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An Empirical Study on Innovation and Sustainability Performance of Green Startups and Sustainable Entrepreneurship

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ABSTRACT

Sustainability has become an essential component of modern business strategies due to increasing environmental concerns and resource constraints. Green startups are emerging as innovative enterprises that integrate sustainability into their core business operations. These startups focus on environmentally friendly technologies, sustainable production methods, and green supply chain practices to reduce environmental impact while maintaining economic growth. The present study examines the innovation strategies and sustainability practices adopted by green startups and evaluate their impact on sustainability performance. Primary data were collected from 120 green startup entrepreneurs through a structured questionnaire using a five-point Likert scale. Statistical tools such as descriptive statistics, reliability analysis, confirmatory factor analysis, and structural equation modeling were used to analyze the data. The results reveal that innovation strategies significantly influence sustainable business practices and sustainability performance. Government support also plays a crucial role in promoting sustainable entrepreneurship. The study concludes that innovation-driven sustainability strategies enhance environmental performance and business growth in green startups.

Keywords: *Green Startups, Sustainable Entrepreneurship, Innovation Strategies, Sustainability Performance, Structural Equation Modeling.*

Introduction

Today, global climate change and resource loss are one of the biggest challenges that organizations face. As more and more people consume more than the Earth can produce, the environment continues to degrade and shrink at an alarming rate. Organizations are taking notice of this sad state of our planet and have begun to adopt practices that will help reduce their negative impacts on the environment while continuing to grow economically. One way that organizations are doing this is through the emergence of green startups, which impact the world in a variety of ways. The primary focus of these startups has been to develop innovations that provide practical answers to urgent environmental issues. Many green startups produce eco-friendly products, develop renewable energy technology, and implement sustainable methods of production. The success of green startups is often dependent on their ability to create new products, services, and/or processes to reduce their impact on the environment and at the same time produce value. However, the most significant factor that contributes to the success of green startups is innovation. Green startups create value through the development of technology-based products and services using environmentally responsible business practices. Examples of innovations that have made a significant contribution to the environment include renewable energy, waste recycling

technology, and sustainable materials. Green startups are changing industry perceptions about what it means to be environmentally responsible, and they have had a tremendous effect on the environment, as well as the economy. Governments globally are creating and supporting green businesses by means of new laws, tax breaks/financial benefits, and the establishment of start-up incubation programs. For instance, the Indian government has recently launched several new initiatives, one of them being called "Start-up India" at the central level; additionally, states throughout India aligned with the Start-up India initiative are also establishing their own respective state-based start-up initiatives where they establish laws, derive strategic plans and set incentives for new, innovative and sustainable businesses in order to foster growth within their respective regions. Tamil Nadu, India is becoming a regional epicenter for green businesses, specifically in renewable energy, sustainable agriculture and waste management. Although green businesses are rapidly growing, limited academic research has analyzed the relationship of innovation, innovative process and outcome of the innovations with respect to sustainable practices and performance by green businesses. The goal of this study will be to examine how various types of innovation will affect the sustainable practices of green businesses and ultimately affect the green business' respective overall performance.

Review of Literature

- **Green Entrepreneurship**

The concept of green entrepreneurship encompasses entrepreneurial endeavors that seek to solve environmental issues while creating profits (Schaltegger & Wagner, 2019). These entrepreneurs create innovative solutions that help move society toward a sustainable future.

- **Innovation in Sustainable Startups**

Innovation and sustainability strategies are the two key drivers of green start-up business success. Kuckertz and Wagner (2020) found that, by innovating, start-ups can develop new technologies and products that are better for the environment and have a smaller carbon footprint.

- **Sustainability Strategies**

Sustainability strategies are approaches to doing business that allow companies to reduce waste, use more renewable energy sources, and manage their supply chains in an environmentally friendly manner and research conducted by Gupta and Sharma (2022) suggests that implementing sustainability strategies leads to both improved operating efficiency and better environmental performance.

- **Government Support for Green Startups**

The role of government support for green start-ups is also an important contributor to promoting sustainable entrepreneurship. Patel (2023) found that the availability of government support programs has a substantial impact on the growth of green start-ups. The literature supports the idea that there is a strong connection between innovation and sustainability strategies, which contribute to the long-term sustainability of green start-up businesses.

