Analyzing the Adoption of Green and Sustainable Business Practices Among Emerging Startups and their Long-Term Performance Outcomes

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Abstract

The growing importance of sustainability and Environmental, Social, and Governance (ESG) practices has changed the strategic orientation of emerging startups across the world. Nevertheless, empirical evidence about the influence of green and sustainable business practices on the long-term performance of early-stage firms remains inadequate. This study examines the determinants of green practice adoption and its effect on startup performance in the context of emerging startups in diversified sectors. Structural Equation Modeling (SEM) based on cross-sectional survey data was utilized. This study collected data through a structured questionnaire measuring various dimensions using Likert-type scales from emerging firms aged between 0 and 7 years. 240 usable responses from emerging startups were finally used for empirical analysis in order to test the direct, indirect, and moderating effects in a conceptual framework. The results indicate that regulatory pressure (β =0.34, p < 0.001), financial support (β =0.29, $p <$ 0.001), founder environmental awareness (β = 0.41, $p <$ 0.001), and market orientation (β = 0.27, p <0.001) had a significant impact on the Adoption of Green Practices by startups. Additionally, green practices adopted had a strong positive effect on startup performance (β =0.52, p <0.001), in turn positively influencing financial performance and non-financial performance, such as brand value and attracting potential investors. Innovation capability was significantly associated as a moderator in the green adoption performance relationship (β = 0.22, $p <$ 0.001), so there is a positive moderating relationship between these three in the adoption of sustainable practices. Mediation analyses supported the hypothesis that green practice adoption significantly partially mediated between sustainability drivers and performance outcomes (Indirect effect = 0.21, p < 0.001). These findings conclude that sustainability is a source of strategic advantage rather than a commitment for the startups. The positive impact on long-term success comes when startups pursue sustainable strategies and build capabilities with robust innovation capacity. The conclusions of this research contribute important insights to entrepreneurs, policymakers, and investors toward the development of green entrepreneurial ecosystems.

Keywords

Green Startups, Sustainable Practices, Startup Performance, ESG Adoption, Innovation Capability, Structural Equation Modeling, Entrepreneurial Sustainability.

1. Introduction

The global startup ecosystem is witnessing a major transition in confluence with growing ecological awareness, pressure coming from legislation, and changing consumer needs. In recent times, the entrepreneurs operating towards sustainability have come to define new avenues for business innovation where the founder's commitment toward environmental and social concerns, along with profit maximization, is a key to assessing corporate success. Such new venture firms are starting to gravitate toward green and sustainable business approaches like minimum energy usage, eco-conscious product development, and reuse or reduction of

process waste to gain legitimacy and competitiveness in constantly evolving markets. The venture capitalists are awarding higher significance to the Inclusion of fundamental ESG indicators in their decision-making process.

Yet this is still a relatively nascent area of research, and there is a lack of empirical evidence on specific motivations for adopters to utilize environmentally sustainable business practices, the process involved in adopting those practices, as well as the impact on the long-run performance of early-stage entrepreneurial ventures. Today, with the growing trend of sustainable practices evolving around new firms, there are fewer studies available on how and why new ventures have adopted the value, and the influence on future performance.

Research Objectives

- To identify the key drivers influencing the adoption of green and sustainable business practices among emerging startups.
- To examine the impact of green practice adoption on both financial and non-financial performance outcomes.
- To explore how sustainability-oriented strategies contribute to long-term competitive advantage in startups.

Research Questions

- What factors drive the adoption of green and sustainable business practices among emerging startups?
- How does the adoption of green practices influence the long-term performance of startups in terms of financial growth and non-financial outcomes such as brand reputation and investor attraction?

The study seeks to answer the above questions by presenting an organized discussion on sustainability adoption and strategic consequences for sustained success for entrepreneurs.

The paper structure includes: Section II is a literature survey of theories related to Green and ESG adoption and also related to the performance of startups. Green Entrepreneurship with a view of start-up is also presented in Section II. In Section III, the study proposed a conceptual framework and Hypotheses H1 to H3. Section IV illustrates the research design, methodology, research unit, i.e., 240 startups of the research, and also the method of data collection and data analysis technique that the study uses to draw conclusions from data. Results were analyzed with the SEM technique in Section V of this paper. Findings and discussion on the theory and hypotheses tested are reported in Section VI. The conclusion is presented in Section VII of this paper, including managerial implications and future work.

