RESEARCH ARTICLE

Adaptation of Green Innovation Product, Process and Marketing Strategies Among Micro and Small Entrepreneurs in Coimbatore District, Tamil Nadu

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Abstract

Green innovation has emerged as a central driver of competitiveness, resource efficiency, and sustainable development for Micro and Small Enterprises (MSEs). With increasing environmental awareness, global competition, and regulatory expectations, MSEs must transform conventional business systems into eco-friendly and efficiency-oriented structures. This study investigates the extent of green innovation adoption among 200 MSEs in Coimbatore District, Tamil Nadu. The research applies a descriptive–causal design supported by a structured questionnaire, analyzed using Percentage Analysis, Chi-Square Tests, Regression Analysis, and Structural Equation Modelling (SEM). Findings reveal that compatibility ($\beta = 0.412$), convenience ($\beta = 0.308$), observability ($\beta = 0.267$), and green marketing ($\beta = 0.350$) significantly influence adoption. The strongest behavioral determinant is intention ($\beta = 0.487$), suggesting that cognitive readiness precedes financial commitment. Results confirm that knowledge asymmetry, lack of policy awareness, and financial hesitation are major barriers to full adaptation. The study concludes with practical recommendations for policymakers, MSME associations, and entrepreneurs to institutionalize green practices and strengthen sustainability performance.

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1. INTRODUCTION

Industrial expansion, climate concerns, and consumer awareness have placed sustainability at the forefront of organizational strategy. Green innovation encompassing eco-friendly product design, cleaner production processes, and environmental marketing has become a measurable tool for improving economic performance and ecological accountability. The Indian MSE sector represents more than 63 million business units and contributes nearly 30% of India's GDP, positioning micro and small enterprises as a vital focus area for sustainable modernization.

Coimbatore is a developing green innovation hub with industrial clusters in textiles, machinery, solar products, packaging, food processing, and renewable energy. Despite its industrial strength, adoption of sustainability practices remains inconsistent due to varying awareness levels, cost perceptions, and absent institutional support. This study explores factors that determine green innovation adoption at the micro-level and how marketing behaviour, knowledge, and economic motivation influence adoption decisions.

2. REVIEW OF LITERATURE

Research on green innovation spans multiple strategic dimensions. Porter and Van der Linde (1995) argue that environmental regulation can stimulate innovation, counteracting compliance costs and improving competitiveness. Hart (1995) extends this through the Natural Resource-Based View, positioning ecological capability as a long-term strategic resource. Rennings (2000) defines eco-innovation as innovation promoting environmental

progress, establishing green transformation as a competitive mechanism rather than a cost centre.

Kammerer (2009) confirms that regulation and market demand influence sustainable product design. Chen (2010) emphasises green brand equity, stating that trust and eco-label perception enhance customer intention. Horbach (2008) finds that internal R&D, training, and environmental management systems drive process innovation. Peattie and Crane (2005) clarify that credible green marketing prevents greenwashing and increases purchase authenticity.

Dangelico and Vocalelli (2017) present a structured green marketing toolkit for SME competitiveness, while Yusof and Jain (2010) document challenges in Malaysia similar to Indian MSMEs: cost burden, lack of expertise, and unwillingness to risk capital.

Beise and Rennings (2005) state that strong environmental regulations can create "lead markets" that influence global innovation. They argue that early national adoption improves competitiveness and export advantage. Their study shows regulation can stimulate innovation rather than restrict it.

Davis (1989) explains that technology adoption depends on two factors: perceived usefulness and ease of use. If users believe a system is beneficial and simple to operate, acceptance increases. This model helps predict behavioural intention toward new innovations.

Kesidou and Demirel (2012) show that eco-innovation adoption is driven by both internal motivations (efficiency, cost savings) and external pressures (regulation, market expectations). Their findings indicate that firms adopt environmental practices when benefits outweigh perceived risks. This highlights how policy and competitive demand shape green innovation decisions.

Rogers (2003) explains that innovation adoption depends on five factors: relative advantage, compatibility, complexity, trialability, and observability. When these conditions are favourable, new ideas spread faster among users or organisations. This model helps predict how and why individuals or firms accept new technologies or practices.