Research Gap

Although many past studies have examined issues related to green entrepreneurship and sustainable practices, there have been limited studies that have utilized sophisticated statistical methods (e.g., structural equation modelling) to analyse the relationships between innovation strategies and sustainability performance. The current study addresses this gap in the literature.

Objectives of the Study

- Investigate the strategies for innovation that green startups are using.
- Analyze the sustainability practices that green startups implement.
- Evaluate the impact of green startup's innovation strategies on their sustainability performance.

Hypotheses

H1: There is a strong relationship between innovation strategies and sustainable business practices.
H2: Sustainable business practices are linked to positive effects on sustainability performance.
H3: Innovation strategies are a major direct contributor to sustainability performance.
H4: Support from government is beneficial for sustainability performance."

Research Methodology

Research Design

Study of Analytical Research Design examines the Relationship between Innovation Strategies and Sustainability Performance

Data Collection

The Study Uses Primary Data Collected by using a Survey Completed by Entrepreneurs of Green Start Up Company.

Sample Size

The Study Used 120 Respondents Who were Selected by Convenience Sampling.

Measurement Scale

A Five-Point Likert Scale was used to rate Responses from Strongly Disagree to Strongly Agree

Statistical Tools

- Descriptive Analysis,
- Reliability Analysis,
- Confirmatory Factor Analysis,
- Structural Equation Modeling.

Data Analysis

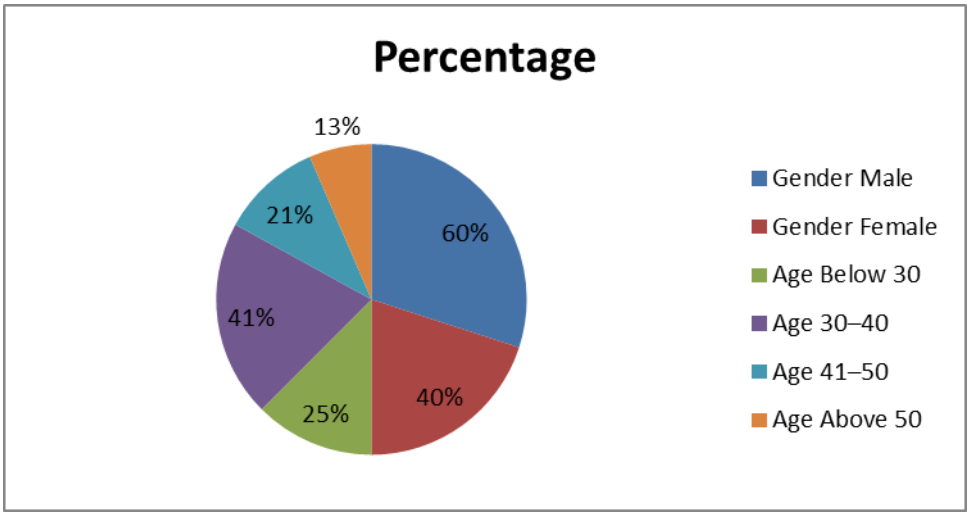
- **Demographic Profile**

Variable	Category	Percentage
Gender	Male	60%
	Female	40%
Age	Below 30	25%
	30–40	41%
	41–50	21%
	Above 50	13%

