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# Key Factors for Achieving Green Competitive Advantage through the Mediation of Green Innovation in Addressing Environmental Concerns

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**Abstract**

Environmental degradation has significantly intensified, raising global concerns, particularly in Indonesia. This issue impacts micro-businesses as consumers become increasingly environmentally conscious, especially in Surabaya. In response, businesses are adopting green innovations to meet market demands and gain a competitive advantage in sustainability. This study aims to identify the key factors for achieving a green competitive advantage through green innovations, which mediate the relationship between external environmental orientation and green dynamic capabilities. The method of this study is a quantitative methodology, utilizing a 6-point Likert scale online questionnaire for data collection. The sample comprises 142 green micro-businesses in the Surabaya region, selected using purposive sampling. Data are analyzed using SmartPLS software. The results indicate significant direct relationships between external environmental orientation, green dynamic capabilities, and green competitive advantage. Additionally, external environmental orientation and green dynamic capabilities significantly influence green innovation. The results also highlight indirect relationships between the independent variables and green competitive advantage, with green innovation partially mediating the proposed model.

**Keywords**: external environmental orientation, green competitive advantage, green dynamic capabilities, green innovation, MSMEs, sustainability

## INTRODUCTION

Indonesia is currently ranked among the top ten global carbon emitters. A significant reduction in carbon emissions could be achieved through various sectors, including businesses, particularly Micro, Small, and Medium Enterprises (MSMEs). MSMEs currently contribute 61% to the nation's Gross Domestic Product (GDP) (Annur, 2023a; Kadin Indonesia, 2023). If the traditional "business-as-usual" model is replaced with a sustainable business model, this sector has the potential to make a substantial contribution to national carbon emission reduction targets, while simultaneously fostering economic growth. This highlights the critical role that MSMEs can play in achieving environmental objectives and underscores the urgent need to promote sustainable business practices within this sector. The adoption of sustainable practices by MSMEs can enhance their competitiveness while significantly contributing to both environmental sustainability and economic resilience (Ruslaini, 2021; Nisaputra, 2023).

Many of the MSMEs might not have the financial resources to make the significant ex-

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penditure needed to switch to environmentally friendly technologies for their production operations (Kadin Indonesia, 2023; Ruslaini, 2021). Increasing knowledge and enhancing MSME owners' ability to implement environmentally friendly business practices is a significant challenge. Many people might still have doubts about the efficacy of green efforts or may not completely comprehend their long-term advantages. MSMEs' ability to promote economic resilience and environmental sustainability will be limited in the absence of greater understanding and assistance. Accordingly, removing these obstacles is essential to empowering MSMEs to contribute significantly to climate change mitigation (Bakos et al., 2020; Nguyen et al., 2023).

A "green business" is an organization that promotes the use of sustainable and eco-friendly products and increases consumer awareness. Government Regulation No. 7-2021 in Indonesia defines a microbusiness as one that has less than IDR 1 billion in financial capital and produces less than IDR 2 billion in revenue annually (Annur, 2023b; Yousaf, 2021). Since 2022, the Green Enterprises sector has grown significantly due to a number of catalysts. Crucial roles have been played by the global emphasis on carbon disclosures and the growing consumer demand for ecologically friendly practices. The Government Task Force on Climate-Related Financial Disclosures (TCFD) has recommended a more advanced regulatory framework, urging businesses to prioritize sustainability initiatives. This regulatory shift has significantly enhanced the development of MSMEs engaged in environmental advocacy (TCFD, 2023).

The Minister of Trade has noted that the green economy represents emerging market mechanisms and business models that are fundamentally reshaping Indonesia's global economic trajectory. To maintain the competitiveness of Indonesian products in the international market, it is essential to align MSME product development with global trends, as consumers are increasingly conscious of environmental issues (Sayekti, 2022; Das, 2022). The sustainability of MSMEs in both domestic and global markets hinges on their ability to achieve green competitiveness, thereby addressing environmental challenges effectively. By adopting eco-friendly practices and fostering innovation, MSMEs can enhance resilience, increase productivity, and make a significant contribution to Indonesia's economic growth and development within the global green economy (Ruslaini, 2021; Rustiarini, Bhegawati, & Mendra, 2022).

The green competitive advantage of a business depends on its ability to establish a reputation as an environmentally sustainable organization through the implementation of green innovation. Research suggests that a green competitive advantage can be achieved by emphasizing an external environmental orientation (Fatoki, 2021; Riza & Sumarti, 2024). However, gaps exist in the literature, indicating that external environmental orientations alone may not directly enhance green business competitiveness unless they are linked with the effective utilization of green innovations. External environmental orientation refers to the factors that influence a company's credibility in meeting the standards and expectations of external stakeholders, including the government, customers, and competitors, thereby promoting green values (Fatoki, 2021; Hsu & Chen, 2022; Riza & Sumarti, 2024). Businesses must emphasize an external environmental orientation, which includes a thorough understanding of and adaptability to external environmental issues, strategies, and stakeholder expectations, in order to capitalize on a green competitive advantage.

