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Impact Analysis of Green Microfinance, Government Regulation, and Environmental Credit Innovation on MSME Productivity in Yogyakarta

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ABSTRACT

This study investigates the impact of Environmental Credit Innovation, Government Regulation, and Green Microfinance on the productivity of Micro, Small, and Medium Enterprises (MSMEs) in Yogyakarta, Indonesia. Using data from 140 MSMEs, the research employs Structural Equation Modeling with Partial Least Squares (SEM-PLS 3) to analyze the relationships between these factors. The results show that all three variables—Environmental Credit Innovation, Government Regulation, and Green Microfinance—positively influence MSME productivity. Specifically, Environmental Credit Innovation, Government Regulation, and Green Microfinance significantly contribute to improving MSME performance. The model explains 71.3% of the variance in MSME productivity, indicating substantial explanatory power. Additionally, the predictive relevance of the model highlights its practical utility for policy recommendations. The findings suggest that fostering environmentally responsible practices, simplifying regulatory processes, and expanding access to green finance are key drivers for boosting MSME productivity in the region.

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1. INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) play a vital role in Indonesia's economy, particularly in regions like Yogyakarta, where they contribute significantly to GDP, employment, and innovation. Despite their importance, MSMEs face challenges such as limited access to financing, inadequate infrastructure, and a complex regulatory environment. Recent trends highlight the integration of sustainability practices as a means to enhance MSME productivity and long-term success. Environmental innovation, a key driver of financial sustainability, supports eco-friendly practices that attract customers and reduce costs, thus improving financial outcomes [1]. Governance and access to credit also provide essential support for MSMEs to thrive within a sustainable development framework [1].

However, MSMEs in low-income areas encounter specific hurdles, including limited access to formal financing, technology, and management skills. Addressing these issues necessitates strategies such as facilitating funding access, offering technology training, and enhancing management practices [2]. Collaboration between MSMEs, government, and financial institutions is essential to foster growth and innovation in these areas [2]. Additionally, education and skills development are crucial for boosting MSME profitability and competitiveness, especially in rural areas. Training programs focusing on market knowledge and technology adoption can help MSMEs better utilize local economic potential and contribute to community welfare [3].

Green microfinance innovation combines financial services with environmental sustainability goals, offering essential resources for MSMEs to adopt eco-friendly practices while promoting environmental responsibility. Government regulation and environmental credit programs play a crucial role in fostering a supportive business environment. Green finance drives sustainable infrastructure and green technology innovation, essential for achieving Sustainable Development Goals (SDGs) [4]. Environmental innovation enhances financial sustainability for MSMEs by focusing on eco-friendly practices [1]. Strong governance and regulatory frameworks are vital for MSME development and financial sustainability [1], with collaboration between governments and international institutions key to creating supportive green finance incentives [5]. Environmental credit programs encourage MSMEs to adopt green technologies, supporting their financial sustainability [1]. Green banks and financial institutions play an essential role in promoting environmental sustainability through innovative financing methods [6].

The interaction between green microfinance innovation, government regulation, and environmental credit has the potential to drive significant improvements in MSME productivity. However, the precise impact of these factors on MSME performance, particularly in terms of productivity, remains underexplored in the literature. This study aims to fill this gap by investigating the relationship between these three factors and their collective impact on the productivity of MSMEs in Yogyakarta. The objective of this research is to examine how green microfinance innovation, government regulation, and environmental credit influence MSME productivity, using a quantitative analysis approach.

2. LITERATURE REVIEW

2.1 Micro, Small, and Medium Enterprises (MSMEs) in Indonesia

Micro, Small, and Medium Enterprises (MSMEs) are vital to Indonesia's economy, contributing significantly to employment and GDP. However, they face challenges such as limited access to finance, inadequate infrastructure, and difficulties in adopting technology, which hinder productivity and sustainability. Addressing these issues is crucial for enhancing MSME productivity. Digital literacy and marketing are key areas of struggle due to a lack of knowledge and resources. Training programs, like those in Bojongpicung Village, have shown that digital marketing can improve MSME performance by expanding market reach [7]. Digital literacy is also essential for product innovation and business development, as seen in Depok City, where capital facilities and digital skills directly influence MSME growth [8]. Access to capital is another significant barrier, as financial support is crucial for innovation

and development [9]. MSMEs contribute to economic development by reducing poverty, creating jobs, and fostering local growth. Strategies such as coworking spaces and job training can further enhance their role in economic empowerment [10]. They also support economic prosperity by increasing income, creating new business opportunities, and preserving local culture [11]. While challenges like traditional production methods and limited marketing strategies persist, innovative approaches, such as those used by Bakmi Jowo Bu Citro, can help overcome these barriers [12].

