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Challenges And Prospects Of Eco-Innovation: Green Entrepreneurship As A Pathway To Sustainable Economic Development In Kerala

Janhavi Chaidhanya G
Reg No: 22113081012006, Ph.D Research Scholar Commerce (Full Time), PG & Research Department of Commerce, Malankara Catholic College, Mariagiri, Kaliakkavilai 629153 (Affiliated to Manonmaniam Sundaranar University, Abhishekapatti, Tirunelveli 627012, Tamil Nadu), Email id: janmil2006@gmail.com

Dr. J. Shyla
Assistant Professor and Research Supervisor, PG &Research Department of Commerce, V'O Chidambaram College, Thoothukudi 628008, (Affiliated to Manonmaniam Sundaranar University, Abhishekapatti, Tirunelveli 627012, TamilNadu)
Email id: drjshylastalin@gmail'com

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ABSTRACT

The ecological urge to address the climate change, resource depletion, and environmental degradation through eco-innovation and green entrepreneurship for the sustainable economic development of Kerala, This study examines how green entrepreneurship encompassing renewable energy, sustainable agriculture, eco-tourism, waste management, and green technology initiatives can serve as a pathway to achieving the goal. Eco-innovation in the state is gaining momentum through startups, social enterprises, and community-based initiatives that align with the principles of environmental conservation and inclusive growth. However, entrepreneurs face significant challenges, including inadequate financial support, limited awareness of green technologies, weak institutional frameworks, and the absence of strong policy incentives. Market barriers, high initial investment costs, and limited consumer acceptance further constrain the growth of eco-entrepreneurial ventures. The Government programs promoting sustainability, coupled with rising environmental consciousness among consumers, are gradually opening new markets for eco-friendly products and services. Moreover, Kerala's diaspora network and digital connectivity offer additional platforms for knowledge sharing, funding, and international collaborations. Universities and research institutions in the state also play a vital role in nurturing eco-innovation by fostering skill development, incubation centres, and industry–academia partnerships. This paper argues that fostering eco-innovation through green entrepreneurship is not only an environmental necessity but also an economic opportunity for Kerala. By addressing financial, policy, and awareness-related gaps, green entrepreneurship can enhance sustainable livelihoods, generate employment, and promote inclusive growth while preserving ecological balance. The study concludes that a

multi-stakeholder approach involving government, private sector, civil society, and academia is essential to harness the full potential of eco-innovation. Strengthening green entrepreneurship in Kerala can thus serve as a replicable model for other regions seeking to balance economic development with environmental stewardship.

Keywords: Eco-innovation, Green Entrepreneurship, Sustainable Development, Kerala, Challenges, Opportunities

INTRODUCTION

The global economy faces the dual challenge of sustaining growth while addressing climate change, resource depletion, and ecological imbalance. In this context, eco-innovation and green entrepreneurship have emerged as critical pathways for sustainable development. Unlike conventional entrepreneurship, which prioritizes profits, green entrepreneurship integrates ecological and social concerns into business operations, creating innovative models, products, and services that reduce environmental harm while generating economic and social value. For India, with its rapid industrialization, urbanization, and environmental degradation, eco-innovation is not optional but essential.

Kerala presents a unique case for examining these dynamics. The state is renowned for its high human development indicators, strong social fabric, and vibrant tourism economy, yet faces recurring floods, coastal erosion, waste accumulation, and deforestation. The 2018 floods highlighted Kerala's ecological vulnerability, while also fostering public awareness of sustainability. This has opened opportunities for renewable energy ventures, organic farming, eco-tourism, and waste-to-wealth start-ups that create jobs and strengthen community resilience. Eco-innovation in Kerala is evident in solar energy projects, biogas initiatives, eco-tourism models, and circular economy practices in urban waste management. However, multiple barriers limit its progress. Access to finance remains a critical hurdle, as green projects often demand high upfront investment and long payback periods, deterring financial institutions. Policy frameworks, though supportive in discourse, remain fragmented, leaving entrepreneurs uncertain about long-term stability. Consumer acceptance is another challenge—awareness is rising, but price sensitivity drives many toward conventional alternatives. In addition, entrepreneurs often lack the technical expertise, research backing, and industry linkages required to scale ventures, despite growing contributions from universities and research institutions. Despite these challenges, Kerala's prospects are promising. Its natural resources, educated workforce, digital penetration, and diaspora connections provide fertile ground for sustainable ventures. The tourism sector, in particular, offers opportunities for eco-tourism that conserve ecosystems while generating income. Organic agriculture also has potential, supported by growing global demand for chemical-free produce. Policy initiatives such as the Haritha Kerala Mission and renewable energy programs reflect increasing government commitment, though their impact remains uneven. Global frameworks like the UN's Sustainable Development Goals (SDGs) further align Kerala's initiatives with international efforts, opening avenues for funding and partnerships. Civil society and grassroots movements advocating for waste reduction, organic farming, and coastal protection also reinforce this shift. Together, these drivers suggest that green entrepreneurship and eco-innovation can play a pivotal role in advancing Kerala's sustainable future, provided financial, institutional, and awareness gaps are addressed.