2. Literature Survey

The literature shows an emerging consensus that a growing mix of institutional pressures, resource capabilities, and strategic positioning toward a long-run value creation mindset encourages the implementation of sustainability in the startup sector. Emerging companies today are not solely driven by profit maximization; instead, startups increasingly embed Environmental, Social, and Governance (ESG) principles into their businesses and operations, aiming to increase their legitimacy and competitiveness (Martins de Souza et al., 2024; Odeyemi et al., 2024). Indeed, systematic literature reviews find that sustainable startups outperform others by improving efficiency, building stakeholders' trust, and boosting their innovative capacity (Voinea et al., 2019; Bergset & Fichter, 2015; Aziz et al., 2023).

The importance of sustainability as an organization’s competitive differentiator is emphasized in an empirical study on startups showing how their engagement in green practices leads to better performance (in terms of profitability, survival rates, and fundraising amounts) when combined with sound organizational capabilities and innovation management frameworks (Sharma et al., 2024; Verma et al., 2023). In the same direction, a

hybrid green business strategy leads to positive non-financial as well as financial performance results in small and medium-sized enterprises (SMEs) and startups (Qin et al., 2024). Accordingly, Sustainability is not simply another cost center but a source of strategic value (Odeyemi et al., 2024; Jafari et al., 2024).

Additionally, various studies have shown that dynamic capabilities and entrepreneurial bricolage play an important role in translating sustainability in resource-constrained settings (Sivathanu & Pillai, 2020; Karan et al., 2024). With regard to sustainability adoption in emerging countries, institutional settings and a need to be perceived as legitimate are relevant factors to take into account, once again reinforcing regulatory pressure to some extent (Bhatnagar et al., 2022; Ge et al., 2016). Moreover, in the context of startups' sustainability, knowledge management and intellectual capital contribute to successful implementation and growth potential in the long run (Shehzad et al., 2024; Paramba et al., 2023). Yet, some research on this topic emphasizes the paradox: Sustainability provides legitimacy and increases performance, but due to resource constraints and scalability issues, startups can feel the pressure and conflicts (Leendertse et al., 2021; Roszkowska-Menkes, 2023). However, recently, research has emerged that stresses the necessity for innovation capabilities and business model innovation to resolve the paradox and make sustainability a driver for competitiveness (Bocken et al., 2014; Jorzik et al., 2024). In sum, the Literature provides strong support for the conceptual basis of this research through a confirmation that green practice adoption is motivated by both internal factors and external factors, and the fact that green practice adoption does influence long-term start-up performance outputs.

3. Conceptual Framework & Hypotheses

The aim of the paper is to develop a conceptual framework that explores how and which of several organizational and environmental variables can drive green and sustainable business practices among emerging startup companies and how the practices adopted can ultimately impact the long-run startup performance. The primary framework consists of a causal chain whereby drivers of sustainability (independent variables) affect green practice adoption (mediating variable), which in turn can affect startup performance variables (dependent variables). The framework has also included the impact of the moderating role of innovation capability on the link between sustainable practice adoption and performance.

Funding assistance, founder environmental awareness, institutional pressure, and market orientation are identified as the independent variables of this framework that influence a startup's propensity towards integrating sustainability. The mediating variable in this structure represents the degree to which the adoption of green or sustainable practices is prevalent in the startup, including the adoption of environmentally concerned behaviors such as resource efficiency, waste reduction, and eco-innovation. The long-term startup performance (long-term success of the firm) will be measured through its financial performance measures like revenue and profitability, as well as its non-financial performance indicators, including reputation, customers, and investors.

- H1: Sustainability drivers, namely regulatory pressure, funding support, founder environmental awareness, and market orientation, positively influence the adoption of green business practices among emerging startups.
- H2: Green practice adoption positively influences the long-term performance of emerging startups.
- H3: Innovation capability positively moderates the relationship between green practice adoption and startup performance.
- HM (Mediation Hypothesis): Green practice adoption mediates the relationship between sustainability drivers (regulatory pressure, funding support, founder environmental awareness, and market orientation) and startup performance.