Prior research has indicated that green organizational capabilities, particularly green dynamic capabilities, can enhance business innovations and the adoption of green practices, thereby improving competitiveness in the green market and overcoming associated barriers (Nguyen et al., 2023; Li et al., 2024; Zhu et al., 2023). Enterprise competencies are strengthened by incorporating environmental factors into strategic planning for ongoing improvement, aided by green innovations. This method allows for precise estimations of market trends and promotes awareness of environmental changes (Li et al., 2024; Zhu et al., 2023). By balancing environmental effect and economics, developing ecological capabilities improves financial results and corporate performance. As customers increasingly evaluate their environmental management efforts, businesses need to efficiently reallocate resources to adapt to changing environmental conditions in order to maintain a competitive edge (Yousaf, 2021; Nguyen et al., 2023; Li et al., 2024).

The use of ecologically friendly goods, services, marketing plans, or organizational techniques inside a business is known as "green innovation" (de Resende Ribeiro & Neto, 2021; Nguyen et al., 2023). Strategies to improve environmental performance are its driving forces (Arsawan et al., 2021; Wiredu, 2024). Green innovation encourages the creation of long-term solutions to environmental problems, such as waste management, pollution control, energy efficiency, and environmental governance. In order to successfully engage relevant consumers, this involves a variety of corporate sectors, including sustainable marketing (Fatoki, 2021; Zhu et al., 2023; Yang & Jiang, 2023).

This study is essential for figuring out how Indonesian SMEs may get a green competitive edge before more regulations and an ongoing shift in consumer preferences toward eco-friendly products. The results of the study will add to the body of information on green entrepreneurship and provide SMEs with practical tactics to stay viable and competitive in this quickly changing environment. This research may help businesses manage future environmental difficulties while maximizing the economic potential of the green economy by emphasizing the crucial role of green innovation.

**Natural Resource-Based View (NRBV)**

Hart (1995) introduced the Natural Resource-Based View (NRBV), which addresses the problem of implementing business plans that maximize environmental benefits and gain a competitive edge. Three strategic skills that evaluate company performance from a sustainability perspective are highlighted by NRBV: pollution avoidance, product stewardship, and sustainable development. By utilizing sustainable and distinctive resources, this framework assists firms in addressing environmental issues, reducing industrial waste, increasing cost-effectiveness, and gaining a competitive edge. Achieving these results requires integrating external orientations with internal methods. Through complementary differentiation and nature-based responses to external forces, an external environmental orientation can improve a company's image and reputation, even while internal initiatives alone might not be enough. According to the notion, business processes can be greatly impacted by a company's green dynamic capabilities, which include initiatives to solve environmental concerns. Businesses can promote green innovations and develop a green competitive advantage by implementing the three strategic capabilities listed in NRBV.

**External Environmental Orientation**

The external environmental orientation of a company is commonly described as the circumstances impacted by external stakeholders' demands that the company use eco-friendly procedures (Fatoki, 2021; Zameer et al., 2020). According to earlier studies, external stakeholders have the power to influence a company's legitimacy by encouraging adherence to particular standards and actions in response to their demands and urgency (Riza & Sumarti, 2024). A business's answer shows its social responsibility and calls for the implementation of sustainable practices to protect the environment, which improves the company's reputation. In order to immediately improve the company's innovation and eco-operational processes, these values must be backed by informed and knowledgeable resources that can put environmentally friendly plans into practice (Riza & Sumarti, 2024; Zameer et al., 2024).

The term "green dynamic capabilities" describes a company's capacity to collect and use data and expertise from multiple fields in order to promote innovation. Companies can use this capability to track changes in the environment and turn them into market data, which helps them spot possibilities and dangers. To enhance the firm's skills, green dynamic capabilities rely on environmentally friendly innovations (Nguyen et al., 2023; Li et al., 2024). In order to promote environmental sustainability, they also entail incorporating environmental factors into strategic planning and consistently enhancing procedures (Zhu et al., 2023). A company's ability to adjust when implementing ecological competences is strengthened by green dynamic capabilities, which improves performance and financial results. Businesses' environmental management initiatives are increasingly being evaluated by external stakeholders, especially consumers. This pattern emphasizes how important it is for businesses to efficiently reallocate resources in order to preserve environmental sustainability. A company's dynamic capacities and competitiveness in the market can be enhanced by resource management expertise (Nguyen et al., 2023; Li et al., 2024).

**Green Innovation**

Enhancing or implementing ecologically friendly goods, services, marketing plans, or organizational procedures into a company's activities is known as "green innovation." It aims to address environmental issues such waste management, pollution control, energy efficiency, and environmental governance. The adoption of green technologies to enhance environmental performance is largely driven by environmental strategies (Arsawan et al., 2021; Nguyen et al., 2023). Green innovation supports sustainable strategies meant to reduce harm to the environment. Green radical innovation (GRI) and green incremental innovation (GII) are the two categories of green innovation. By embracing eco-innovations and applying creative approaches to satisfy the increasing demand for eco-friendly goods and services, both kinds promote sustainable development and give businesses a major competitive edge (Khan et al., 2021; Fernando et al., 2021; Al-Khatib, 2022).