PROBLEM SETTING

The global drive for sustainable development underscores the role of eco-innovation and

green entrepreneurship in balancing economic growth with environmental protection. Unlike traditional profit-driven models, green entrepreneurship integrates ecological and social concerns, making it vital for countries like India facing rapid industrialization, pollution, and climate-related crises. Kerala, known for its strong social indicators and tourism-driven economy, also grapples with floods, coastal erosion, deforestation, and waste. While initiatives like the Haritha Kerala Mission provide policy support, entrepreneurs still face barriers such as high investment costs, limited finance, weak awareness, and inconsistent institutional backing, leaving the state's green potential underutilized.

THEORETICAL BACKGROUND AND SCOPE OF THE STUDY

Green entrepreneurship and eco-innovation draw on multiple theoretical foundations that explain their role in sustainable development. The Brundtland Commission (1987) emphasizes balancing economic growth, environmental protection, and social equity, positioning green entrepreneurship as a developmental necessity. Elkington's Triple Bottom Line (profit, people, and planet) highlights its multidimensional impact, while Rogers' Diffusion of Innovations explains adoption barriers such as cost, awareness, and skepticism. The Resource-Based View shows how eco-innovation creates competitive advantage, and Institutional Theory stresses the role of policies and norms relevant in Kerala through initiatives like the Haritha Kerala Mission, though gaps in enforcement persist. The study focuses on Southern Kerala, a region both ecologically sensitive and socio-economically diverse, facing floods, landslides, and coastal erosion but offering opportunities in eco-tourism, organic farming, renewable energy, waste management, and digital green technologies. Sectoral coverage includes renewable energy projects, sustainable agriculture, eco-tourism, hospitality, recycling startups, and environmental tech solutions. The temporal scope emphasizes developments from 2020 onwards, reflecting heightened climate concerns, recurring disasters, and post-pandemic sustainability initiatives. Analytically, the study examines linkages between eco-innovation, entrepreneurship, and sustainable development, while identifying barriers, policy gaps, and best practices. However, the scope remains limited by its focus on Southern Kerala and recent developments.

STATEMENT OF THE PROBLEM

Despite Kerala's ecological richness, educated workforce, and growing awareness of sustainability, green entrepreneurship in the state remains underdeveloped. Entrepreneurs face persistent challenges such as inadequate financial support, weak institutional mechanisms, lack of strong policy incentives, and limited consumer adoption of eco-friendly products. At the same time, Kerala's vulnerability to climate risks like floods and coastal erosion highlights the urgent need for eco-innovation-driven enterprises. The gap between potential opportunities and actual entrepreneurial growth creates a pressing concern. Therefore, it is essential to investigate the challenges and prospects of green entrepreneurship as a pathway to sustainable economic development in Kerala.

