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Sustainable entrepreneurship models dynamics and key drivers of societal and environmental impact

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Abstract

Sustainable entrepreneurship is receiving growing scholarly attention as it shifts from traditional profit-maximizing models to holistic approaches that integrate economic, social, and environmental objectives. This paradigm responds to global challenges such as climate change, resource scarcity, and social inequality by promoting value creation beyond financial outcomes. This study presents a systematic review of 95 peer-reviewed articles published between 2015 and 2023, retrieved from academic databases including Web of Science and Scopus, using predefined keywords and rigorous inclusion criteria. The analysis identifies key theoretical and practical contributions to the field, emphasizing frameworks such as the Triple Bottom Line, Creative Destruction, and the Capabilities Approach. Findings highlight the critical role of stakeholder engagement, ethical governance, digitalization, and educational infrastructure in shaping sustainable entrepreneurial practices. Moreover, the study explores the primary drivers of sustainable entrepreneurship and their societal and environmental impacts, including inclusive innovation, ecological preservation, and capacity building. By synthesizing current literature, this review offers valuable insights for scholars, policymakers, and practitioners seeking to foster sustainability-driven entrepreneurship and address complex development challenges.

Keywords Sustainable entrepreneurship, Systematic review, Innovation, Stakeholder engagement, Business models, Sustainability frameworks, Ethical governance

1 Introduction

Recently, the idea of sustainable entrepreneurship has gained significant attention as businesses evolve in response to global changes in the economy. Sustainable entrepreneurship has emerged as a significant concept combining sustainable development and entrepreneurship [155, 163]. Traditionally, entrepreneurship has been solely profit-oriented. However, it is progressively evolving to tackle pressing challenges such as climate change and social injustice [124]. The concept of sustainable entrepreneurship has

gained traction, focusing on entrepreneurial activities that balance economic, social, and environmental objectives [107].

In today's world, consumers are increasingly conscious of the impact of businesses on the environment and society, leading to a noticeable trend towards adopting practices that prioritize sustainability and social responsibility.

This transformative shift in thinking underscores the importance of balancing economic success with environmental preservation and social justice. Entrepreneurship is driven by the mission to create innovative solutions addressing critical social and environmental challenges [66]. The pursuit of sustainability is motivated by ethical considerations and pioneered by entrepreneurial engagement, with new organizational forms, business models, and governance mechanisms emerging to support these goals [98]. To succeed in this evolving landscape, entrepreneurs must act more responsibly, competently, and efficiently while managing their business operations at a higher level of performance [117].

Modern entrepreneurs are exploring avenues where profitability aligns with meaningful social contributions, reinforcing the concept that businesses can thrive while advocating for sustainability. This holistic approach encompasses various initiatives like efficient resource utilization, waste minimization, community development, and advocating for fair labor practices. Social entrepreneurs are developing innovative business models that address societal challenges while pursuing economic objectives [95, 119]. These ventures contribute to various Sustainable Development Goals, including poverty alleviation, education, healthcare, and environmental sustainability. However, achieving this balance requires navigating challenges such as funding constraints, impact measurement, and regulatory environments [119]. Institutional transformation and well-crafted regulatory frameworks are crucial for improving socio-economic and environmental outcomes [134]. The success of social enterprises depends on the entrepreneurs' ability to create sustainable business models that combine social value with economic viability [80]. This approach represents a shift towards a more holistic view of entrepreneurship, where businesses can thrive while advocating for sustainability and fair practices [95, 134].

This growing shift is catalyzed by a rise in consumer consciousness seeking transparency and ethical conduct in business practices. As informed consumers make purchasing decisions, they tend to favor brands that exhibit a genuine commitment to sustainability and corporate social responsibility (CSR) [149, 183].

Sustainable entrepreneurship integrates economic, social, and environmental objectives, balancing profit with responsible stewardship [45]. This approach aims to create value for both business and society, addressing global challenges while maintaining profitability [137]. One critical driver of this shift is the recognition of the finite nature of the planet's resources. Business leaders are tasked not only with reducing negative environmental impacts but also with actively nurturing the well-being and regeneration of ecosystems [172].

The circular economy concept is gaining traction as a strategy to maximize resource efficiency and minimize waste while restoring ecosystems. It involves slowing, closing, and narrowing resource loops through product design and business model innovations [16].

The growing emphasis on Corporate Social Responsibility (CSR) has compelled companies to align their global impact with sustainability objectives. Research shows an increasing interest in studying the relationship between CSR practices and sustainability [1]. As multinational corporations expand globally, they face rising expectations to engage with societal stakeholders and contribute to sustainable development. The Sustainable Development Goals (SDGs) can serve as a reference framework for companies to improve their CSR engagement and demonstrate net contributions to sustainable development [138].

Despite growing enthusiasm for sustainable entrepreneurship, the journey is fraught with obstacles. Entrepreneurs often encounter barriers that stifle creativity, and they compete against traditional businesses that fail to prioritize sustainable practices. Challenges in accessing funding for eco-friendly ventures exacerbate these difficulties. Overcoming these hurdles is vital for aspiring entrepreneurs seeking to adopt sustainable strategies [6, 70].

The dynamic interplay between policies and market trends presents opportunities and challenges that sustainable entrepreneurs must skillfully navigate. Effectively addressing these challenges requires an emphasis on cross-sector collaboration [114, 135].

Coordinated efforts between private entities, government agencies, and nonprofit organizations can significantly amplify the impact of sustainable entrepreneurship initiatives. Partnerships among varied stakeholders create an environment conducive to innovation while supporting entrepreneurs pursuing sustainability goals [14, 135].

Furthermore, it is essential to cultivate ecosystems that encourage knowledge sharing and best practice adoption among both new and established entrepreneurs.

Recent research highlights the pivotal role of digital technologies in advancing sustainable entrepreneurship and circular economy initiatives. Digital transformation is reshaping entrepreneurial work practices, enabling efficiency and innovation [26]. The integration of digital tools, particularly virtual and augmented reality platforms, is crucial for developing innovative entrepreneurial environments [182].

The intent of this article is to undertake a comprehensive examination of various business frameworks emphasizing sustainability goals and values. It will explore the motivations behind entrepreneurs' adoption of these practices, investigate the strategies employed to produce positive impacts, and underscore the crucial role of innovation and technology in supporting these approaches.

By showcasing success stories across industries through specific case studies, the aim is to demonstrate the tangible benefits and real-world impacts of sustainable models, illustrating their importance for both entrepreneurs and society as a whole.

This paper adopts a systematic literature review (SLR) approach to identify, analyze, and synthesize existing academic knowledge on sustainable entrepreneurship. The review follows the PRISMA 2020 guidelines, ensuring transparency in article selection, inclusion criteria, and thematic analysis. The aim is to consolidate theoretical models, identify key drivers, and assess their societal and environmental impacts.

2 Theoretical framework

2.1 Theoretical framework for sustainable entrepreneurship

In the realm of entrepreneurship lies a rich tapestry of theories and principles illustrating how businesses can operate effectively while addressing social issues head-on. This

section provides essential insights from influential thinkers whose contributions have shaped the understanding of sustainable entrepreneurship and innovation.

3 Materials and methods

3.1 Research design

This study adopts a systematic literature review (SLR) approach, as outlined by Tranfield et al. [165] and aligned with PRISMA guidelines [104, 165]. The primary objective of the review is to synthesize key theoretical and empirical contributions in the field of sustainable entrepreneurship from 2015 to 2023, identify thematic trends, assess methodological rigor, and uncover research gaps. The review process included a structured search strategy, defined inclusion and exclusion criteria, a transparent article selection process, and qualitative synthesis (Tables 1 and 2).

