

Mobilizing Artificial Intelligence to Drive Sustainability and Competitiveness in SME- Driven Entrepreneurship: An Interpretative Study



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Abstract

Artificial Intelligence (AI) is reshaping economic systems and entrepreneurial ecosystems, particularly within startups and small- and medium-sized enterprises (SMEs). As environmental challenges intensify globally, AI-supported tasks provide opportunities for sustainable development while enabling economic growth. This interpretative study examines the dual role of AI in promoting sustainability and contributing to environmental pressures.

As societies confront mounting ecological and resource-based challenges—ranging from climate change and biodiversity loss to unsustainable energy consumption—the role of AI in supporting sustainable development has become increasingly salient. With its capacity for automation, optimization, prediction, and real-time decision-making, AI offers powerful tools for enhancing environmental sustainability.

The study integrates perspectives from sustainable entrepreneurship, SME adoption, and AI-driven innovation, with particular emphasis on Asian economies. Findings suggest that AI, when implemented responsibly, can support environmentally sustainable practices while enhancing business competitiveness. However, concerns related to energy consumption, carbon emissions, and governance highlight the need for sustainable AI frameworks.

Findings from this study underscore the dual nature of AI as both an enabler of sustainability and a contributor to environmental risk. On one hand, AI-supported tasks demonstrate considerable potential in advancing environmental goals.

Keywords: Artificial Intelligence, Sustainable AI, Health care AI, Task Automation, Market Competitiveness.

1. Introduction

Artificial Intelligence (AI) has emerged as a central driver of innovation and economic transformation. Its capacity to analyze large datasets, automate processes, and enable intelligent decision-making has made it indispensable for modern enterprises [1].

Entrepreneurship ecosystems are increasingly influenced by AI, particularly in startups and SMEs that rely on technological innovation for growth. AI-supported tasks enhance operational efficiency, reduce costs, and enable scalable business models, making them especially valuable for resource-constrained firms [2,3].

At the same time, sustainability challenges such as climate change and environmental degradation have intensified, particularly in Asian economies. AI applications in energy optimization, environmental monitoring, and resource management offer solutions to these challenges [4,5].

However, the environmental footprint of AI systems—including energy consumption and carbon emissions—raises concerns about their long-term sustainability [6,7].

This study examines how AI-supported tasks can balance economic and environmental objectives within entrepreneurial ecosystems.

2. Literature Review

2.1 AI in Entrepreneurship and Startups

AI has significantly transformed entrepreneurial practices by enabling data-driven innovation and enhancing decision-making capabilities. Startups increasingly integrate AI into their core operations, allowing rapid scaling and improved market responsiveness [8,9].

2.2 Green Entrepreneurship and Sustainable Business Models

Green entrepreneurship focuses on aligning economic activities with environmental sustainability. AI plays a crucial role in enabling sustainable business models by improving efficiency, reducing waste, and supporting circular economy practices [10,11].

2.3 SME Adoption of AI

AI adoption among SMEs has increased due to advancements in cloud computing and digital platforms. These technologies provide cost-effective solutions that enhance productivity and sustainability. However, challenges such as lack of expertise and financial constraints remain [2,12].

2.4 AI and Environmental Sustainability

AI applications contribute significantly to environmental sustainability through climate modeling, biodiversity conservation, and pollution control[4]. However, the environmental costs associated with AI infrastructure, such as energy-intensive data centers and e-waste, present ongoing challenges [13,14].

3. Research Gap

Although the intersection of Artificial Intelligence (AI) and sustainability has attracted increasing scholarly attention, the existing body of literature remains fragmented and insufficiently integrated, particularly from an entrepreneurial perspective. Most studies tend to examine either the role of AI in environmental sustainability or the economic implications of AI adoption independently, with limited efforts to bridge these domains in a unified framework [4,9].

A significant gap exists in understanding how AI-supported tasks can be embedded within **sustainable business models**, especially in the context of startups and innovation-driven enterprises. While green entrepreneurship literature highlights the importance of environmentally responsible business practices, it rarely incorporates AI as a core enabler of sustainability-oriented value creation[10,11].

Furthermore, research on AI adoption in SMEs has primarily focused on operational efficiency and productivity improvements, often overlooking its

potential to drive environmental sustainability and green innovation. The role of SMEs as key actors in sustainable development—particularly through AI-enabled practices—remains underexplored [12].

There is a critical gap lies in the **limited examination of AI-driven sustainable entrepreneurship within the Asian context**. Despite being home to rapidly expanding startup ecosystems and facing acute environmental challenges, Asian economies have not been adequately represented in empirical and conceptual studies linking AI, sustainability, and entrepreneurship[5].

Additionally, there is a lack of interpretative and interdisciplinary research that examines the **trade-offs between AI-driven economic value creation and its environmental costs**, such as energy consumption and carbon emissions. Existing studies often fail to address how these trade-offs influence business strategy, regulatory compliance, and long-term sustainability outcomes [13].

In light of these gaps, the present research study seeks to develop an integrative perspective that connects AI-supported tasks with sustainable entrepreneurship, SME adoption, and environmental outcomes.

4. AI Applications in Sustainable Business Ecosystems

AI-supported tasks are widely applied across industries, generating both economic and environmental value.