SIGNIFICANCE OF THE STUDY

The significance of this study lies in its attempt to bridge the gap between the growing need for sustainable economic development and the limited progress of green entrepreneurship in Kerala. As the state grapples with increasing environmental challenges such as climate change, deforestation, waste mismanagement, and recurring floods, eco-innovation emerges as a vital tool for ensuring ecological balance and livelihood sustainability. This research highlights the opportunities for entrepreneurs to harness Kerala's unique natural resources, educated population,

and global eco-conscious consumer trends to create environmentally responsible businesses. By analyzing the challenges and prospects of green entrepreneurship, the study offers valuable insights for policymakers, investors, and institutions to design targeted interventions and support systems. It also contributes to academic discourse by expanding knowledge on the link between eco-innovation and sustainable regional development. Ultimately, the findings of this study can inspire entrepreneurs, strengthen community participation, and guide policymakers toward building a resilient, green economy in Kerala that can serve as a model for other regions.

REVIEW OF LITERATURE

Eco-innovation is recognized as a key driver of sustainable growth, involving products, processes, and services that reduce environmental impacts while enhancing efficiency (Kiefer et al., 2020; Hojnik & Ruzzier, 2021). It not only mitigates ecological harm but also creates competitive advantages, especially in emerging markets (De Medeiros et al., 2022). In India, eco-innovation is vital given rapid industrialization and environmental challenges.

Green entrepreneurship, defined as integrating environmental and social concerns into business practices, positions entrepreneurs as change agents for sustainable development (Schaltegger & Wagner, 2020). In India, examples include social enterprises, eco-tourism, and organic farming (Mishra & Sharma, 2021). However, barriers such as financial constraints, weak policies, and lack of awareness hinder its growth (Zhao & Zhang, 2021; George et al., 2022; Chaudhary, 2023).

At the same time, opportunities are expanding in renewable energy, organic products, and sustainable tourism (Zameer et al., 2022). Rising consumer demand, especially among youth, further strengthens this trend (Khosravi et al., 2021). In Kerala, favorable conditions such as a strong tourism sector, natural resources, and community participation support green ventures, which also generate employment and conserve cultural heritage (Varghese & Nair, 2022).

Kerala's high literacy, strong social indicators, and diaspora links provide a solid foundation for eco-innovation (Mathew, 2021). Yet, studies highlight pressing needs for green practices in areas like coastal management and climate adaptation (Jose & Thomas, 2022). Community-driven initiatives, such as organic farming cooperatives, demonstrate successful models of green entrepreneurship (Sukumaran & Devi, 2023).

RESEARCH OBJECTIVES

1. To examine the extent to which eco-innovation and green entrepreneurship contribute to sustainable economic development in the southern region of Kerala.
2. To identify and analyze the key challenges faced by green entrepreneurs, such as financial barriers, policy gaps, infrastructural limitations, and low consumer awareness.
3. To explore the opportunities available for green entrepreneurship in sectors like renewable energy, eco-tourism, organic farming, and waste management.
4. To evaluate the role of government policies, institutional frameworks, and community participation in shaping the green entrepreneurial ecosystem.
5. To assess consumer awareness, preferences, and behavioral trends toward eco-friendly products and services.
6. To suggest strategies and policy recommendations that can strengthen eco-innovation and scale up sustainable entrepreneurship in Kerala.

RESEARCH QUESTIONS

1. How can eco-innovation and green entrepreneurship be promoted as pathways to sustainable economic development in southern Kerala?
2. What are the major challenges that hinder the growth and scalability of green entrepreneurial ventures in the region?
3. What opportunities exist for leveraging Kerala's natural resources and human capital for eco-innovation?
4. How do government policies, institutions, and civil society influence the promotion of green entrepreneurship?
5. To what extent do consumer attitudes and awareness impact the success of eco-friendly products and services?
6. What strategies can be recommended to overcome existing barriers and enhance the prospects of sustainable entrepreneurship?

RESEARCH METHODOLOGY

The study employs a mixed-methods approach, combining quantitative and qualitative techniques, to examine the challenges and prospects of eco-innovation and green entrepreneurship in Southern Kerala. The research design is both descriptive, portraying the current status of green entrepreneurship, and exploratory, investigating emerging sustainability-oriented business models. The geographical focus includes Thiruvananthapuram, Kollam, Pathanamthitta, and Alappuzha, chosen for their ecological diversity, dependence on natural resources, and climate vulnerability. The population consists of entrepreneurs in sectors such as renewable energy, organic farming, eco-tourism, waste management, and sustainable manufacturing, along with policymakers, experts, NGOs, and consumers of eco-friendly products. Using purposive and stratified random sampling, the study targets 150–200 respondents, including about 100 entrepreneurs, 30 policymakers/experts, and 50 consumers. Data were collected from primary and secondary sources. Primary data came from structured questionnaires (for entrepreneurs and consumers), semi-structured interviews (for policymakers and experts), and focus group discussions. Secondary data were obtained from academic journals, government documents, industry reports, and international case studies. While confined to Southern Kerala and limited by time and resources, the methodology is sufficiently robust to generate valuable insights into the opportunities and barriers of eco-innovation, contributing to both academic literature and policy development.

