ASSESSING THE FINANCIAL PERFORMANCE OF MSMES WITHIN THE FRAMEWORK OF GREEN ECONOMY PRACTICES

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Abstract

This research aims to empirically investigate the relationship between the adoption of green economy practices and the financial performance of Micro, Small, and Medium Enterprises (MSMEs). The transition towards a circular and sustainable economy presents both challenges and opportunities for MSMEs, which are crucial economic actors. While the strategic benefits of sustainability are often discussed, a clear, quantifiable link to financial metrics remains underexplored, particularly in the context of MSMEs in emerging economies. This study employs a quantitative, cross-sectional research design, collecting primary data from 150 MSME owners and managers across the manufacturing and services sectors through a structured questionnaire. The constructs of Green Process Innovation (GPI), Green Supply Chain Management (GSCM), and Digital Transformation (DT) are operationalized as independent variables, while financial performance is measured using self-reported indicators of profitability, sales growth, and return on investment. Data analysis was conducted using multiple linear regression. The results indicate that all three independent variables have a statistically significant positive effect on MSMEs' financial performance ($p < 0.05$). Digital Transformation emerged as the strongest predictor ($\beta = 0.42$), followed by Green Process Innovation ($\beta = 0.31$) and Green Supply Chain Management ($\beta = 0.25$). The regression model explains 58% of the variance in financial performance ($R^2 = 0.58$). The discussion contextualizes these findings within the broader literature, arguing that digital tools enable efficient green practices, which in turn reduce costs and open new market opportunities, thereby enhancing financial outcomes (Lerman et al., 2022; Yadav et al., 2020). This study contributes to the literature by providing empirical evidence from the MSME perspective, bridging the gap between sustainability theory and financial praxis. It concludes that integrating green economy practices, supported by digitalization, is not merely an ethical or regulatory compliance issue but a viable financial strategy for MSMEs. The study's limitations include its reliance on self-reported data and cross-sectional design. Future research should employ longitudinal designs and incorporate objective financial data.

Keywords: *Green Economy, Financial Performance, Digital Transformation, Green Process Innovation, Green Supply Chain Management.*

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1. Introduction

The global economic landscape is undergoing a profound transformation, driven by the urgent need to reconcile economic growth with environmental stewardship. The concept of a green economy, which emphasizes low-carbon, resource-efficient, and socially inclusive development, has moved from the periphery to the center of policy and business strategy (UNEP, 2011). Within this paradigm, Micro, Small, and Medium Enterprises (MSMEs) are recognized as pivotal agents of change due to their significant collective contribution to employment, GDP, and innovation in both developed and developing nations (Cueto et al., 2022; Mohite et al., 2025). However, MSMEs often face a unique dilemma: while pressured by stakeholders—including consumers, regulators, and larger partners in supply chains—to adopt sustainable practices, they simultaneously grapple with resource constraints, limited technical expertise, and perceived high initial costs (Sharma et al., 2020; Kumar et al., 2022). This tension raises a critical research question: Can the adoption of green economy practices translate into tangible financial benefits for MSMEs, or does it primarily represent a costly operational burden?

Extant literature has extensively explored the drivers and barriers to sustainability in large corporations, with findings suggesting that environmental and social performance can positively influence financial outcomes through mechanisms such as enhanced brand reputation, operational efficiency, and risk mitigation (Govindan et al., 2020; Thorisdottir & Jóhannsdóttir, 2020). Research on sustainable-oriented innovation and circular economy principles also indicates potential for improved social, economic, and environmental performance (Rodríguez-Espíndola et al., 2022; Suchek et al., 2022). In the MSME context, studies highlight the role of Corporate Social Responsibility (CSR) and green process innovation as antecedents to performance, especially under volatile conditions (Achi et al., 2021). Furthermore, the advent of Industry 4.0 technologies and digital transformation is posited as a key enabler for sustainability, offering MSMEs tools to optimize resource use, enhance supply chain transparency, and access green finance (Yadav et al., 2020; Martínez-Peláez et al., 2023; Lerman et al., 2022).

Despite this growing body of knowledge, a significant research gap persists. First, there is a paucity of integrated empirical studies that simultaneously examine the impact of core green economy constructs—specifically Green Process Innovation (GPI), Green Supply Chain Management (GSCM), and Digital Transformation (DT)—on the financial performance of MSMEs. Many studies treat these elements in isolation (Habib et al., 2021; Sánchez-García et al., 2023). Second, the evidence remains mixed and often context-specific, with some MSMEs viewing sustainability as a cost center rather than a value driver (Sharma et al., 2020). Third, the mediating or enabling role of digital capabilities in unlocking the financial value of green practices for resource-constrained MSMEs requires further empirical validation (Lerman et al., 2022).

