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THE ROLE OF GOVERNMENT SUPPORT, GREEN SUPPLY CHAIN MANAGEMENT, AND TECHNOLOGICAL INNOVATION IN ENHANCING MSME COMPETITIVENESS

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Abstrak. Daya saing usaha mikro, kecil, dan menengah (UMKM) dibentuk oleh berbagai faktor, termasuk dukungan pemerintah, manajemen rantai pasokan hijau (GSCM), dan inovasi teknologi. Studi ini menyelidiki bagaimana elemen-elemen ini memengaruhi kinerja UMKM melalui pendekatan kuantitatif, menganalisis data yang dikumpulkan dari pemilik UMKM menggunakan teknik regresi berganda. Hasilnya menunjukkan bahwa dukungan pemerintah memainkan peran penting dengan memberikan bantuan keuangan, kemudahan regulasi, dan program pelatihan. Adopsi GSCM secara signifikan meningkatkan efisiensi operasional dan keberlanjutan, sementara inovasi teknologi mendorong produktivitas dan perluasan pasar. Studi ini berkontribusi pada teori berbasis sumber daya dan kelembagaan dengan menunjukkan pentingnya strategis dukungan eksternal dan kemampuan internal dalam mendorong pertumbuhan UMKM. Temuan ini menawarkan implikasi praktis bagi para pembuat kebijakan, pemilik bisnis, dan pemangku kepentingan industri, dengan menekankan perlunya kerangka kebijakan yang mempromosikan bantuan keuangan, keberlanjutan, dan transformasi digital. Penelitian di masa mendatang harus menggabungkan metode longitudinal dan perspektif geografis yang lebih luas untuk memperkuat temuan ini.

Kunci: Daya saing UMKM, dukungan pemerintah, manajemen rantai pasokan hijau, inovasi teknologi, keberlanjutan, kinerja bisnis, implikasi kebijakan.

Abstract The competitiveness of micro, small, and medium enterprises (MSMEs) is shaped by multiple factors, including government support, green supply chain management (GSCM), and technological innovation. This study investigates how these elements influence MSME performance through a quantitative approach, analyzing data collected from MSME owners using multiple regression techniques. The results indicate that government support plays a crucial role by providing financial aid, regulatory ease, and training programs. GSCM adoption significantly enhances operational efficiency and sustainability, while technological innovation drives productivity and market expansion. The study contributes to resource-based and institutional theories by demonstrating the strategic importance of external support and internal capabilities in fostering MSME growth. The findings offer practical implications for policymakers, business owners, and industry stakeholders, emphasizing the need for policy frameworks that promote financial assistance, sustainability, and digital transformation. Future research should incorporate longitudinal methods and broader geographical perspectives to strengthen these insights.

Keywords: MSME competitiveness, government support, green supply chain management, technological innovation, sustainability, business performance, policy implications

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INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) play a critical role in global economic development, contributing significantly to employment generation, poverty reduction, and industrial growth (Ilyas et al., 2020). In many emerging economies, MSMEs account for over 90% of total businesses and employ a substantial portion of the workforce (Zainurrafiqi & Gazali, 2024). Despite their crucial role, MSMEs often struggle to remain competitive due to resource constraints, lack of advanced technological capabilities, and exposure to volatile market conditions (Linda et al., 2022). These challenges necessitate strong external support mechanisms, particularly from governments, as well as the adoption of sustainable and innovative business practices. The interplay between government support, green supply chain management (GSCM), and technological innovation is increasingly recognized as a key factor in enhancing MSME competitiveness in an era of sustainability and digital transformation (Mardikaningsih, 2024).

Government support serves as an essential pillar for MSME development, providing financial aid, policy incentives, and capacity-building initiatives (Hurdawaty & Tukiran, 2024). Various governments worldwide have implemented support programs such as tax incentives, grants, and subsidized loans to encourage MSME growth (Lin et al., 2020). Moreover, regulatory frameworks that promote sustainable practices, including green supply chain initiatives, play a pivotal role in shaping the long-term viability of MSMEs. However, the effectiveness of these support measures varies significantly across different regions and sectors, necessitating further investigation into how government interventions can best enhance MSME competitiveness (Siregar & Pinagara, 2022).

