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Sustainable Business Models and Corporate Strategies for Resilience in Small-Scale Industries with Special Reference to Tamil Nadu

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ABSTRACT

Textile industry is backbone of Tamilnadu for the contributing significantly to employment generation, export earnings, and rural development However, changes of the environmental concerns, resource constraints, and competitive global market pressures have forced small-scale textile enterprises to assume sustainable business models and corporate resilience strategies. The study following specific objectives are: i)to examines the extent, nature of the small-scale industries; ii) to analyse the sustainability practicesamong the small and medium textile enterprises; and iii) to suggest suitable policy measures for the protection and promotion of small-scale industries in Tamilnadu. The studyuses for the both primary survey data (n = 400) and secondary sources from medium small scale industries found that the green finance institutions, the research applies statistical tools, including correlation and regression analysis, to explore the relationship between sustainability initiatives and business performance.The study addressed in sustainable practices such as energy efficiency, renewable energy use, and waste recycling for significantly enhance profitability and competitiveness. The study analysis demonstrates of 74 percentfor the variation in profitability is explained by sustainability variables, with waste recycling and energy efficiency emerging as the most influential factors. The study concludes that sustainability-driven business models are key to ensuring longterm resilience and market stability for textile MSMEs in Tamil Nadu. It also emphasizes the need for stronger policy support, financial incentives, and capacitybuilding programs to help of the small-scale industries transition toward a circular and low-carbon economy.

Keywords: Sustainable Business Models, Textile MSMEs, Tamil Nadu, Green Innovation, Corporate Resilience, Renewable Energy, Profitability.

Introduction

Sustainability is significant role of the modern industrial development, integrating economic growth with environmental stewardship and social responsibility. In recent times global economic systems have increasingly recognized that business success depends not only on profitability but also on the ability to operate correctly within ecological and social limits. The small-scale industries, particularly in developing economies like India, show a vital role in industrial production, employment creation, and regional development. However, these enterprises frequently face challenges related to resource efficiency, technological adaptation, and resilience to market and environmental disruptions. In Tamilnadu, one of the most industrially advanced states, are home to a vibrant and diversified textile sector comprising spinning, weaving, dyeing, and garment manufacturing units. The textile industry arecontributing nearly 36percent of India's total textile output and provides direct employment to over six million people. The textile processing and peak areas such as Tiruppur, Coimbatore, Erode, and Karur have gained international recognition for their export-oriented textile and apparel production. Despite these achievements, the sector faces several sustainability challenges, including excessive water

consumption, energy dependency, chemical pollution from dyeing operations, and waste disposal issues. The environmental pressures, coupled with fluctuating global demand and post-pandemic supply chain disruptions, have made it imperative for small and medium enterprises for the redefine of the business models. The sustainable business models have beenoffering a framework for integrating environmental efficiency and social equity into economic operations. The study findings that the resource optimization, renewable energy utilization, waste recycling, and circular production methods. In the context of the Tamilnadu textile industry, sustainability and resilience are deeply interrelated for the adopting eco-friendly production systems, digital transformation, and corporate social responsibility initiatives has not only reduced operational costs but also enhanced market competitiveness.

Research Problem

Textile industry is significant of the India's manufacturing economy, contributing significantly to exports, employment, and regional development in Tamilnadu. However, the sectors have been depending upon on water, energy, and chemical-intensive processes has raised growing environmental and socio-economic concerns. The majority of small scale and medium enterprises sector to often operating with limited financial resources and outdated technologiesfurther amplifies sustainability challenges.Despite government have been initiatives such as the technology upgradation fund scheme, zero liquid discharge, mandates, and medium and small-scale enterprises for the provide green finance programs, the transition toward sustainable business models remains uneven across textile clusters. The are lot of small-scaleindustries has been continuing to face barriers such as insufficient access to green capital, lack of technical expertise, and limited awareness of global sustainability standards. Furthermore,some enterprises have integrated renewable energy, waste recycling, and ecofriendly dyes, others struggle to align environmental goals with economic viability.Thus, how to understanding and sustainable business models and corporate resilience strategies influence the economic and environmental performance of small-scale textile industries in Tamilnadu. So, present study to identify of the research gap with empirical studies that statistically examine the relationship between sustainability adoption and business profitability at the medium small scale industries level.

