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Analysis of Green Finance, Green Innovative Behavior and Digitization of Sustainable Competitive Advantage Mediated by Pro-Environmental Behavior in MSME Actors in West Nusa Tenggara Province

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Abstract

This research aims to analyze the influence of Green Finance, Green Innovative Behavior, and Digitization on the Sustainable Competitive Advantage of MSMEs in West Nusa Tenggara Province, with Pro-Environmental Behavior as a mediating variable. This research uses a quantitative approach with an explanatory research type, involving 150 MSME actors selected through purposive sampling. Data was collected through questionnaires and analyzed using the Structural Equation Modeling (SEM) model based on Partial Least Squares (PLS). The research results show that the three independent variables directly have a significant effect on Sustainable Competitive Advantage. Apart from that, Pro-Environmental Behavior is proven to mediate the influence of Green Finance, Green Innovative Behavior, and Digitization on these advantages. These findings emphasize the importance of integrating green and digital strategies supported by environmentally friendly behavior in building sustainable competitiveness of MSMEs in the digital era.

INTRODUCTION

Micro, Small and Medium Enterprises (MSMEs) play an important role in the global economy, especially in Indonesia, where MSMEs contribute more than 60% to Gross Domestic Product (GDP) and absorb more than 90% of the national workforce (Ministry of Cooperatives and SMEs, 2020). However, in the increasingly pressing era of digitalization and climate change, MSMEs are faced with the challenge of adapting to technology and presenting more environmentally friendly solutions to compete in an increasingly competitive market. (BPS NTB, 2023) According to a report, the adoption of digital technology in the MSME sector can increase productivity by up to 30%, but this adoption rate is still low, especially in the aspect of digital financial transformation. Apart from that,

MSMEs also still depend on traditional operational methods that are inefficient and not environmentally friendly.

The increasingly rapid development of the global economy followed by increased awareness of the importance of environmental sustainability has encouraged many sectors to implement environmentally friendly practices. On a micro and small scale, especially for Micro, Small and Medium Enterprises (MSMEs), adopting the concepts of Green Finance, Green Innovative Behavior and Digitization is a strategic step to maintain competitiveness in a market that increasingly pays attention to aspects of sustainability and technology. However, the application of these concepts in the context of MSMEs in Indonesia, especially in West Nusa Tenggara Province, is still limited, and the role of Pro-Environmental Behavior as a mediating variable has not been widely explored.

Green Finance refers to financing that supports environmentally friendly economic activities, such as investment in renewable energy, waste management, and the use of environmentally friendly technology (Jenkins & Yakovleva, 2019). In Indonesia, the MSME sector has a very important role in the economy, but a big challenge is the limited access of MSMEs to environmentally friendly financing. Therefore, strengthening access to Green Finance is expected to help MSMEs innovate in aspects of sustainability and improve their operational efficiency.

Green Innovative Behavior refers to innovation behavior that supports the development of environmentally friendly products, processes and technologies. In the context of MSMEs, the adoption of green innovation can increase competitiveness and introduce more environmentally friendly products to consumers who are increasingly aware of sustainability issues (Adolph, 2023) MSMEs that implement green innovation have the potential to improve their reputation and attract a wider market.

Apart from that, Digitization or digitization can provide great opportunities for MSMEs to increase operational efficiency and expand market access. The use of digital technology allows MSMEs to optimize business processes, such as marketing, distribution and resource management. Digitalization also opens up opportunities for MSMEs to introduce their environmentally friendly products to larger markets, both domestically and internationally (Kraus et al., 2020)

Pro-Environmental Behavior or pro-environmental behavior refers to the attitudes and actions of individuals or organizations that aim to reduce negative impacts on the environment. In the context of MSMEs, pro-environmental behavior can act as a bridge that connects Green Finance, Green Innovative Behavior, and Digitization with Sustainable Competitive Advantage. Strong pro-environmental behavior among MSME owners and managers can encourage the implementation of environmentally friendly strategies which in turn increase sustainable competitive advantage (Appiah-Kubi et al., 2024)

Sustainable competitive advantage is the ability to maintain a superior position in the market in the long term through innovation and practices that are not easily imitated by competitors. MSMEs that are able to integrate sustainability strategies such as Green Finance, Green Innovative Behavior, and Digitization, driven by Pro-Environmental Behavior, are expected to achieve competitive advantages that are not only financially profitable, but also have a positive impact on the environment (Huda et al., 2024)