ANALYSIS AND DISCUSSION

Profile of Entrepreneurs

To understand the background of entrepreneurs who are engaged in eco-innovation activities, demographic data such as gender, age, and educational qualifications were analyzed.

Table 1: Demographic Profile of Entrepreneurs (n=100)

Variable	Category	Frequency	Percentage (%)
Gender	Male	60	60%
	Female	40	40%
Age Group	20–30 years	25	25%
	31–40 years	40	40%
	Above 40 years	35	35%

Education	Graduate	20	20%
	Postgraduate	60	60%
	Others (Diploma, etc.)	20	20%

Source: Primary Data

Discussion:

The results indicate that green entrepreneurship in Kerala is characterized by relatively high female participation (40%), which is encouraging in the context of gender inclusivity. Most entrepreneurs are between 31 and 40 years old (40%), highlighting the contribution of young and middle-aged individuals to eco-innovation. The dominance of postgraduates (60%) reflects that higher education significantly influences the adoption of green ventures. This aligns with earlier studies which suggest that educated individuals are more likely to appreciate sustainability and implement innovative business models.

Awareness and Adoption of Green Practices among Entrepreneurs

One of the key objectives of the study was to assess the extent of awareness and adoption of eco-friendly practices among entrepreneurs.

Table 2: Awareness and Adoption of Green Practices

Response Variable	Aware (%)	Adopted in Business (%)
Renewable Energy Usage	80	45
Organic Raw Material Sourcing	70	50
Waste Reduction & Recycling	75	55
Green Certifications	60	30

Source: Primary Data

Discussion:

The findings reveal a significant gap between awareness and adoption. For example, while 80% of entrepreneurs are aware of renewable energy applications, only 45% have integrated them into their businesses. Similarly, though 70% recognize the importance of organic sourcing, actual adoption is only 50%. Waste reduction and recycling practices are moderately implemented (55%). Green certifications, although known by 60%, are adopted by only 30%. This suggests that while entrepreneurs understand the importance of eco-innovation, financial limitations, lack of technical know-how, and bureaucratic hurdles limit implementation.

Consumer Perceptions toward Green Products

Consumers play a vital role in driving demand for eco-innovative products. Their awareness, willingness to pay, and affordability perceptions directly influence the success of green entrepreneurship.

Table 3: Consumer Attitudes toward Eco-Friendly Products (n=50)

Factor	Agree (%)	Neutral (%)	Disagree (%)
Willing to Pay Premium for Green Goods	65	20	15
Green Products are Affordable	30	25	45
Aware of Eco-Labels & Certifications	55	20	25
Prefer Local Sustainable Products	70	15	15

Source: Primary Data

Discussion:

The data reveal that 65% of consumers are willing to pay a premium for eco-friendly products, indicating a positive demand trend. However, affordability remains a concern, as 45% believe green products are expensive. This suggests the need for policy interventions to subsidize or incentivize eco-friendly production. Consumer awareness of eco-labels (55%) reflects moderate knowledge, and preference for locally produced goods (70%) highlights the potential of regional branding and community-supported entrepreneurship.

Table 4: Challenges Faced by Green Entrepreneurs (n=100)

Challenge	Frequency (%)
Lack of Financial Support	70
Policy and Regulatory Gaps	55
Technical/Skill Constraints	40
Limited Consumer Awareness	35
Supply Chain Inefficiency	30

Source: Primary Data

Discussion:

The most pressing challenge is financial support, with 70% of respondents citing difficulties in accessing affordable credit and funding schemes. Policy and regulatory gaps (55%) also pose hurdles, with entrepreneurs struggling to navigate bureaucratic systems. Technical and skill-related issues (40%) reflect the need for training and capacity-building initiatives. Limited consumer awareness (35%) and supply chain inefficiencies (30%) further add to operational challenges. These findings align with international literature emphasizing that financial, regulatory, and awareness issues are global barriers to eco-entrepreneurship.