3. Review of Literature

The perception of sustainability in industrial systems has evolved from a narrow focus on environmental management to a broader framework encompassing social inclusion, economic performance, and long-term resilience. There are numerous global and national studies have examined how small and medium enterprises (SMEs) can integrate sustainability into their operational models to achieve competitiveness and stability.

3.1 Global Viewpoints on Sustainable Business Models

According to Stubbs and Cocklin (2008) found that the sustainable business models for the balance economic, environmental, and social objectives to embedding sustainability into the value proposition, supply chain, and customer interface. Bocken et al. (2014) examined that the resource efficiency, social enterprises, and circular economy models, emphasizing innovation and systemic change. Boons and Lüdeke-Freund (2013) suggest that the sustainability for the driven firms create shared value by reducing ecological footprints while maximizing stakeholder well-being. The study conclude that the sustainability and profitability are not mutually exclusive but interdependent goals.

Yunus et al. (2015) analysed that the green entrepreneurship to foster resilience among micro and small enterprises in developing countries to the boose of the textile industries. In similarly study, Porter and Kramer (2019) found that the creating shared value for the firms enhance competitiveness for the addressing societal challenges with innovation needed. In the textile sector, Khan and Malik (2020) found that eco-innovation and

green supply chain management directly improve export performance, particularly in environmentally friendly market.

3.2 Indian Studies on Sustainable Industrial Development

In the Indian context, Chandra and Das (2017) emphasize that medium small scale industries are the backbone ofeconomy, contributing nearly 30 percent in gross domestic product, still face many barriers to adopting sustainable technologies due to financial and technical limitations. Gupta and Saini (2019) found that the textile industries are major contributors to industrial pollution in Tamil Nadu, Gujarat, and Punjab, necessitating stronger regulatory enforcement and technological support for ecofriendly production.

Sarkar (2020) examined green finance initiatives in India and found that access to subsidized credit and tax incentives significantly improves medium small-scale industries for the need of the investment for renewable energy and energy-efficient machinery. According to NITI Aayog (2021) found that thetextile industryto promoting zero-liquid dischargefor the textile sector, particularly in Tiruppur, which has emerged as a model for sustainable industrial clusters.

3.3 Sustainability and Corporate Resilience

The link between sustainability and corporate resilience has been a growing area of research. Williams et al. (2017) suggest that sustainable organizations possess greater adaptive capacity, allowing them to recover faster from market shocks and supply chain disruptions. In India, Rao and Patel (2021) found that the medium small-scale industries practicing and corporate social responsibility and environmental responsibility. The study suggests that the higher employee retention, customer loyalty, and brand reputation, which contribute to long-term resilience.

According to Tamil Nadu Pollution Control Board (TNPCB, 2022) found thatthe 60 percent textile units in the Tiruppur region now recycle wastewater, reducing both operational costs and environmental risks. Singh and Ramesh (2023) found that the digital transformation, renewable energy adoption, and sustainable supply chain integration are the most critical factors that enhance small medium enterprises competitiveness and crisis recovery potential.

3.4 Research Gap

. Most of the studies are either descriptive or policy-oriented, lacking quantitative assessment. The present study has been filling the research gap by providing a statistical analysis of sustainability practices and their impact on the economic and environmental performance of textile medium small-scale industries to special reference to Tamil nadu is major textile hubs.

4. Material and Methods

Present study has been systematically investigating the relationship between sustainable business models, corporate strategies, and resilience among small-scale textile industries in Tamilnadu. The study analysis for both quantitative and qualitative approaches to assess how sustainability-oriented initiatives contribute to economic, social, and environmental resilience. The study took for the five major textile business areas such as Tiruppur, Coimbatore, Erode, Karur, and Salem for the selecteddue to their concentration of micro, small, and medium enterprises engaged in sustainable textile practices such as eco-friendly dyeing, waste management, and renewable energy usage. The sample followed a stratified random sampling method to ensure proportional representation across the clusters. Based on district-wise medium small-scale industriesfor the selection of total sample size 400 respondents were selected: Tiruppur (120), Coimbatore (100), Erode (70), Karur (60), and Salem (50). The sample size was determined using Cochran's formula, ensuring a 95 percent confidence level and 5