This research is based on previous research which shows the importance of Green Finance, Green Innovative Behavior, and Digitization in building Sustainable Competitive Advantage for MSMEs. This research will further examine how these factors interact with each other and how Pro-Environmental Behavior can function as a mediator in the relationship between sustainability and MSME competitiveness, including: The Influence of Green Finance on MSME Sustainability Research by Liu et al. (2017) revealed that Green Finance can improve the environmental and economic performance of companies, including MSMEs. Through greater access to green finance, MSMEs can adopt environmentally friendly technologies, which in turn increases efficiency and reduces operational costs. This contributes to their sustainability and competitiveness. This research supports the importance of Green Finance in helping MSMEs adapt to sustainability trends and improve brand performance

Green Innovation and Sustainable Competitive Advantage (Zhou, Y., Zhang, J., & Wang, 2021) in their research found that Green Innovation plays an important role in increasing a company's Sustainable Competitive Advantage. Green innovation not only reduces negative impacts on the environment, but also gives companies an edge in terms of resource efficiency, product differentiation and cost savings. Environmentally friendly innovation can be a significant differentiator for MSMEs who want to compete in a market that is increasingly concerned with sustainability issues. This research supports the importance of Green Innovative Behavior as a factor influencing the competitiveness of MSMEs, Digitalization in Increasing the Competitiveness of MSMEs Research by (Kraus .et, 2020) stated that Digitization or digitization can increase the competitiveness of MSMEs by expanding market access, increasing operational efficiency, and speeding up the decision-making process. Adoption of digital technology allows MSMEs to reach a wider range of consumers, utilize e-commerce platforms, and optimize business processes. This supports the argument that Digitization is an important factor in increasing sustainable competitiveness for MSMEs.

Pro-Environmental Behavior and Sustainability of MSMEs A study by (Appiah-Kubi et al., 2024) shows that Pro-Environmental Behavior can improve the sustainability performance of companies, including MSMEs. Companies that have pro-environmental behavior are more likely to adopt environmentally friendly business practices, which results in increased efficiency and reduced carbon footprint. This research supports the idea that Pro-Environmental Behavior

acts as a mediator connecting sustainability factors with the long-term success of MSMEs,

Sustainable Competitive Advantage in the MSME Context Research by (Adolph, 2023) on the resource-based theory of the company (RBV) confirms that Sustainable Competitive Advantage can be achieved if companies are able to manage resources and capabilities that are rare, cannot be imitated, and are difficult to replace by competitors. In the context of MSMEs, Green Finance, Green Innovation, and Digitization can be strategic resources that provide sustainable competitive advantages. This research provides a basis for analyzing the relationship between sustainability factors and the competitive advantage of MSMEs.

Micro, Small and Medium Enterprises (MSMEs) in West Nusa Tenggara (NTB) Province have a very vital role in the regional economy. As one of the main sectors that absorbs a lot of labor, MSMEs in NTB are the main driver for economic growth and reducing unemployment. However, this sector is also faced with various challenges that can hinder its development and sustainability. Some of the main problems faced by MSMEs in NTB Province include (Huda et al., 2024)

One of the main problems faced by MSMEs in NTB is limited access to financing that supports environmentally friendly business practices (Green Finance). Although Green Finance can help MSMEs to invest in green technology, improve energy efficiency, and reduce operational costs, many MSMEs in NTB have not utilized this source of financing. Some of the main reasons include a lack of knowledge about environmentally friendly financial products, limited information regarding relevant government policies, and low levels of financial literacy among MSME players. MSMEs in NTB generally still rely on traditional production methods that are less environmentally friendly and do not have a focus on innovation that supports sustainability. Green Innovative Behavior, which includes innovation in environmentally friendly processes and products, has not been widely implemented among MSMEs. This is caused by several factors, such as limited funds for research and development (R&D), as well as a lack of understanding of the importance of green innovation in increasing competitiveness in a market that increasingly demands environmentally friendly products. Low Level of Digitalization Most MSMEs in NTB still depend on conventional and traditional managerial systems.