Table-1. AI Applications, Business Use Cases, and Sustainability Impact

Climate & Energy	Renewable startups	Cost efficiency	Reduced emissions
Agriculture	Precision farming	Productivity increase	Resource conservation
Biodiversity	Monitoring firms	Data services	Conservation
Pollution Control	Smart city firms	Compliance services	Pollution reduction
Circular Economy	Recycling firms	Resource recovery	Waste reduction

These applications demonstrate AI’s role in enabling sustainable innovation and improving business performance [11,15].

AI-Driven Sustainable Business and Entrepreneurship Framework

Table -2. AI-Driven Sustainable Business Framework

Component	Description	Outcome
AI Capability	Automation	Innovation
Startup Ecosystem	Support systems	Growth
SME Adoption	Digital tools	Scalability
Sustainability Integration	Green practices	Environmental benefits
Value Creation	Profit + sustainability	Long-term success

Green AI approaches emphasize reducing computational costs and environmental impact, supporting sustainable business practices[16].

5. Implications for Entrepreneurship and SMEs:

AI enables the development of innovative and sustainable business models, particularly in emerging markets.

Table- 3. AI Adoption in SMEs – Opportunities and Challenges

Factors	Opportunities	Challenges
Technology	Automation	High cost
Sustainability	Green growth	Awareness
Infrastructure	Cloud computing	Data security

AI-driven entrepreneurship creates opportunities for green startups, particularly in Asia, where sustainability challenges intersect with rapid economic growth [5].

Table- 4. Industry-Wise Applications of Artificial Intelligence

Industry Sector	Key AI Applications	Functional Benefits	Organizations
Healthcare	Medical imaging, disease diagnosis, drug discovery	Improved diagnostic accuracy, faster research outcomes	IBM Watson Health
Automotive	Autonomous driving, predictive maintenance	Enhanced safety, reduced operational risks	Tesla
Retail & E-commerce	Recommendation systems, warehouse automation	Personalized customer experience, efficient logistics	Amazon
Banking & Finance	Fraud detection, AI-based credit scoring	Risk reduction, improved financial decision-making	JPMorgan Chase
Education (EdTech)	Adaptive learning, AI tutors, automated assessment	Personalized learning, improved student engagement	Coursera

AI functions as a general-purpose technology with broad applicability and its integration across sectors indicates a transition toward data-driven and intelligent systems, which are critical for sustaining competitive advantage in dynamic market environments [17-22].

6. Discussion

AI-supported tasks are transforming business strategies by integrating sustainability into core operations. Firms adopting AI can achieve cost efficiency, regulatory compliance, and competitive advantage. However, sustainable AI adoption requires balancing technological innovation with environmental responsibility. Policymakers should promote green innovation, provide financial support, and establish regulatory frameworks to encourage sustainable entrepreneurship[14].

Table 1 indicates that AI applications in climate and energy management, agriculture, biodiversity conservation, pollution control, and circular economy initiatives generate tangible environmental and economic benefits. By enabling predictive analytics, process optimization, and efficient resource allocation, AI supports firms—especially startups and SMEs—in achieving higher productivity while minimizing ecological impact. This underscores AI’s role as a strategic enabler rather than a purely operational tool.

Table 2 presents an integrated framework for AI-driven sustainable business models. It emphasizes that the mere presence of AI capabilities is insufficient; effective outcomes require alignment with startup ecosystems, SME adoption pathways,

sustainability integration, and coherent value creation strategies. The framework also highlights the relevance of Green AI principles, advocating for energy-efficient computation and environmentally responsible AI deployment [7,16].

Table 3 complements this by identifying both opportunities and challenges in AI adoption among SMEs. AI fosters automation, innovation, and green growth; however, adoption is constrained by high investment costs, limited technical skills, and infrastructure gaps. These findings suggest the need for supportive measures such as capacity building, regulatory facilitation, and knowledge-sharing initiatives. In emerging Asian markets, SMEs that successfully integrate AI can develop novel business models that simultaneously promote economic growth and sustainability[5].

Finally, Table 4 illustrates AI’s status as a general-purpose technology with broad cross-sector applicability. Its integration across industries reflects a transition toward data-driven, intelligent systems that enhance operational efficiency and reinforce competitive advantage in dynamic market environments.

Collectively, the tables indicate that AI’s impact on sustainability and business performance is maximized when technological capabilities are combined with strategic alignment, institutional support, and environmentally responsible practices. This integrated perspective provides actionable insights for researchers, policymakers, and practitioners seeking to leverage AI for resilient and sustainable business growth.

Analysis underscores four key observations: (i) **Multi-dimensional value creation**, where AI supports both economic performance and environmental sustainability; (ii) **Ecosystem convergence**, highlighting the need for technological, institutional, and governance integration; (iii) **SME potential and limitations**, emphasizing targeted interventions to overcome adoption barriers; and (iv) **Strategic implications**, where embedding AI into sustainable business practices enhances competitiveness, CSR, and ESG performance.

7. Conclusion

To conclusion, it can be illustrated that AI acts as catalyst for sustainable entrepreneurship, linking technology adoption, value creation, and environmental stewardship in a unified framework. This underscores the necessity of adopting an integrative, ecosystem-oriented approach to AI deployment for fostering long-term business resilience and ecological sustainability. AI-supported tasks represent a critical driver of sustainable entrepreneurship. By enabling efficient resource use and innovative business models, AI contributes to both economic growth and environmental sustainability.

Future research should focus on empirical validation, cross-regional analysis, and policy frameworks to enhance AI-driven sustainable development.

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