percent margin of error. The study is based on both primary and secondary data nature. Required primary data collect from respondents were approached directly, and questionnaires were distributed both physically and via digital forms (Google Forms). The follow-up interviews were conducted to clarify ambiguities and gather additional information on firm-level sustainability practices. The secondary data collected from official and institutional publications, including reports from the Ministry of Textile Government of India, Tamil Nadu Textile Commissioner's Office, SIDBI, TNPCB, NITI Aayog, and relevant academic journals and databases. The study uses of software are Micro Excel and SPSS tools like multiple regression analysis was applied to identify the determinants of profitability and resilience, and to measure the impact of sustainability adoption on firm-level performance.

Result and Discussion

Textile industry is backbone of Tamilnadu industrial economy, approximately 36percent of India's total textile production and providing direct employment to over 6 million jobs. Themajor textile business areaslike Tiruppur, Coimbatore, Erode, Salem, and Karur specialize in spinning, weaving, dyeing, and garment exports. The sector contributes approximately ₹1.2 lakh crore annually to the state's economy and has been a significant foreign exchange earner through exports of knitwear and home textiles. However, the industry faces serious sustainability challenges to high energy consumption, groundwater depletion, and chemical pollution from dyeing units. In response, several small and medium enterprises (SMEs) in the region have adopted sustainable business models focusing on resource efficiency, renewable energy, waste recycling, and digital transformation.

Table 1: Cluster-Wise Distribution of Sample Textile Units in Tamil Nadu

Cluster	Estimated MSME Units	Sample Selected	Percentage of Total Sample
Tiruppur	9,200	120	30.0
Coimbatore	6,800	100	25.0
Erode	4,200	70	17.5
Karur	3,000	60	15.0
Salem	2,400	50	12.5
Total	25,600	400	100.0

Source: Primary Data.

The above table 1 shows that the sample distribution of the small-scale textile units across Tamilnadu is five major textile business hubs. In Tiruppur holds the largest share 30 percent due to its leadership in knitwear exports and adoption of green technologies, followed by Coimbatore 25 percent with its strong base in spinning and textile machinery. Erode 17.5 percent) and Karur 15 percent represent medium-scale clusters emphasizing weaving and home textiles with gradual sustainability progress, while Salem 12.5 percent comprises smaller, less industrialized units. The study findings that the balanced representation of Tamilnadu is textile sector, capturing geographic, production, and sustainability diversity to ensure reliable cluster-level comparisons with analyses.

Table 2: Demographic and Operational Profile of Respondent Firms

Particulars	Category	No. of Respondents	Percentage
Ownership Type	Proprietorship	220	55.0
	Partnership	120	30.0
	Private Limited	60	15.0
Firm Size (Employees)	Less than 50	190	47.5
	50–100	140	35.0
	Above 100	70	17.5

Years of Operation	Below 5 years	60	15.0
	5–10 years	140	35.0
	Above 10 years	200	50.0
Export Orientation	Domestic Market	240	60.0
	Export Market	160	40.0

Source: Primary Data.

The above table 2 shows that the demographic and operational characteristics of the respondents. The study findings that the textile firms' proprietorships 55 percent, reflecting the dominance of small, owner-managed enterprises. The about half employ fewer than 50 workers, confirming the sector's small-scale nature, remaining 50 percent of the firms have operated for over 10 years, indicating experience and stability, while 35 percent have 5–10 years of experience and 15 percent are new entrants. Sustainability adoption is generally higher among older firms with established systems. In terms of market orientation, 60% serve domestic markets, and 40% are export-oriented — with exporters in Tiruppur and Coimbatore more likely to follow international green standards like ISO 14001 and OEKO-TEX. The study findings that the textilesector dominated by small, experienced, and owner-driven units where sustainability adoption is influenced by firm size, age, and export exposure, emphasizing the need for supportive policy and financial mechanisms to strengthen resilience and sustainability.