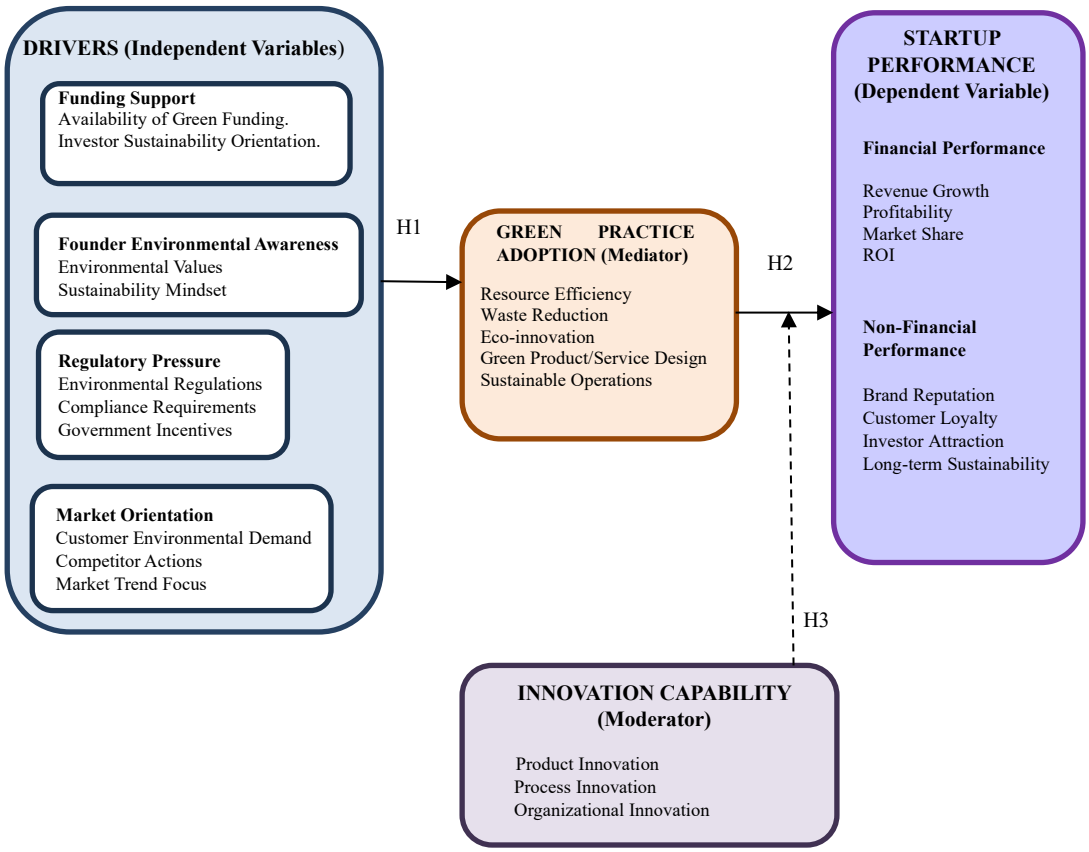

Fig. 1: Conceptual framework illustrating drivers of green practice adoption and their impact on startup performance

Fig. 1 displays the conceptual model showing the links among critical drivers of the adoption of sustainability (funding support, founders' environmental consciousness, regulatory push, and market orientation) with the adoption of green practices of nascent startups. The model shows that sustainability drivers (regulatory pressure, financial incentives, environmental awareness of founders, and market orientation) affect green practice adoption (H1) in such a way that it improves the performance of startups (H2). Innovation capability moderates the effect of green practice adoption on startup performance (H3). Also, green practice adoption is supposed to mediate the effect of sustainability drivers on startup performance (HM).

4. Research Methodology

This research uses a quantitative research methodology, possibly supplemented with small qualitative measures for context, in investigating the links between sustainability drivers' adoption, green business practices, and start-up performance outcomes in the long term. This research uses a cross-sectional survey design to gather information about early-stage start-ups at a particular point in time and investigate sustainability adoption patterns and impacts in various organizational contexts. The cross-sectional design is suited to testing the hypothesized relations (H1-H3) in the theoretical model.

