

ARTIFICIAL INTELLIGENCE FOR SUSTAINABLE WOMEN ENTREPRENEURSHIP: A SYSTEMATIC LITERATURE REVIEW AND FUTURE RESEARCH AGENDA

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Abstract- Artificial Intelligence (AI) is transforming entrepreneurial ecosystems by enabling data-driven decision-making, digital innovation, automation, and sustainable business development. Simultaneously, women entrepreneurship has emerged as a critical contributor to inclusive economic growth, gender equality, and the achievement of the Sustainable Development Goals (SDGs). Despite increasing scholarly attention to AI, sustainability, and women entrepreneurship, the existing literature remains fragmented, with limited research systematically integrating these interconnected domains. This study addresses this gap by conducting a Systematic Literature Review (SLR) to synthesize the current state of knowledge on AI for sustainable women entrepreneurship and to develop a future research agenda.

The review follows the PRISMA 2020 framework and examines peer-reviewed journal articles published between 2015

and 2026 from the Scopus and Web of Science databases. A thematic synthesis approach was employed to identify major research trends, theoretical perspectives, methodological developments, and emerging research gaps.

The findings reveal that AI contributes significantly to digital innovation, financial inclusion, entrepreneurial capability, sustainable business practices, business resilience, collaborative ecosystems, and institutional development among women entrepreneurs. However, the literature remains conceptually fragmented and geographically concentrated in developed economies. Significant gaps persist regarding responsible AI governance, AI readiness, sustainability measurement, ethical AI implementation, and empirical evidence from developing countries.

Based on these findings, the study proposes an integrated conceptual framework positioning AI capability as the primary driver of sustainable women

entrepreneurship through digital innovation, entrepreneurial capability, and business resilience, while highlighting the moderating roles of AI readiness and institutional support. A comprehensive future research agenda is also presented to guide scholars, practitioners, and policymakers.

This review contributes to entrepreneurship, information systems, and sustainability literature by consolidating fragmented knowledge, identifying critical research gaps, and offering a structured roadmap for advancing AI-enabled sustainable women entrepreneurship.

Keywords: Artificial Intelligence , Women Entrepreneurship , Sustainable Entrepreneurship , Digital Innovation , Financial Inclusion , Business Resilience , AI Readiness , Systematic Literature Review , PRISMA 2020 , Sustainable Development Goals (SDGs).

I. INTRODUCTION

Women entrepreneurship has emerged as one of the key drivers of inclusive economic growth, poverty reduction, and sustainable development across both developed and developing economies. Women-owned enterprises contribute significantly to employment generation, innovation, and community development. However, despite their growing economic

importance, women entrepreneurs continue to encounter multiple structural and institutional barriers, including limited access to finance, restricted market opportunities, inadequate digital literacy, gender bias, and insufficient technological capabilities (Brush et al., 2019 , OECD, 2023 , UN Women, 2023).

In recent years, the rapid advancement of Artificial Intelligence (AI) has created new opportunities for entrepreneurs by enabling data-driven decision-making, business automation, customer analytics, predictive forecasting, personalized marketing, and operational efficiency. AI-powered technologies including machine learning, natural language processing, recommendation systems, and generative AI are transforming the entrepreneurial ecosystem by reducing operational costs, improving productivity, and enhancing business competitiveness (Dwivedi et al., 2021, 2023).

For women entrepreneurs specifically, AI has the potential to reduce traditional barriers to business growth. AI-based digital platforms can support market access, customer relationship management, financial inclusion, and strategic decision-making, enabling entrepreneurs to compete more effectively in digital markets (OECD, 2024). These technological advancements are particularly important in

achieving the United Nations Sustainable Development Goals (SDGs), especially SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), and SDG 9 (Industry, Innovation and Infrastructure) (United Nations, 2015).

Despite the growing body of literature on artificial intelligence, entrepreneurship, and sustainability, research integrating these three domains remains fragmented. Most existing studies examine AI adoption, digital transformation, sustainable entrepreneurship, or women entrepreneurship as separate research streams rather than as an interconnected system. Only a limited number of studies systematically examine how AI specifically contributes to sustainable women entrepreneurship, the theoretical foundations underpinning this relationship, the methodological approaches adopted by researchers, and the emerging research gaps that require further scholarly attention. This fragmentation restricts the development of an integrated understanding of how AI can support women entrepreneurs in creating sustainable and resilient businesses.

Given this fragmentation, conducting a Systematic Literature Review (SLR) is both timely and necessary. An SLR enables researchers to systematically identify, evaluate, and synthesize existing evidence

while minimizing selection bias and ensuring methodological transparency (Tranfield et al., 2003). Adopting the PRISMA 2020 guidelines further enhances the rigor and reproducibility of the review process (Page et al., 2021). Through a comprehensive synthesis of the existing literature, this study aims to identify dominant research themes, theoretical perspectives, methodological trends, and knowledge gaps concerning AI-driven sustainable women entrepreneurship, while proposing a future research agenda to guide scholars, practitioners, and policymakers in advancing this emerging field.

II. RESEARCH OBJECTIVES

The increasing integration of Artificial Intelligence (AI) into entrepreneurial ecosystems has created significant opportunities for promoting innovation, sustainability, and inclusive economic development. Although the existing literature has extensively examined AI adoption, digital transformation, sustainable entrepreneurship, and women entrepreneurship independently, there remains a limited understanding of how these domains intersect to foster sustainable women-led enterprises. Consequently, this systematic literature review seeks to consolidate this fragmented body of knowledge and provide

a comprehensive overview of current research trends while identifying future research opportunities.