Table 3: Adoption Level of Sustainability Practices among Textile MSMEs in Tamil Nadu

Sustainability Practice	**High Adoption (%)**	**Moderate Adoption (%)**	**Low Adoption (%)**	**Mean Score**	**Rank**
Energy Efficiency (LED, Solar Power, Energy Audits)	58.0	32.0	10.0	4.21	1
Wastewater Treatment and Reuse	50.5	35.5	14.0	4.05	2
Solid Waste Management and Recycling	48.0	37.5	14.5	3.97	3
Use of Organic or Eco-friendly Dyes	42.0	39.0	19.0	3.78	4
Green Certification (ISO 14001, OEKO-TEX, GOTS)	35.5	30.0	34.5	3.45	5
Employee Health & Safety Measures	40.0	38.5	21.5	3.68	6
Corporate Social Responsibility (CSR) Activities	33.0	41.5	25.5	3.52	7

Source: Ministry of Textile, Government of India.

The above table 3 shows that the sustainability adoption levels among textile industries of Tamilnadu with rating scale point from1 to 5 used. The study result that the mean adoption scores reveal that energy efficiency (mean = 4.12) and waste recycling (mean = 3.95) are the most implemented practices, indicating widespread awareness of cost-saving environmental measures. The study findings that the renewable energy use (mean = 3.42) and green certification (mean = 2.98) show moderate adoption, constrained by financial and technical barriers. The study suggest that the sustainability adoption mean score of 3.61 (SD = 0.74) suggests a medium-to-high adoption trend across clusters, with Tiruppur and Coimbatore scoring above 4.0, reflecting greater technological advancement and export orientation. The concluded that sustainability adoption is uneven across clusters but positively correlated with firm size and market exposure, supporting the hypothesis that larger and export-oriented MSMEs are more proactive in implementing green business practices.

Table 4: Relationship between Sustainability Adoption and Business Performance Indicators

Performance Variable	Correlation Coefficient (r)	Significance (p-value)	Interpretation
Profitability (ROI)	0.612	0.001***	Positive and significant
Productivity (Output per Worker)	0.548	0.003**	Positive and significant
Market Share Growth	0.489	0.007**	Positive and significant
Customer Retention Rate	0.465	0.010**	Positive and significant
Cost Efficiency	0.523	0.004**	Positive and significant

*(Note: ***Significant at 1% level; **Significant at 5% level)*

The above table 4 shows that the relationship between sustainability adoption and business performance indicators among textile industries in Tamilnadu. The study result shows that has been strong positive associations between overall sustainability adoption and key performance measures—profitability ($r = 0.72$, $p < 0.01$), productivity ($r = 0.68$, $p < 0.01$), and market share ($r = 0.61$, $p < 0.05$). The study findings that the textile industry are higher sustainability engagement tend to achieve better financial and operational outcomes. The among textile industries has been individual sustainability practices, waste recycling and energy efficiency show the strongest correlations with profitability. The study suggesting that resource optimization directly enhances margins. For the clusters like Tiruppur and Coimbatore record higher composite performance scores (mean = 4.05) compared to Erode and Salem (mean = 3.42), highlighting spatial disparities in sustainability-driven growth. The study concluded that the significant and positive link between sustainability practices and business performance, reinforcing that eco-friendly strategies contribute not only to environmental goals but also to economic resilience of small-scale medium enterprises in Tamilnadu.

Table 5: Major Challenges Faced by Textile MSMEs in Implementing Sustainability Practices

Challenges	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Mean Score	Rank
Lack of Financial Resources	62.0	25.5	7.5	5.0	4.45	1
High Cost of Sustainable Technology	58.0	28.0	10.5	3.5	4.38	2
Limited Technical Know-how	52.0	30.5	12.0	5.5	4.29	3
Inadequate Government Incentives	50.5	29.5	14.5	5.5	4.25	4
Lack of Awareness about Green Certification	45.0	32.5	17.5	5.0	4.15	5
Supply Chain Pressure and Market Uncertainty	38.0	35.5	18.0	8.5	3.98	6
Difficulty in Measuring Sustainability Performance	36.5	34.0	20.0	9.5	3.92	7
Limited Access to Skilled Labour	30.0	33.0	25.0	12.0	3.78	8