According to previous studies, green innovations are directly influenced by and closely related to external environmental orientations (Fatoki, 2021; Riza & Sumarti, 2024). These approaches are crucial in supporting green value business strategies and promoting funding for green innovation research. Consequently, external environmental orientations are seen as a key factor in encouraging companies to adopt green

technologies (Feng, Zhao, Li, & Song, 2018; Yang & Jiang, 2023).

H1: External environmental orientation has a positive significant effect on green innovation.

Green dynamic capacities have a major impact on the relationship with green innovation, according to numerous research. A company's capacity to successfully integrate, configure, and coordinate green innovations into its operations is improved by green dynamic capabilities, a crucial part of operational capabilities. It has been demonstrated that enhancing green dynamic capabilities has a good impact on enterprises' financial performance, with increased profitability and favorable environmental results coming from the expansion of the company (Zhu et al., 2023; Burcã et al., 2024; Li et al., 2024).

H2: Green dynamic capabilities have a positive significant effect on green innovation.

According to earlier research, when linked to external environmental orientations, green innovations can increase the significance of a green competitive advantage (Fatoki, 2021; Riza & Sumarti, 2024). Furthermore, when a company's green dynamic skills are strong, green innovations act as a powerful mediator. The continuous impacts of green dynamic capabilities on a company's green competitive advantage have been demonstrated to be mediated and enhanced by green innovation (Nguyen et al., 2023; Zhu et al., 2023). The importance of green innovation allows a business to establish its unique selling point in response to external environmental demands.

**Green Competitive Advantage**

The ability of a business to continue to surpass its rivals in the marketplace is referred to as competitive advantage. Businesses are being pushed more and more to implement eco-friendly and sustainable practices due to increasing market pressure. Businesses can improve their environmental reputation by maximizing resource usage and minimizing waste through eco-friendly technologies (Fatoki, 2021; Zhu et al., 2023). Therefore, resolving environmental issues has emerged as a crucial goal for businesses looking to maintain their competitive advantage and market position. The idea of "green competitive advantage," which is the competitive edge obtained by addressing environmental issues by putting creative solutions into practice, was developed as a result of this urgency.

H3: Green innovation has a positive significant effect on green competitive advantage.

Green competitive advantage is a firm's market positioning in response to environmental preservation, achieved by occupying difficult-to-imitate states that allow it to outperform competitors. It also results from a firm's ability to implement positive sustainability values (Astuti & Datrini, 2021; Hossain et al., 2021). Integrating environmental values into organizational processes enhances green competitive advantage (Riza & Sumarti, 2024), as firms that successfully gain a competitive edge rely on customer satisfaction and responsible practices to establish a superior reputation, distinguishing themselves from competitors. Previous research has concluded that green competitive advantage can be attained through external environmental orientations and is further amplified by the adoption of green innovations. Moreover, a business's ability to coordinate and integrate—referred to as green dynamic capabilities—can directly contribute to a significant green competitive advantage (Fatoki,

2021; Zhu et al., 2023). Green competitive advantage can be enhanced through the mediation of green innovations, which serve to utilize and implement green value adaptations as capabilities, promoting greater efficiencies in specific areas (Nguyen et al., 2023).

H4: External environmental orientation has a positive significant effect on green competitive advantage.

H5: Green dynamic capabilities have a positive significant effect on green competitive advantage.

H6: Green innovation mediated the relationship between external environmental orientation and green competitive advantage.

H7: Green innovation mediated the relationship between green dynamic capabilities and green competitive advantage.

## METHOD

This research adopts a quantitative approach, specifically correlational quantitative research, utilizing survey questionnaires for data collection. The dependent variable in this study is green competitive advantage, with green innovation serving as the mediating variable, and external environmental orientation and green dynamic capabilities as independent variables. The correlational research will involve problem statements, hypotheses with formulated questions based on relevant indicators, a literature review, and quantitative data analysis derived from survey questionnaire responses. The proposed population for this study consists of micro-businesses in Surabaya that incorporate green values into their products, processes, and organizational practices, according to the criteria outlined in Government Regulation No. 7, 2021 (Annur, 2023b). The classification criteria, as stated in Article 35 of Government Regulation (GR) No. 7/2021, categorize enterprises based on their capital and annual revenue. Micro enterprises are defined as businesses with a maximum capital of IDR 1,000,000,000 (excluding land and buildings) and annual revenue not exceeding IDR 2,000,000,000. Small enterprises are characterized by business capital ranging from IDR 1,000,000,000 to IDR 5,000,000,000 and annual revenue between IDR 2,000,000,000 and IDR 15,000,000,000. Medium enterprises, in contrast, have business capital ranging from IDR 5,000,000,000 to IDR 10,000,000,000, with annual revenue between IDR 15,000,000,000 and IDR 50,000,000,000.

It is important to recognize that these classifications serve as the primary method for identifying a business as an MSME. However, for purposes not specified in Government Regulation No. 7/2021, Article 36 allows the Ministry of Cooperatives and Small-Medium Enterprises to apply additional criteria, including net worth, investment, number of employees, incentives and disincentives, domestic component rate, and the adoption of eco-friendly technologies. This study suggests using non-probability sampling—more especially, purposive sampling—to choose sample units for analysis from the unknown population because of the uncertainty around the population's exact size (Hossan et al., 2023). Based on the 20 indicators created for the suggested variables framework, the sample size will be established using an adaptation of Hair et al. (2021), aiming for a minimum of 140 respondents and a maximum of 200 respondents.

