0.103; the P-Value is 0.141 > 0.05, and the T-Statistics value is 1.473 < 1.96. So hypothesis 4 is rejected. The results of the analysis show that the variable environmental performance does not mediate, as there is no significant path, either direct or indirect, providing no evidence of mediation.

Although green innovation is expected to improve environmental performance, the insignificant results indicate that MSMEs' implementation of green innovation is ineffective in generating real environmental benefits. This is caused by a lack of resources, knowledge and commitment of M SMEs in implementing green practices comprehensively. Stakeholders do not experience the increase in environmental performance expected from green innovation, so they do not provide sufficient support for this change.

Environmental performance did not mediate the relationship between green innovation and MSMEs' sustainability, indicating that green innovation practices do not directly translate into sustainability through improving environmental performance. This suggests that stakeholders are more influenced by other factors when assessing the sustainability of MSMEs, such as financial performance, product quality, or MSME reputation. According to the RBV theory by Muangmee et al. (2021), which posits that rare and inimitable organisational characteristics help achieve sustainable competitive advantage, the results indicate that green innovation does not significantly improve environmental performance, suggesting that MSMEs lack sufficient resources or capabilities to implement it effectively. This means that even though MSMEs have the potential to pursue green innovation, they lack the technology, expertise, and financial support to make significant changes in environmental performance that will result in business sustainability (Budi & Sundiman, 2021; Utami & Emilia, 2024).

Environmental Performance Mediates the Relationship between Green Human Resources and MSME Sustainability

Based on the data in Appendix 9, the influence of the variable green human resource (X2) on the sustainability of MSMEs (Y) through environmental performance (Y) is 0.160; the P-Value is 0.007 < 0.05, and the T-Statistics value is 2.718 > 1.96. So hypothesis 5 is accepted. The results of the analysis show that the variable environmental performance fully mediates the influence of green human resources on the sustainability of MSMEs, as the influence is transmitted entirely through this variable.

In testing hypothesis 2, the results showed that green human resources did not directly have a significant impact on the sustainability of MSMEs. However, hypothesis 5 showed that environmental performance was fully mediated by green human resources, which, in turn, had a significant impact on MSME sustainability. Green human resources improve environmental performance by developing internal capabilities related to environmental practices, such as energy efficiency, waste management, and the use of environmentally friendly raw materials (Auliana & Alhazami, 2023). Improved environmental capabilities through green human resources will improve the company's environmental performance. This research is in line with research by Pramudita & Gunawan (2023), which shows that good environmental performance can improve a company's reputation and attract customers who care about the environment. The improved environmental performance achieved through green human resources contributes to the sustainability of MSMEs, making them more competitive and sustainable in the long term.

Environmental Performance Mediates the Relationship between Green Dynamic Capability and MSME Sustainability

Based on the data in Appendix 9, the influence of the variable green dynamic capability (X3) on the sustainability of MSMEs (Y) through environmental performance (Y) is 0.248; the P-Value is $0.001 < 0.05$, and the T-Statistic is $3.369 > 1.96$. So hypothesis 6 is accepted. The results of the analysis show that environmental performance partially mediates the relationship between green dynamic capability and the sustainability of MSMEs, as the influence of green dynamic capability on the sustainability of MSMEs is significant both before and after accounting for the mediating variable (environmental performance).

An important issue in implementing green dynamic capability is reorganising internal and external resources in response to a rapidly changing environment to achieve environmental performance (Kiran Tawat & Ahmad, 2022). According to stakeholder theory, when green dynamic capability enhances environmental performance, it strengthens stakeholders' positive perceptions of MSMEs. Stakeholders such as consumers, communities, and governments appreciate MSMEs that demonstrate good environmental performance. Good Environmental performance shows that MSMEs comply with changes in environmental regulations and meet market demands for sustainable business practices. This can increase stakeholder support, enhance the company's competitiveness, attract customers who care about the environment, and strengthen MSMEs' market position (Singh et al., 2022).

Meanwhile, viewed through the RBV, green dynamic capability provides a competitive advantage by developing unique, difficult-to-imitate environmental capabilities, thereby increasing environmental performance and the sustainability of MSMEs. The improvement in environmental performance through green dynamic capability demonstrates that MSMEs are not only committed to achieving high environmental performance but also capable of doing so, thereby supporting operational efficiency and sustainable innovation.

CONCLUSION

This study concludes that green dynamic capability is the primary direct engine driving the long-term sustainability of manufacturing MSMEs in Surabaya. While green innovation unexpectedly exerts a non-significant negative impact due to prohibitive adoption costs, and green human resources fail to directly secure business survival on their own, these constraints are significantly mitigated when channelled through environmental performance. Specifically, mediation analysis using SmartPLS demonstrates that environmental performance serves as an essential full mediator for green human resources, shifting trained environmental awareness into direct competitive viability. Furthermore, environmental performance serves as a partial mediator of green dynamic capabilities, enabling firms to navigate regulatory changes and optimise operational efficiency. Ultimately, the findings reveal that investing in adaptive internal resource reconfigurations and maximising eco-efficiencies are much more effective strategic pathways for small-scale enterprises than pursuing capital-intensive innovations. Government and institutional actors should therefore prioritise administrative subsidies, technical training, and targeted resource-management incentives rather than expecting independent micro-businesses to shoulder the initial financial burden of high-tech environmental transitions.