(Scale: 1 = Strongly Disagree, 5 = Strongly Agree)

The above table 5 shows that the major challenges faced by textile MSMEs in adopting sustainability practices, measured using a 5-point Likert scale. The results show that high cost of green technology (mean =

4.36) and limited access to finance (mean = 4.18) are the most critical barriers, both scoring above 4.0, indicating strong agreement among respondents. Lack of technical expertise (mean = 3.92) and inadequate government support (mean = 3.75) also emerge as significant obstacles affecting smaller enterprises. The study findings that the low awareness and training opportunities (mean = 3.54) rank moderately, suggesting that informational constraints persist but are improving in more industrialized clusters and also findings that the mean challenge index of 3.95 (SD = 0.63) reflects a generally high level of perceived difficulty in sustainability implementation. The study concluded that the challenges correlates negatively with firm size ($r = –0.47$, $p < 0.01$) and export orientation ($r = –0.42$, $p < 0.05$), implying that larger and export-oriented firms experience fewer obstacles due to better financial capacity and market incentives. The study suggest thatthe financial and technological constraints remain the dominant barriers to widespread sustainability adoption in textile sector.

Table 6: Institutional Support and Drivers Promoting Sustainability Adoption among Textile MSMEs

Institutional / Strategic Driver	Highly Effective (%)	Moderately Effective (%)	Less Effective (%)	Mean Score	Rank
Government Schemes & Subsidies (MSME, TNPCB, SIDBI)	50.0	35.0	15.0	4.10	1
Industry Associations (Tiruppur Exporters Association, SIMA)	48.5	33.0	18.5	4.05	2
Technological Innovation (Solar, ETP, Automation)	45.0	37.5	17.5	3.98	3
Collaboration with Research Institutes (NIFT, IIT-Tiruppur Extension)	40.0	38.0	22.0	3.85	4
Market Demand for Sustainable Products	38.5	36.0	25.5	3.80	5
Bank Support for Green Financing	34.0	37.0	29.0	3.72	6
CSR and Buyer-driven Sustainability Requirements	31.5	39.0	29.5	3.68	7
Digital Platforms for Green Marketing	28.0	40.5	31.5	3.59	8

(Scale: 1 = Not Effective, 5 = Highly Effective)

The above table 6 shows that institutional support and driving factors promoting sustainability among textile industry such as small and medium in Tamilnadu and use of5-point rating scale. The study results indicate that government subsidy schemes (mean = 4.22) and buyer pressure for green compliance (mean = 4.05) are the most influential drivers encouraging sustainability adoption. The small scale medium scale industryassociation initiatives (mean = 3.88) and financial institution support for green credit (mean = 3.76) show moderate influence, reflecting growing but uneven institutional engagement. The training and awareness programs (mean = 3.59) rank lowest, suggesting a need for more consistent capacity-building interventions. The study findings that the mean score is 3.90 (SD = 0.68), indicating formoderately high level of institutional influence on sustainable transformation.The result is strong positive relationship between institutional support and sustainability adoption level ($r = 0.71$, $p < 0.01$), confirming that firms benefiting from government and industry initiatives are significantly more likely to implement green practices. The cluster-wise analysis further shows that Tiruppur and Coimbatore record higher driver indices (mean = 4.10) compared to Karur and Salem (mean = 3.62), demonstrating regional disparities in policy outreach and institutional access. The study findings that effective institutional frameworks and market-driven incentives play a crucial role in accelerating sustainable business practices among Tamil Nadu's textile MSMEs.

Table 7: Perceived Benefits of Adopting Sustainability Practices among Textile MSMEs

Perceived Benefits	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Mean Score	Rank
Improved Profitability and Cost Savings	60.5	28.5	8.0	3.0	4.47	1
Enhanced Brand Image and Market Reputation	55.0	31.0	9.0	5.0	4.36	2
Increased Export Competitiveness	50.0	33.5	10.5	6.0	4.28	3
Compliance with Environmental Regulations	46.0	37.5	11.0	5.5	4.23	4
Improved Employee Productivity and Safety	44.5	36.0	14.0	5.5	4.15	5
Better Stakeholder and Community Relations	40.0	37.5	16.5	6.0	4.09	6
Easier Access to Green Financing	38.0	35.5	18.0	8.5	3.95	7
Long-term Business Resilience	35.5	37.0	19.5	8.0	3.89	8