2.2 *Green Microfinance Innovation*

Green microfinance innovation is a financial model that integrates environmental sustainability with financial services, specifically targeting micro, small, and medium enterprises (MSMEs) to adopt eco-friendly practices. This model provides access to credit and promotes environmental responsibility, encouraging MSMEs to invest in green technologies, reduce waste, and implement energy-efficient processes. The positive impact of green microfinance on MSME sustainability is well-documented, with benefits including reduced operational costs, improved environmental footprints, and increased market attractiveness to eco-conscious consumers and partners [13]. However, several challenges hinder adoption, such as limited awareness and financial literacy among MSME owners, a lack of technical expertise in green technologies, and financial constraints that make transitioning to sustainable operations difficult [14]. Despite these challenges, institutional initiatives like green lending schemes from Bank BRI and Bank Negara Indonesia highlight a growing trend of integrating sustainability into financial services [15]. Furthermore, the global adoption of green loans and sustainable-linked loans is increasing, driven by alignment with Sustainable Development Goals (SDGs) [16].

2.3 *Government Regulation and Policy Support*

Government regulation plays a significant role in shaping the business environment for MSMEs in Indonesia, particularly in promoting sustainable development and green initiatives. The Indonesian government has introduced policies such as the Green Economy Policy and the National Medium-Term Development Plan (RPJMN) to support MSMEs in adopting sustainable practices, offering incentives for green technology adoption, reducing carbon emissions, and improving waste management. Policies like tax breaks and subsidies help reduce operational costs and enhance financial viability, while programs facilitating access to green financing are crucial for enabling MSMEs to invest in renewable energy and sustainable practices [17]–[20]. However, despite these policies, enforcement remains inconsistent, and many MSME owners are unaware of the available incentives [18]. Resource constraints and limited access to sustainable

technologies further hinder the adoption of green practices [19]. Eco-regulation and government support positively influence eco-innovation adaptation, with eco-environmental factors playing a mediating role in MSMEs' green investment choices [21]. Financial literacy and behavior also play a critical role in MSMEs' green investment decisions, highlighting the need for educational initiatives to improve financial decision-making [20].

2.4 Environmental Credit Programs

Environmental credit programs are vital financial tools that help Micro, Small, and Medium Enterprises (MSMEs) in Indonesia transition to sustainable practices. These programs, including loans, grants, and tax incentives, ease the financial burden on MSMEs investing in green technologies, improving operational efficiency and competitiveness by reducing energy and waste management costs. The positive impact of these programs on MSME productivity is well-documented, with studies showing increased profitability and better market positioning. Environmental credit programs contribute to financial sustainability by enabling eco-friendly practices and strengthening governance frameworks [1]. Participation leads to enhanced operational efficiency, profitability, and market positioning, crucial for long-term competitiveness [1]. However, challenges remain, such as limited awareness, stringent eligibility criteria, and complex application processes, which hinder MSMEs from accessing these programs, highlighting the need for collaboration between financial institutions and government agencies to simplify procedures [1].

2.5 Productivity in MSMEs

Productivity in MSMEs, particularly in Yogyakarta, is influenced by factors such as financial access, human capital, and technological adoption, all crucial for enhancing competitiveness, profitability, and sustainable growth. Financial literacy and inclusion are critical for better financial management and growth [22]. Green microfinance supports sustainable practices, enabling MSMEs to invest in environmentally friendly technologies that boost productivity [23]. Human capital plays a key role in MSME performance, with skill development creating a competitive advantage that enhances productivity [24]. Technological innovation drives operational efficiency and cost reduction, essential for competitiveness [23]. Access to technology and resources enables MSMEs to upgrade processes and stay competitive [25]. Government policies create a supportive environment for MSMEs, while environmental credit programs provide financial resources for investing in productivity-enhancing technologies [23].

By integrating sustainability into their operations, MSMEs can not only reduce their environmental impact but also enhance their productivity by lowering operational costs, improving resource efficiency,

and expanding their market opportunities. The successful integration of these factors—green microfinance innovation, government regulation, and environmental credit—can therefore lead to a sustainable increase in productivity among MSMEs in Yogyakarta.