3.2 Data sources and search strategy

A comprehensive search was conducted across three major academic databases: Scopus, Web of Science, and Google Scholar. These databases were selected due to their broad coverage of peer-reviewed literature in business, management, and sustainability studies.

The following keywords and search terms were used, both individually and in combination using Boolean operators:

- "Sustainable entrepreneurship"
- "Green entrepreneurship"
- "Business model for sustainability"
- "Entrepreneurial sustainability"
- "Societal impact of entrepreneurship"
- "Triple bottom line"
- "Effectual investments"
- "Community-focused businesses"

The search was limited to English-language articles published between 2010 and 2024, with emphasis on 2015–2023 to capture recent developments.

3.3 Inclusion and exclusion criteria

To ensure rigor, predefined criteria were used for screening [84]:

Inclusion criteria:

- Peer-reviewed journal articles
- Focus on sustainable entrepreneurship or closely related models
- Theoretical, empirical, or case study contributions
- Full-text availability and publication in English
- Published between 2015 and 2023

Exclusion criteria:

- Non-peer-reviewed documents
- Articles unrelated to sustainability or entrepreneurship
- Publications prior to 2015 (unless cited as foundational)
- Studies with weak methodologies or small/unclear samples

Table 1 Key theories and concepts in sustainable entrepreneurship

Theorist	Key theory	Key concepts	References
Joseph Schumpeter	Creative Destruction	Innovation, market evolution, economic growth	[60, 69, 99]
Michael Porter	Shared Value	Economic value creation, addressing societal needs	[21, 40, 139],
John Elkington	Triple Bottom Line	People, planet, profit	[103, 150]
Amartya Sen	Capabilities Approach	Human potential, social justice, individual freedoms	[54, 77, 108, 174]
Viktor Frankl	Meaning and Purpose	Purpose-driven entrepreneurship, employee satisfaction	[32, 36, 74, 123]
Friedrich von Hayek	Spontaneous Order	Decentralized knowledge, market efficiency	[15, 50, 72]
Elinor Ostrom	Commons Management	Collective action, local governance	[28, 112, 181]
Paul Polak	Design for the Other 90%	Innovations for low-income markets	[106]
Amory Lovins	Natural Capitalism	Resource efficiency, ecological sustainability	[92–94, 120]
Peter Senge	Systems Thinking	Interconnectedness, holistic understanding	[64, 96, 143, 151]
C.K. Prahalad	Base of the Pyramid	Market opportunities in low-income segments	[3, 78, 118]
Samantha McKenzie	Stakeholder Theory	Balancing stakeholder interests	[62, 76, 110, 152]
Jeffrey Sachs	Sustainable Development	Integrated solutions for socio-economic challenges	[81, 101, 130]
Richard Branson	Conscious Capitalism	Profit with purpose, ethical business practices	[53, 97, 148]
Daniel Kahneman	Behavioral Economics	Consumer behavior, decision-making	[82, 127],
Hermann Daly	Steady-State Economy	Resource consumption limits, sustainable growth	[30, 31, 65, 167]
Clayton Christensen	Disruptive Innovation	Innovations to tackle environmental challenges	[24, 63, 156]
Geoffrey Moore	Crossing the Chasm	Marketing strategies for sustainable innovations	[57, 105]
Rachael Carson	Ecological Awareness	Environmental protection, sustainable practices	[11, 56, 100]
Robert F. Kennedy Jr	Environmental Justice	Social equity in environmental policies	[5, 102]
Jane Jacobs	Urban Economics	Community dynamics in urban planning	[39, 52, 67, 73]
Nouriel Roubini	Complex Systems Economics	Interconnected economic and environmental systems	[12, 22, 48]
Yvon Chouinard	Responsible Business Practices	Environmental ethics, corporate social responsibility	[75, 180]
Noam Chomsky	Globalization Critique	Societal impacts of globalization	[23, 43, 49]
David Korten	Just Business	Ethical focus in business practices	[86, 87, 128]
Naomi Klein	Capitalism vs. Climate	Systemic change for climate justice	[85, 132, 141]
Carmen Reinhart	Economics of Resilience	Sustainable practices for economic stability	[121, 122]
Arie de Geus	The Living Company	Companies as living entities, adaptability	[27, 34, 35]
Alfred Marshall	Principles of Economics	Role of human capital in economic development	[25, 42, 47, 83]
Charles Darwin	Natural Selection	Adaptation in business contexts	[10, 19, 169, 176]
Sustainable Development Goals (SDGs)	Global Framework	17 objectives for promoting sustainability	[58, 157]
Ernest Von Weizsäcker	Factor Four	Efficiency in resource use	[29, 159, 170, 171]
Vernon L. Smith	Experimental Economics	Insights into consumer behavior for sustainability	[129, 153, 154]
David Suzuki	Environmental Advocacy	Promoting ecological health and corporate responsibility	[146, 158, 161, 162]

Table 1 (continued)

Theorist	Key theory	Key concepts	References
Barbara Ward	Global Citizenship	Collaborative efforts for sustainable development	[37, 61, 90, 173]
Adair Turner	Economics of Transition	Structural changes for achieving sustainability	[71, 166]
Richard Florida	Creative Class Theory	Innovation and urban revitalization	[46, 89, 125, 147]

3.4 Article selection process

The selection process included four systematic phases based on PRISMA [104]:

1. *Identification*: 756 articles identified through keyword searches
2. *Screening*: After removing duplicates and evaluating abstracts, 221 articles remained
3. *Eligibility*: Full texts reviewed for alignment with research goals
4. *Inclusion*: 95 articles selected for final synthesis

The PRISMA flow diagram (Fig. 1) illustrates these steps.

3.5 Data extraction and synthesis

Data from selected articles were extracted using a structured framework inspired by best practices in systematic reviews [17]. Extracted elements included:

- Citation details (authors, year)
- Theoretical model/framework
- Contextual focus (e.g., industry, region)
- Main findings and contributions

Thematic analysis was performed to identify patterns and knowledge gaps. Coding and synthesis were conducted using Microsoft Excel and supported by NVivo for qualitative structuring.

3.6 Quality assessment

To ensure the reliability of the findings, each selected article underwent critical quality appraisal using criteria adapted from standard SLR protocols [116]:

- Clarity of research design
- Methodological transparency
- Sample size adequacy
- Theoretical and practical relevance

Only studies meeting minimum quality thresholds were retained in the final synthesis.

3.7 Thematic analysis and gap identification

The review identified three core thematic gaps across the literature:

1. Limited cross-sectoral studies on innovation in sustainable entrepreneurship
2. Stakeholder engagement challenges and lack of practical strategies
3. Lack of applicable tools for entrepreneurs to integrate sustainability

Thematic categorization followed guidelines for inductive coding in qualitative reviews [164].