Source: Primary Data

Interpretation

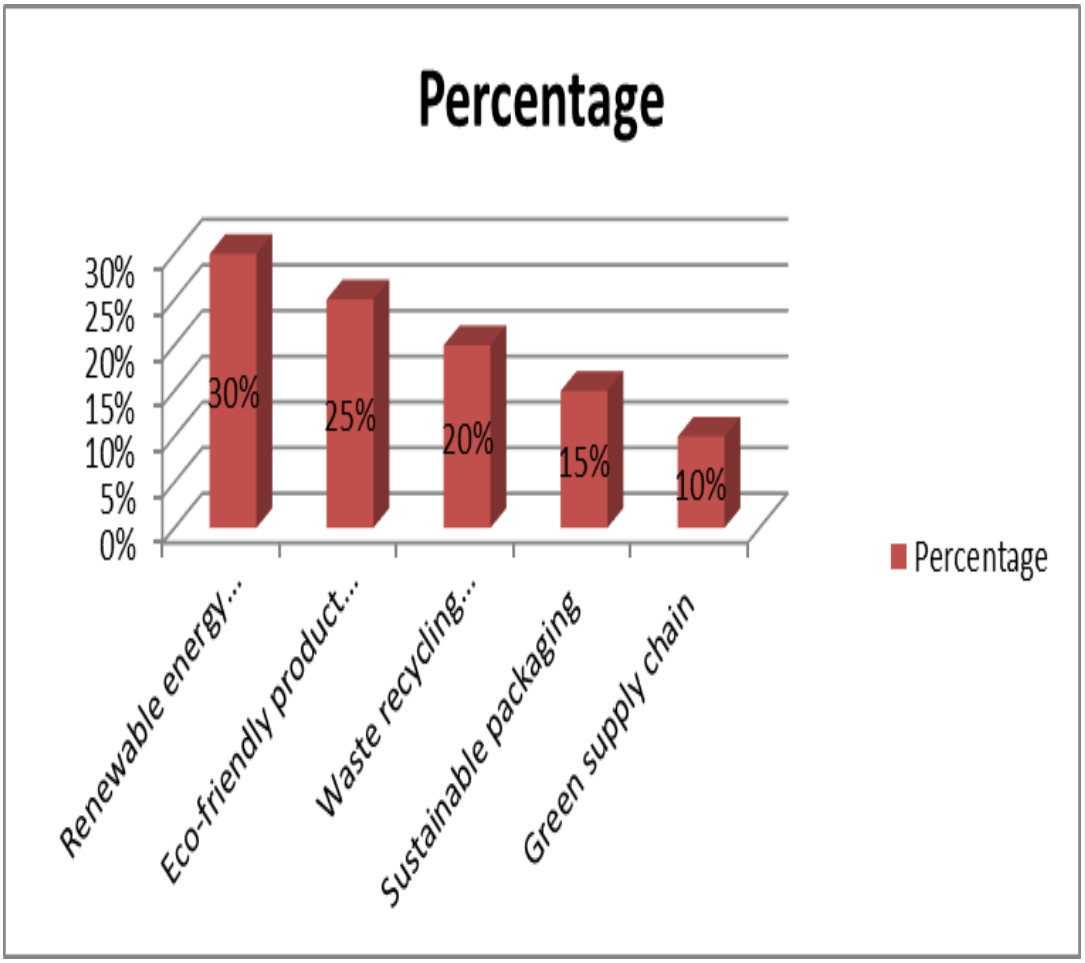
The individuals surveyed for this study were predominantly (over 60%) of the 30-40 year age range, indicating that young entrepreneurs are an important part of new green start-up businesses.



- **Innovation Strategies Adopted**

Strategy	Percentage
Renewable energy technology	30%
Eco-friendly product design	25%
Waste recycling innovation	20%
Sustainable packaging	15%
Green supply chain	10%