Digitization, which involves the use of digital technology to optimize business operations and expand markets, is still limited among MSMEs in NTB. In fact, digitalization can open up great opportunities for MSMEs to market products more widely and efficiently. Factors that hinder digitalization include a lack of technical skills, limited digital infrastructure in several NTB areas, and low awareness of the benefits of technology in increasing business efficiency. Lack of pro-environmental behavior, which includes attitudes and actions that support environmental sustainability, is still not well developed among MSMEs in NTB. Many MSME players do not yet have a strong understanding of the

importance of sustainability and the negative impacts of business activities on the environment. Without pro-environmental behavior, it is difficult for MSMEs to adopt Green Finance and Green Innovative Behavior, which in turn hinders their ability to compete in a market that is (Huda et al., 2024)

To be able to compete sustainably in a global market that is increasingly concerned with environmental issues, MSMEs in NTB need to be empowered with understanding and access to green financing, environmentally friendly innovation and digital technology. Therefore, this research aims to identify how Green Finance, Green Innovative Behavior, and Digitization can influence the Sustainable Competitive Advantage of MSMEs in NTB, with Pro-Environmental Behavior as a mediator. The research focus of this research is the Green Economy and Digital Economy. The urgency of this research will explore whether NTB MSMEs can utilize Green Finance, Green Innovative Behavior and Digitalization mediated by Pro-Environmental behavior as a strategy to achieve and maintain sustainable Competitive Advantage for West Nusa Tenggara Province MSMEs. increasingly concerned with sustainability issues.

METHODS

This research uses a quantitative approach with the type of explanatory research. According to (Sugiyono, 2019) explanatory research is research to test a hypothesis which states a cause and effect relationship between two or more variables. which aims to explain the causal relationship between independent variables (Green Finance, Green Innovative Behavior, Digitization) and the dependent variable (Sustainable Competitive Advantage), with Pro-Environmental behavior as a mediating variable. Thus, this research aims to find patterns and test hypotheses regarding the variables that influence the sustainable competitive advantage of MSMEs in West Nusa Tenggara Province. This research was carried out in West Nusa Tenggara Province, especially in MSMEs in Bima City, Bima Regency and Dompu Regency.

Data collection was carried out using questionnaires distributed offline (directly to MSME locations) and online (using Google Form). The target population in this research is all MSMEs in West Nusa Tenggara Province which operate in the agribusiness, culinary, creative industry and small manufacturing sectors which currently have or already have the potential to adopt sustainable business practices with the number of MSMEs registered with the NTB Cooperative and SME Service being 149,962 MSMEs with a research sample of 150 respondents determined by purposive sampling according to certain criteria: MSMEs active for at least the last 2 years, MSMEs that have used digital technology in operations/marketing, MSMEs that have the initiative or access to green financing programs. Research data was obtained through documentation techniques to collect archival documents, notes and reports owned by respondents and questionnaires distributed to respondents. The research instrument was tested

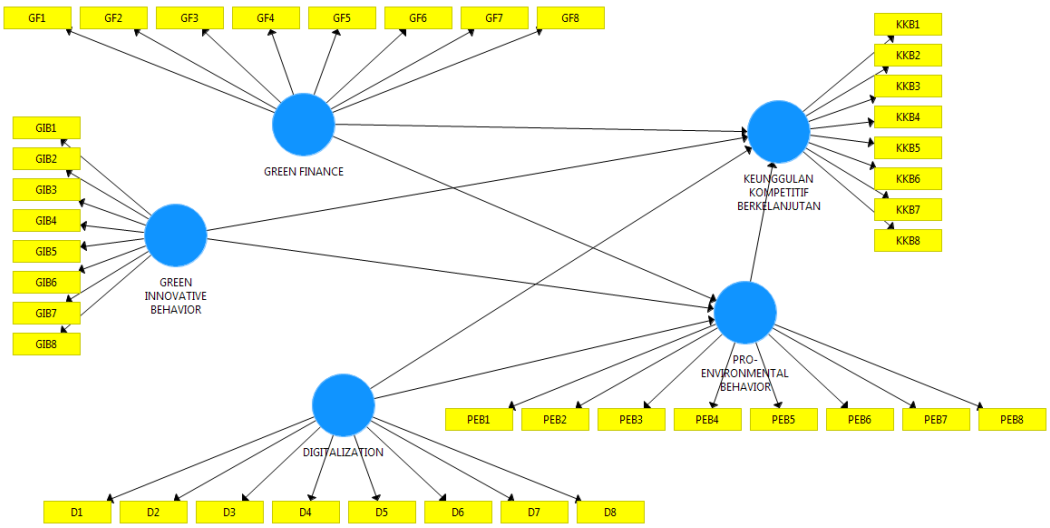
first through a validity test using the product moment correlation formula and a reliability test using the Pearson correlation. Testing was carried out using Structural Equation Modeling (SEM) based on Partial Least Squares (PLS) using SmartPLS software