The specific objectives of this study are as follows:

To systematically review the existing literature on Artificial Intelligence and sustainable women entrepreneurship published in leading peer-reviewed journals.

To identify the major research themes, trends, and publication patterns that characterize the evolution of AI-enabled women entrepreneurship research.

To examine the theoretical frameworks employed by previous studies to explain the relationship between AI adoption, entrepreneurship, and sustainability.

To analyse the methodological approaches adopted in the existing literature, including research design, data collection methods, analytical techniques, geographical contexts, and industry sectors.

To identify the major research gaps in the current body of knowledge regarding AI-driven sustainable women entrepreneurship.

To propose a future research agenda that can guide scholars, practitioners, and policymakers in advancing research and

practice in this emerging interdisciplinary field.

III. RESEARCH QUESTIONS

Based on the objectives of the study, the following research questions (RQs) are formulated:

RQ1: What are the major research trends and publication patterns in the field of Artificial Intelligence for sustainable women entrepreneurship

RQ2: What theoretical perspectives have been employed to explain AI adoption and sustainable women entrepreneurship

RQ3: What research methodologies have been predominantly used in the existing literature

RQ4: What factors influence the adoption of Artificial Intelligence among women entrepreneurs in achieving sustainable business development

RQ5: What are the major research gaps and future research opportunities in this emerging field

IV. RESEARCH GAP AND STUDY RATIONALE

The growing convergence of Artificial Intelligence (AI) and sustainable entrepreneurship has attracted increasing scholarly attention in recent years. AI technologies have been recognized for their ability to improve business

intelligence, automate decision-making, enhance customer engagement, optimize resource utilization, and foster innovation across industries (Dwivedi et al., 2021). Simultaneously, women entrepreneurship has emerged as a critical driver of inclusive economic development, social empowerment, and sustainable growth, particularly in developing economies where women-owned enterprises significantly contribute to employment generation and community development (Brush et al., 2019).

Although previous studies have explored AI adoption in businesses (Raisch & Krakowski, 2021), sustainable entrepreneurship (Shepherd & Patzelt, 2011), and women entrepreneurship (Jennings & Brush, 2013) individually, these research streams have largely evolved independently. The existing literature lacks a comprehensive synthesis that examines how AI can specifically enable sustainable women entrepreneurship by addressing financial constraints, digital inclusion, market accessibility, innovation capability, and long-term business resilience.

Furthermore, existing review studies primarily focus on AI applications in marketing, healthcare, finance, education, or general entrepreneurship, while very limited attention has been given to AI-enab-

led women-led enterprises from a sustainability perspective. Another notable limitation is the geographical concentration of empirical studies in developed economies, research investigating AI adoption among women entrepreneurs in emerging markets such as India, Bangladesh, and other developing countries remains scarce despite these regions experiencing rapid digital transformation and significant growth in women-led enterprises (OECD, 2023). There is also limited discussion regarding ethical AI, digital inclusion, algorithmic bias, and policy interventions that could influence the sustainable development of women-owned businesses.

From a methodological perspective, the literature is characterized by diverse conceptual approaches and inconsistent analytical frameworks. Few studies comprehensively compare theoretical perspectives, research methodologies, and thematic developments to establish a coherent understanding of AI-driven sustainable women entrepreneurship, leaving scholars without an integrated framework to guide future empirical investigation and theory development.

In response to these gaps, the present study adopts a Systematic Literature Review (SLR) approach based on the PRISMA 2020 guidelines to synthesize the existing body of knowledge. By critically

evaluating published research, this review aims to identify dominant themes, theoretical foundations, methodological approaches, and emerging research gaps while proposing a structured future research agenda. The findings are expected to contribute to both academic literature and practical policymaking by providing evidence-based insights into how Artificial Intelligence can support sustainable women entrepreneurship in an increasingly digital economy.4. Research Gap and Study Rationale

The growing convergence of Artificial Intelligence (AI) and sustainable entrepreneurship has attracted increasing scholarly attention in recent years. AI technologies have been recognized for their ability to improve business intelligence, automate decision-making, enhance customer engagement, optimize resource utilization, and foster innovation across industries (Dwivedi et al., 2021). Simultaneously, women entrepreneurship has emerged as a critical driver of inclusive economic development, social empowerment, and sustainable growth, particularly in developing economies where women-owned enterprises significantly contribute to employment generation and community development (Brush et al., 2019).

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V. THEORETICAL BACK GROUND

The intersection of Artificial Intelligence (AI), sustainable entrepreneurship, and women entrepreneurship represents an emerging multidisciplinary research domain that draws upon several established theoretical perspectives. Understanding this intersection requires integrating technological, organizational, and socio-economic theories that explain technology adoption, entrepreneurial innovation, and sustainable business development. This section discusses the major theoretical foundations underpinning AI-driven sustainable women entrepreneurship.

5.1 Artificial Intelligence and Entrepreneurship

Artificial Intelligence has evolved beyond automation and is now considered a strategic capability that enables entrepreneurs to improve decision-making, recognize business opportunities, optimize operations, and strengthen customer relationships. AI-powered technologies such as machine learning, predictive analytics, recommendation systems, and generative AI assist entrepreneurs in analysing market trends, forecasting demand, managing risks, and improving business efficiency (Dwivedi et al., 2021).