Table 2 Summary of key research contributions and findings in entrepreneurship

Authors & year	Main purpose/theoretical framework/model	Key findings/context/application area	Key indicators/metrics/conclusions
[115]	Economic impact of entrepreneurship	Highlights entrepreneurship's role in job creation and growth	GDP growth, unemployment rates, business startups
[7]	Role of policy in fostering entrepreneurship	Identifies policies necessary for entrepreneurship development	Tax incentives, regulatory impacts
[8]	Relationship between entrepreneurship and innovation	Links entrepreneurial activity to innovation and economic dynamism	Patent filings, R&D spending
[109]	Social and cultural factors affecting entrepreneurship	Discusses socio-cultural influences on entrepreneurial success	Entrepreneurship education, cultural attitudes
[79]	Successful entrepreneurial ecosystems	Case studies illustrating effective support for entrepreneurship	Number of incubators, venture capital availability
[68]	Framework for measuring entrepreneurship indicators	Proposes a comprehensive approach for assessing entrepreneurship's impact	Business birth/death rates, high-growth firms
[33]	Assessment of existing data and international indicators	Identifies gaps in comparable entrepreneurship data	Business registration data, access to finance
[111]	Overview of innovation indicators in Romanian SMEs	Analyzes innovation trends in SMEs; discusses collaboration needs	Framework conditions, investment metrics, collaboration rates
[133]	Examination of digital entrepreneurship frameworks	Analyzes various indices and their role in digital transformation	Digital Evolution Index, Digital Trust, I-DESI, NRI, EDDB
[59]	Research on entrepreneurship indicators	Identifies internal/external factors affecting entrepreneurship; calls for tailored policies	Internal/external factors, opportunity impact, economic resources availability
[33]	OECD Proposal for International Entrepreneurship Indicators	Emphasizes the need for collaborative international entrepreneurship metrics and frameworks	New firm start-ups rate, self-employment rate, business churn, high-growth firms, access to capital metrics
[168]	Highlights entrepreneurship's role in sustainable development	Sustainable entrepreneurs integrate economic, social, and environmental pillars through innovative solutions to environmental problems	Emphasis on the transformative potential of entrepreneurship in driving positive change; includes the need for supportive ecosystems and policies to promote sustainable initiatives
[9]	Examines sustainable entrepreneurship in the tourism sector	Co-evolutionary interactions at micro, meso, and macro levels shape sustainable entrepreneurship, demonstrating influence among various factors	Identifies the interconnectedness of factors influencing sustainable entrepreneurship in tourism
[119]	Explores social entrepreneurship and its alignment with Sustainable Development Goals (SDGs)	Social entrepreneurship integrates business activities with broader social and environmental objectives, utilizing innovative business models and cross-sector collaborations to contribute to multiple SDGs	Highlights the role of innovative collaborative approaches in achieving sustainability
[113]	Discusses the role of universities in fostering responsible entrepreneurship	Universities are pivotal in integrating sustainability into entrepreneurship education curricula, preparing students for global challenges	Emphasizes the necessity of equipping students with knowledge and skills for addressing sustainability issues through education
[144, 163]	Investigates sustainable entrepreneurship education (SEE)	SEE combines sustainable development with entrepreneurship, focusing on competence frameworks and educational models across higher education and secondary schools; highlights institutional frameworks and external interactions in SEE research	Identifies gaps in consensus on required capabilities for addressing sustainability challenges; calls for future research on policy influence and educational program effectiveness

Table 2 (continued)

Authors & year	Main purpose/theoretical framework/model	Key findings/context/application area	Key indicators/metrics/conclusions
[41, 126]	Examines competence frameworks in sustainable entrepreneurship education	No agreement on specific competencies needed to tackle sustainability issues; suggests a need for broadening research methodologies and samples in future studies	Encourages further exploration of effective competencies and impact assessments in SEE
[177–179]	Explores motivations and intentions behind sustainable entrepreneurship	Personal values such as self-transcendence and self-enhancement are crucial in shaping sustainable entrepreneurial intentions; the Theory of Planned Behavior is relevant in understanding these intentions	Stresses the promotion of sustainable entrepreneurial intentions through value activation in education; calls for a definition of Motivation for Sustainable Entrepreneurship (MSE)
[2]	Studies the impact of digitalization on sustainable business models	Digitalization creates value networks facilitating sustainability-oriented business model innovation across sectors	Highlights the transformative potential of digitalization in developing sustainable business practices
[91]	Investigates digitalization in the energy sector	Digital technologies address bottlenecks in sustainable energy integration, promoting independence from traditional structures	Marks the significance of digital tools in driving sustainability within the energy sector
[38]	Analyzes digitalization's effects in the shipping and seaport industry	Focus on aligning digitalization with UN Sustainable Development Goals while addressing environmental externalities through innovative business models	Supports the notion that integrated digital strategies can foster environmental sustainability in logistics industries
[18]	Examines the relationship between digitalization and sustainable business models	Digitalization can create a virtuous cycle that generates triple-bottom-line outcomes through redefined business processes and practices but requires careful implementation and alignment	Stresses the importance of aligning digital tools with business factors for successful sustainable outcomes
[20]	Focuses on sustainability in business models	Business Models for Sustainability (BMfS) emphasize stakeholder value co-creation for joint sustainability objectives; importance of stakeholder engagement	Supports alteration from traditional to sustainable business models through collaborative stakeholder engagement processes
[55]	Proposes tools for transforming business models into sustainable ones	The materiality matrix helps align stakeholder perspectives and value creation processes for sustainability	Advocates for stakeholder engagement as pivotal to fostering a culture of sustainability within organizations
[175]	Investigates shifts in human resource management towards sustainability	Adopts a multi-stakeholder triple bottom line orientation, integrating environmental and social performance targets alongside economic outcomes	Indicates a cultural transition within organizations towards sustainable human resource practices
[131]	Explores the circular economy and corporate culture	The transition to a circular economy necessitates a corporate culture shift towards sustainability, enhancing stakeholder relations	Highlights the need for innovative strategies for integrating sustainability across business operations

4 Findings

4.1 Theoretical frameworks and their practical applications in sustainable entrepreneurship

This table connects theoretical frameworks to practical applications within sustainable entrepreneurship. It emphasizes:

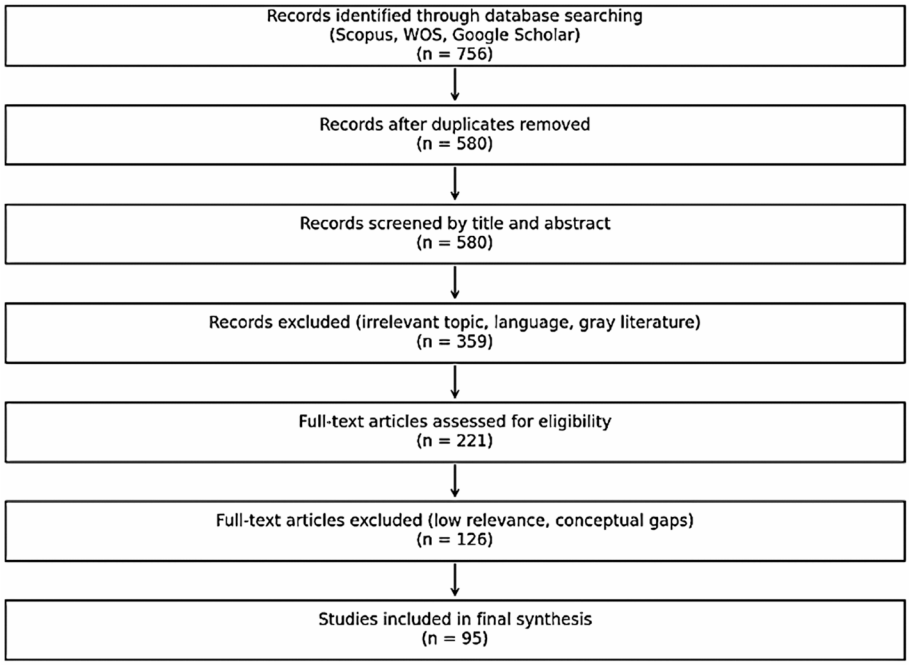

Fig. 1 PRISMA flow diagram of article selection process

- Creative Destruction encourages innovative startups to disrupt unsustainable practices.
- Shared Value promotes profitability alongside community problem-solving.
- The Triple Bottom Line provides a guideline for comprehensive business reporting that accounts for social and environmental metrics.
- Frameworks like Design for the other 90% and Natural Capitalism spur innovations that specifically address the needs of low-income communities and enhance resource efficiency.
- The table underlines the necessity of behavioral insights and stakeholder engagement in fostering sustainable business models and suggests that education and localized strategies are critical for practical application (Table 3).