Source: Primary Data

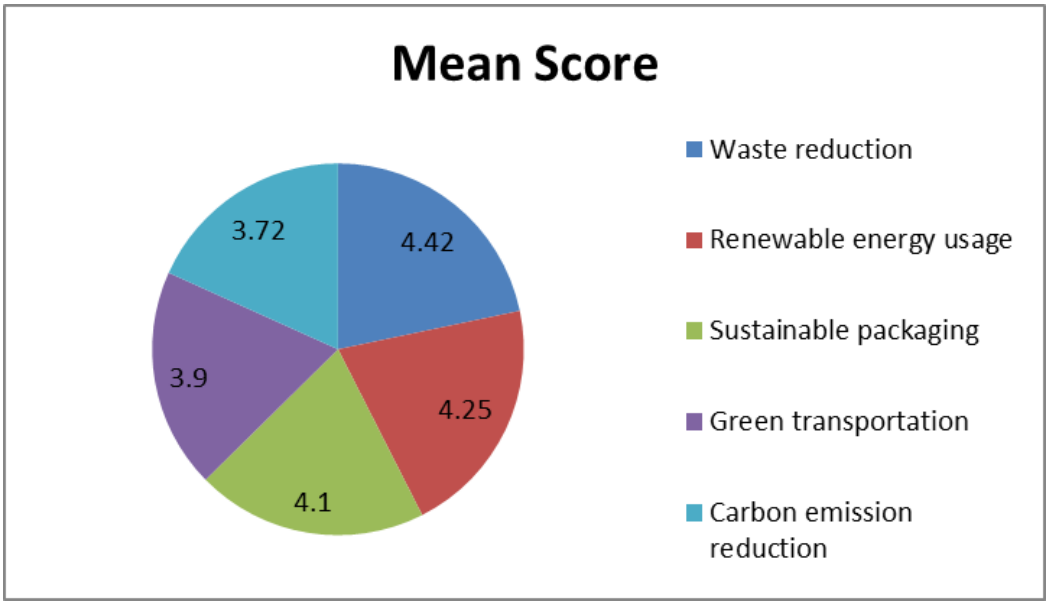


Interpretation

The most common innovation method implemented was Renewable energy technology.

- **Sustainability Practices**

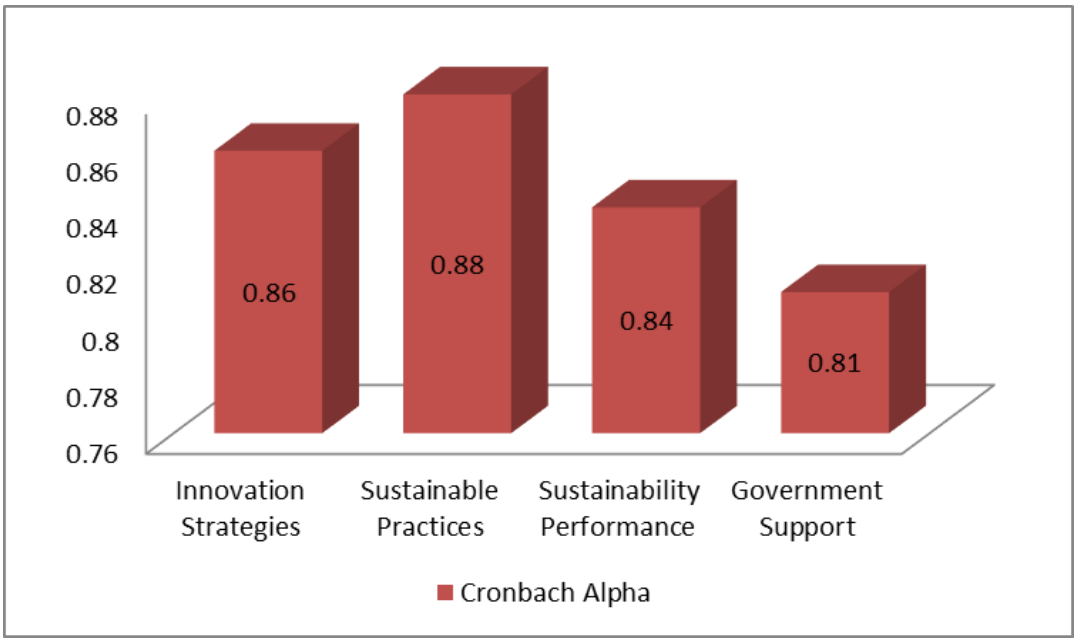
Practice	Mean Score	Rank
Waste reduction	4.42	1
Renewable energy usage	4.25	2
Sustainable packaging	4.10	3
Green transportation	3.90	4
Carbon emission reduction	3.72	5



Reliability Analysis

Construct	Cronbach Alpha
Innovation Strategies	0.86
Sustainable Practices	0.88
Sustainability Performance	0.84
Government Support	0.81

The reliability of the measurements exceeded the acceptable standard (0.70) for this study.