2.6 Conceptual Framework and Hypotheses

This study conceptualizes the relationships between green microfinance innovation, government regulation, environmental credit, and MSME productivity. Based on the literature, the following hypotheses are proposed.

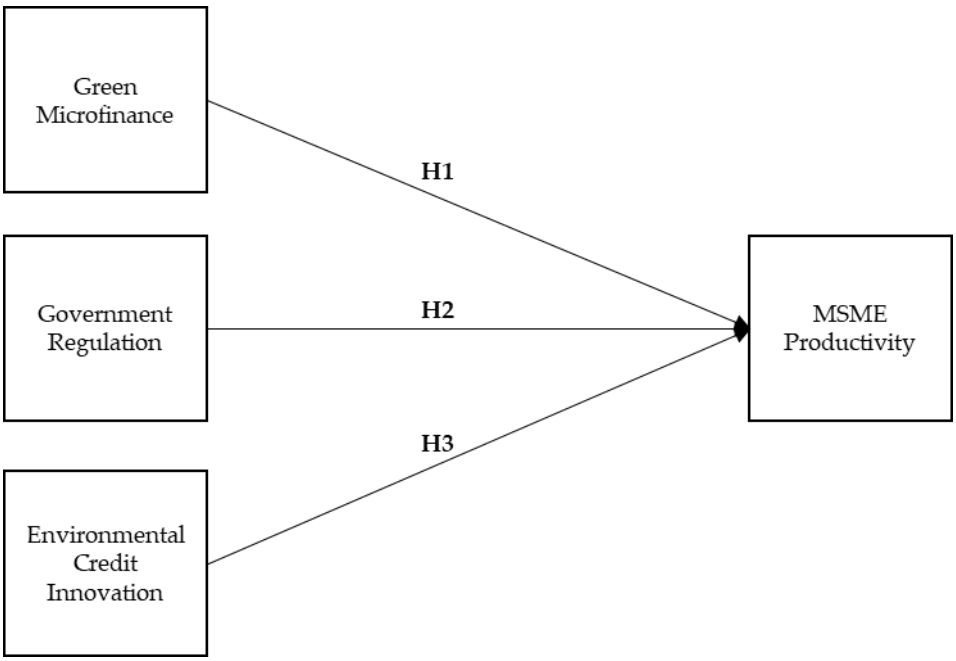

Figure 1. Conceptual Framework

3. METHODS

3.1 Research Design

This study adopts a quantitative research design to examine the impact of green microfinance innovation, government regulation, and environmental credit on the productivity of Micro, Small, and Medium Enterprises (MSMEs) in Yogyakarta. Quantitative research is suitable for this study as it allows for the measurement of relationships between variables using numerical data, enabling the identification of patterns and causal effects. The research design employs a structured survey questionnaire to gather data from a sample of MSME owners and managers in Yogyakarta, followed by data analysis using Structural Equation Modeling - Partial Least Squares (SEM-PLS 3).

3.2 Population and Sample

The population of this study consists of MSMEs operating in Yogyakarta, specifically those involved in sustainable practices and environmental innovation. Yogyakarta was chosen as the research site due to its dynamic MSME sector and increasing focus on sustainability in recent years. The target respondents are MSME owners and managers who have knowledge of their enterprise's environmental practices, financial management, and regulatory compliance.

A total of 140 MSMEs will be surveyed to ensure that the sample size is statistically adequate for SEM-PLS analysis. The sample size is chosen based on the recommendation that SEM-PLS requires at least 100–150 samples to achieve reliable

results, especially with a complex model. Respondents will be selected using a purposive sampling method, which involves selecting participants who are likely to provide relevant and useful information regarding the variables under study.

3.3 Data Collection

Data for this study will be collected through a structured questionnaire that includes Likert-scale items. The Likert scale will range from 1 to 5, with 1 indicating strong disagreement and 5 indicating strong agreement. The questionnaire will be divided into sections corresponding to the main variables in the study: green microfinance innovation, government regulation, environmental credit, and MSME productivity.

The questionnaires will be distributed to MSME owners and managers either through direct handouts or via email. The responses will be collected over a 4-week period, ensuring that a diverse range of MSMEs from different sectors and sizes is included in the sample.