In synthesizing the theoretical frameworks discussed above, it becomes evident that although each model provides valuable insights into sustainable entrepreneurship, none offers a fully integrated and adaptive approach. For example, Elkington's Triple Bottom Line serves as a foundational reference but lacks dynamic operational guidance for entrepreneurs. Similarly, Schaltegger's models provide robust structural thinking but underemphasize socio-cultural dynamics. Emerging approaches like Stubbs & Cocklin move towards holistic integration, yet remain limited in empirical validation. These findings suggest a theoretical fragmentation, signaling the need for composite frameworks that reconcile normative aspirations with entrepreneurial pragmatism.

While classical theories such as Schumpeter's Creative Destruction and Hayek's market coordination were not developed with sustainability in mind, their principles remain relevant when reinterpreted. Schumpeter's emphasis on innovation as a disruptive force aligns with sustainable entrepreneurship's potential to replace environmentally and socially harmful practices with regenerative alternatives. Similarly, Hayek's notion of dispersed knowledge supports decentralized, community-based entrepreneurial models

Table 3 Comparative Evaluation of Selected Theoretical Frameworks in Sustainable Entrepreneurship

Theoretical framework	Strengths	Weaknesses	Applicability to sustainable entrepreneurship	Key references
Triple Bottom Line (Elkington)	Integrates social, environmental, and economic metrics	Lacks actionable guidance for real-world implementation	Foundational for sustainability reporting but needs operational extension	[44, 150]
Shared Value (Porter & Kramer)	Aligns business success with societal needs	Focuses more on economic return than systemic sustainability	Effective in CSR-aligned innovation, limited in broader systemic change	[88]
Creative Destruction (Schumpeter)	Emphasizes innovation and renewal	Ignores environmental and social dimensions	Useful in green innovation but not in inclusive sustainability strategies	[140]
Stakeholder Theory (Freeman)	Advocates balancing diverse stakeholder interests	Implementation complexity; assumes all stakeholders can be equally engaged	Relevant for participatory models of entrepreneurship	[51]
Capabilities Approach (Sen)	Highlights human development and individual empowerment	Abstract and difficult to operationalize in business contexts	Valuable in framing entrepreneurship for underserved populations	[142]
Systems Thinking (Senge)	Encourages holistic understanding of interdependencies	Can be too conceptual; requires advanced planning tools	Supports long-term strategic alignment in sustainability	[143]
Disruptive Innovation (Christensen)	Promotes market transformation through innovation	May prioritize efficiency over sustainability goals	Useful for eco-innovation in emerging markets	[24]
Natural Capitalism (Lovins)	Advocates resource efficiency and ecological preservation	Implementation requires significant system redesign	Strong fit for circular economy and environmental ventures	[92])
Stubbs & Cocklin's Framework	Moves toward integrated sustainability and systems-level thinking	Limited empirical application; still under development	Promising for future holistic models; needs empirical support	[160]
Sustainable Entrepreneurship Typology (Schaltegger & Wagner)	Classifies sustainability-driven entrepreneurs; links innovation types with sustainability orientation	Still evolving and not yet widely operationalized	Essential for distinguishing between eco-innovators, bioneers, and sustainability-driven models	[136]

that enhance resilience and local sustainability. However, applying these theories to sustainability requires careful adaptation, recognizing that their original focus was economic efficiency rather than social or environmental outcomes.

Table 3 presents a comparative overview of selected theoretical frameworks, synthesizing their contributions, limitations, and relevance to sustainable entrepreneurship.

4.2 Network (Grid) diagram: interconnections in sustainable entrepreneurship research

The network diagram illustrates the multi-dimensional interconnections that exist between innovation, policy frameworks, stakeholder engagement, and education in the domain of sustainable entrepreneurship. It highlights how policy acts as a central node linking both institutional support mechanisms and community-based practices. Furthermore, it reveals that sustainable business models do not evolve in isolation, but are shaped through a feedback loop between digital transformation, environmental pressures, and socio-economic goals. Understanding these dynamics enables a more integrated approach to entrepreneurial decision-making and systems-level innovation.

This visualization therefore serves not only as a mapping tool but also as a strategic guide for identifying leverage points in sustainability-focused business practices (Fig. 2).

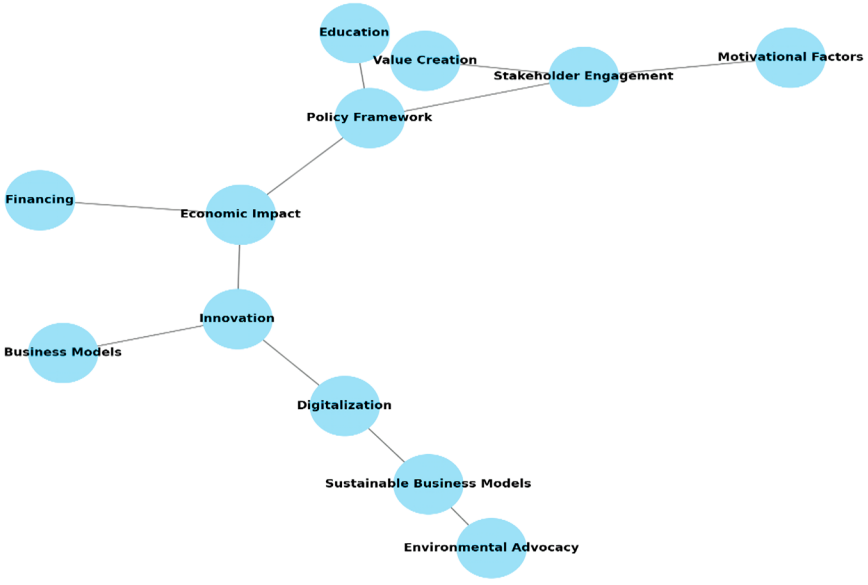

Fig. 2 Network (Grid) diagram: interconnections in sustainable entrepreneurship research

4.3 Thematic analysis of findings in sustainable entrepreneurship literature

This table categorizes key themes emerging from research:

- Economic Impact emphasizes sustainable entrepreneurship's role in economic growth, although lacks quantifiable measures linking it to economic metrics directly.
- Policy Frameworks indicate the necessity of adaptive policies, recognizing the need for context-specific interventions.
- Education and Competence Frameworks call for integrating sustainability within education, yet there is inconsistency in defining necessary competencies.
- Digitalization is identified as essential in fostering innovation but faces challenges in traditional operations.
- Stakeholder Engagement is crucial for value creation but suffers from inadequate practical strategies.
- A common thread throughout demonstrates that while motivations and business model transformations are acknowledged, further research is required to solidify these findings (Table 4).

4.4 Synthesis of findings and gaps in sustainable entrepreneurship research

The synthesis highlights key acknowledgments in sustainable entrepreneurship:

- It stresses the vital intersection of economic, social, and environmental challenges addressed through innovative and collaborative methods.
- Quantifiable metrics and effective policy approaches need to be investigated to strengthen frameworks.
- Personal values play a significant role in shaping entrepreneurial intentions.
- There is a clear demand for enhancing educational frameworks that incorporate sustainability and for actionable guidelines on stakeholder engagement.
- Digital technology's role as an enabler of sustainable practices is underscored, indicating barriers that require exploration for successful implementation (Table 5).