Structural Equation Modeling

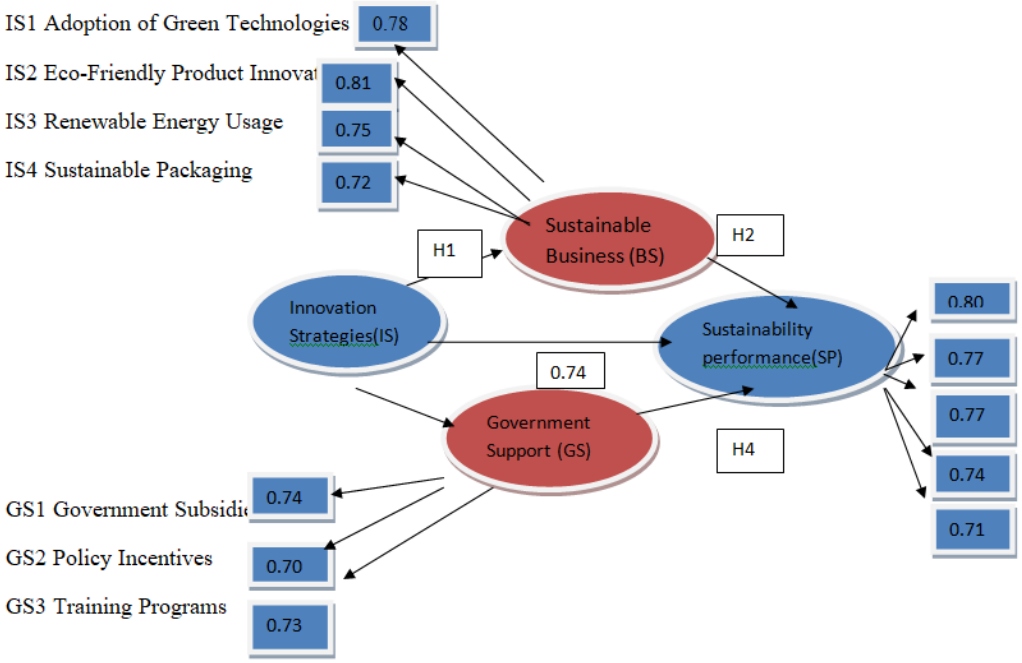
Model Fit Indices

Fit Index	Value	Recommended
Chi-square/df	2.45	<3
GFI	0.92	>0.90
CFI	0.94	>0.90
RMSEA	0.058	<0.08

The overall model produced acceptable fit.

Structural Model Results

Path	Coefficient	Result
Innovation → Sustainable Practices	0.72	Supported
Sustainable Practices → Sustainability Performance	0.66	Supported
Innovation → Sustainability Performance	0.42	Supported
Government Support → Sustainability Performance	0.37	Supported



Discussion

Overall, the analysis of the data indicated that there is a significant relationship between innovation methods in green startup companies and their ability to be sustainable in business. Companies that utilized renewable energy sources and eco-friendly products had better performance with regards to being sustainable. It should be noted that the government plays an important role in helping support sustainable entrepreneurs through financial or policy making incentives.

Findings

Green startup companies typically use Renewable Energy Innovations as their primary innovation method. - The most popular sustainability practice used by green startup companies is Waste Reduction. - The Use of innovation methods will help to improve sustainability of green startup companies. - The Support provided by government will positively influence and improve sustainable entrepreneurship.

Suggestions

- Governments should increase and expand funding opportunities for green startup companies to grow.
- Entrepreneurs should provide funding to develop renewable technologies that help create eco-friendly products.
- It is important for universities and green startup companies to collaborate on developing and implementing sustainability products and renewable energy technologies.
- Increased Public Awareness about sustainable goods should be created.

Conclusion

The role of green businesses in addressing the environmental issues we face today is very important, as well as contributing towards sustainable growth. From the results of this study, it can be concluded that innovation strategy has a strong impact on increasing sustainability performance through increased use of sustainable methods of operating. Sustainable technology (e.g., renewable energy technology), production of clean products and supply chain activities are elements that also have a positive effect on enhancing overall environmental performance and business effectiveness. Continued investment by government in research and development with technological advances will allow green businesses to play an even greater role in supporting sustainable economic growth.

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