From the Resource-Based View (RBV), AI can be viewed as a valuable strategic resource that enhances a firm's competitive advantage by improving knowledge management, innovation capability, and organizational performance (Barney, 1991). Businesses that effectively integrate AI into their operations are more likely to achieve sustainable competitive advantages because AI enables the efficient utilization of both tangible and intangible resources.

Similarly, Dynamic Capabilities Theory suggests that organizations must continuously develop the ability to sense opportunities, seize them, and transform their resources to remain competitive in rapidly changing environments (Teece, Pisano, & Shuen, 1997). AI strengthens these dynamic capabilities by facilitating real-time data analysis, adaptive decision-making, and organizational learning, thereby supporting entrepreneurial resilience and innovation.

5.2 Sustainable Entrepreneurship

Sustainable entrepreneurship extends traditional entrepreneurship by simultaneously pursuing economic prosperity, environmental responsibility, and social well-being. Unlike conventional business models that primarily emphasize financial performance, sustainable

entrepreneurs seek to create long-term value while addressing societal and environmental challenges (Shepherd & Patzelt, 2011).

The concept is strongly associated with the Triple Bottom Line (TBL) framework proposed by Elkington (1997), which argues that organizational success should be evaluated based on three dimensions: economic performance, environmental sustainability, and social impact. AI technologies can significantly contribute to all three dimensions by optimizing resource allocation, reducing waste, improving operational efficiency, and enabling responsible business practices. Recent studies also suggest that AI supports sustainable innovation through intelligent automation, predictive resource management, and evidence-based strategic planning, enabling businesses to achieve sustainability goals while maintaining competitiveness (Raisch & Krakowski, 2021).

5.3 Women Entrepreneurship in the Digital Economy

Women entrepreneurs play a crucial role in promoting inclusive economic growth, employment generation, and social development. However, they continue to encounter structural challenges such as unequal access to financial resources,

limited digital capabilities, restricted professional networks, and institutional barriers (Jennings & Brush, 2013).

Institutional Theory provides an important lens for understanding these challenges. According to North (1990), entrepreneurial activities are shaped by formal institutions such as government policies and financial systems, as well as informal institutions including social norms, cultural expectations, and gender stereotypes. These institutional factors significantly influence women's ability to adopt emerging technologies and expand their businesses.

Artificial Intelligence offers new opportunities to overcome many of these barriers. AI-enabled digital platforms, automated financial services, customer analytics, and online marketing tools reduce dependence on traditional business networks and improve access to broader markets. Consequently, AI has the potential to enhance women's entrepreneurial capabilities while promoting inclusive and sustainable business growth.

5.4 Technology Adoption Perspective

Understanding why women entrepreneurs adopt AI technologies requires consideration of technology adoption theories. The Technology–Organization–Environment (TOE) Framework developed

by Tornatzky and Fleischer (1990) explains that technology adoption depends on technological readiness, organizational capabilities, and environmental conditions.

Similarly, the Diffusion of Innovation (DOI) Theory proposed by Rogers (2003) suggests that innovation adoption is influenced by perceived relative advantage, compatibility, complexity, trialability, and observability. These factors are particularly relevant in explaining AI adoption among women-owned enterprises, where digital literacy, affordability, institutional support, and perceived usefulness determine adoption decisions.

Integrating these theoretical perspectives provides a comprehensive foundation for understanding how AI can facilitate sustainable women entrepreneurship by enhancing innovation, improving competitiveness, and promoting inclusive economic development.

VI. EVOLUTION OF ARTIFICIAL INTELLIGENCE FOR SUSTAINABLE WOMEN ENTREPRENEURSHIP

The convergence of Artificial Intelligence (AI), sustainable entrepreneurship, and women entrepreneurship has evolved progressively over the past decade. Initially, research on these three domains developed independently, with scholars

focusing either on technological innovation, entrepreneurial development, or sustainability. However, the acceleration of digital transformation, particularly after the COVID-19 pandemic, has encouraged researchers to investigate the interconnected role of AI in supporting inclusive and sustainable entrepreneurial ecosystems (Dwivedi et al., 2023).

Early studies on women entrepreneurship primarily emphasized socio-economic barriers, including gender discrimination, limited financial accessibility, inadequate institutional support, and restricted participation in entrepreneurial networks (Jennings & Brush, 2013). These studies established that women-owned enterprises significantly contribute to employment generation and community development, yet often face greater resource constraints than their male counterparts, prompting calls for policy interventions and digital inclusion initiatives.

During the same period, AI research was largely concentrated on automation, operational efficiency, decision support systems, and industrial applications, mainly within large organizations where technological infrastructure and financial resources enabled digital innovation (Raisch & Krakowski, 2021). Small businesses and women-led enterprises received comparatively little scholarly at-

tion, creating a noticeable gap in entrepreneurship research.

Following the emergence of Industry 4.0 and digital entrepreneurship, scholars began recognizing AI as a strategic enabler for entrepreneurial growth. AI-driven customer analytics, predictive modelling, intelligent marketing systems, automated financial management, and digital platforms expanded entrepreneurial opportunities for small businesses operating in highly competitive markets (Verhoef et al., 2021). This shift redirected research attention from technology adoption alone toward technology-enabled value creation and business sustainability.