RESULTS AND DISCUSSION

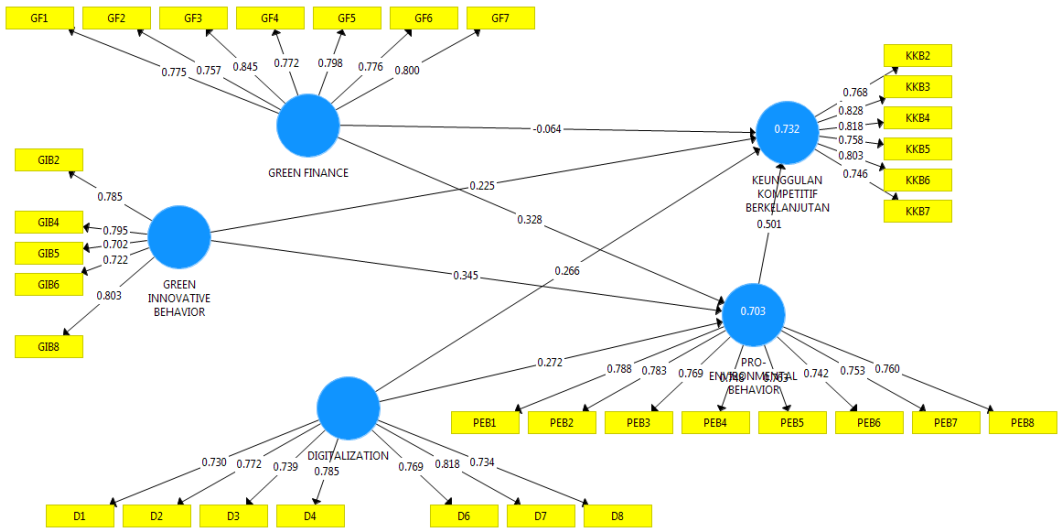
4.1. Evaluation of Measurement Models (*Outer Model*)

1. *Convergent Validity Testing*

The parameters used for convergent validity testing are by looking at the factor loading value. The results of the validity tests that have been carried out show that several indicators for each construct in the measurement model have met the requirements. This can be seen from each indicator in a construct being different from the indicators in another construct and accumulating in that construct with a factor loading value > 0.7. It can be seen from Figure 2 that there are several indicators that have a factor loading value of <0.7 so the indicators must be removed or eliminated. GIB1, GIB3, GIB7,D5, KKB1.
The results of the Outer model evaluation can be seen as in the following image:



The test results after several indicators have been issued can be seen from Figure 2 below:



Based on the results of the PLS Algorithm Phase II analysis in Figure 2 above, it shows that the loading factor values of all indicators for each variable have loading factor values above 0.7. This means that all indicators for each variable in this research have met convergent validity

2. *Disrciminant Validity*

Discreminant validity with reflective indicators can be tested by looking at the cross loading correlation value with the latent variable which must be greater than the correlation value with other latent variables. The way to test discriminant validity with reflective indicators is by looking at the cross loading value for each variable which must be > 0.70. Based on the test results, it was found that the cross loading value for each indicator was > 0.70.

3. *Composite Reliability*

Composite reliability is carried out to determine the extent to which the measurement tool has consistent measurement accuracy and precision over time. The reliability of the instrument is determined from the composite reliability and Cronbach's alpha values greater than 0.70.

Tabel 2. *Composite Reliability* dan *Cronbach's Alpha*

Variabel	*Composite Reliability*	*Cronbach Alpha*	Keterangan
Green Finance	0,905	0,899	Reliabel
Green Innovative Behavior	0,824	0,819	Reliabel
Digitization	0,887	0,882	Reliabel
Pro-Environmental behavior	0,898	0,898	Reliabel
Sustainable Competitive Advantage	0,878	0,877	Reliabel

a. Structural Model Evaluation (*Inner Model*)

The inner model is evaluated with the R Square value for the endogenous latent construct, and is used to see the ability of exogenous variables to explain the addition of endogenous variables. The R Square value can be seen in Table 3 below:

Tabel 3. Koefisien Determinasi (R^2)

Konstruk	R^2
Sustainable Competitive Advantage	0,732

The table above shows that the R2 value for the latent construct value of Performance is 0.732, which means that the variables Green Finance, Green Innovative Behavior, and Digitization can influence Sustainable Competitive Advantage, with Pro-Environmental Behavior as a mediator, by 73.2% while 26.8% is influenced by other variables not studied.