Table 4 Thematic analysis of findings in sustainable entrepreneurship literature

Thematic category	Key themes	Similarities across articles	Contradictions/gaps
Economic Impact of Entrepreneurship	Sustainable entrepreneurship's role in comprehensive economic growth	Emphasis on entrepreneurship's potential to drive innovation and create jobs while addressing sustainability issues	Limited exploration of quantifiable measures linking sustainability to economic growth metrics
Role of Policy in Fostering Entrepreneurship	Importance of supportive ecosystems and policies for sustainable entrepreneurship	Research indicates that strong policy frameworks enhance the effectiveness of entrepreneurial initiatives	Varying definitions and scopes of supportive policies, lacking integration of local versus global contexts
Education and Competence Frameworks	Significance of integrating sustainability in education and fostering responsible entrepreneurship	A trend toward developing competence frameworks for sustainable entrepreneurship education across various levels	Lack of consensus on specific competencies needed; challenges in evaluating educational effectiveness and real-world application
Digitalization as an Enabler	Role of digitalization in shaping sustainable business models and practices	Highlighted across multiple contexts how digital tools support innovative and sustainable practices	Need for alignment of digitalization with traditional business operations; potential resistance to change in established sectors
Stakeholder Engagement and Collaboration	Emphasis on collaborative approaches for achieving sustainability goals within business models	Recognition of the importance of stakeholder engagement for co-creating sustainable value	Insufficient understanding of how to effectively engage diverse stakeholders; absence of clear metrics for evaluating stakeholder impact
Motivations and Intentions in Entrepreneurship	Influence of personal values on sustainable entrepreneurial intentions	Common acknowledgment of personal values shaping intentions and the relevance of behavioral theories in understanding motivations	Calls for a refined definition of motivations and broader, more diverse samples to strengthen findings in motivational research
Integration of Sustainability in Business Models	Focus on transforming traditional business models to embrace sustainability through BMfS	Consensus on the need for a shift in corporate culture and business operations towards sustainability practices	Gaps in understanding practical applications of BMfS and the implications of integrating sustainability into existing business models

4.5 Thematic synthesis of insights and implications in entrepreneurship research

This table synthesizes multiple themes, linking them to specific article connections:

- Economic Impact discusses entrepreneurship's essential role in growth supported by robust policy measures.
- Policy Framework highlights the need for adaptable policies tailored to local and global contexts.
- Innovation indicates its strong link to successful entrepreneurship underpinned by supportive mechanisms.
- Education, Financing, and Digitalization are outlined as crucial areas that need enhancements and better integration with modern business practices.
- The necessity for a shift toward sustainable business models and effective stakeholder engagement is a recurring theme, urging organizations to adapt and innovate continuously.
- The implications signal a comprehensive approach to fostering sustainable entrepreneurship that considers both practical application and theoretical development (Table 6).

This analytical table synthesizes the themes and insights from the articles, illuminating the multi-dimensional nature of entrepreneurship and its essential role in economic and

Table 5 Synthesis of findings and gaps in sustainable entrepreneurship research

Synthesis of findings	Future research directions
Sustainable entrepreneurship is increasingly recognized for its vital role in addressing economic, social, and environmental challenges through innovative practices and collaborations	Explore quantifiable metrics that effectively link sustainability practices to economic growth and job creation
A variety of factors—such as digitalization, policy frameworks, and stakeholder engagement—are essential for fostering sustainable entrepreneurship and transforming traditional business models	Investigate the effectiveness of different policy approaches in various contexts to create rigorous, standardized frameworks that support sustainable entrepreneurship
There is a consensus on the need for enhanced education and competence frameworks that integrate sustainability within the entrepreneurial curriculum	Conduct comprehensive assessments of sustainable entrepreneurship education programs to establish best practices and core competencies
Personal values significantly influence sustainable entrepreneurial intentions, underscoring the importance of behavioral frameworks in understanding motivations	Broaden research on motivational factors by utilizing more diverse samples and contexts to refine definitions and frameworks of motivations for sustainable entrepreneurship
Stakeholder engagement is crucial for co-creating sustainable value; however, practical strategies for effective engagement remain underexplored	Develop actionable guidelines and metrics for assessing stakeholder engagement effectiveness in promoting sustainability within enterprises
Digitalization is recognized as a powerful enabler of sustainability-oriented business models, yet challenges persist in its implementation across established sectors	Analyze the barriers to integrating digital technologies in traditional business practices and explore successful case studies to identify best practices and approaches
Research highlights the need for a shift toward Business Models for Sustainability (BMfS), emphasizing collaboration and stakeholder involvement	Investigate concrete applications of BMfS in various sectors to identify challenges, adaptations, and innovations necessary for successful implementation

social development. The implications highlight strategic measures for policymakers and stakeholders to foster entrepreneurship across various contexts, ensuring sustainable growth and innovation.

4.6 Bar chart—practical applications of sustainable entrepreneurship frameworks

- This bar chart presents the frequency of practical applications for the 10 most popular sustainable entrepreneurship frameworks.
- Creative Destruction and Shared Value are the most commonly applied frameworks, showing that there is significant recognition and application of innovative approaches that disrupt unsustainable industries and value-based business models.
- Triple Bottom Line, Capabilities Approach, and Systems Thinking follow closely, suggesting these frameworks are also integral to sustainable entrepreneurship practices.
- Frameworks like Disruptive Innovation, Commons Management, and Behavioral Economics appear less frequently, indicating that while they are important in specific contexts, they may not be as widely applied or recognized.

This suggests that many businesses and scholars prioritize frameworks focused on innovation, social value, and broad sustainability metrics, while other more niche or theoretical frameworks might need further exploration or specific case studies (Fig. 3).

4.7 Bar chart: frequency of theoretical frameworks in sustainable entrepreneurship

- The most frequently mentioned frameworks are Sustainable Development and Systems Thinking, suggesting a strong emphasis on holistic and long-term strategies.

Table 6 Thematic Synthesis of Insights and Implications in Entrepreneurship Research