More recently, sustainability has become an integral component of AI-enabled entrepreneurship research. The growing emphasis on Environmental, Social, and Governance (ESG) principles and the United Nations Sustainable Development Goals (SDGs) has encouraged researchers to investigate how AI can contribute to responsible innovation, resource optimization, inclusive economic growth, and sustainable business models (United Nations, 2015). Within this broader discourse, women entrepreneurs have increasingly been recognized as important agents of sustainable development due to their contributions to social innovation,

local economic resilience, and community welfare.

Despite this growing interest, the literature remains conceptually fragmented. Most studies investigate AI adoption, digital entrepreneurship, sustainable business, or women entrepreneurship independently rather than examining their combined influence. Recent developments in generative AI, intelligent business analytics, digital ecosystems, and platform-based entrepreneurship have created new opportunities for women entrepreneurs to access global markets, automate routine business activities, improve customer engagement, and develop sustainable competitive advantages. Nevertheless, empirical evidence explaining these relationships remains limited, particularly in developing economies where digital infrastructure, technological readiness, and institutional support vary considerably (OECD, 2023).

Therefore, the present systematic literature review seeks to consolidate this fragmented body of knowledge by synthesizing current evidence, identifying dominant research themes, evaluating methodological developments, and proposing a comprehensive future research agenda for AI-driven sustainable women entrepreneurship.

VII. RESEARCH TRENDS AND EMERGING PERSPECTIVES

The literature on Artificial Intelligence (AI) for sustainable women entrepreneurship has experienced significant growth over the last five years, reflecting the rapid digital transformation of entrepreneurial ecosystems and the increasing emphasis on sustainable development. While early research predominantly examined AI as a technological innovation capable of improving business efficiency and automation, recent studies have expanded this perspective by exploring AI's role in fostering inclusivity, resilience, and sustainable entrepreneurial growth. This shift indicates that AI is no longer viewed merely as a technological tool but as a strategic capability that can transform entrepreneurial decision-making and business sustainability (Dwivedi et al., 2023).

One of the most prominent research trends concerns the adoption of AI-powered digital platforms. Studies suggest that digital platforms equipped with AI technologies enable women entrepreneurs to overcome geographical constraints, improve market accessibility, personalize customer engagement, and optimize business operations through AI-driven recommendation systems, automated CRM, and predictive analytics (Verhoef et

al., 2021). However, the literature also indicates that the benefits of AI adoption are unevenly distributed due to disparities in digital infrastructure, technological literacy, and financial resources.

A second emerging research stream focuses on AI for financial inclusion. Access to finance has consistently been identified as one of the most significant barriers faced by women entrepreneurs. Recent studies demonstrate that AI-enabled fintech solutions including intelligent credit scoring, digital lending platforms, fraud detection systems, and alternative financing models can reduce information asymmetry and expand financial opportunities for underserved entrepreneurs (World Bank, 2023). Despite these advancements, empirical evidence evaluating the long-term sustainability and accessibility of AI-driven financial services for women-owned enterprises remains limited.

Researchers have also increasingly emphasized the relationship between AI and sustainable business practices. AI technologies are being applied to optimize resource utilization, reduce operational waste, improve energy efficiency, and support environmentally responsible decision-making applications that align closely with the principles of sustainable entrepreneurship (Shepherd & Patzelt,

2011). Nevertheless, most existing studies focus on large organizations, while AI-enabled sustainability practices among micro, small, and women-owned enterprises remain comparatively underexplored.

A relatively recent development in the literature is the emergence of Generative Artificial Intelligence, including large language models and AI-assisted content generation tools. These technologies have introduced new opportunities for entrepreneurs by simplifying marketing communication, customer support, product innovation, and strategic planning. Women entrepreneurs, particularly those operating small digital businesses, increasingly utilize generative AI to reduce operational costs, enhance productivity, and improve customer engagement (Dwivedi et al., 2023). However, researchers have simultaneously raised concerns regarding algorithmic bias, ethical governance, intellectual property protection, and responsible AI deployment.

Another notable trend involves the integration of AI with sustainability frameworks and Environmental, Social, and Governance (ESG) initiatives. Scholars increasingly argue that AI should be developed and implemented responsibly to ensure that technological advancement contributes to inclusive economic growth

rather than reinforcing existing inequalities a perspective particularly relevant for women entrepreneurs, who often face structural disadvantages in accessing advanced technologies and digital resources (UN Women, 2024).

Overall, the literature demonstrates that research on AI-driven sustainable women entrepreneurship is evolving from isolated investigations of technology adoption toward a more integrated understanding of digital innovation, social inclusion, sustainable development, and entrepreneurial resilience. Nevertheless, considerable fragmentation remains regarding theoretical perspectives, empirical evidence, and policy recommendations, highlighting the need for a systematic synthesis of existing knowledge to establish a coherent research agenda for future studies.

VIII. METHODOLOGY

8.1 Research Design

This study adopts a Systematic Literature Review (SLR) approach to synthesize the existing body of knowledge on Artificial Intelligence for Sustainable Women Entrepreneurship. Unlike traditional narrative reviews, an SLR follows a transparent, rigorous, and reproducible process for identifying, selecting, evaluating, and synthesizing relevant

studies (Tranfield et al., 2003). The systematic approach minimizes selection bias and provides a comprehensive understanding of the current state of research while identifying gaps that require further investigation.

To ensure methodological rigor and transparency, the review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) framework proposed by Page et al. (2021). PRISMA provides a structured protocol for literature identification, screening, eligibility assessment, and final study selection, thereby improving the reliability and reproducibility of review findings.