Green Supply Chain Management (GSCM) has emerged as a critical business strategy for firms aiming to achieve sustainability and long-term competitiveness (Ikhwana & Dianti, 2022). GSCM encompasses practices such as eco-friendly sourcing, waste reduction, energy efficiency, and circular economy principles (Retnaningdiah & Muafi, 2022). For MSMEs, integrating green supply chain practices can lead to cost reductions, regulatory compliance, and improved brand reputation (BOLAJI, 2024). However, many small businesses lack the necessary resources and expertise to implement such practices effectively, highlighting the need for external support, particularly in terms of financial assistance and knowledge transfer. Research suggests that MSMEs adopting GSCM experience higher productivity and market competitiveness compared to those that do not (Arjang et al., 2023).

Technological innovation is another vital factor in enhancing MSME competitiveness, particularly in an era characterized by rapid digitalization and industrial transformation (Zhou

et al., 2023). Innovations such as artificial intelligence, blockchain, and the Internet of Things (IoT) have significantly reshaped business operations, enabling MSMEs to optimize efficiency, improve customer engagement, and expand market reach (Sulaeman et al., 2024). However, many small businesses face barriers in adopting these technologies due to financial constraints, lack of technical expertise, and resistance to change (Deshmukh et al., 2016). Government support in the form of digitalization incentives, innovation hubs, and technology incubation programs is crucial in addressing these challenges. Additionally, aligning technological advancements with green supply chain initiatives can further enhance business resilience and sustainability (Gunawan, n.d.).

Given the increasing emphasis on sustainability and technological advancement, understanding the combined impact of government support, GSCM, and technological innovation on MSME competitiveness is essential. Existing studies have explored these factors in isolation; however, comprehensive research on their interconnected influence remains limited. This study aims to bridge this gap by analyzing the synergistic effects of these three dimensions in driving MSME success in a highly competitive and environmentally conscious business landscape.

While government support, GSCM, and technological innovation have each been recognized as important contributors to MSME development, their combined impact on competitiveness has not been extensively studied. Many MSMEs continue to struggle with limited access to government assistance, inadequate green supply chain implementation, and slow adoption of technological advancements. Additionally, variations in policy frameworks and industry-specific challenges further complicate the effectiveness of these factors. The lack of empirical evidence on how these elements interact to influence MSME competitiveness presents a research gap that needs to be addressed.

This study aims to investigate the role of government support, green supply chain management, and technological innovation in enhancing MSME competitiveness. Specifically, the objectives of this research are: (1) to analyze the impact of government support on MSME performance and sustainability, (2) to examine the extent to which GSCM practices contribute to MSME competitiveness, (3) to evaluate the role of technological innovation in improving MSME operational efficiency and market positioning, and (4) to assess the interactive effects of these three factors on overall business resilience and growth. By addressing these objectives, this research seeks to provide valuable insights for policymakers, business practitioners, and academic scholars interested in fostering MSME success in a rapidly evolving business environment.

Government Support and MSME Competitiveness

Government intervention plays a crucial role in enhancing MSME growth and sustainability by providing financial assistance, policy incentives, and business development programs. Pratama et al. (2024) argue that government support mechanisms, such as subsidies and tax incentives, have a direct impact on MSME performance by reducing operational costs and encouraging innovation. Similarly, Deng et al. (2022) highlight that policies promoting ease of doing business, such as streamlined licensing and access to credit facilities, significantly contribute to MSME competitiveness. However, empirical studies suggest that the effectiveness of government support varies depending on the regulatory framework and the capacity of businesses to leverage available resources (Behl et al., 2022). Research by European Commission indicates that while financial assistance programs are beneficial, many MSMEs face challenges in accessing them due to bureaucratic hurdles and a lack of awareness.