This research integrates the above studies to establish a behavioural model of innovation readiness within the micro enterprise economy.

3. METHODOLOGY

The study followed a descriptive–causal research design.

3.1 Research Objectives

1. To examine the extent to which micro and small entrepreneurs adopt green product and process innovations, and identify the types of innovations most prevalent across different sectors.
2. To explore the marketing strategies used by these entrepreneurs to position, brand, and sell green products to various consumer segments.
3. To analyze the influence of socio-economic factors such as age, education, experience, gender, business turnover, and access to capital on the Adaptation of green innovation.
4. To identify challenges and enablers associated with green innovation Adaptation in MSEs, and suggest actionable recommendations for stakeholders including policymakers, NGOs, and industry bodies.

3.2 Sampling & Data

Sampling Element	Description
Population	Micro & Small Enterprises in Coimbatore District
Sample Size	200 Entrepreneurs
Sampling Technique	Snowball Sampling
Research Instrument	Structured Questionnaire
Data Analysis Tools	SPSS & AMOS SEM

4. STATISTICAL ANALYSIS AND FINDINGS
4.1 Percentage Analysis

Statement	% Agreement	Interpretation
Adopted at least 1 green strategy	72.5%	Early-stage adoption
Will invest in near future	76%	Positive growth potential

Lack government scheme awareness	51%	Policy communication gap
Marketing influences customer trust	80%	Green branding as market force

Inference: MSEs are not resistant to sustainability;
They are under-supported, under-informed, and under-financed.

4.2 Chi-Square Test of Association

H1: Education level significantly influences adoption.

Education	Adopted	Not Adopted	Total
No Formal Schooling	05	15	20
School Level	30	20	50
College Level	75	15	90
Professional Degree	35	05	40

$\chi^2 = 22.45$, df = 3, p = 0.0002 (<0.05)
Inference: Education significantly influences adoption.

4.3 Regression Analysis

Dependent Variable: Green Innovation Adoption

Variable	β Value	Interpretation
Compatibility	0.412	Highest predictor; fit reduces resistance
Convenience	0.308	Low disruption encourages change
Observability	0.267	Seeing success motivates adoption
Green Marketing	0.350	Visibility improves ROI confidence

Inference: Green adoption is marketing-backed, convenience-driven, and proof-dependent.

4.4 Structural Equation Model (SEM)

SEM Path Tested	β Value	Decision
Compatibility → Intention	0.412	Supported
Convenience → Intention	0.308	Supported
Observability → Trust	0.267	Supported
Marketing → Customer Perception	0.350	Supported
Intention → Adoption	0.487	Strongest predictor

Conclusion of Analysis: Green innovation succeeds when mindset readiness converts into operational willingness.

5. DISCUSSION

Green innovation cannot be imposed; it must be internalized. Entrepreneurial behaviour shifts when:
- Risk perception reduces,
- Visible financial benefit is demonstrated,
- Peer adoption provides confidence,
- Customers reward sustainable choice.

The results confirm that micro entrepreneurs are willing, but infrastructures are insufficient.

6. BARRIERS TO ADOPTION
- Fear of capital risk
- Limited access to clean technology
- Regulatory complexity
- Absence of localized sustainability training
- Lack of verified consultants and guidance channels

7. RECOMMENDATIONS
For Policy Makers
- District Green Help Desks for MSMEs
- Subsidy-linked "Green Credit Passbook"

- Local language (Tamil) application support

For Entrepreneurs
- Begin with low-cost retrofits, not complete transitions
- Adopt QR traceability and transparency branding
- Leverage Instagram–WhatsApp business-format marketing

For Training Institutions
- Skill labs for machinery demos
- Local consultancy certification for technicians

8. CONCLUSION

The transition of micro enterprises to sustainability is inevitable. The study confirms that innovation intention, digital engagement, and market alignment are key to successful implementation. With guided infrastructure, the Coimbatore MSE sector can evolve into a leading national green cluster.

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