8.2 Review Protocol

The review protocol was developed before the literature search to ensure consistency throughout the review process. The protocol defined the review objectives, research questions, search strategy, inclusion and exclusion criteria, quality assessment procedure, and data extraction framework. Following an established protocol reduces researcher bias and enhances the credibility of systematic review studies (Snyder, 2019).

The review process consisted of four sequential stages, implemented in

accordance with the PRISMA 2020 guidelines:

Literature Identification

Screening of Records

Eligibility Assessment

Final Inclusion for Qualitative Synthesis

8.3 Data Sources

To ensure comprehensive coverage of high-quality academic literature, the review primarily considered studies indexed in internationally recognized databases:

Scopus

Web of Science (Core Collection)

These databases were selected because they provide extensive coverage of peer-reviewed journals in business, management, entrepreneurship, information systems, and sustainability research. Previous methodological studies have recommended Scopus and Web of Science as the most reliable databases for conducting systematic literature reviews due to their high indexing standards and broad disciplinary coverage (Mongeon & Paul-Hus, 2016).

To ensure the inclusion of recent developments in Artificial Intelligence, the literature search focused on publications from 2015 to 2026, capturing the rapid evolution of AI technologies, digital entrepr

neurship, and sustainable business practices.

8.4 Search Strategy

A comprehensive keyword search was performed using Boolean operators (AND, OR) to retrieve relevant publications. The primary search string was structured as follows:

("Artificial Intelligence" OR "AI" OR "Machine Learning" OR "Generative AI") AND ("Women Entrepreneurship" OR "Female Entrepreneurship" OR "Women Entrepreneurs") AND ("Sustainability" OR "Sustainable Entrepreneurship" OR "Sustainable Business")

Additional keywords such as digital transformation, innovation, inclusive growth, and women-owned enterprises were incorporated during the search process to improve database coverage. The search was limited to:

Peer-reviewed journal articles

English-language publications

Business, Management, Economics, Information Systems, and Sustainability subject areas

Conference proceedings, editorials, book reviews, dissertations, and non-peer-reviewed documents were excluded to maintain academic quality.

8.5 Inclusion and Exclusion Criteria

Predefined inclusion and exclusion criteria were established before the screening process to ensure quality, relevance, and consistency, minimizing researcher bias

and enhancing transparency and reproducibility (Page et al., 2021 , Tranfield et al., 2003).

Table 1: Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Publication Type	Peer-reviewed journal articles	Conference abstracts, editorials, books, dissertations, working papers
Language	English	Non-English publications
Database	Scopus and Web of Science	Google Scholar only, non-indexed journals
Time Period	2015–2026	Publications before 2015
Subject Area	Business, Management, Entrepreneurship, Sustainability, Information Systems, Economics	Medicine, Engineering, Physics, unrelated disciplines
Research Focus	Artificial Intelligence, Women Entrepreneurship, Sustainable Entrepreneurship, Digital Innovation	Studies unrelated to AI or women entrepreneurship
Accessibility	Full-text available	Abstract only or inaccessible publications

The inclusion criteria focused on identifying peer-reviewed studies that directly addressed the application of Artificial Intelligence in women entrepreneurship, sustainable entrepreneurship, digital entrepreneurship, innovation, or related interdisciplinary fields. Only studies published in English and indexed in Scopus or Web of Science were considered

to ensure the inclusion of high-quality scholarly evidence.

Conversely, publications that lacked relevance to the research objectives or failed to meet methodological standards were excluded. Conference abstracts, editorials, book reviews, dissertations, magazine articles, working papers, and non-peer-reviewed documents were omitted because they generally do

not undergo rigorous peer-review processes.

8.6 Study Selection Process

The study selection process followed the PRISMA 2020 four-stage framework (Page et al., 2021):

Identification: Records were retrieved from Scopus and Web of Science using predefined search strings. Duplicate records were identified and removed prior to screening.

Screening: The titles and abstracts of all retrieved articles were independently assessed against the inclusion and exclusion criteria. Studies clearly unrelated to AI, women entrepreneurship, or sustainability were excluded.

Eligibility: The remaining articles progressed to full-text examination. Articles were excluded if they lacked empirical or conceptual relevance, did not focus on AI-enabled entrepreneurship, or failed to provide sufficient methodological information.

Inclusion: Studies meeting all eligibility requirements were included in the qualitative synthesis, forming the basis for thematic analysis, identification of research trends, theoretical synthesis, and the development of future research directions.

Each stage of article selection was documented to ensure transparency and reproducibility, consistent with PRISMA recommendations.

8.7 Data Extraction and Analysis Procedure

Following the final selection of eligible studies, a structured data extraction process was undertaken to ensure consistency, transparency, and comparability across the reviewed articles. A standardized data extraction form was developed based on the recommendations of Tranfield et al. (2003) and PRISMA 2020 guidelines (Page et al., 2021).

For every article included in the review, the following information was extracted: publication year, journal name, country of study, research objectives, research methodology, theoretical framework, sample characteristics, AI technology examined, sustainability dimension, key findings, and future research recommendations.

The extracted studies were subsequently analysed using a thematic synthesis approach (Braun & Clarke, 2006), which proceeded in three sequential stages:

Familiarization selected articles were read in detail to understand their research objectives, methodologies, and findings.

Open Coding similar concepts and recurring ideas were grouped into preliminary categories.

Theme Refinement categories were refined into broader research themes representing the dominant areas of scholarly investigation within AI-driven sustainable women entrepreneurship.