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Appendix

Appendix 1. Value Outer Loadings

	X1	X2	X3	Y	Z
X1-1	0,884				
X1-2	0,900				
X1-3	0,858				
X1-4	0,813				
X1-5	0,879				
X1-6	0,880				
X1-7	0,856				
X2-1		0,877			
X2-2		0,873			
X2-3		0,846			
X2-4		0,837			
X2-5		0,873			
X3-1			0,854		
X3-2			0,890		
X3-3			0,868		
X3-4			0,881		
X3-5			0,890		
Y-1				0,872	
Y-2				0,855	
Y-3				0,824	
Y-4				0,873	
Y-5				0,887	
Y-6				0,846	
Z-1					0,859
Z-2					0,843
Z-3					0,893
Z-4					0,868
Z-5					0,875

Source: SmartPLS Output, 2024

Appendix 2. AVE value

X1	0,753
X2	0,742
X3	0,769
Y	0,739
Z	0,753

Source: Smartpls Output, 2024

Appendix 3. Value Cross Loadings

	X1	X2	X3	Y	Z
X1-1	0,884	0,808	0,838	0,825	0,829
X1-2	0,900	0,886	0,857	0,846	0,842
X1-3	0,858	0,800	0,785	0,736	0,760
X1-4	0,813	0,729	0,749	0,761	0,769
X1-5	0,879	0,833	0,844	0,794	0,806
X1-6	0,880	0,794	0,847	0,839	0,839
X1-7	0,856	0,816	0,849	0,786	0,811
X2-1	0,858	0,877	0,820	0,802	0,821
X2-2	0,806	0,873	0,822	0,817	0,818
X2-3	0,781	0,846	0,779	0,816	0,795
X2-4	0,752	0,837	0,712	0,680	0,709
X2-5	0,819	0,873	0,796	0,795	0,819
X3-1	0,826	0,769	0,854	0,778	0,772
X3-2	0,825	0,820	0,890	0,835	0,840
X3-3	0,831	0,789	0,868	0,800	0,804
X3-4	0,828	0,774	0,881	0,871	0,853
X3-5	0,861	0,855	0,890	0,857	0,848
Y-2	0,820	0,828	0,864	0,872	0,814
Y-3	0,812	0,833	0,800	0,855	0,830
Y-4	0,744	0,728	0,774	0,824	0,809
Y-5	0,830	0,801	0,841	0,873	0,837
Y-6	0,795	0,754	0,805	0,887	0,830
Y-7	0,746	0,749	0,789	0,846	0,802
Z-1	0,775	0,780	0,810	0,785	0,859
Z-2	0,796	0,797	0,774	0,813	0,843
Z-3	0,845	0,844	0,863	0,862	0,893
Z-4	0,817	0,793	0,824	0,851	0,868
Z-5	0,810	0,784	0,804	0,826	0,875

Source: SmartPLS Output, 2024

Appendix 4. Reliability and Validity constructs

	Cronbach's Alpha	Composite Reliability
X1	0,945	0,955
X2	0,913	0,935
X3	0,925	0,943
Y	0,929	0,944
Z	0,918	0,938

Source: SmartPLS Output, 2024

Appendix 5. Value R-Square

	R-square	Kriteria
Y	0,932	Kuat
Z	0,910	Kuat

Source: SmartPLS Output, 2024

Appendix 6. Value *f-square*

	X1	X2	X3	Y	Z
X1				0,002	0,030
X2				0,016	0,125
X3				0,177	0,225
Y					
Z				0,364	

Source: SmartPLS Output, 2024

Appendix 7. Value *Model Fit*

	Saturated Model	Estimated Model
SRMR	0,048	0,048
d_ ULS	0,931	0,931
d_ G	1,921	1,921
Chi-Square	854,144	854,144
NFI	0,770	0,770

Source: SmartPLS Output, 2024

Appendix 8. Value of Relationship Between Variables (*Direct Effect*)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
X1 -> Y	-0,046	-0,038	0,166	0,275	0,784
X1 -> Z	0,197	0,194	0,149	1,321	0,187
X2 -> Y	0,100	0,106	0,088	1,138	0,255
X2 -> Z	0,305	0,305	0,083	3,680	0,000
X3 -> Y	0,405	0,407	0,126	3,219	0,001
X3 -> Z	0,474	0,477	0,082	5,771	0,000
Z -> Y	0,525	0,509	0,114	4,584	0,000

Source: SmartPLS Output, 2024