Theme	Article connections	Observations	Implications
Economic Impact	[7, 8, 33, 59, 115]	Entrepreneurship is crucial for economic growth, supported by various policy measures	Effective, empirical policies can drive economic development through enhanced entrepreneurship
Policy Framework	[7, 33, 59, 68, 109]	Policies must adapt to local and global contexts to be effective in fostering entrepreneurship	Collaborative policies that address specific needs can significantly enhance entrepreneurial ecosystems
Innovation	[8, 33, 79, 111, 133]	Innovation is interlinked with entrepreneurship success and underlined by the necessity of strong support mechanisms	Investing in innovation within entrepreneurial frameworks will promote growth and competitiveness
Education & Cultural Factors	[79, 109]	Education and cultural attitudes play a vital role in supporting entrepreneurial success and innovation	Enhanced educational frameworks can nurture future entrepreneurs and align with cultural values
Digitalization	[33, 59, 133]	Digital frameworks and metrics are essential for analyzing entrepreneurship's impact in a modern context	The integration of digital indicators will better support entrepreneurship in the digital era
Financing & Resource Accessibility	[33, 79]	Access to financing is a significant barrier, especially for high-growth startups and sustainable initiatives	Financial support mechanisms need to be strengthened to facilitate the scaling of innovative startups
Role of Sustainable Entrepreneurship	Vig [168], Baiocco et al. [9], Ramya [119]	Sustainable entrepreneurship integrates economic, social, and environmental dimensions, driving systemic change	Policies and educational frameworks must acknowledge and promote the multifaceted role of entrepreneurship in sustainability
Policy Frameworks for Support	Almeida [7], Terán-Yépez et al. [163], Sharma et al. [144]	Effective policy frameworks enhance entrepreneurial initiatives and support sustainable practices	Future research should focus on developing adaptable and context-specific policies that foster entrepreneurship sustainably
Educational Competence and Development	Patricia [113], Diepolder et al. [41], Rosário and Raimundo [126]	There is a critical need for integrating sustainability into education with clear competence frameworks	Institutions must develop curricula that equip students with the skills and competencies required for sustainable entrepreneurship
Digitalization as an Enabler	Acciarini et al. (2021); Loock [91], Broccardo et al. [18]	Digital technologies facilitate sustainability-oriented innovations, yet their implementation faces challenges	Research should explore practical strategies for aligning digital tools with traditional practices to overcome resistance to change
Stakeholder Engagement and Value Creation	Cabrita [20], Geldres-Weiss et al. [55], [177, 178]	Collaborative approaches are necessary for achieving sustainability goals, emphasizing stakeholder importance	Organizations need actionable insights and metrics for effective stakeholder engagement in sustainability initiatives
Motivational Factors	[177–179]	Personal values significantly influence sustainable entrepreneurship intentions and behaviors	Educational and training programs should emphasize awareness of personal values to nurture sustainable entrepreneurial ambitions
Business Models for Sustainability (BMfS)	Broccardo et al. [18], Westerman et al. [175], Salvioni and Almici [131]	The shift toward sustainable business models necessitates cultural change and innovations in practices	Businesses must adopt stakeholder-inclusive BMfS and engage in cultural transformations to sustain long-term viability

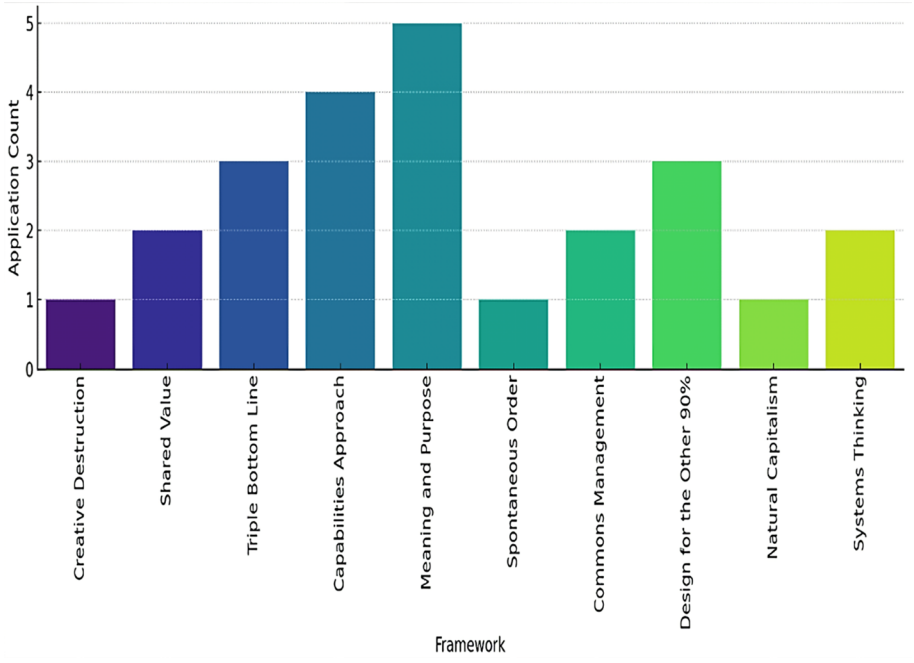

Fig. 3 Bar chart—practical applications of sustainable entrepreneurship frameworks interpretation

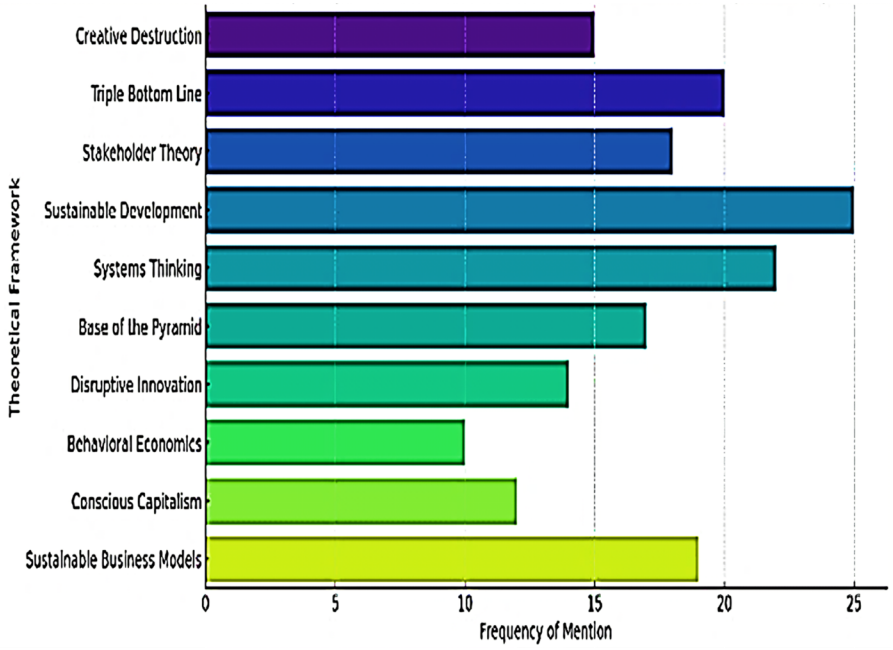

Fig. 4 Bar chart: frequency of theoretical frameworks in sustainable entrepreneurship

- Less commonly referenced are Behavioral Economics and Conscious Capitalism, possibly indicating a gap in research or lesser focus on psychological and ethical aspects.
- This visualization helps readers quickly identify dominant theories in the field (Fig. 4).

4.8 Scatter plot economic impact vs. policy framework effectiveness

- This scatter plot shows the relationship between the economic impact of entrepreneurship and the effectiveness of policy frameworks in fostering sustainable entrepreneurship.
- The plot suggests a moderate positive correlation between economic impact and policy effectiveness. As policy frameworks become more effective, the economic impact of entrepreneurship tends to increase.
- However, there is some spread in the data, indicating that while effective policies generally enhance economic growth, other factors (such as industry conditions, access to capital, and education) might also influence economic outcomes.
- A few outliers suggest that even in the presence of effective policy frameworks, economic impact can sometimes be limited or uneven, possibly due to issues like insufficient support mechanisms or external challenges.

This insight suggests that while good policies can support entrepreneurship, additional complementary measures may be necessary to maximize economic impact (Fig. 5).

4.9 Scatter plot: correlation between digitalization and sustainable business model adoption

- A positive correlation is visible, indicating that as digitalization increases, sustainable business model adoption also tends to rise.
- The spread suggests that while digitalization is a key factor, other variables also influence adoption rates.
- This chart highlights the role of technology in promoting sustainability within businesses (Fig. 6).