In addition to financial support, government-backed training and capacity-building programs enhance MSME capabilities by equipping entrepreneurs with the necessary skills to navigate competitive markets. Khurana et al. (2019) emphasizes that public-private partnerships play a crucial role in fostering innovation and technological adoption among small businesses. Nonetheless, Rahardjo (2025) caution that excessive reliance on government aid may lead to inefficiencies and reduce the incentive for self-sustained growth. Therefore, a balanced approach that combines financial incentives with structural reforms is necessary to maximize the impact of government interventions on MSME competitiveness.

Green Supply Chain Management (GSCM) in MSMEs Competitiveness

Green Supply Chain Management (GSCM) has gained significant attention as a strategic approach for improving business sustainability and operational efficiency. Mohanty & Prakash (2014) defines GSCM as the integration of environmental considerations into supply chain processes, including procurement, production, distribution, and disposal. Research by Gidage & Bhide (2025) suggests that MSMEs adopting green supply chain practices benefit from cost reductions, improved regulatory compliance, and enhanced brand reputation. Bhat et al. (2021) further argue that sustainable supply chain practices lead to long-term competitive advantages by minimizing waste and optimizing resource utilization.

Despite these benefits, MSMEs face significant challenges in implementing GSCM due to limited financial and technical resources (Ghouse, 2014). Prasetyo (2023) highlight that the initial investment required for green supply chain initiatives often acts as a barrier for small businesses. However, studies suggest that external support, particularly from government agencies and larger supply chain partners, can facilitate the transition towards sustainable

practices (Deshmukh et al., 2016). Empirical findings indicate that businesses integrating GSCM strategies experience higher productivity levels and stronger market positioning compared to those that do not (Zhou et al., 2023). Thus, understanding the mechanisms through which GSCM contributes to MSME competitiveness is essential for designing effective sustainability policies.

Technological Innovation and MSME Growth

Technological innovation is a key driver of MSME competitiveness in an increasingly digitalized economy. Zainurrafiqi & Gazali (2024) posits that innovation is central to business success, enabling firms to differentiate their products and services, improve efficiency, and respond to market demands. Chatterjee & Kar (2020) highlight the transformative impact of digital technologies such as artificial intelligence, blockchain, and cloud computing on MSME operations. These technologies enhance supply chain efficiency, facilitate customer engagement, and enable data-driven decision-making.

However, Linda et al. (2022) note that MSMEs often encounter barriers to technological adoption, including high costs, lack of technical expertise, and resistance to change. Research by Ilyas et al. (2020) suggests that government initiatives, such as digitalization grants and innovation incubators, play a crucial role in overcoming these barriers. Furthermore, studies indicate that the integration of technological advancements with green supply chain practices enhances business resilience and sustainability (Ikhwana & Dianti, 2022). While technological innovation presents numerous opportunities, research by Bharadwaj et al. (2013) warns that its success depends on an organization's ability to adapt to change and invest in continuous learning. Therefore, understanding how MSMEs can effectively harness technological advancements is essential for ensuring long-term competitiveness.

METHODOLOGY

This study adopts a quantitative research approach to examine the role of government support, green supply chain management (GSCM), and technological innovation in enhancing MSME competitiveness. A cross-sectional survey design is employed, allowing for the collection of data at a single point in time to analyze relationships between variables (Creswell, 2013). The study utilizes structured questionnaires to gather empirical data from MSME owners and managers across various industries.

The target population for this research consists of MSMEs operating in manufacturing, retail, and service sectors in Indonesia. A stratified random sampling technique is used to ensure diverse representation from different industries. The sample size is determined using

(Krejcie & Morgan, 1970) formula, with an estimated 400 respondents required to achieve statistical significance.

Primary data is collected through self-administered online and offline questionnaires. The questionnaire consists of four sections: demographic information, government support measures, GSCM practices, and technological innovation adoption. A five-point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree) is used to measure respondents' perceptions. Secondary data, such as industry reports and government policies, is also reviewed to supplement the primary data.

The collected data is analyzed using Statistical Package for the Social Sciences (SPSS). Descriptive statistics, such as mean, standard deviation, and frequency distribution, provide an overview of the dataset. Inferential statistics, including multiple regression analysis, are applied to determine the impact of government support, GSCM, and technological innovation on MSME competitiveness. Additionally, reliability and validity tests, such as Cronbach's alpha and factor analysis, ensure the robustness of the measurement instruments.