b. Hypothesis Testing

Evaluation of the structural model (inner model) aims to predict the relationship between latent variables/constructs. To test the hypothesis, the value in the estimate for path coefficients (path coefficient value) is used, namely the statistical t value compared with the t-table value. The hypothesis will be accepted if the t statistic value > t table (1.97). Another way that can be used to determine the supportability of a hypothesis is to look at the significance value of the p-value compared to the error rate determined in this research for a one-sided test with an alpha of 5 percent (0.05). If the p value <0.05 means the hypothesis is supported. The results of the analysis of estimate for path coefficients (path coefficient values) can be seen from Table 4 below:

Tabel 4. *Path Coefficients*

Variabel/Konstruk	***Original Sample* (O)**	**T-*Statistics***	**P *Values***	**Keterangan**
Green Finance → Sustainable Competitive Advantage	0, 426	4,010	0,012	Signifikan / accepted
Green Innovative Behavior → Sustainable Competitive Advantage	0,225	2,231	0,026	Signifikan / accepted
Digitization → Sustainable Competitive Advantage	0,266	2,310	0,021	Signifikan / accepted
Green Finance → *Pro-Environmental Behavior* → Sustainable Competitive Advantage	0,173	2,848	0,004	Signifikan / accepted
Green Innovative Behavior → *Pro-Environmental Behavior* → Sustainable Competitive Advantage	0,136	2,413	0,016	Signifikan / accepted
Digitization → *Pro-Environmental Behavior* → Sustainable Competitive Advantage	0,164	2,459	0,014	Signifikan / accepted

DISCUSSION

The Influence of Green Finance on Sustainable Competitive Advantage

The path coefficient value is 0.429 and the t-statistic value (4.010) > t-table (1.97), then the p value < 0.05 or 0.012 < 0.05 shows that Green Finance has an effect on the Sustainable Competitive Advantage of MSMEs in NTB Province (H1 is accepted). These results indicate that a financing strategy that pays attention to environmental aspects (green finance) is able to increase long-term competitive advantage. Having access to green finance allows organizations to invest in environmentally friendly business practices, which not only strengthens reputation but also efficiency and innovation. This research is supported (Wang, Y et. al, 2021) in the Journal of Cleaner Production stated that the implementation of green finance supports company investment in green technology and energy efficiency, which ultimately strengthens sustainable competitive advantages.

The Influence of Green Innovative Behavior on Sustainable Competitive Advantage

The path coefficient value is 0.225 and the t-statistic value (2, 231) > t-table (1.97), then the p value < 0.05 or 0.026 < 0.05 shows that Green Innovative Behavior influences the Sustainable Competitive Advantage of MSMEs in NTB Province (H2 is accepted). These results indicate that innovative behavior based on sustainability values is able to make a positive contribution to the company's competitiveness in the long term. Organizations that encourage their employees or business units to create green solutions tend to be more adaptive and responsive to market demands and environmental regulations. This research is supported by (Zhou, Y., et al, 2021) show that green innovation behavior significantly improves a company's brand image and competitiveness in the long term**.**

The Effect of Digitization on Sustainable Competitive Advantage

The path coefficient value is 0.266 and the t-statistic value (2.310) > t-table (1.97), then the p value < 0.05 or 0.021 < 0.05 shows that Digitization has an effect on the Sustainable Competitive Advantage of MSMEs in NTB Province (H3 is accepted). These results show that digital transformation is not only an efficiency tool, but also a source of competitive advantage if integrated with sustainability principles. Digitalization can accelerate the innovation process, improve management information systems, and support data-based decision making in the context of sustainability. This research is supported (Bharadwaj et al., 2019) emphasize that the use of digital technology enables data-based decision making that is more environmentally friendly and increases company flexibility and competitiveness.

The Influence of Green Finance on Sustainable Competitive Advantage Through Pro-Environmental Behavior

The path coefficient value is 0.173 and the t-statistic value (2.848) > t-table (1.97), then the p value < 0.05 or 0.004 < 0.05 indicates that Pro-Environmental Behavior mediates Green Finance's influence on the Sustainable Competitive Advantage of MSMEs in NTB Province (H4 is accepted). These results indicate that the positive impact of green finance will be more optimal if the organization also fosters pro-environmental behavior in its operations. This mediation emphasizes the importance of building a strong environmental culture so that green finance strategies do not stop at financial aspects alone, but are internalized in daily actions. This research is supported by support this finding, where the success of green finance policies is determined by the extent to which

pro-environmental behavior becomes an organizational culture. Additionally, (Appiah-Kubi et al., 2024)