Research Design

Following the research methodology, a structured quantitative approach is adopted. A cross-sectional survey methodology is adopted for the measurement of the perceived practices of startups on green business, the innovative capacity of startups, and entrepreneurial performance outcomes in order to collect the data effectively across a representative sample and test relationships through multivariate statistical analyses such as regression analysis and structural equation modeling (SEM).

Sample Selection

A total of 240 complete and valid responses received from emerging startups were employed for the final analysis. Population: The study population is composed of emerging startups founded between 0 and 7 years. This study adopts a stratified sampling design to cover the major sectors, namely: Technology startups, Manufacturing startups, and Service-based startups. This stratified design guarantees coverage for differences sector-wise in adoption and its outcome. This study gathers responses typically from founders, co-founders, or senior-level managers possessing decision-making powers for their firm's operations.

Data Collection

Primary data is gathered via a structured questionnaire, which is administered online and offline. The questionnaire utilizes a 5-point or 7-point Likert scale to determine agreement of responses on key items related to the sustainability drivers, the implementation of green practice, and its effects on innovation capability and overall performance.

Measurement of Variables

Adoption of green practices is defined through a composite index reflecting energy savings, waste reduction, green innovations, and sustainable supply chains. Performance measures in the venture setting include financial (revenue, profitability) and nonfinancial measures (brand image, customer satisfaction, attracting investors). Control variables are represented by firm size, firm age, and industry.

Analytical Tools

A PLS-SEM or a Regression Analysis is the chosen way for data analysis. It is preferred when the intent is to test direct, mediating (green adoption), and moderating (innovation capability) effects. Mediation and Moderation analysis tests can confirm the intended conceptual model and establish the influence of the tested relationship.

5. Results

Descriptive Statistics

This paper captures new-generation startups (0–7 years) operating in technology, manufacturing, and service industries. From table 1, it appears that a moderate and high intensity for the eco-practice of surveyed startups, also showing differences according to sector of belonging. Technology-based start-ups record the highest score regarding eco-innovative practices, whereas start-ups in the manufacturing sector show a major interest in minimizing waste and energizing processes efficiently. Overall, performance metrics for startups show positive results in a mixed way, indicating that sustainability remains a challenge.

Table 1: Descriptive statistics of key variables (N = 240)

Variable	Mean	Std. Deviation	Interpretation
Regulatory Pressure	3.78	0.84	Moderate–High
Funding Support	3.62	0.91	Moderate
Founder of Environmental Awareness	4.01	0.76	High
Market Orientation	3.89	0.80	Moderate–High
Green Practice Adoption	3.74	0.88	Moderate
Innovation Capability	3.95	0.79	High
Startup Performance	3.81	0.83	Moderate–High

Measurement Model (SEM Results)

Cronbach's Alpha, CR, and AVE were computed to evaluate the measurement model. All constructs are reported to possess acceptable reliability and convergent validity, indicating that the validity of measurement scales was satisfactory, as depicted in table 2.

Table 2: Reliability and validity analysis

Construct	Cronbach's Alpha	CR	AVE
Regulatory Pressure	0.86	0.89	0.62
Funding Support	0.84	0.88	0.60
Environmental Awareness	0.88	0.91	0.66
Market Orientation	0.85	0.89	0.61
Green Practice Adoption	0.90	0.92	0.68
Innovation Capability	0.87	0.90	0.64
Startup Performance	0.89	0.92	0.67

All values exceed recommended thresholds (CR > 0.70, AVE > 0.50), confirming strong measurement validity.