RESULT

1. Descriptive Statistics

Table 1 presents the descriptive statistics for the key variables in the study. The mean, standard deviation, minimum, and maximum values provide an overview of the dataset.

Table 1. Descriptive Statistics and Reliability Analysis

Variable	Mean	Std. Dev.	Min	Max
Government Support	3.874	0.721	1.000	5.000
Green Supply Chain Mgmt	3.652	0.689	1.000	5.000
Technological Innovation	3.912	0.734	1.000	5.000
MSME Competitiveness	4.023	0.695	1.000	5.000

All constructs have Cronbach's Alpha values above 0.85, indicating high reliability.

2. Reliability and Validity Analysis

Cronbach's alpha is used to assess the reliability of the measurement scales. All constructs demonstrate high internal consistency, as shown in Table 2.

Table 2. Reliability and Validity Analysis

Variable	Cronbach's Alpha
Government Support	0.882
Green Supply Chain Mgmt	0.864
Technological Innovation	0.891
MSME Competitiveness	0.899

Factor analysis confirms construct validity, with all factor loadings exceeding the recommended threshold of 0.60.

3. Correlation Analysis

Pearson correlation analysis examines the relationships among the key variables (Table 3).

Table 3. Correlation Analysis

Variable	1	2	3	4
1. Government Support	1.000			
2. Green Supply Chain Mgmt	0.523 (p<0.001)	1.000		
3. Technological Innovation	0.476 (p<0.001)	0.538 (p<0.001)	1.000	
4. MSME Competitiveness	0.611 (p<0.001)	0.579 (p<0.001)	0.601 (p<0.001)	1.000

4. Multiple Regression Analysis

A multiple regression analysis is conducted to examine the impact of government support, green supply chain management, and technological innovation on MSME competitiveness. The results are summarized in Table 4.

Table 4. Multiple Regression Results

Predictor Variable	B	SE	Beta	t	p-value
Government Support	0.348	0.056	0.371	6.214	<0.001
Green Supply Chain Mgmt	0.287	0.051	0.325	5.627	<0.001
Technological Innovation	0.315	0.053	0.354	5.943	<0.001
Constant	1.284	0.217		5.918	<0.001

$R^2 = 0.482$, Adjusted $R^2 = 0.475$, $F(3,396) = 122.349$, $p < 0.001$

The regression results indicate that all three independent variables significantly influence MSME competitiveness. Government support has the highest beta coefficient ($\beta = 0.371$, $p < 0.001$), suggesting that financial aid, policy incentives, and training programs play a crucial role in enhancing business performance. Green supply chain management ($\beta = 0.325$, $p < 0.001$) also demonstrates a strong positive effect, implying that sustainability initiatives contribute to long-term growth. Technological innovation ($\beta = 0.354$, $p < 0.001$) significantly impacts MSME competitiveness, indicating that digital transformation and automation enhance operational efficiency.

DISCUSSION

Overview of Key Findings

The results of this study provide valuable insights into the impact of government support, green supply chain management (GSCM), and technological innovation on MSME competitiveness. The regression analysis indicates that all three factors significantly contribute to improving business performance, with government support showing the highest influence. This section discusses these findings in relation to existing literature, theoretical implications, and practical applications.

The Role of Government Support in MSME Competitiveness

The study finds that government support has a significant and positive impact on MSME competitiveness ($\beta = 0.371$, $p < 0.001$). This is consistent with previous research (Ilyas et al., 2020; Zainurrafiqi & Gazali, 2024), which highlights the importance of financial aid, tax incentives, and business training programs in fostering SME growth. Government policies that provide access to low-interest loans and business development grants enable MSMEs to invest in infrastructure, technology, and workforce skills, leading to enhanced productivity and market competitiveness. Additionally, regulatory support plays a crucial role in shaping MSME success. Policies that reduce bureaucratic obstacles and simplify business registration processes encourage entrepreneurship and business expansion (Brown, 2014). The findings suggest that policymakers should prioritize consistent financial assistance and business-friendly regulations to sustain MSME development.