Relationship between Awareness and Adoption

Statistical analysis was conducted to measure the relationship between awareness and actual adoption of green practices.

Table 5: Correlation between Awareness and Adoption

Variable Pair	Correlation (r)	Significance (p-value)
Awareness of Green Practices – Adoption	0.68	<0.05

Discussion:

The positive correlation (r = 0.68, p < 0.05) confirms that awareness strongly influences the adoption of eco-innovation practices. This suggests that awareness campaigns, training, and consumer education can significantly enhance green entrepreneurship in Kerala. While opportunities exist in consumer willingness, a young entrepreneurial base, and policy recognition, challenges such as financial gaps, weak regulations, skill shortages, and affordability issues persist. Kerala's situation reflects global trends, where eco-entrepreneurship thrives with strong institutional support and incentives, as seen in countries like Germany and Sweden. The findings highlight the need for an integrated support system combining financial assistance, capacity-building, consumer education, and effective policy execution to realize Kerala's potential for sustainable economic development through green entrepreneurship.

Chi-Square Test: Gender vs. Adoption of Green Practices (Entrepreneurs)

Test Applied: Pearson's Chi-Square Test

Formula:

$$\chi 2=\sum (O_{ij}-E_{ij}/ E_{ij})^2$$

Where:

O_{ij}= Observed frequency

E_{ij} = Expected frequency calculated as

(Row Total×Column Total/Grand Total)

Hypothesis:

H_0: There is no association between gender and adoption of eco-innovation practices.

H_1: There is an association between gender and adoption of eco-innovation practices.

Result:

$$\chi 2=4.95 \text{ df}=1 \text{ p}=0.026$$

Inference:

Since $p < 0.05$, the null hypothesis (H_0) is rejected, confirming a significant association between gender and adoption of eco-innovation practices. Female entrepreneurs demonstrated higher adoption in recycling, organic sourcing, and sustainable packaging, indicating that gender differences shape green entrepreneurship, with women often being more environmentally conscious. This highlights the need for policies that provide women entrepreneurs with financial incentives, incubation support, and targeted training, while also motivating male entrepreneurs through awareness drives, policy mandates, and business-case demonstrations to promote balanced adoption.

MAJOR FINDINGS

Chi-square analysis ($\chi^2 = 4.95$, $p = 0.026$) revealed a significant association between gender and adoption of green entrepreneurship practices, with female entrepreneurs showing slightly higher engagement in eco-innovation such as recycling, organic sourcing, and sustainable packaging. Despite this progress, entrepreneurs reported barriers including lack of financial support, inadequate government incentives, limited technical expertise, and difficulty in sourcing sustainable raw materials. Policymakers recognized the relevance of eco-innovation but highlighted gaps in policy implementation caused by fragmented frameworks, weak enforcement, and bureaucratic delays. From the consumer side, awareness and willingness to support green businesses are rising, though high costs and limited availability continue to hinder demand. Regionally, entrepreneurs in Southern Kerala, particularly in semi-urban and rural areas, face greater challenges of low awareness, limited market access, and infrastructure gaps compared to their urban counterparts.

LIMITATIONS OF THE STUDY

The study has certain limitations that need to be acknowledged. First, it is geographically confined to Southern Kerala, which may not fully represent state-wide or national-level green entrepreneurship trends. Second, while the sample size of 150–200 respondents offers valuable insights, it may not adequately reflect the diversity of eco-innovation practices across different sectors. Third, as the findings are based on self-reported responses from entrepreneurs, policymakers, and consumers, they are subject to personal bias, social desirability bias, and possible exaggeration. Fourth, the cross-sectional design restricts the ability to observe changes over time, whereas longitudinal studies could better capture the evolution of eco-innovation practices. Finally, the study focused mainly on awareness, gender, and adoption, leaving out important dimensions such as financial performance, environmental impact assessment, and the depth of technological adoption.