The Influence of Green Innovative Behavior on Sustainable Competitive Advantage Through Pro-Environmental Behavior

The path coefficient value is 0.136 and the t-statistic value (2.413) > t-table (1.97), then the p value < 0.05 or 0.016 < 0.05 indicates that Pro-Environmental Behavior mediates Green Innovative Behavior's influence on the Sustainable Competitive Advantage of MSMEs in NTB Province (H5 is accepted). These results show that green innovation will have more impact when it is aligned with behavior that supports environmental conservation, both in production activities, energy consumption and waste management. This finding is strengthened by research by Xie et al. (2022) which states that Green Innovation provides maximum impact on competitive advantage when integrated with a pro-environmental organizational culture

The Influence of Digitization on Sustainable Competitive Advantage Through Pro-Environmental Behavior

The path coefficient value is 0.164 and the t-statistic value (2.459) > t-table (1.97), then the p value < 0.05 or 0.014 < 0.05 indicates that Pro-Environmental Behavior mediates the influence of Digitization on the Sustainable Competitive Advantage of MSMEs in NTB Province (H6 is accepted). These results show that digitalization that supports resource management and monitoring environmental impacts can be a strong foundation for building sustainable competitiveness. The use of technology such as the Internet of Things (IoT), big data, or automated reporting systems can encourage energy efficiency and environmental transparency in supply chains. This finding is reinforced who emphasized that successful digital transformation is one that is able to change organizational behavior and culture towards a green business model. Pro-Environmental Behavior plays an important role as a link between the digitalization process and achieving sustainable competitive advantage (Appiah-Kubi et al., 2024)

CONCLUSION

Green Finance influences Sustainable Competitive Advantage. Financing that pays attention to environmental aspects is able to increase the long-term competitiveness of MSMEs through efficiency, innovation and sustainable business reputation. Green Innovative Behavior influences Sustainable Competitive Advantage. Innovative behavior based on environmental values encourages the adaptability of MSMEs to market dynamics and regulations, thereby increasing competitive advantage. Digitization influences Sustainable Competitive Advantage. Digital transformation plays a role in increasing efficiency, optimizing information systems, and making data-based decisions in the context of sustainability.

Pro-Environmental Behavior mediates the relationship between Green Finance and Sustainable Competitive Advantage. Green financing accompanied by environmentally friendly behavior strengthens the positive impact on the sustainable competitiveness of MSMEs. Pro-Environmental Behavior mediates the relationship between Green Innovative Behavior and Sustainable Competitive

Advantage. Green innovation will be more effective if it is aligned with real actions that support environmental conservation in business practices. Digitization influences Sustainable Competitive Advantage through the mediation of Pro-Environmental Behavior. Digitalization that supports environmental resource management is an important foundation in shaping the sustainable competitiveness of MSMEs.

Research Implications This study contributes to the theoretical development in the fields of sustainable management and competitive advantage for MSMEs by integrating *Green Finance*, *Green Innovative Behavior*, *Digitization*, and *Pro-Environmental Behavior* into a comprehensive conceptual model. The findings reinforce the sustainable competitive advantage framework by highlighting the significance of environmental and digital strategies as key determinants. Furthermore, the mediating role of pro-environmental behavior underscores the importance of behavioral mechanisms that bridge strategic inputs with long-term competitive outcomes. For MSME practitioners, the study highlights that long-term competitiveness is not solely dependent on innovation or digital capabilities, but also on a strong commitment to environmentally responsible behavior. Implementing green finance and digital transformation strategies will be more effective when coupled with real actions such as waste reduction, energy efficiency, and promoting environmental values to consumers. Financial institutions and business development agencies can utilize these findings to design green financing programs and behavioral-based incentives for MSMEs.

This research provides a basis for public policy formulation that supports the green and digital transformation of MSMEs. Government bodies should encourage the integration of digital technologies with sustainability initiatives through training, subsidies, and the development of green digital platforms. Additionally, financing policies such as *green loans* or *eco-credit scoring* can serve as strategic tools to promote environmentally responsible business practices among MSMEs. The adoption of pro-environmental behavior, supported by innovation and digitalization, not only enhances competitiveness but also contributes to broader sustainable development goals. By promoting green business practices at the grassroots level, MSMEs can act as drivers of local economic development while safeguarding the environment and improving community well-being.

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