3.4 Data Analysis

The data will be analyzed using Structural Equation Modeling - Partial Least Squares (SEM-PLS 3), a statistical method suitable for examining complex relationships, multiple dependent variables, latent variables, and measurement errors. This approach is ideal for exploring the effects of green microfinance innovation, government regulation, and environmental credit on MSME productivity. The analysis includes evaluating the measurement model's reliability and validity using composite reliability (CR), average variance extracted (AVE), and the Fornell-Larcker criterion. Structural model evaluation will follow, analyzing path coefficients, t-values, and R-squared values to assess relationships. Hypotheses will be tested using bootstrapping, with significance determined by a t-statistic exceeding 1.96 at a 95% confidence level. Mediation analysis will examine indirect effects of green microfinance innovation and government regulation via environmental credit, and model fit will be assessed using indices such as SRMR and NFI.

4. RESULTS AND DISCUSSION

4.1 Demographic Sample

The demographic characteristics of the 140 MSME respondents who participated in this study are summarized in Table 1 below. The sample represents MSMEs from various sectors in Yogyakarta, with a focus on the distribution of gender, age, education level, industry type, and business size. This section provides an overview of the respondent profiles to understand the characteristics of the sample population.

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	94	67.14%
	Female	46	32.86%
Age Group	20-30 years	53	37.86%
	31-40 years	46	32.86%
	41-50 years	27	19.29%
	51 years and above	14	10.00%
Education Level	High school or below	25	17.86%
	Diploma (Associate degree)	35	25.00%
	Bachelor's degree	67	47.86%
	Postgraduate degree	13	9.29%
Industry Type	Retail	45	32.14%
	Manufacturing	38	27.14%
	Services	32	22.86%

Demographic Variable	Category	Frequency (n)	Percentage (%)
	Agriculture	25	17.86%
Business Size	Micro (1-9 employees)	58	41.43%
	Small (10-50 employees)	48	34.29%
	Medium (51-100 employees)	24	17.14%
	Large (more than 100 employees)	10	7.14%

The demographic analysis of respondents reveals key characteristics of MSMEs in Yogyakarta. Gender distribution showed a higher proportion of male participants (67.14%) compared to females (32.86%), reflecting the common gender roles in business operations, particularly in industries like manufacturing and retail. The majority of respondents were relatively young, with 37.86% aged 20-30 years and 32.86% aged 31-40 years, highlighting a youthful, adaptive, and innovation-oriented entrepreneurial base. Educationally, 47.86% held a Bachelor's degree, indicating a growing number of MSME owners with higher education, complemented by 25% with a Diploma, 17.86% with high school or below, and 9.29% with postgraduate degrees. Industry representation was dominated by retail (32.14%), manufacturing (27.14%), and services (22.86%), while agriculture accounted for 17.86%, reflecting the urban economy's focus on retail and manufacturing. In terms of business size, most respondents were from micro businesses (41.43%) with 1-9 employees, followed by small businesses (34.29%), medium-sized businesses (17.14%), and large businesses (7.14%), consistent with the typical small-scale nature of Indonesian MSMEs.

4.2 Measurement Model

The measurement model assesses the reliability and validity of the latent variables used in the study, including Green Microfinance, Government Regulation, Environmental Credit Innovation, and MSME Productivity. To evaluate the measurement model, several indicators were considered: loadings, Cronbach's alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). These indicators allow us to assess internal consistency, convergent validity, and reliability.

Table 1. Measurement Model Assessment

Variable	Code	Loading Factor	Cronbach's Alpha	Composite Reliability	Average Variant Extracted
Green Microfinance	GM.1	0.888	0.895	0.935	0.827
	GM.2	0.951			
	GM.3	0.888			
Government Regulation	GR.1	0.758	0.847	0.897	0.686
	GR.2	0.848			
	GR.3	0.873			
	GR.4	0.830			
Environmental Credit Innovation	EC.1	0.906	0.880	0.926	0.806
	EC.2	0.882			
	EC.3	0.906			
MSME Productivity	MP.1	0.841	0.879	0.917	0.734
	MP.2	0.841			
	MP.3	0.856			
	MP.4	0.889			

Source: Data Processing Results (2024)

The constructs demonstrate strong reliability and validity, with Cronbach's alpha and Composite Reliability values exceeding the recommended threshold of 0.7, confirming good internal consistency. Convergent validity is supported by Average Variance Extracted (AVE) values above 0.5 for all constructs, indicating robust measurement. Notably, Green Microfinance and Environmental Credit Innovation exhibit high convergent validity, while Government Regulation, though slightly lower, remains within an acceptable range.