In order to thoroughly investigate the processes that lead to a green competitive advantage, this study integrates twenty crucial indicators, which are categorized into four main con-

**Table 1 Variables, Indicators, Operational Definition, and Questionnaires**

| Variables | Indicators | Operational Definition | Questionnaires |
|---|---|---|---|
| External Environmental Orientation (Fatoki, 2021) | 1. Financial Well-being | 1. State of a micro business financial performance affected by environmental factors. | 1. Our micro business's financial well-being depends on the state of the natural environment. |
| | 2. Environmental Preservation Responsibilities | 2. Micro business commitment to implement sustainable practices in business operations by prioritizing environmental friendliness. | 2. Our micro business has a responsibility to preserve the environment. |
| | 3. Environmental Preservation Vitality | 3. Micro businesses aim to uphold states of environmental sustainability to enhance business viability within the market. | 3. Our micro business's sustainability is dependent on environmental preservation. |
| | 4. External Stakeholders Urgency | 4. Micro business's obligation in prioritizing urgency of external stakeholders over environmental preservation efforts. | 4. Our micro business responsibility to its external stakeholders is as important as our responsibility toward environmental preservation. |
| Green Dynamic Capabilities (Yousaf, 2021) | 1. Sensing Capability | 1. Micro business's capacity to recognize green business opportunities within the surrounding environment. | 1. Our micro business can identify green business opportunities towards environmental issues. |
| | 2. Learning Capability | 2. Micro business's competence in process improvement through the application of evolved green knowledge ideation. | 2. Our micro business has a competency to develop green knowledge and effective routines as solutions to environmental issues. |
| | 3. Integrating Capability | 3. Micro business's ability to enact new developments in fostering a collective understanding within the organization. | 3. Our micro business has a competent implementation of green knowledge within the firms to preserve environmental conditions. |
| | 4. Coordinating Capability | 4. Micro business's capacity in the creation of processes design implementation that incorporates new ideational developments. | 4. Our micro business has a competent coordination of green knowledge within the firm's resources as solutions to solve environmental issues. |
| Green Innovation (Yousaf, 2021) | 1. Product Eco Innovation | 1. Micro business efforts of sustainable materials resources product development with the aim of environmental preservation. | 1. Our micro business attempts to implement innovation by utilizing environmentally sustainable materials in our products. |
| | 2. Process Eco-Innovation | 2. Micro business endeavors in operational processes development to minimize unsustainable approaches usage. | 2. Our micro business attempts to implement innovation by utilizing environmentally sustainable approaches in our operations processes. |

| | | | |
|---|---|---|---|
| | 3. Waste Minimization | 3. Micro businesses declined the capacity of waste generated from business processes. | 3. Our micro business attempts to minimize hazardous waste effectively in the firm's operations process. |
| | 4. Energy Consumption | 4. Micro business sustainable development in energy consumption to minimize unsustainability impacts resulting from the firm's activities. (Examples of sustainable energy forms: Heat, Water, Wind, and environmentally-friendly energy). | 4. Our micro business attempts to use the consumption of renewable energy in the firm's operations process. (Example: Heat, Water, Wind, and environmentally-friendly energy). |
| Green Competitive Advantage (Fatoki, 2021) | 1. Cost Competitiveness | 1. Micro business ability to maintain low costs facilitated by green innovation adaptation integration, in comparison to its competitors. | 1. Our business has a competitive advantage of low cost in the area of environmental management innovation compared to our major competitors. |
| | 2. Green Product Quality | 2. Micro business values embedded in the product as a determinant of competitiveness relative to its competitors | 2. The quality of the green products that our micro business offers is better than our major competitors. |
| | 3. Profitability | 3. Micro business capacity to sustain profits to surpass business competitors. | 3. Our micro business is more profitable in the market than our competitors. |
| | 4. Brand Image | 4. Impact from micro business image on the market as levels of engagement surpass competitors. | 4. Our micro business's image is better than our competitors in the view of our market. |

structs: External Environmental Orientation (EEO), Green Dynamic Capabilities (GDC), Green Innovation (GI), and Green Competitive Advantage (GCA). According to recent studies, the Natural Resource-Based View (NRBV) is crucial for fostering green dynamic capabilities, which are characterized as a company's capacity for sustainable innovation and environmental adaptation. By incorporating green innovation and adapting to outside environmental demands, these competencies improve competitive posture (Nguyen et al., 2023; Riza & Sumarti, 2024). Green dynamic capabilities are measured using key indicators, including sensing, learning, integrating, and coordinating capacities. Furthermore, the relationship between dynamic capacities and green competitive advantage is mediated by green innovation, which may be divided into four categories: waste minimization, energy consumption, process eco-innovation, and product eco-innovation. Environmentally friendly strategies give businesses a green competitive edge and help them stand out in the marketplace. It is assessed based on elements including brand image, profitability, cost competitiveness, and the quality of green products (Astuti & Datrini, 2021; Fatoki, 2021). This approach shows how integrating sustainability into corporate plans promotes long-term growth and market dominance in addition to addressing environmental issues.