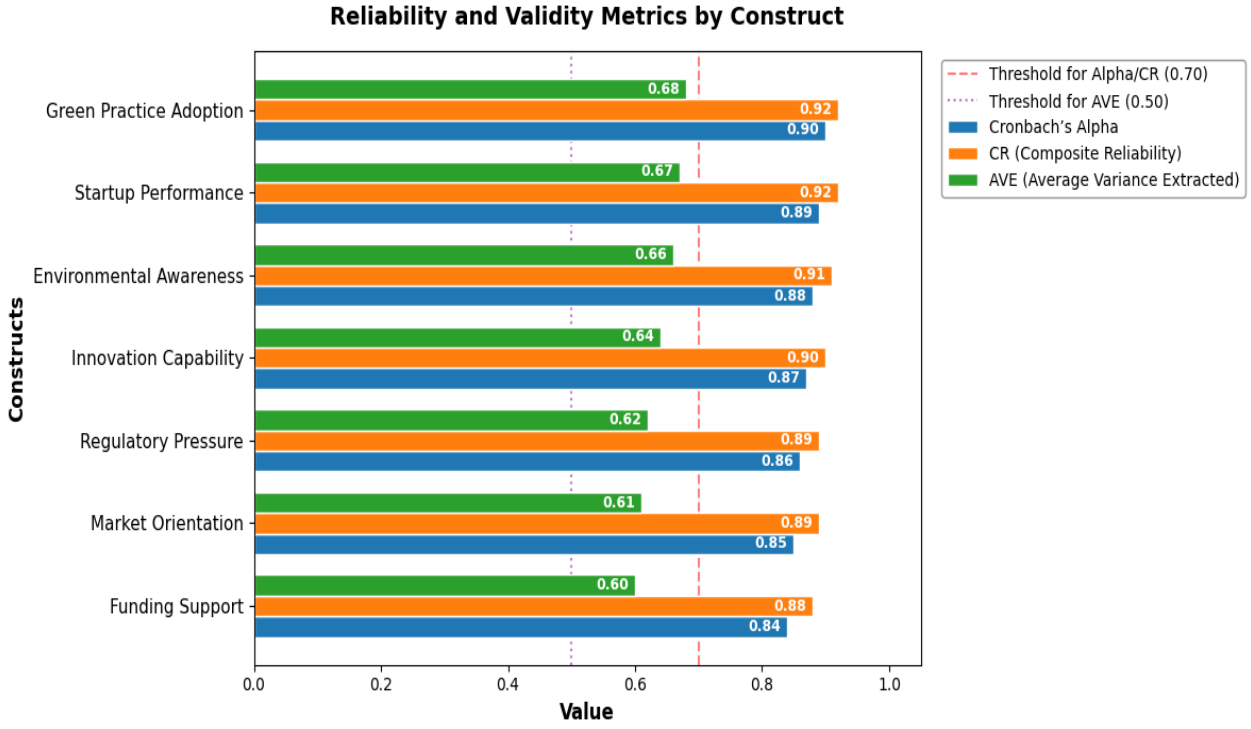

Fig. 2: Reliability and validity assessment of measurement constructs in SEM analysis

Fig. 2 depicts measures of reliability with Cronbach's alpha, Composite Reliability (CR), and AVE for the constructs, and it reveals that the study achieved high measurement reliability and high convergent validity measures beyond threshold values for the majority of the constructs.

Structural Model Results

The structural model (Table 3) highlights that there exists a relationship between the drivers of sustainability, the adoption of green practices, and the performance of start-ups.

Table 3: Structural path coefficients

Path	β Coefficient	t-value	p-value	Result
Regulatory Pressure → Green Adoption	0.34	5.62	<0.001	Significant
Funding Support → Green Adoption	0.29	4.87	<0.001	Significant
Environmental Awareness → Green Adoption	0.41	6.95	<0.001	Significant
Market Orientation → Green Adoption	0.27	4.21	<0.001	Significant
Green Adoption → Startup Performance	0.52	7.88	<0.001	Significant
Innovation Capability → Performance	0.36	6.11	<0.001	Significant
Interaction (Green × Innovation) → Performance	0.22	3.94	<0.001	Significant

Hypothesis Testing Results

The hypothesis testing confirms full support for all proposed relationships, as illustrated in table 4.