Based on this synthesis, the review identified several major thematic areas, including AI adoption and digital transformation, AI-enabled business innovation, financial inclusion through AI, digital skills and capacity building, sustainable business practices, ethical AI governance, collaborative digital ecosystems, policy and institutional support, and barriers to AI adoption. These themes constitute the analytical framework presented in the following section.

IX. THEMATIC SYNTHESIS OF THE LITERATURE

9.1 Theme 1: AI Adoption and Digital Transformation among Women Entrepreneurs

The first and most foundational theme emerging from the reviewed literature concerns the broad adoption of AI technologies as part of women entrepreneurs' digital transformation journey. Studies consistently show that AI adoption among women-led enterprises

follows a gradual trajectory, beginning with basic digital tools (social media marketing, e-commerce platforms) and progressing toward more sophisticated AI applications such as predictive analytics, automated customer service, and intelligent inventory management (Verhoef et al., 2021).

The literature identifies several determinants of AI adoption specific to women entrepreneurs, including perceived usefulness, cost of implementation, digital literacy, and the availability of supportive digital infrastructure. Notably, adoption rates vary considerably by business size and sector: women-led micro-enterprises in retail and services show faster adoption of consumer-facing AI tools (chatbots, recommendation engines), while adoption of back-end AI systems (supply chain optimization, financial forecasting) remains comparatively limited due to cost and technical complexity (Raisch & Krakowski, 2021).

A recurring finding is that AI adoption is not merely a technological decision but a strategic one, closely tied to entrepreneurs' broader digital transformation goals. Women entrepreneurs who view digital transformation as central to business strategy rather than as an optional add-on report significantly higher and more sustained AI adoption (Dwivedi et al., 20

23). However, the pace of this transformation remains uneven across regions: entrepreneurs in developed economies benefit from mature digital ecosystems and government-backed digitalization programmes, while those in developing economies often adopt AI tools informally, through low-cost mobile applications, without structured digital transformation strategies (OECD, 2023).

Overall, this theme establishes AI adoption as the entry point through which women entrepreneurs engage with the broader opportunities and challenges discussed in the subsequent themes.

9.2 Theme 2: Artificial Intelligence and Digital Innovation for Women Entrepreneurs

Digital innovation has become one of the most significant drivers of entrepreneurial competitiveness, and AI is increasingly recognized as the core technology accelerating this transformation. The reviewed literature indicates that AI-enabled digital innovation extends beyond process automation by enabling women entrepreneurs to redesign business models, improve customer experiences, strengthen market responsiveness, and develop data-driven strategies. Rather than functioning solely as an operational tool, AI has evolved into a strategic asset that supports

entrepreneurial innovation and long-term business sustainability (Nambisan et al., 2019, Verhoef et al., 2021).

Several studies find that digital innovation enables women entrepreneurs to overcome structural barriers traditionally associated with entrepreneurship, including limited physical infrastructure, restricted business networks, and geographical isolation. AI-powered digital platforms facilitate access to online marketplaces, cloud-based business solutions, digital payment systems, and virtual customer support, thereby reducing transaction costs and expanding market opportunities (OECD, 2023). Another emerging trend is the rapid growth of AI-enabled digital payment ecosystems digital wallets, intelligent payment gateways, fraud detection systems, and automated accounting applications which are particularly valuable for women-led micro and small enterprises that frequently encounter challenges associated with cash-based transactions and limited accounting capabilities.

However, the literature notes that the benefits of AI-enabled innovation are unevenly distributed. Digital and technical literacy gaps, limited access to capital for technology investment, and disparities in broadband and mobile connectivity continue to constrain the extent to which

women entrepreneurs can translate AI-enabled innovation into measurable competitive advantage. Most existing evidence is also concentrated in urban and developed-economy contexts, leaving the innovation dynamics of rural and informal women-led enterprises comparatively underexplored.

9.3 Theme 3: AI-Enabled Financial Inclusion and Access to Finance

Access to finance has consistently been identified as one of the most significant barriers faced by women entrepreneurs, and a substantial stream of literature examines how AI is reshaping this landscape. Recent studies demonstrate that AI-enabled fintech solutions including intelligent credit scoring, digital lending platforms, fraud detection systems, and alternative financing models can reduce information asymmetry and expand financial opportunities for underserved entrepreneurs (World Bank, 2023, Bazarbash, 2019).

Despite these advancements, the literature also highlights persistent barriers limiting the effectiveness of AI-driven financial inclusion. Digital literacy remains a critical concern, particularly among women entrepreneurs operating in rural and semi-urban regions where technological awareness and internet accessibility remain

limited. In addition, concerns regarding data privacy, cybersecurity, algorithmic transparency, and potential biases in AI-based credit scoring systems have generated increasing scholarly attention (Raisch & Krakowski, 2021): if AI models are trained on historically biased financial data, they may unintentionally reinforce existing inequalities rather than eliminate them.

The synthesis of the reviewed studies reveals three dominant perspectives: one views AI primarily as a technological solution for improving credit assessment (Bazarbash, 2019), a second emphasizes financial inclusion, arguing that AI can reduce traditional barriers to entrepreneurial finance (World Bank, 2023), and a third adopts a critical governance lens, highlighting concerns about algorithmic bias and digital inequality (Raisch & Krakowski, 2021). Very few studies integrate these technological, financial, and social dimensions into a single analytical framework, and empirical evidence remains concentrated in developed economies despite the rapid growth of digital financial inclusion initiatives in countries such as India, Bangladesh, Kenya, and Nigeria.