Online survey questions were utilized to obtain primary data, which was the main emphasis of data gathering. To address the characteristics or indications of the chosen variables, the survey included closed-ended questions in the form of a 6-point Likert scale. The questionnaire was translated into Indonesian in order to get around language limitations. The ordinal scale is the chosen measurement level, and the 6-point Likert scale approach is used to guarantee objective responses (Lukewich et al., 2023). According to a survey of Likert scale usage in research by Kusmaryono & Wijayanti (2022), 90% of studies utilized odd-numbered scales, with 5-point scales being the most popular, while 6-point scales can reduce central tendency bias.

## RESULTS

The data for this research were collected through online questionnaires distributed to a predetermined, unknown population of micro-businesses in Surabaya that implement green values in their operations. Out of 142 responses collected, three were excluded due to ineligibility, resulting in a final sample size of 139 respondents, which slightly exceeded the minimum required sample size of 140. PLS-SEM was used to evaluate and validate the data, and the greater sample size improved the data analysis's validity and accuracy (Hair et al., 2021).

With 83 respondents (41.55%) identifying as female and 59 respondents (58.45%) identifying as male, women represented the majority of respondents. Consequently, it can be said that women who actively incorporate green ideals into their business operations provided the majority of the research data. In compliance with Indonesian Government Regulation No. 7-2021, which defines micro-businesses, respondents had to provide yearly revenues of less than IDR 2 billion in order to guarantee the validity of the data. Based on the data, 97.9% of the respondents' businesses qualify as micro-businesses. The 2.1% of respondents who do not meet this criterion were excluded from further analysis. Additionally, 98.6% of respon-

dents met the financial capital criterion, as they reported capital of less than IDR 1 billion, in line with the regulations for micro-businesses (Annur, 2023b).

For validating the quantitative research using PLS-SEM, Hair et al. (2021) outlined two key validity measures: convergent validity and discriminant validity. Convergent validity, assessed by the average variance extracted (AVE), requires an AVE greater than 0.50 and factor loadings above 0.7. Discriminant validity in this research was evaluated using the heterotrait-monotrait ratio (HTMT), with a threshold of 0.90 or lower, and cross-loading tests, where items must correlate more strongly with their corresponding constructs than with others. These measures ensure that the constructs within the measurement model remain conceptually distinct. The data for this research were collected through online questionnaires distributed to a predetermined, unknown population of micro-businesses in Surabaya that implement green values in their operations. Out of 142 responses collected, three were excluded due to ineligibility, resulting in a final sample size of 139 respondents, which slightly exceeded the minimum required sample size of 140. The data were processed using SmartPLS software to analyze and validate the significance of the proposed research hypotheses. The use of PLS-SEM, supported by the larger sample size, positively influenced the accuracy and validity of the data analysis.

The majority of respondents were women, with 83 individuals (41.55%) identifying as female, while 59 respondents (58.45%) were male. Therefore, it can be concluded that most of the research data were obtained from women, who actively implement green values in their business operations. To ensure data validity, respondents were required to meet specific criteria, including generating annual revenues of less than IDR 2 billion, in accordance with Indonesian Government Regulation No. 7-2021, which defines micro-businesses. Based on the data, 97.9% of the respondents' businesses qualify as micro-businesses. The 2.1% of respondents who do not meet this criterion were excluded from further analysis. Additionally, 98.6% of respondents met the financial capital criterion, as they reported capital of less than IDR 1 billion, in line with the regulations for micro-businesses (Annur, 2023b).

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Table 2 presents the results for assessing convergent validity in the data analysis. All data met the measurement construct criteria, including the Average Variance Extracted (AVE) and Outer Loading. The AVE values exceeded the minimum threshold of 0.50, with green innovation and green competitive advantage achieving the highest AVE score of 0.712, while green competitive advantage recorded the lowest score of 0.639. Additionally, the Outer Loading measurements were satisfactory, with all scores exceeding the threshold of 0.7. These results

**Table 2 Convergent Validity**

| Variable | Indicator | Item | Outer Loading | AVE |
|---|---|---|---|---|
| External environmental orientations (X1) | X1.1 | EEO 1 | 0.830 | 0.640 |
| | X1.2 | EEO 2 | 0.775 | |
| | X.1.3 | EEO 3 | 0.814 | |
| | X.1.4 | EEO 4 | 0.779 | |
| Green dynamic capabilities (X2) | X2.1 | GDC 1 | 0.866 | 0.712 |
| | X2.2 | GDC 2 | 0.818 | |
| | X2.3 | GDC 3 | 0.809 | |
| | X2.4 | GDC 4 | 0.881 | |
| Green innovation (Z) | Z1.1 | GI 1 | 0.864 | 0.712 |
| | Z1.2 | GI 2 | 0.858 | |
| | Z1.3 | GI 3 | 0.828 | |
| | Z1.4 | GI 4 | 0.824 | |
| Green competitive advantage (Y) | Y1.1 | GDC1 | 0.798 | 0.639 |
| | Y1.2 | GDC 2 | 0.800 | |
| | Y1.3 | GDC 3 | 0.801 | |
| | Y1.4 | GDC 4 | 0.798 | |

confirm the convergent validity of the constructs in the research model.