Table 4: Hypothesis testing summary

Hypothesis	Statement	Result
H1	Sustainability drivers (regulatory pressure, funding support, founder environmental awareness, and market orientation) positively influence green practice adoption.	Accepted
H2	Green practice adoption positively influences startup performance.	Accepted
H3	Innovation capability positively moderates the relationship between green practice adoption and startup performance.	Accepted
HM	Green practice adoption mediates the relationship between sustainability drivers and startup performance.	Accepted

Table 5: Indirect effects (Mediation analysis)

Indirect Path	Effect (β)	t-value	p-value	Effect Size
Drivers → Green Adoption → Performance	0.21	5.73	<0.001	Medium

Table 5 mediation analyses show clearly that the green practice adoption process transfers the impact of the sustainability drivers into the startup performance, playing a vital mediating role in the proposed model.

6. Discussion

The findings reveal that emerging startups engage in green and sustainable business practices as driven by the interaction between external institutional pressure and internal capabilities. First, regulatory pressure, financial support, and customer and market demand effectively encourage startups to implement sustainability, indicating that perceived legitimacy and perceived compliance with regulations are major external pressures shaping the initial decision of sustainability engagement. Second, internal conditions such as entrepreneurial environmental concern and innovation capability enable startups to implement green practices in depth and quality, signifying that sustainability adoption is not simply a passive reaction but a process actively influenced by entrepreneurial intention and capacity.

The findings were fitted with much earlier literature discussing the role of the resource-based view (RBV) as well as the institutional perspective in the context of sustainability entre-preneurship. The positive relationship of green practices adoption with the performance of new start-up companies echoes much literature, stating that sustainability has a positive impact on brand image, operational firm-level profitability, the attraction of investors, and so on. In contrast, the results provide strong support for the moderating effect of innovation capability in the relationship between adoption of green practices and firm-performance of new ventures and thus contribute to extending the scope and domain of existing studies, as sustainability in- volved with an organization should not only involve the adoption of eco-proacting but also the development of the dynamism capabilities within that Organization. Theoretical contribution, the proposed framework extends the RBV into the new domain of sustainability management, stating that green capabilities may play a strategic resource role and be responsible for competitive advantages of new Ventures. It also adds some new evidence to the field of research on sustainability, for which data are rarely from the perspective of start-ups. From the practice point of view, the study recommends that new ventures should consider sustainability strategies as well as brand image from the very start-up stage of the business lifecycle. Also, the paper can serve as a guide for investors considering a start-up, given that ESG performance is important.

7. Conclusion

The research tested the impact of green and sustainable business practice adoption among newly created business ventures on future business performance. The results show that the adoption of sustainability depends on both institutional pressures and the resources/capabilities a firm possesses. Regulatory pressure (β =0.34, p < 0.001), provision of funds (β =0.29, p <0.001), the founder's environmental concern (β =0.41, p < 0.001), and a strong orientation towards customers (β = 0.27, p <0.001) impact the likelihood of adopting green practices strongly in the positive direction. Among the considered determinants, founders' environmental concern seemed to have the strongest influence on their decision to adopt green practices in a startup. The results also provide support for the notion that adopting green practices exerts a significantly positive impact on startup performance (β = 0.52, p < 0.001), thus emphasizing the significance of sustainable practices in driving startups' financial (e.g. Revenue growth) and nonfinancial performance (e.g. Reputation, attraction of external funding). Furthermore, innovation capability was identified as a significant moderating mechanism that positively influences the linkage between sustainability practices adoption and performance (β =0.22, p < 0.001), demonstrating that dynamic capabilities are critical in achieving a competitive advantage when sustainability principles are embraced. The mediation analysis revealed that the adoption of green practices plays a mediating role in the link between sustainability triggers and performance impacts (indirect effect β = 0.21, p < 0.001), serving as a hub for several effects and drivers under the purview of sustainable practices in a conceptual sense. Overall, the research empirically supports that sustainability is not just a means of compliance but a strategic advantage in emerging start-ups. By integrating green practices in conjunction with innovation capability results in better long-run firm performances. Future research can look to the study's work in two ways. Firstly, longitudinal studies should be designed to evaluate the sustainability effect over time, there could also be further investigations into sector-level impacts and the use of qualitative analysis in examining behaviors and cultural traits in sustainability. The influence of technology (AI/blockchain etc) should also be studied when seeking scalable, demonstrable solutions for green practices within start-up ecosystems.

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