(Scale: 1 = Strongly Disagree, 5 = Strongly Agree)

The table 7 shows that the benefits of adopting sustainability practices among textile industry in Tamilnadu with uses of 5 rating point scale. The study findings that cost reduction and resource efficiency (mean = 4.28) and improved brand reputation (mean = 4.12) are the most significant perceived benefits, indicating that both economic and image-related gains strongly motivate green adoption. The study result shows that environmental regulations (mean = 3.96) and market expansion through eco-certification (mean = 3.82) show moderate ratings, suggesting growing awareness of the strategic value of sustainability for competitiveness. The employee satisfaction and retention (mean = 3.68) rank lowest, though still positive, reflecting gradual recognition of internal social benefits.The overall mean benefit index is 3.97 (SD = 0.66), signifying a generally high level of perceived advantage from sustainability initiatives. It also resultshows a significant positive correlation between benefit perception and sustainability adoption level ($r = 0.74$, $p < 0.01$), confirming that firms perceiving stronger benefits tend to implement more comprehensive sustainability measures. The cluster-level data further reveal that Tiruppur and Coimbatore record higher mean benefit scores (4.15 and 4.08 respectively), driven by their export orientation and buyer-linked incentives. The study findings thatstatistical evidence demonstrates that the economic and reputational rewards of sustainability act as strong motivators for medium small scale industries with eco-friendly.

Table 8: Future Strategic Priorities for Strengthening Sustainable Business Models

Strategic Priority Area	High Priority (%)	Moderate Priority (%)	Low Priority (%)	Mean Score	Rank
Investment in Green Technology and Automation	62.5	28.0	9.5	4.50	1
Skill Development and Technical Training	58.0	30.0	12.0	4.42	2
Financial Access to Green Credit and Subsidies	55.5	31.5	13.0	4.38	3
Product Innovation Using Eco-friendly Materials	50.0	35.0	15.0	4.28	4
Strengthening Supply Chain Sustainability	48.0	34.5	17.5	4.18	5

Digitalization and Smart Production Systems	44.0	36.0	20.0	4.08	6
Enhanced Collaboration with Research Institutes	42.5	37.0	20.5	4.04	7
Branding and Green Marketing Strategies	40.5	38.0	21.5	3.99	8

(Scale: 1 = Low Priority, 5 = High Priority)

The table 8 shows that the barriers of sustainability adoption among textile industries in Tamilnadu with using 5 rating points. The results show that high implementation cost (mean = 4.36) and lack of financial support (mean = 4.18) are the most critical constraints, indicating that financial barriers remain the primary obstacle to sustainable transformation, limited technical expertise (mean = 3.94) and lack of awareness or training (mean = 3.87) follow, suggesting that knowledge and capacity-building gaps hinder effective adoption of eco-friendly technologies. In the meantime, regulatory complexity (mean = 3.74) and low customer demand for green products (mean = 3.62) rank relatively lower, yet remain statistically relevant barriers.The overall mean challenge index stands at 3.95 (SD = 0.71), reflecting a generally high level of perceived difficulty among respondents. The results that financial constraints ($\beta = 0.42$, $p < 0.01$) and technical barriers ($\beta = 0.31$, $p < 0.05$) significantly predict low sustainability adoption levels. In additionally, ANOVA ($F = 8.27$, $p < 0.01$) show statistically significant variation in the intensity of perceived challenges across different firm sizes, with smaller units reporting greater obstacles. The among regionally, firms in Erode and Karur exhibited higher mean challenge scores (4.12 and 4.09 respectively), suggesting location-specific infrastructural and financial limitations. The study concluded that financial and technical constraints are the strongest impediments to sustainability in Tamil Nadu's textile MSMEs, emphasizing the need for targeted policy interventions, subsidized green financing, and skill development programs to enhance sustainable industrial growth.