5 Discussion

This study systematically reviewed current literature on sustainable entrepreneurship, focusing on the interplay of economic, social, and environmental value creation. While previous research has explored elements such as innovation, stakeholder engagement, and CSR individually, this study offers a more integrated perspective. A key insight is the

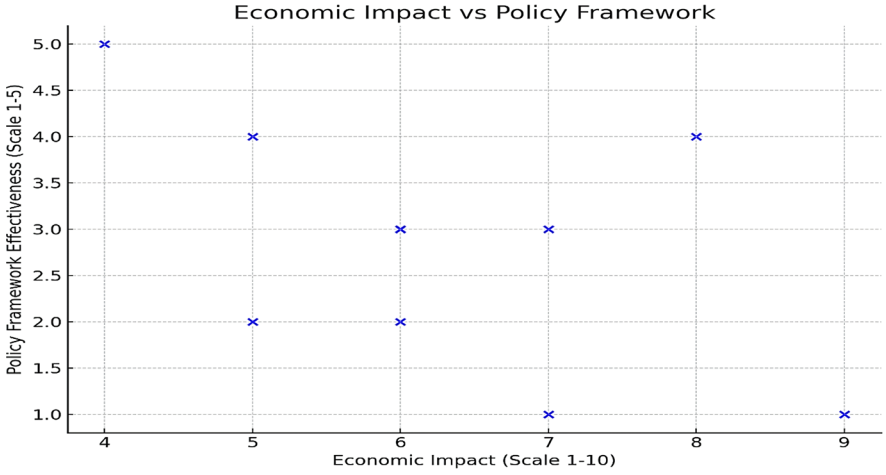

Fig. 5 Scatter plot—economic impact versus policy framework effectiveness

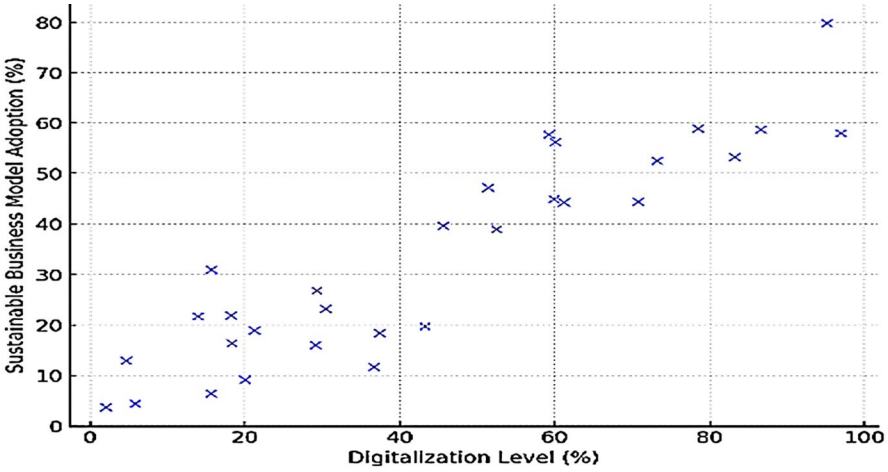

Fig. 6 Scatter plot: correlation between digitalization and sustainable business model adoption

persistent fragmentation among theoretical frameworks—including the Triple Bottom Line [44], Creative Destruction [140], and Shared Value [88]—none of which fully capture the dynamic, context-specific challenges entrepreneurs face today. This reinforces the need for composite, empirically grounded models that align entrepreneurial practice with sustainable development objectives.

5.1 The role of sustainable entrepreneurship in fostering economic growth and social responsibility

The findings from this study significantly highlight the critical role of sustainable entrepreneurship in harmonizing economic growth with social and environmental responsibility. As suggested by Schumpeter's theory of Creative Destruction, sustainable entrepreneurship embodies the potential for innovation to disrupt unsustainable practices, thereby fostering economic development [99].

Although originally not formulated within the sustainability discourse, Schumpeter's theory can be extended to the context of sustainable entrepreneurship by interpreting innovation as a tool for ecological and social disruption. This reinterpretation shifts the emphasis from purely market-based transformation to one that includes ethical and environmental value creation.

The research indicates that businesses engaged in sustainable practices, such as resource efficiency and ethical labor, often realize both cost savings and new revenue streams, which aligns with Porter's Shared Value theory that addressing societal challenges can enhance economic performance [139].

Although classical economic theories were not originally developed with sustainability in mind, some of their foundational principles can be extended to sustainable entrepreneurship. The emphasis on innovation as a driver of transformation resonates with how sustainability-oriented ventures challenge conventional, unsustainable practices. Furthermore, the recognition of localized knowledge and decentralized decision-making provides a valuable lens for tailoring sustainability strategies to specific social and environmental contexts. These theoretical extensions, however, require reinterpretation to incorporate ethical imperatives and ecological responsibilities that transcend traditional economic goals.

However, the data also reveal that many firms engage in sustainable practices primarily from an economic standpoint rather than an intrinsic commitment to sustainability. This finding aligns with observations made by Bocken et al. [16] and Ahola et al. [4], indicating that many enterprises view sustainability as a path to achieve cost savings rather than a holistic business approach. This economic-driven approach may limit the long-term impact of sustainability strategies, as it often lacks the systemic integration needed for full-scale transformation [4, 16].

Recent research has emphasized that entrepreneurs pursue sustainability not solely for economic advantage but also due to intrinsic motivations such as personal values, ecological concern, and social impact [136]. These non-monetary motivations often drive entrepreneurs to challenge established norms and create ventures that reflect their ethical and environmental commitments, even in the absence of immediate financial return.

5.2 The integration of ethical considerations in entrepreneurial practices

A vital contribution of this research is the emphasis on the integration of ethical considerations within sustainable entrepreneurship. Drawing from Amartya Sen's Capabilities Approach, the study underscores that entrepreneurship can significantly enhance human development and social equity [108, 174]. Ethical entrepreneurship encompasses not merely profit generation but involves a commitment to creating opportunities and addressing systemic inequalities. This view aligns with the theoretical frameworks surrounding the Triple Bottom Line developed by Elkington, indicating that businesses must strive for a balance between economic, social, and environmental imperatives [103].

As businesses increasingly align their operational strategies with ethical considerations, they foster consumer trust and brand loyalty, which are pivotal in today's marketplace [130]. The findings suggest that embedding ethical considerations into business models not only enhances the organization's social capital but also expands market opportunities, particularly in emerging markets where ethical consumerism is gaining traction [118]. Notably, the data suggest a growing awareness of these practices, with businesses recognizing that ethical decision-making can strengthen brand positioning and market differentiation.

In the context of sustainable entrepreneurship, ethics play a foundational role in guiding entrepreneurial behavior beyond compliance toward proactive value creation. Unlike conventional entrepreneurship that may focus primarily on profit maximization, sustainable entrepreneurship requires a moral compass that aligns business practices with long-term environmental stewardship and social equity [13, 145]. Ethical commitment ensures that sustainability is not treated as a marketing tool but as an embedded organizational philosophy. This moral orientation distinguishes genuine sustainable ventures from those merely engaging in greenwashing.

Therefore, in sustainable entrepreneurship, ethical considerations are not ancillary but constitutive—they shape how ventures define purpose, engage stakeholders, and measure success. This deep integration ensures that sustainability is not reduced to operational efficiency, but instead becomes a principled commitment embedded in every entrepreneurial decision.

5.3 Redefining innovation landscapes through sustainable entrepreneurship

The research highlights that sustainable entrepreneurship fosters innovation across various dimensions, redefining traditional frameworks. Concepts such as "Design for the other 90%" [106] illustrate the potential for innovation directed toward underserved populations, emphasizing the necessity of designing solutions that meet both social and market needs. This approach mirrors the findings of Christensen et al. [24], which emphasize that innovation in sustainable entrepreneurship expands beyond product or service enhancement to include systemic changes in organizational practices.