This study seeks to address these gaps by developing and testing a framework that assesses the direct effects of GPI, GSCM, and DT on the financial performance of MSMEs. It posits that these practices are not mutually exclusive but are synergistic, where digital transformation acts as a critical infrastructure for implementing effective green innovations and supply chain management, ultimately leading to superior financial results. By providing quantitative evidence from the MSME sector, this research aims to offer actionable insights for entrepreneurs, policymakers, and business support organizations. It argues that embedding green economy principles is a strategic imperative for MSME resilience and competitiveness in the 21st century, aligning ethical imperatives with financial logic. Therefore, the primary objective of this research is to empirically assess the relationship between the adoption of green economy practices (GPI, GSCM, DT) and the financial performance of MSMEs.

2. Methods

This study employed a quantitative, explanatory research design with a cross-sectional approach to collect data at a single point in time. The positivist paradigm underpinned the research, aiming to test objective theories by examining the relationship among defined variables. The population of interest was owners and senior managers of registered MSMEs operating within the manufacturing and service sectors, as these sectors are directly implicated in resource use and supply chain operations relevant to

green practices. A non-probability purposive sampling technique was used to select participants who were decision-makers knowledgeable about their firm's operational, environmental, and financial strategies. The target sample size was 150 respondents, determined based on the rule of thumb for multiple regression analysis requiring a minimum of 10-15 observations per predictor variable.

Data collection was conducted through a structured online questionnaire, distributed via professional networks and business associations. The questionnaire consisted of five sections. The first section captured demographic and firmographic data (e.g., industry, years in operation, number of employees). The subsequent sections measured the core constructs using a five-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). **Green Process Innovation (GPI)** was adapted from Achi et al. (2021) and measured items related to the modification of production processes to reduce energy consumption, waste, and emissions. **Green Supply Chain Management (GSCM)** was measured using scales from Habib et al. (2021) and Govindan et al. (2020), covering green procurement, cooperation with customers for eco-design, and reverse logistics. **Digital Transformation (DT)** was operationalized based on items from Lerman et al. (2022) and Martínez-Peláez et al. (2023), focusing on the use of digital technologies (e.g., data analytics, IoT, cloud platforms) to improve business processes and decision-making. The dependent variable, **Financial Performance (FP)**, was measured using subjective, self-reported indicators of profitability, sales growth, and return on investment over the past three years, a common approach in strategic management research when objective financial data is difficult to obtain from private MSMEs (Rodríguez-Espíndola et al., 2022).

The collected data were analyzed using Statistical Package for the Social Sciences (SPSS) version 26. Data screening was performed to check for missing values, outliers, and normality. Reliability analysis using Cronbach's Alpha confirmed the internal consistency of all scales ($\alpha > 0.7$). Validity was established through content and construct validity. The primary analysis involved multiple linear regression, with Financial Performance as the dependent variable and GPI, GSCM, and DT as independent variables. This analysis tested the hypothesis that higher levels of adoption of these green economy practices predict better financial performance.

3. Results and Discussion

Data screening confirmed the suitability of the dataset for regression analysis. The reliability coefficients (Cronbach's Alpha) for all constructs were above the acceptable threshold of 0.70, indicating good internal consistency. The results of the multiple linear regression analysis are presented below.

Table 1: Model Summary and ANOVA

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	F-Change	Sig. F-Change
1	.76	.58	.57	.512	65.43	.000

Note: Predictors: (Constant), Digital Transformation, Green Process Innovation, Green Supply Chain Management. Dependent Variable: Financial Performance.

The model summary (Table 1) shows that the combination of Green Process Innovation (GPI), Green Supply Chain Management (GSCM), and Digital Transformation (DT) explains 58% of the variance in MSMEs' Financial Performance ($R^2 = .58$). The model is statistically significant ($F = 65.43$, $p < .001$), indicating that the regression model is a good fit for the data.

Table 2: Regression Coefficients

Model	Unstandardized Coefficients (B)	Standardized Coefficients (Beta)	t	Sig.	Collinearity Statistics (Tolerance/VIF)
(Constant)	0.854		2.891	.004	
Green Process Innovation	0.298	.312	4.521	.000	.723 / 1.383
Green SCM	0.227	.248	3.672	.000	.685 / 1.460
Digital Transformation	0.401	.421	5.983	.000	.712 / 1.404

Note: Dependent Variable: Financial Performance.

The coefficients table (Table 2) provides detailed insights into the contribution of each predictor. All three independent variables have a positive and statistically significant effect on Financial Performance ($p < .001$). Digital Transformation (DT) exhibits the strongest influence, with a standardized beta coefficient (β) of .421. This suggests that a one standard deviation increase in DT adoption is associated with a 0.421 standard deviation increase in financial performance, holding other variables constant. Green Process Innovation (GPI) is the second strongest predictor ($\beta = .312$), followed by Green Supply Chain Management (GSCM) ($\beta = .248$). The collinearity statistics (Tolerance > 0.1, VIF < 10) confirm that multicollinearity is not a concern among the predictors, meaning each variable contributes unique explanatory power to the model. The constant is also significant, indicating a baseline level of financial performance. In summary, the results strongly support the hypothesis that the adoption of green economy practices, particularly when enabled by digital transformation, is positively associated with enhanced financial performance in MSMEs.