Based on Table 3, the Heterotrait-Monotrait Ratio (HTMT) test results for this research indicate discriminant validity. The criterion for satisfactory values in this measurement is a value below 0.90. The data presented in the table show that all values are below this threshold, with the highest value being 0.840 and the lowest value being 0.784. These results confirm that the required values for measuring discriminant validity in this research are met.

The cross-loading test was conducted as an efficient alternative to measure discriminant validity. As shown in Table 4, the test results indicated that the specific variable indicators correlated more strongly within their respective constructs compared to other constructs. For

**Table 3 Discriminant Validity Test (HTMT Test)**

| Variable | External Environmental Orientation | Green Competitive Advantage | Green Dynamic Capabilities | Green Innovation |
|---|---|---|---|---|
| External environmental orientation | | | | |
| Green competitive advantage | 0.805 | | | |
| Green dynamic capabilities | 0.788 | 0.840 | | |
| Green innovation | 0.784 | 0.835 | 0.822 | |

**Table 4 Cross-Loading Test**

| Variable | External Environmental Orientation | Green Competitive Advantage | Green Dynamic Capabilities | Green Innovation |
|---|---|---|---|---|
| EEO1 | **0.830** | 0.551 | 0.561 | 0.537 |
| EEO2 | **0.775** | 0.548 | 0.554 | 0.580 |
| EEO3 | **0.814** | 0.562 | 0.486 | 0.476 |
| EEO4 | **0.779** | 0.436 | 0.512 | 0.512 |
| GCA1 | 0.577 | **0.798** | 0.609 | 0.584 |
| GCA2 | 0.519 | **0.800** | 0.541 | 0.526 |
| GCA3 | 0.516 | **0.801** | 0.573 | 0.596 |
| GCA4 | 0.489 | **0.798** | 0.534 | 0.535 |
| GDC1 | 0.591 | 0.596 | **0.866** | 0.595 |
| GDC2 | 0.542 | 0.539 | **0.818** | 0.557 |
| GDC3 | 0.520 | 0.583 | **0.809** | 0.598 |
| GDC4 | 0.581 | 0.663 | **0.881** | 0.653 |
| GI1 | 0.620 | 0.632 | 0.629 | **0.864** |
| GI2 | 0.514 | 0.584 | 0.608 | **0.858** |
| GI3 | 0.531 | 0.606 | 0.614 | **0.828** |
| GI4 | 0.559 | 0.544 | 0.554 | **0.824** |

example, EEO indicators 1–4 showed stronger correlations in the external environmental orientation column, GCA indicators 1–4 were more strongly correlated in the green competitive advantage column, and GDC indicators 1–4 had higher correlations in the green dynamic capabilities column. These findings confirm that the measurement of discriminant validity through the cross-loading test was successfully achieved.

Reliability was evaluated by analyzing the variance of each indicator within a construct, with Cronbach's alpha used to assess internal consistency. Indicator reliability is considered acceptable when the values exceed 0.708. Internal consistency and composite reliability were measured using Cronbach's alpha, with values between 0.60 and 0.70 deemed acceptable, and values between 0.70 and 0.90 considered satis-

**Table 5 Reliability Test**

| Variables | Cronbach's Alpha | Composite Reliability |
|---|---|---|
| External environmental orientation | 0.812 | 0.876 |
| Green competitive advantage | 0.812 | 0.876 |
| Green dynamic capabilities | 0.865 | 0.908 |
| Green innovation | 0.865 | 0.908 |

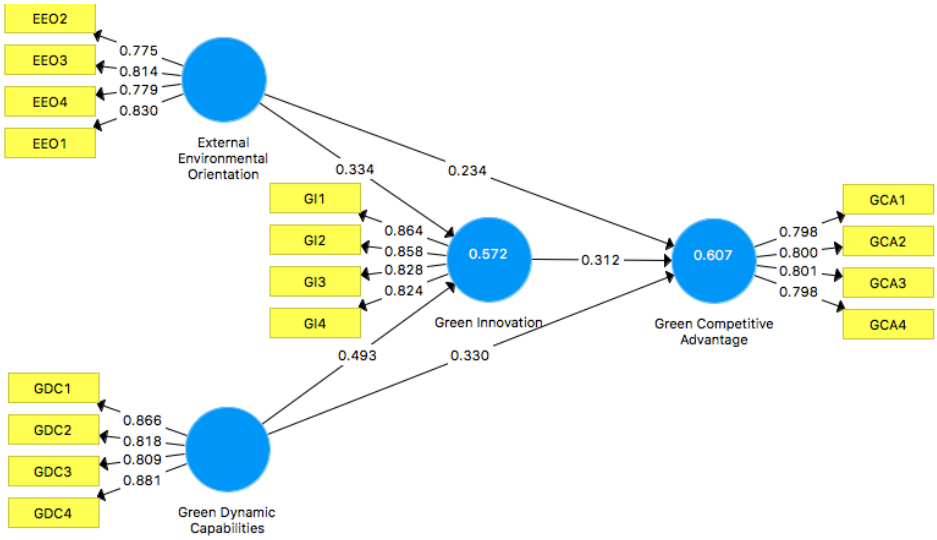


**Figure 2 Structural Equation Model (SEM) Analysis Result**

factory. These measures ensure the reliability of the constructs within the model.