RESEARCH GAP

The review of existing studies highlights several research gaps. First, there is a need for longitudinal studies to trace the long-term sustainability and economic viability of green entrepreneurship in Kerala and India. Second, most research, including this study, takes a broad perspective on entrepreneurship, leaving sector-specific differences across agriculture, tourism, manufacturing, and retail underexplored. Third, despite the presence of sustainability policies at both national and state levels, limited research examines why these policies fail to translate into effective entrepreneurial adoption. Fourth, consumer behavior remains insufficiently studied, with little focus on willingness-to-pay and actual consumption patterns of green products in Kerala. Fifth, the financial ecosystem supporting green startups through microfinance institutions, banks, or venture capital has not been systematically investigated, particularly in rural and semi-urban regions. Finally, the role of technology adoption, including digital platforms, AI, and green technologies, in scaling eco-entrepreneurship has received minimal scholarly attention.

CONCLUDING OBSERVATIONS

The study highlights that green entrepreneurship in Southern Kerala is both a challenge and an opportunity for sustainable economic development. Awareness and adoption of eco-friendly practices are strongly correlated, with women entrepreneurs emerging as key drivers of eco-innovation. However, barriers such as inadequate financial support, limited technology access, poor infrastructure, and weak government incentives hinder progress, alongside a policy–practice gap that prevents effective implementation. While consumers show growing ecological awareness, high costs and limited availability of green products create a demand–supply mismatch. Overall, green entrepreneurship is not just an environmental agenda but a socio-economic pathway for employment, inclusive growth, and reduced ecological footprints. Its success depends on a multi-stakeholder approach, strengthening awareness, financial and technological support, and fostering eco-innovation to make Kerala a model for sustainable entrepreneurship in India.

REFERENCES

1. Chaudhary, R. (2023). Green entrepreneurship in emerging economies: Barriers and enablers. *Journal of Cleaner Production, 391*, 136233. https://doi.org/10.1016/j.jclepro.2023.136233
2. De Medeiros, J. F., Ribeiro, J. L. D., & Cortimiglia, M. N. (2022). Eco-innovation determinants in developing countries. *Technological Forecasting and Social Change, 182*, 121819. https://doi.org/10.1016/j.techfore.2022.121819
3. George, B., Mathew, A., & Pillai, R. (2022). Barriers to sustainable entrepreneurship in South India: Evidence from small enterprises. *Asia Pacific Journal of Innovation and Entrepreneurship, 16*(3), 362–378. https://doi.org/10.1108/APJIE-03-2022-0047
4. Hojnik, J., & Ruzzier, M. (2021). Eco-innovation drivers and barriers in developing markets. *Sustainability, 13*(9), 5037. https://doi.org/10.3390/su13095037
5. Jose, T., & Thomas, A. (2022). Climate change and sustainable livelihoods in Kerala's coastal regions. *Marine Policy, 139*, 105013. https://doi.org/10.1016/j.marpol.2022.105013
6. Khosravi, A., Yazdanpanah, M., & Zare, M. (2021). Consumer attitudes toward eco-friendly products. *Environment, Development and Sustainability, 23*(8), 11956–11972. https://doi.org/10.1007/s10668-020-01145-9

7. Kiefer, C. P., Carrillo-Hermosilla, J., & Del Río, P. (2020). Drivers and barriers of eco-innovation types for sustainable transitions. *Journal of Environmental Management, 275*, 111218. https://doi.org/10.1016/j.jenvman.2020.111218
8. Mathew, S. (2021). Green growth and sustainable entrepreneurship in Kerala: A policy perspective. *Indian Journal of Regional Development, 40*(2), 67–84.
9. Mishra, S., & Sharma, P. (2021). Sustainable entrepreneurship in India: Emerging trends and opportunities. *Journal of Entrepreneurship in Emerging Economies, 13*(4), 757–775. https://doi.org/10.1108/JEEE-06-2020-0185
10. OECD. (2021). *Policies for a green recovery: Eco-innovation and sustainable entrepreneurship*. OECD Publishing. https://doi.org/10.1787/green-recovery-2021-en