4.3 Discriminant Validity

Discriminant validity is a critical measure in structural equation modeling (SEM) that ensures that constructs in the model are distinct and not overly correlated with one another. It verifies that each construct in the model represents a unique concept and is not merely a reflection of other constructs. To assess discriminant validity, we examine the Fornell-Larcker criterion, where the square root of the Average Variance Extracted (AVE) for each construct should be greater than the correlation between that construct and any other construct in the model.

Table 2. Discriminant Validity

	Environmental Credit Innovation	Government Regulation	Green Microfinance	MSME Productivity
Environmental Credit Innovation	0.818			
Government Regulation	0.753	0.828		
Green Microfinance	0.785	0.748	0.809	
MSME Productivity	0.799	0.762	0.757	0.857

Source: Data Processing Results (2024)

Based on the Fornell-Larcker criterion, discriminant validity is established for all constructs in this model. The square roots of AVE for each construct are greater than the inter-construct correlations, indicating that the constructs are sufficiently distinct from each other. This suggests that the measurement model is well-constructed and that the constructs do not overlap to an extent that would compromise the interpretation of their relationships.

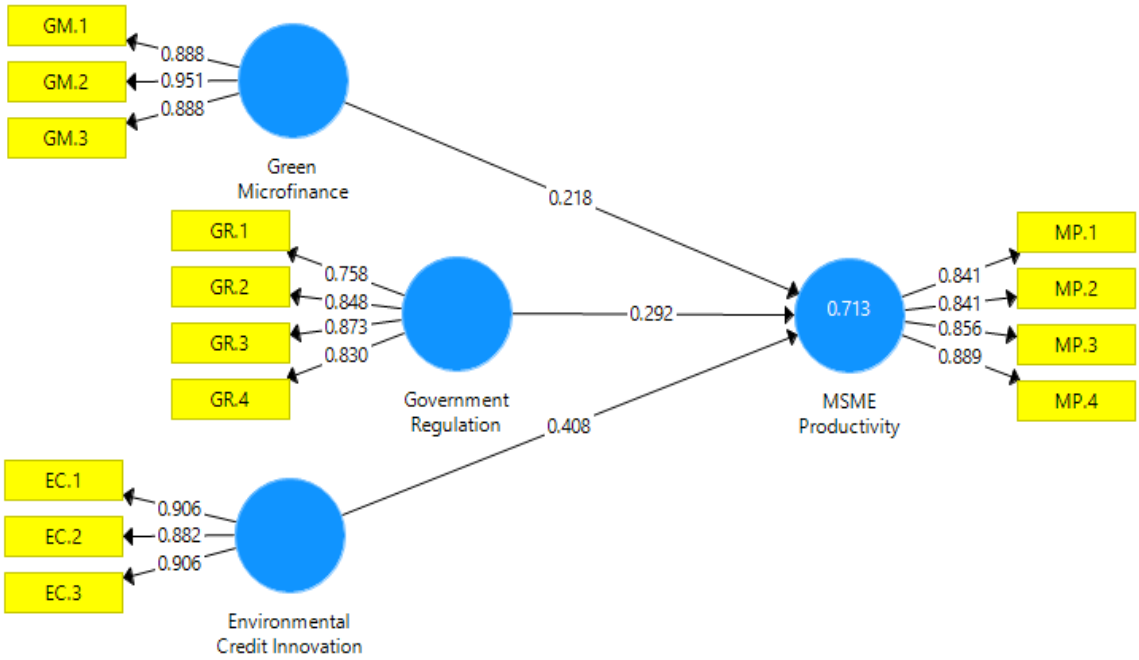

Figure 2. Model Results

Source: Data Processed by Researchers, 2024

4.4 Model Fit

Model fit is a crucial aspect of evaluating the adequacy of a structural equation model (SEM), ensuring that the estimated model aligns well with the observed data and that the hypothesized relationships and constructs are appropriate. In this study, key fit indices used to assess model fit include the Standardized Root Mean Square Residual (SRMR), d_ULS (difference of unweighted least squares), d_G (difference of geodesic distances), Chi-Square (χ^2), and Normed Fit Index (NFI). Comparative values for both the Saturated Model (the theoretical model incorporating all possible relationships) and the Estimated Model (the model derived from the data) are provided to evaluate the model's performance comprehensively.