Table 6 illustrates the significant relationships between the proposed variables, confirming the acceptance of all hypotheses. The first hypothesis, linking external environmental orientation and green innovation, is supported by a t-value of 3.093 and a p-value of 0.002. With a t-value of 4.497 and a p-value of 0.000, the second hypothesis—which relates to green dynamic capabilities and green innovation—shows significance. A t-value of 3.125 and a p-value of 0.002 support the third hypothesis, which examines the connection between green innovation and green competitive advantage. With a t-value of 2.392 and a p-value of 0.017, the fourth hypothesis—which relates to external environmental orientation and green competitive advantage—is significant. Lastly, a t-value of 2.647 and a p-value of 0.014 support the

**Table 6 Direct Effects**

| Hypothesis | Path | Path Coefficient | Standard Deviation | T-Values | P-Values |
|---|---|---|---|---|---|
| H1 | External environmental orientation (X1) → Green innovation (Z) | 0.334 | 0.098 | 3.093 | 0.002 |
| H2 | Green dynamic capabilities (X2) → Green innovation (Z) | 0.493 | 0.108 | 4.497 | 0.000 |
| H3 | Green innovation (Z) → Green competitive advantage (Y) | 0.312 | 0.134 | 3.125 | 0.002 |
| H4 | External environmental orientation (X1) → Green competitive advantage (Y) | 0.234 | 0.110 | 2.392 | 0.017 |
| H5 | Green dynamic capabilities (X2)→ Green competitive advantage (Y) | 0.330 | 0.100 | 2.467 | 0.014 |

**Table 7 Specific Indirect Test**

| Hypothesis | Path | Path Coefficient | Standard Deviation | T-Values | P-Values |
|---|---|---|---|---|---|
| H6 | External environmental orientation (X1) → Green innovation (Z) → Green competitive advantage (Y) | 0.104 | 0.049 | 2.118 | 0.035 |
| H7 | Green dynamic capabilities (X2) → Green innovation (Z) → Green competitive advantage (Y) | 0.154 | 0.060 | 2.547 | 0.011 |

fifth hypothesis, which investigates the connection between green dynamic capacities and green competitive advantage. These findings emphasize important correlations between each set of variables and show that all hypotheses put forth are accepted.

The indirect test findings, which establish the mediation effect of the suggested factors, are shown in Table 7. With t-values of 2.118 and p-values of 0.035, the association between external environmental orientation and green competitive advantage is substantial, indicating partial mediation and supporting Hypothesis 6. According to this theory, the relationship between green competitive advantage and external environmental orientation is mediated by green innovation. Furthermore, with t-values of 2.547 and p-values of 0.011, the association between green dynamic capacities and green competitive advantage, mediated by green innovation, is similarly significant. The relationship between green dynamic capacities and green competitive advantage is mediated by green innovation, according to Hypothesis 7, which is supported by this result, which shows partial mediation.

## DISCUSSION

The importance of a number of suggested components has been shown by this study, and the existence of mediators like green innovation has been shown to increase corporate competitiveness. The results demonstrate that external environmental orientations have a positive effect on the adoption of green solutions. These results demonstrate that external environmental orientation has a significant effect on green innovations and green competitive advantage, supporting the first and fourth hypotheses. These findings are consistent with a number of earlier investigations that demonstrated the considerable connections among these correlated factors (Zameer et al., 2020; Riza & Sumarti, 2024). They contend that the adoption of environmentally friendly practices in corporate operations can be accelerated by a company's positioning in response to external stakeholders. However, this finding contrasts with previous literature, which suggested that external environmental orientations have an insignificant direct relationship with green competitive advantage (Riza & Sumarti, 2024; Giantari & Sukaatmadja, 2021).

According to the data findings, a company's ability to react to innovations is a key component of its green dynamic capabilities, which in turn enhances its green competitiveness. This implies that green innovations can be integrated more successfully to create a sustainable competitive advantage if a company is more capable

at organizing, integrating, recognizing, and integrating green knowledge into its operations (Singh et al., 2021; Yousaf, 2021; Zhu et al., 2023). Because green dynamic skills enable green innovations and help achieve a green competitive advantage, hypotheses 2 and 5 are thus supported. These results are consistent with other research that showed how green dynamic capabilities, as operational capabilities, can improve the adaptability of green innovation and raise the possibility of competitiveness in the green market through efficient capacities (Li et al., 2024; Yousaf, 2021).

The results of the research showed that green competitive advantage, green dynamic capabilities, and external environmental orientation were all correlated, with green innovation serving as a partial mediator (Hypotheses 6 and 7). According to the findings, green innovation acts as a mediator between external environmental orientations and major indirect interactions (Fatoki, 2021; Riza & Sumarti, 2024). Green dynamic capacities also show strong indirect relationships through partial mediation, which is consistent with other studies (Zhu et al., 2023; Nguyen et al., 2023). In order to effectively respond to market environmental demands, this mediation emphasizes the need for initiatives that are customized to a company's unique vision and capacity levels in order to integrate green values as a distinctive selling advantage (Zameer et al., 2020).