4. Discussion

The findings of this study provide robust empirical evidence that integrating green economy practices is financially beneficial for MSMEs, thereby addressing a central concern among entrepreneurs regarding the return on sustainability investments. The positive and significant impact of **Green Process Innovation (GPI)** aligns with prior research by Achi et al. (2021) and Rodríguez-Espíndola et al. (2022), who found that process-oriented innovations aimed at reducing waste and energy consumption lead to significant cost savings. For MSMEs, these savings directly improve the bottom line by lowering operational expenses related to raw materials, utilities, and waste disposal. Furthermore, GPI can enhance product quality and production efficiency, creating a competitive advantage that may command price premiums or increase market share.

The significant effect of **Green Supply Chain Management (GSCM)** underscores the importance of looking beyond organizational boundaries. As Govindan et al. (2020) noted, social and environmental sustainability tensions and opportunities often manifest across multi-tier supply chains. By engaging in green procurement, collaborating with suppliers and customers on eco-design, and managing product end-of-life, MSMEs can mitigate risks (e.g., resource scarcity, regulatory non-compliance), secure contracts with larger, sustainability-focused partners, and improve overall supply chain resilience (Habib et al., 2021; Kumar et al., 2022). This external orientation translates into more stable and potentially profitable business relationships, which is reflected in improved financial performance.

The most powerful predictor in our model, **Digital Transformation (DT)**, offers a crucial explanation for how MSMEs can overcome traditional barriers to green adoption. As Lerman et al. (2022) argue in their configurational approach, smart technologies are fundamental to achieving green performance. Digital tools such as IoT sensors, data analytics, and cloud-based platforms enable MSMEs to monitor resource consumption in real-time, optimize logistics routes, and implement predictive maintenance, making GPI and GSCM initiatives more effective and less resource-intensive to manage (Yadav et al., 2020; Martínez-Peláez et al., 2023). DT also facilitates access to green finance and digital marketing for sustainable products, expanding revenue streams (Soundarrajan & Vivek, 2016; Sharabati et al., 2024). Therefore, DT acts not just as a direct performance driver but as a critical enabler that amplifies the financial returns from green practices.

The synergy between these variables suggests a progressive pathway for MSMEs. Initial digitalization efforts provide the data and control necessary to identify inefficiencies and implement targeted green process innovations. These internal improvements then create a foundation for extending sustainability principles into the supply chain. This integrated approach transforms sustainability from a series of isolated, costly projects into a coherent system that drives efficiency, innovation, and market differentiation. The results contradict the notion that green practices are merely a cost for MSMEs (Sharma et al., 2020), instead positioning them as a strategic investment in long-term financial viability and resilience, especially in an era of increasing environmental regulation and conscious consumerism (Wu & Tham, 2023).

4. Conclusion

This study concludes that the adoption of green economy practices—specifically Green Process Innovation, Green Supply Chain Management, and Digital Transformation—has a statistically significant and positive impact on the financial performance of Micro, Small, and Medium Enterprises (MSMEs). The research demonstrates that sustainability and profitability are not mutually exclusive goals but can be synergistic. Digital Transformation emerged as the most influential factor, highlighting its pivotal role as an enabler that makes green initiatives more feasible, measurable, and effective for resource-constrained MSMEs. By reducing operational costs, mitigating risks, unlocking new market opportunities, and fostering innovation, these integrated practices contribute directly to enhanced profitability, sales growth, and return on investment.

The theoretical contribution of this work lies in its integrated empirical framework that connects three critical streams of contemporary business literature—green innovation, sustainable supply chains, and digitalization—within the specific context of MSMEs. It provides quantitative evidence that helps bridge the gap between normative sustainability advocacy and the practical financial concerns of small business owners.

From a practical standpoint, the findings offer clear guidance for MSME managers and entrepreneurs. Prioritizing investments in foundational digital technologies is a crucial first step. Subsequently, leveraging these digital capabilities to drive process efficiencies and engage with supply chain partners on sustainability can create a compound positive effect on financial health. For policymakers and business development agencies, the study underscores the importance of designing support programs that promote the dual adoption of digital and green technologies, such as through targeted grants, training, and the development of digital platforms for green knowledge sharing.

This study is not without limitations. First, the use of self-reported, perceptual measures for financial performance may introduce common method bias, although procedural remedies were applied. Second, the cross-sectional design limits the ability to infer causality definitively; a longitudinal study would be valuable to observe performance changes over time following the adoption of green practices. Third, the sample, while diverse, may not be fully representative of all MSME sectors or geographical contexts. Future research should address these limitations by incorporating objective financial data (e.g., from financial statements) and employing longitudinal or experimental designs. It would also be fruitful to explore potential moderating variables, such as the level of environmental volatility (Achi et al., 2021), the role of entrepreneurial orientation (Burchi et al., 2021), or the specific type of digital technology adopted (Sánchez-García et al., 2023). Investigating the role of artificial intelligence in achieving sustainability goals within MSMEs, as suggested by Palomares et al. (2021), represents another promising avenue. Ultimately, as the global economy continues its green transition, MSMEs that proactively integrate these practices will be better positioned not only to survive but to thrive.

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