Table 3. Model Fit Results Test

	Saturated Model	Estimated Model
SRMR	0.089	0.089
d_ULS	0.825	0.825
d_G	0.477	0.477
Chi-Square	313.187	313.187
NFI	0.786	0.786

Source: Process Data Analysis (2024)

The model fit evaluation considered several indices to assess the adequacy of the structural equation model. The Standardized Root Mean Square Residual (SRMR), an absolute fit index, measures the difference between observed and predicted correlations. Both the Saturated and Estimated Models have an SRMR of 0.089, slightly above the ideal threshold of 0.08 but still within an acceptable range, indicating a reasonable fit. The d_ULS (Difference of Unweighted Least Squares) and d_G (Difference of Geodesic Distances) values are 0.825 and 0.477, respectively, for both models, suggesting a reasonable and adequate fit by closely replicating the covariance structure of the

data. The Chi-Square (χ^2) value is 313.187 for both models, significant due to the large sample size (140 respondents); however, it remains consistent with acceptable model fit when considering other indices. Finally, the Normed Fit Index (NFI) is 0.786, below the ideal threshold of 0.90 but moderately close, indicating the model explains a reasonable proportion of variance, though not achieving a perfect fit.

Table 4. Coefficient Model

	R Square	Q2
MSME Productivity	0.713	0.506

Source: Data Processing Results (2024)

The R-Square (R^2) and Q^2 values are essential indicators for evaluating a model's explanatory power and predictive relevance in Structural Equation Modeling (SEM). The R^2 value, representing the proportion of variance in the dependent variable explained by independent variables, is 0.713 for MSME Productivity in this study. This indicates that 71.3% of the variance in MSME Productivity is explained by Green Microfinance, Government Regulation, and Environmental Credit Innovation, reflecting a strong explanatory power and substantial relationships between these variables. Meanwhile, the Q^2 value, assessing the model's predictive relevance, is 0.506, signifying moderate-to-high predictive accuracy. A Q^2 value exceeding 0.35 is considered substantial, confirming the model's strong ability to predict MSME Productivity outcomes effectively based on the independent variables. These results demonstrate the model's reliability and predictive strength in explaining and forecasting MSME productivity.

4.5 Hypothesis Testing

Hypothesis testing is a critical component of Structural Equation Modeling (SEM) as it allows researchers to determine whether the proposed relationships in the theoretical model are statistically significant. In this study, the hypotheses test the effects of Environmental Credit Innovation, Government Regulation, and Green Microfinance on MSME Productivity. The hypotheses were tested using path coefficients, T-statistics, and P-values.

Table 5. Hypothesis Testing

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics	P Values
Environmental Credit Innovation -> MSME Productivity	0.408	0.409	0.100	4.066	0.000
Government Regulation -> MSME Productivity	0.392	0.388	0.099	3.942	0.003
Green Microfinance -> MSME Productivity	0.318	0.324	0.108	3.029	0.004

Source: Process Data Analysis (2024)

The analysis of the structural model demonstrates that Environmental Credit Innovation, Government Regulation, and Green Microfinance all have significant positive effects on MSME Productivity. Environmental Credit Innovation has a path coefficient of 0.408, with a T-statistic of 4.066 and a P-value of 0.000, indicating a moderate and statistically significant positive relationship. Similarly, Government Regulation shows a path coefficient of 0.392, a T-statistic of 3.942, and a P-value of 0.003, confirming its significant positive impact on MSME productivity, suggesting that effective regulations promote better outcomes. Green Microfinance also exhibits a positive

relationship, with a path coefficient of 0.318, a T-statistic of 3.029, and a P-value of 0.004, highlighting the role of financial programs in moderately enhancing MSME productivity. These findings confirm that all three constructs significantly contribute to improving MSME productivity.

Discussion

The primary objective of this study was to examine the effects of Environmental Credit Innovation, Government Regulation, and Green Microfinance on MSME Productivity in Yogyakarta.

1. Impact of Environmental Credit Innovation on MSME Productivity

The positive and significant path coefficient between Environmental Credit Innovation and MSME Productivity (0.408) demonstrates that initiatives to promote sustainable business practices through financial products designed to support environmental responsibility are crucial for MSME productivity. This finding aligns with previous research suggesting that financial support for environmentally friendly practices leads to improved business outcomes, particularly in MSMEs that face financial constraints [1], [26], [27].