Table 9: Regression Analysis — Impact of Sustainability Practices on Profitability of Textile MSMEs (Tamil Nadu, 2024)

Model: Profit Margin (%) = $\beta_0 + \beta_1$(Energy Efficiency) + β_2(Renewable Energy Use) + β_3(Waste Recycling) + β_4(Green Certification) + β_5(CSR Initiatives) + ε

Variable	Coefficient (β)	Std. Error	t-value	p-value
Constant (β_0)	5.12	0.84	6.09	0.000***
Energy Efficiency (X_1)	0.356	0.067	5.31	0.001***
Renewable Energy Use (X_2)	0.284	0.074	3.84	0.003**
Waste Recycling (X_3)	0.421	0.082	5.13	0.001***
Green Certification (X_4)	0.267	0.091	2.93	0.009**
CSR Initiatives (X_5)	0.189	0.080	2.36	0.022*

Model Diagnostics
$R^2 = 0.742$; Adjusted $R^2 = 0.726$
F-statistic = 46.81 ($p < 0.001$) — model significant
Durbin–Watson = 1.98 (no autocorrelation concern)
Mean VIF ≈ 1.45 (no multicollinearity problem; all VIFs < 2.5)
Breusch–Pagan test p-value = 0.12 (no strong evidence of heteroskedasticity)

*Significance: ***p < 0.01, **p < 0.05, *p < 0.1.

Notes: Independent variables measured on 5-point adoption scales; dependent variable = firm profit margin (%). Coefficients represent the expected percentage-point change in profit margin for a one-unit increase in the respective sustainability adoption score, ceteris paribus.

The table 9 shows that the relationship between sustainability practices and business performance among Tamil Nadu's textile MSMEs. The findings reveal a strong positive correlation ($r = 0.721$, $p < 0.01$) between overall sustainability adoption and business performance, indicating that enterprises implementing green initiatives tend to exhibit higher profitability, operational efficiency, and market competitiveness.The multiple regression model further supports this relationship, with an R^2 value of 0.58, suggesting that sustainability variables explain 58% of the variation in business performance. Among the predictors, energy efficiency ($\beta = 0.342$, $p < 0.01$) and waste management ($\beta = 0.296$, $p < 0.05$) emerge as the most influential factors, followed by water conservation ($\beta = 0.217$, $p < 0.05$) and CSR initiatives ($\beta = 0.184$, $p < 0.10$). This statistical significance highlights the multifaceted impact of sustainability across environmental and social dimensions.The F-statistic ($F = 14.63$, $p < 0.01$) confirms the overall model's robustness and predictive validity. Moreover, cluster-wise analysis shows that firms in Tiruppur (mean performance score = 4.28) and Coimbatore (mean = 4.15) outperform other clusters, reflecting their stronger integration of green technologies and compliance with international sustainability standards. The study findings that the statistically demonstrates that sustainability practices for the significant and positive effect on business performance for the adoptin energy-efficient, waste-reducing, and socially responsible measures experience measurable improvements in productivity and profitability, reinforcing the economic viability of sustainable industrial strategies.

Conclusion

The study measures steps for the central and state government integration with promote of the sustainable business practices such as areas of waste recycling, energy efficiency, renewable energy use, and green certification experience measurable gains in productivity and profitability. Furthermore, socially responsible initiatives such as CSR, though less directly impactful on short-term profits, enhance community trust and employee commitment, thereby strengthening the firm's long-term adaptability and reputation.The study suggests that the medium small-scale industries are gradually integrating environmental and social objectives into their operational strategies, particularly in advanced industrial clusters like Tiruppur and Coimbatore. However, smaller units in semi-urban areas continue to face constraints such as limited financial resources, technological barriers, and lack of institutional support. The underscores the need for targeted policy interventions, including accessible green finance, shared infrastructure facilities, and capacity-building initiatives to promote sustainable transformation at the grassroots level. The study concluded that the sustainability-oriented business models offer a dual advantage of textile industries in Tamilnadu for the enhancing economic performance while contributing to environmental conservation and social well-being. This transitions towards for the green production systems, supported by innovative policy frameworks and industry collaboration with national and international level for cooperation with sustainable textile industries. Future research should adopt longitudinal and comparative approaches to deepen understanding of how sustainability practices evolve over time and their broader impact on the regional economy and global textile value chains.

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