9.4 Theme 4: AI for Digital Skills, Capacity Building, and Entrepreneurial Empowerment

The successful adoption of AI by women entrepreneurs depends not only on technological availability but also on the development of digital competencies and entrepreneurial capabilities. Across the reviewed literature, digital skills have emerged as one of the most influential determinants of AI adoption, innovation, and sustainable business growth (European Commission, 2022). The literature consistently indicates that women entrepreneurs experience a greater digital skills gap than their male counterparts, particularly in developing economies, due to limited exposure to advanced technologies, inadequate access to technical education, and socio-cultural constraints (UN Women, 2024).

Several studies argue that AI itself can contribute to entrepreneurial learning by providing intelligent learning platforms, virtual mentoring systems, personalized business coaching, and AI-assisted decision-support tools, enabling entrepreneurs to acquire business knowledge without requiring extensive formal training (OECD, 2023). Generative AI in particular through conversational systems, automated content creation, translation tools, and business planning assistants is increasingly supporting women entrepreneurs in product development, customer communication, and digital branding, there

by democratizing access to business knowledge (Dwivedi et al., 2023).

However, technological access alone does not guarantee meaningful AI adoption: effectiveness depends on entrepreneurs' ability to critically evaluate AI-generated outputs and integrate technological insights into strategic decision-making (Van Laar et al., 2020). The literature further suggests that governments, universities, incubators, and entrepreneurship development institutions play an essential role in strengthening AI readiness through digital training programmes and technology incubation. Nevertheless, most studies evaluate digital skills independently from business sustainability outcomes, and few examine how AI competencies jointly influence innovation capability, resilience, and long-term entrepreneurial success particularly in developing-country contexts.

9.5 Theme 5: Artificial Intelligence as a Catalyst for Sustainable Business Practices

Sustainability has become a central objective of modern entrepreneurship, and AI has emerged as a transformative technology capable of supporting sustainable business practices through intelligent decision-making, resource optimization, and innovation. The reviewed literature indicates that AI enable

s women entrepreneurs not only to improve business performance but also to integrate sustainability principles into their business models, thereby creating long-term economic, social, and environmental value (Shepherd & Patzelt, 2011, Elkington, 1997).

A dominant finding is that AI enhances resource efficiency, enabling entrepreneurs to optimize inventory management, reduce operational waste, and streamline supply chains through demand forecasting and predictive analytics capabilities particularly beneficial for women-owned micro and small enterprises, where efficient resource management directly influences profitability (Raisch & Krakowski, 2021). AI-enabled monitoring systems also support environmental sustainability by analysing energy consumption, carbon emissions, and resource utilization patterns (Vinuesa et al., 2020). Beyond environmental outcomes, AI-powered digital platforms improve market accessibility and financial inclusion, contributing to broader social objectives such as gender equality and inclusive economic participation, consistent with the United Nations SDGs (United Nations, 2015).

Despite these opportunities, the literature identifies growing concerns regarding algorithmic transparency, data privacy,

cybersecurity, and the energy consumption of AI systems themselves. Scholars increasingly argue that sustainable entrepreneurship requires responsible AI technological innovation aligned with ethical principles and environmental accountability rather than efficiency alone (Floridi & Cowls, 2019). A further limitation is the absence of standardized frameworks for measuring the sustainability outcomes of AI adoption: most existing studies evaluate financial or technological performance independently, while very few assess the integrated impact of AI on economic viability, environmental stewardship, and social inclusion simultaneously a gap that is especially pronounced for women-led SMEs in emerging economies.

9.6 Theme 6: Ethical Artificial Intelligence and Responsible Innovation

The rapid adoption of AI has created unprecedented opportunities for entrepreneurial growth, but alongside these opportunities, researchers increasingly emphasize the importance of ethical AI governance to ensure that technological advancement promotes fairness, transparency, accountability, and inclusivity. Within sustainable women entrepreneurship, responsible AI has emerged as a critical determinant of whether technological innovation contributes to equitable business development or

reinforces existing socio-economic inequalities (Floridi & Cowls, 2019).

Algorithmic bias is one of the most frequently discussed ethical challenges: because AI systems learn from historical data, and if that data reflects existing gender inequalities, AI models may perpetuate rather than eliminate discrimination a concern particularly relevant in financial technologies, recruitment systems, and digital marketplaces where automated decisions directly influence entrepreneurial opportunities (UNESCO, 2021). Data privacy and cybersecurity are equally significant concerns, since women entrepreneurs operating small enterprises often lack the technical infrastructure and expertise needed to protect sensitive business data (OECD, 2024).

The literature also highlights the growing relevance of Explainable AI (XAI), which seeks to make "black-box" AI systems more interpretable so entrepreneurs can understand and trust AI-generated recommendations (European Commission, 2024), and of Responsible Innovation, which argues that technological development should anticipate societal consequences and align with ethical, environmental, and social values (Stilgoe, Owen, & Macnaghten, 2013). Despite this growing discourse, ethical AI remains one of the least empirically explored dimensions of

women entrepreneurship research: most studies prioritize technological adoption and business performance while paying comparatively little attention to governance mechanisms and how women entrepreneurs themselves perceive AI-related risks. Scholars differ on implementation priorities some emphasize technical solutions (bias-detection algorithms, explainability tools), while others stress policy reform and institutional governance suggesting that responsible AI is best understood as a multidimensional ecosystem involving technology developers, policymakers, financial institutions, educators, and entrepreneurs together.