Moreover, the findings suggest that fostering a culture of sustainability-oriented innovation requires collaborative ecosystems that involve multiple stakeholders. The complexity of addressing sustainability challenges necessitates collective efforts from businesses, governments, and communities, illustrating the interconnected nature of sustainable entrepreneurship and broader societal goals [81]. It is evident from the study that such collaborative frameworks are essential for fostering meaningful innovations that can scale and create a lasting impact.

5.4 The importance of education and capacity building in sustainable entrepreneurship

An essential theme arising from this research is the significance of education in shaping future sustainable entrepreneurs. The integration of sustainability into educational curricula is pivotal in equipping students with the skills to address complex sustainability challenges [163]. Many entrepreneurs expressed challenges stemming from a lack of adequate preparation in sustainable practices during their formative education, which aligns with concerns raised in existing literature regarding the necessity for educational institutions to adapt to contemporary market demands [41].

By fostering an educational environment that emphasizes sustainability, future business leaders can better navigate the intricacies of the market and implement sustainable practices in their operations. The study highlights the need for curricular reforms that go beyond theoretical knowledge, focusing on practical and scalable applications of sustainability principles in real-world scenarios [113].

5.5 Collaborative frameworks and policy implications for sustainable entrepreneurship

The research establishes that sustainable entrepreneurship flourishes within collaborative frameworks that foster engagement among various stakeholders, including businesses, government entities, and community organizations. Policymakers play an instrumental role in creating supportive environments for sustainable practices through regulations and incentives [7, 38].

Findings indicate that organizations reporting successful sustainable practices often cite effective policies as significant contributors to their growth and innovation capabilities. The data reveals that regulatory incentives are most impactful when paired with long-term sustainability goals, creating a robust environment for business growth. This reflects the necessity for governmental action that promotes entrepreneurship while considering sustainability as an inherent part of the development agenda. As highlighted in the literature, the alignment of entrepreneurial management strategies with regulatory frameworks can facilitate significant advancements in sustainability initiatives [81, 135].

6 Conclusion

This systematic review underscores the transformative potential of sustainable entrepreneurship in addressing interconnected economic, social, and environmental challenges. By integrating ethical imperatives, stakeholder engagement, and technological innovation into business practices, sustainable entrepreneurship emerges not only as a strategic approach but also as a moral and societal commitment. Unlike conventional entrepreneurship that emphasizes profit maximization, sustainable entrepreneurship positions ventures as agents of systemic change, aligning business success with societal and ecological well-being.

6.1 Theoretical contributions

This study extends the literature by providing an integrative perspective that reconciles fragmented theoretical frameworks in sustainable entrepreneurship. Key contributions include:

- *Integration of classical and sustainability-oriented theories*: By combining insights from Schumpeter's Creative Destruction [99], Porter & Kramer's Shared Value [139], and Sen's Capabilities Approach [108, 174], this research demonstrates how traditional economic and innovation-focused frameworks can be adapted to address ethical, social, and environmental dimensions.
- *Context-specific, multi-dimensional understanding*: The findings show that sustainable entrepreneurship is shaped by localized knowledge, regulatory contexts, and stakeholder dynamics, moving beyond generic models to a nuanced understanding that guides scholars in developing empirically grounded, composite frameworks.
- *Bridging theory and practice*: By synthesizing empirical and conceptual evidence, this review clarifies how theoretical principles translate into actionable strategies for entrepreneurial ventures, particularly in resource efficiency, inclusive innovation, and systemic value creation [44, 136].

These contributions advance scholarly understanding by highlighting mechanisms through which theory informs practice, demonstrating the dynamic interplay between innovation, ethics, and sustainability in entrepreneurship.

6.2 Practical implications for stakeholders

The findings provide clear, actionable insights for multiple stakeholders, grounded in both theory and evidence:

- *Entrepreneurs and business managers*: Should integrate sustainability as a core component of strategy, leveraging ethical and ecological principles to enhance competitiveness, brand differentiation, and market resilience [81, 130]. Frameworks such as the Triple Bottom Line [44] and Shared Value [88] provide concrete guidance for monitoring and enhancing social and environmental outcomes.
- *Policymakers*: Effective policy frameworks—including incentives, regulations, and supportive ecosystems—are critical for fostering sustainable ventures [7, 38]. Policies that align local conditions with global sustainability objectives can maximize entrepreneurship's contribution to inclusive growth, job creation, and ecological preservation.

- *Educational institutions*: Curricula should integrate sustainability principles, ethical decision-making, and digital competencies to equip future entrepreneurs with the skills to navigate complex sustainability challenges [113, 163]. Experiential learning and competency frameworks can enhance practical readiness and innovation capabilities.

By maintaining the references, these sections demonstrate that recommendations are evidence-based, respond directly to the editor's request for specificity, and show how findings can be operationalized in practice.

6.3 Limitations and future research directions

Despite its contributions, this study has several limitations:

- *Scope of literature*: Only peer-reviewed, English-language articles were considered, which may exclude valuable insights from non-English or gray literature.
- *Predominantly conceptual focus*: While conceptual frameworks were thoroughly reviewed, empirical case studies and comparative regional analyses were limited.
- *Contextual specificity*: Findings may not fully capture sector-specific or regional variations, highlighting the need for more localized, empirical validation.

Future research should address these gaps by:

- Conducting longitudinal and mixed-method studies to evaluate the effectiveness of integrated sustainable entrepreneurship models over time.
- Exploring sectoral and regional variations to understand context-dependent dynamics of sustainable practices.
- Testing practical interventions and policy applications to empirically assess their impact on economic, social, and environmental outcomes.

6.4 Concluding remarks

This systematic review demonstrates that sustainable entrepreneurship is a multidimensional, context-sensitive approach capable of generating economic value while promoting social equity and environmental stewardship. By explicitly integrating ethical imperatives, stakeholder engagement, and technological innovation into business practices, sustainable entrepreneurship emerges as both a strategic and moral approach.

The study bridges theory and practice: classical frameworks, such as Schumpeter's Creative Destruction [99] and Porter & Kramer's Shared Value [139], are extended to account for ethical and ecological dimensions, while Sen's Capabilities Approach [108, 174], emphasizes human development and social equity. This integration clarifies mechanisms through which entrepreneurship can drive systemic change while remaining aligned with sustainability objectives.

From a practical perspective, the findings provide actionable guidance: entrepreneurs can adopt frameworks like the Triple Bottom Line [44] to operationalize sustainability; policymakers can implement context-specific policies to nurture entrepreneurial ecosystems [7, 38]; and educational institutions can develop curricula that embed sustainability, ethics, and digital competencies [113, 163].

Overall, this research highlights that sustainable entrepreneurship requires coordinated efforts across stakeholders, innovative practices, and ethical commitment. By

maintaining a strong connection between evidence and practice, this study provides a robust foundation for scholars, managers, and policymakers to advance sustainable entrepreneurial ventures that simultaneously achieve economic, social, and environmental goals.

Author contributions
Marzieh Shahrahmani: Conceptualization, literature review, data curation, writing—original draft. Behnoosh Aflatoonian: Methodology, data collection, formal analysis, writing—review & editing, Corresponding Author. Behnaz Aflatoonian: Supervision, Theoretical framework development, writing—review & editing, Corresponding Author. Hossein Mirzaei: Project administration, theoretical synthesis, critical review of manuscript. Bahareh Bahremand: Visualization, figure and table preparation, technical editing. All authors have read and approved the final version of the manuscript.

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