This study has answered all of the research questions and achieved a number of important goals, including proving the importance of applying external environmental orientation to green innovations and green competitive advantage, illustrating the influence of green dynamic capabilities on these two factors, and proving that green innovation acts as a mediating variable to strengthen the long-term effects of external orientation and green dynamic capabilities on microbusinesses' green competitive advantage. These conclusions stem from hypothesis testing on the connection between Surabaya region microbusinesses' external environmental orientation, green dynamic capacities, green innovation, and green competitive advantage.

According to the study's findings, every variable has a significant relationship with the suggested constructs. This suggests that microbusinesses can improve their green competitive advantage by implementing green innovations and external environmental orientation (Liboni et al., 2022; Zhu et al., 2023). Microbusinesses can increase their competitiveness by focusing on small, incremental improvements and aligning their company goal with these constructs. Microbusinesses have a larger green competitive advantage when external environmental orientation, green dynamic capabilities, and green innovations—where innovations act as partial mediators—are combined. Green incremental innovations are especially beneficial at the microbusiness level since they are more affordable and accessible than other traditional innovation kinds. As a result, micro-businesses can efficiently maximize their capacities to deliver green values and achieve sustainable growth (Zameer et al., 2020; Skordoulis et al., 2022; Zhu et al., 2023).

By connecting their operations with environmental preservation, microbusinesses may meet the demands of environmentally concerned consumers and future-proof their operations. Microbusinesses can apply small-scale innovations that support sustainability and competitiveness by embracing environmentally friendly practices in areas including production, delivery, packaging, and employee training. In addi-

tion to saving money, this strategy boosts market accessibility, strengthens the brand's reputation, and supports larger environmental projects (Pronti, Zecca, & Antonioli, 2023; Wiredu, 2024). Future studies could think about broadening the focus to cover other areas of Indonesia, investigating other factors including operational capabilities and green marketing, and involving larger companies for more comprehensive understanding. These results highlight the significance of using green values to obtain a competitive edge and offer microbusiness owners useful information. Microbusinesses can more successfully use green innovations to boost their competitiveness if they comprehend the importance of external environmental orientations and green dynamic capabilities.

Dependency on sustainable practices becomes essential in this situation since innovation is essential to promoting corporate sustainability and improving brand recognition in the green market. For instance, the Natural Resource-Based View (NRBV) theory's recycling, reuse, and recollection concepts are used by green microbusinesses in Surabaya. Businesses reduce waste production and support environmental sustainability objectives by implementing these concepts. In addition to reducing pollution, this business model—which combines the use of reusable, green materials and the bulk store concept—puts companies in a position to satisfy consumer demands and pressures, which in turn increases consumer engagement and support for environmental causes (Hart, 1995; Setyaningrum et al., 2024).

Understanding that innovation is a major factor in business sustainability and brand image in the green market requires a dependence on it. A green microbusiness in Surabaya, for example, integrates the ideas of recycling, reuse, and recollection into routines like bulk stores and the usage of environmentally friendly, reusable materials in their manufacturing operations. The polluting waste produced by their operations is successfully reduced by these measures. In addition to meeting consumer expectations, this incorporation of sustainability ideals into their business model tackles environmental issues, increasing consumer participation and bolstering support for eco-friendly activities (Giantari & Sukaatmadja, 2021; Zhu et al., 2023).

In the future, microbusinesses should further integrate their operations with environmental preservation aims in order to meet the increasing demands of external stakeholders, especially consumers who care about the environment. Microbusinesses can increase their efficiency and incorporate eco-friendly applications into all facets of their operations, such as production, delivery, packaging, and human resources, while keeping an eye on green knowledge, by improving their operational capabilities. They would be able to apply small-scale improvements that promote sustainability and competitiveness with this approach. Their position in the expanding green economy would be strengthened by the advantages, which would include cost savings, improved brand recognition, easier access to the green market, and contributions to government environmental preservation programs (Das, 2022; Singh et al., 2021; Yousaf, 2021; Zhu et al., 2023).

## CONCLUSION

This study emphasizes how important green dynamic capabilities and external environmental orientation are to increasing Surabaya microbusinesses' green competitive advantage.

According to the findings, companies that use green technologies to match their strategy with environmental sustainability are better able to satisfy consumer expectations and become more competitive. Business performance in the green market is largely dependent on green innovation, which acts as a mediator between external environmental orientation and green dynamic capabilities. The study highlights how important it is to implement green practices, including recycling and reusing, in order to reduce waste and satisfy customers' demands for environmentally conscious companies. Microbusinesses can enhance their market presence, lower expenses, and improve their brand image while also helping to preserve the environment by adopting small, steady improvements. To gain a better understanding of how companies may maintain and improve their competitive edge in the green economy, future studies should examine the wider regional effects and take other factors into account. For companies looking to maintain their competitiveness while promoting environmental sustainability, this would provide insightful advice.

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