Implementing environmental credit policies can help MSMEs access the capital needed to invest in green technologies, renewable energy, waste management, and sustainable supply chain practices, all of which contribute to improved productivity. This result suggests that encouraging environmental responsibility not only benefits the ecosystem but also provides economic incentives for MSMEs, creating a win-win situation. Furthermore, MSMEs that adopt green innovations are better positioned to meet the increasing consumer demand for sustainable products, further boosting their competitive advantage in the market.

2. Impact of Government Regulation on MSME Productivity

Similarly, Government Regulation has a significant and positive impact on MSME productivity (0.392). The positive relationship suggests that well-designed regulatory frameworks provide MSMEs with a more stable operating environment, encouraging innovation and operational efficiency. Policies that promote tax incentives, reduce administrative burdens, and enhance access to resources for small businesses are critical for improving MSME performance [28].

The findings emphasize the importance of government intervention in creating an enabling environment that supports MSMEs. Governments can promote policies that facilitate access to finance, reduce bureaucratic hurdles, and provide training or incentives to boost productivity. Furthermore, regulatory support related to environmental sustainability can help MSMEs navigate the complexities of green technologies while remaining competitive.

3. Impact of Green Microfinance on MSME Productivity

The path coefficient for Green Microfinance (0.318) also reveals a significant positive effect on MSME productivity, suggesting that access to microfinance with a focus on environmental sustainability plays an essential role in improving productivity. Green microfinance initiatives often offer favorable loan terms, specialized financial products, and guidance on adopting environmentally friendly technologies, all of which contribute to MSME growth and efficiency.

This result is consistent with studies indicating that access to financial resources is a primary barrier to the growth of MSMEs [29]–[31], particularly in developing regions like Yogyakarta. Green microfinance provides MSMEs with the financial resources necessary to invest in eco-friendly technologies and business practices, which can lead to both cost reductions (through more efficient resource use) and revenue growth (by attracting customers interested in sustainable products). Furthermore, the inclusion of environmental

criteria in financial products aligns with global trends toward sustainability, offering MSMEs a way to participate in the green economy.

4. Model Fit and Predictive Relevance

The model's fit indices, including R^2 (0.713) and Q^2 (0.506), further support the robustness of the results. An R^2 value of 0.713 indicates that the model explains over 71% of the variance in MSME productivity, reflecting the significant contribution of the independent variables (Environmental Credit Innovation, Government Regulation, and Green Microfinance). This suggests that the model provides a comprehensive framework for understanding the key drivers of MSME productivity in the context of sustainability.

Additionally, the Q^2 value of 0.506 confirms that the model has substantial predictive relevance, meaning that it not only explains a significant portion of the variance but also offers predictive power for MSME productivity. These findings demonstrate that the relationships proposed in the model are not only theoretically sound but also practically relevant for policy-making and business strategy.

5. Policy Implications and Recommendations

Given the significant effects of Environmental Credit Innovation, Government Regulation, and Green Microfinance on MSME productivity, it is important for policymakers to focus on fostering an environment that encourages the integration of green finance and supportive regulations for small businesses. The results suggest several policy recommendations:

a. Incentivize Green Innovation: Government programs that incentivize environmentally sustainable practices can provide MSMEs with the necessary resources to implement eco-friendly technologies, resulting in productivity gains.
b. Simplify Regulatory Processes: Simplifying regulatory processes and reducing bureaucratic barriers can help MSMEs access the resources they need to grow. Policies that streamline licensing, taxation, and financial support can significantly reduce the operational burden on MSMEs.
c. Expand Access to Green Microfinance: Expanding access to green microfinance, particularly for MSMEs in underserved sectors, can enable these businesses to invest in sustainable innovations. Financial institutions can be encouraged to offer more competitive green finance products to small businesses, especially in environmentally sensitive industries.

5. CONCLUSION

This study highlights the significant role of Environmental Credit Innovation, Government Regulation, and Green Microfinance in improving the productivity of MSMEs in Yogyakarta. The positive relationships found between these factors and MSME productivity suggest that integrating sustainable financial products and supportive regulations is crucial for fostering business growth in the region. Government initiatives that promote green innovation, reduce bureaucratic barriers, and provide access to green finance can help MSMEs become more competitive, sustainable, and productive. The findings contribute to the growing body of research on sustainable business practices and offer valuable insights for policymakers and financial institutions aiming to support MSMEs in adapting to environmental challenges and enhancing their productivity. The results emphasize the need for an enabling environment where MSMEs can thrive through sustainable practices, driving both economic and environmental benefits.

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