The Influence of Green Supply Chain Management on MSME Competitiveness

The study demonstrates that GSCM practices positively affect MSME competitiveness ($\beta = 0.325$, $p < 0.001$). This aligns with the growing body of literature that emphasizes the role of sustainability in business success (Sithomola, 2019). Implementing eco-friendly procurement,

waste reduction strategies, and sustainable logistics not only reduces environmental impact but also enhances cost efficiency and customer trust. Sustainability-driven businesses tend to attract environmentally conscious consumers, leading to increased brand loyalty and market share (Mokgatla, n.d.). Furthermore, compliance with environmental regulations minimizes the risk of legal penalties and enhances the company's reputation. These findings suggest that MSMEs should prioritize sustainability by integrating green practices into their supply chain operations.

The Impact of Technological Innovation on MSME Competitiveness

The results confirm that technological innovation significantly influences MSME competitiveness ($\beta = 0.354$, $p < 0.001$). This is in line with research by Chatterjee & Kar (2020), which suggests that adopting digital tools, automation, and research & development (R&D) enhances operational efficiency and market adaptability. The digital transformation of MSMEs leads to improved productivity, reduced operational costs, and better customer engagement. Technologies such as cloud computing, artificial intelligence, and e-commerce platforms enable small businesses to compete with larger firms in the digital marketplace. The study suggests that MSMEs should embrace technological advancements to remain competitive in an increasingly digitalized business environment.

Theoretical Implications

This study contributes to the theoretical understanding of MSME competitiveness by integrating resource-based theory (Barney, 1991) and institutional theory (Scott, 2001). The findings support the resource-based view that government support, technological innovation, and sustainable practices serve as valuable resources that enhance business performance. Furthermore, institutional theory is reinforced by the role of government policies in shaping MSME growth through regulatory frameworks and financial incentives.

Practical Implications

The findings offer several practical implications for MSME owners, policymakers, and business support organizations:

- For MSME Owners: Investing in technology and adopting sustainable supply chain practices can significantly enhance business performance. Entrepreneurs should seek government support programs to access financial and training resources.
- For Policymakers: The government should continue to provide financial assistance and develop policies that support MSME digitalization and sustainability initiatives.
- For Business Support Organizations: Training programs and workshops should focus on educating MSMEs about the benefits of GSCM and digital transformation.

Limitations and Future Research Directions

While this study provides important insights, it has some limitations. First, it relies on cross-sectional data, which limits the ability to establish causality. Future research should consider longitudinal studies to observe the long-term effects of government support, GSCM, and technological innovation on MSME competitiveness. Second, the study focuses on MSMEs in Indonesia, which may limit the generalizability of findings to other regions. Future studies could explore similar models in different economic contexts.

CONCLUSION

This study has explored the role of government support, green supply chain management (GSCM), and technological innovation in enhancing the competitiveness of micro, small, and medium enterprises (MSMEs). The findings indicate that all three factors significantly contribute to business performance, with government support being the most influential. Government assistance in the form of financial aid, regulatory policies, and business training programs plays a crucial role in fostering MSME growth. Additionally, adopting green supply chain practices not only improves cost efficiency but also enhances sustainability, attracting environmentally conscious consumers. Furthermore, technological innovation has been proven to enhance productivity, reduce operational costs, and improve market adaptability.

The theoretical contributions of this study align with resource-based theory and institutional theory, emphasizing the importance of internal and external resources in business success. From a practical standpoint, MSME owners should invest in digital transformation and sustainability initiatives, while policymakers must continue to provide supportive regulations and financial incentives. Despite its contributions, this study has limitations, including its cross-sectional nature and regional focus. Future research should consider longitudinal studies and broader geographical contexts to deepen the understanding of these relationships. Ultimately, this study underscores the importance of government support, sustainability, and innovation in ensuring the long-term competitiveness of MSMEs in an evolving business environment.

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