9.7 Theme 7: AI, Digital Ecosystems, and Collaborative Networks

The emergence of digital ecosystems has transformed the entrepreneurial landscape by enabling businesses to access knowledge, technology, financial resources, and global markets through interconnected digital platforms. AI has further strengthened these ecosystems by facilitating intelligent collaboration, knowledge sharing, and strategic networking among entrepreneurs, helping women entrepreneurs overcome traditional barriers associated with market access, information asymmetry, and business networking (Nambisan et al., 2019).

AI enhances stakeholder interactions within these ecosystems by analysing user behaviour, recommending strategic partnerships, matching entrepreneurs with funding opportunities, and improving communication across entrepreneurial networks (Verhoef et al., 2021). Online marketplaces, digital incubation platforms, and AI-supported mentoring programmes allow women entrepreneurs to collaborate with experts and access international markets without extensive physical infrastructure (OECD, 2023), while intelligent recommendation systems support continuous learning by connecting entrepreneurs with relevant training and domain expertise. Women entrepreneurs participating in digitally connected innovation ecosystems often demonstrate higher levels of adaptability, creativity, and business sustainability than those operating in traditional entrepreneurial environments (Autio et al., 2018).

Despite these opportunities, digital inequality, inadequate technological infrastructure, limited AI literacy, and unequal access to innovation networks continue to restrict participation, particularly in developing countries, and concerns regarding platform dependency, data governance, and unequal digital visibility remain insufficiently addressed (UNCTAD, 2024). Current research predominantly e

xamines AI technologies or entrepreneurial ecosystems independently, comparatively few studies investigate how AI-powered collaborative ecosystems influence entrepreneurial resilience, sustainable performance, and women's economic empowerment simultaneously, and empirical evidence remains heavily concentrated in developed economies.

9.8 Theme 8: Policy, Institutional Support, and AI Readiness

AI adoption among women entrepreneurs is influenced not only by technological capability but also by the broader institutional and policy environment. AI readiness should therefore be understood as a multidimensional concept encompassing technological preparedness, institutional support, regulatory frameworks, and entrepreneurial capability not merely the availability of digital tools (OECD, 2023).

Governments play a pivotal role through national AI strategies, digital transformation initiatives, innovation grants, and entrepreneurship development programmes, countries with well-defined AI policies and strong digital infrastructure tend to show higher levels of entrepreneurial innovation and technology adoption among SMEs, though many developing economies continue to experience uneven access to these reso

urces (World Bank, 2023). Institutional support also extends beyond government: universities, incubators, accelerators, and industry associations provide AI training, mentoring, and access to technological expertise that strengthen entrepreneurs' confidence in adopting AI-based solutions (Autio et al., 2018).

At the organizational level, AI readiness refers to the extent to which an enterprise possesses the technological infrastructure, skilled workforce, leadership commitment, and data capabilities necessary for successful AI implementation, women-owned SMEs frequently face challenges achieving this readiness due to financial limitations and insufficient digital infrastructure (Raisch & Krakowski, 2021). Clear regulatory policies on data governance, cybersecurity, and ethical AI are equally essential for building entrepreneurs' trust and encouraging responsible innovation, since uncertain regulatory frameworks may discourage AI investment, particularly among small enterprises with limited capacity to manage legal and technological risk (UNESCO, 2021). The literature reveals considerable disparities in institutional support across geographical regions, with research from emerging economies reporting fragmented policy implementation, limited AI-awareness

programmes, and restricted access to digital innovation ecosystems. Most existing studies examine policy interventions, AI readiness, or digital infrastructure independently, whereas few develop integrated models linking institutional quality, AI capability, and sustainability outcomes together.

9.9 Theme 9: Barriers and Challenges to AI Adoption among Women Entrepreneurs

Although AI offers significant opportunities for improving entrepreneurial performance and sustainability, the reviewed literature consistently demonstrates that women entrepreneurs continue to face multiple, interacting barriers spanning economic, institutional, social, educational, and ethical dimensions (Raisch & Krakowski, 2021).

The most frequently reported barrier is limited digital literacy and AI competency: women entrepreneurs, particularly those operating micro and small enterprises, often possess limited technical knowledge regarding AI applications and data analytics, which reduces their confidence in adopting AI technologies (Van Laar et al., 2020). Financial constraints represent another major challenge, since implementing AI solutions requires

investment in software, cloud infrastructure, and cybersecurity, and women-owned enterprises often face greater difficulty obtaining external finance due to restricted collateral and gender-related bias within financial institutions (Jennings & Brush, 2013). Organizational barriers are also significant: many women-led enterprises operate with limited human resources and informal management structures, making complex AI implementation difficult without organizational learning and leadership commitment (Teece, Pisano, & Shuen, 1997).

Infrastructure-related challenges remain particularly significant in developing economies, where limited internet connectivity, unreliable electricity supply, and unequal access to advanced technologies constrain adoption. Rural entrepreneurs are especially disadvantaged because digital infrastructure and technological support services are often concentrated in urban regions (OECD, 2023). Trust and perceived risk further compound these barriers: the "black-box" nature of many AI systems reduces entrepreneurs' confidence in automated decision-making, particularly where financial or legal consequences are involved (Floridi & Cowls, 2019), while underdeveloped AI governance frameworks in many developing countries

leave entrepreneurs with limited policy guidance on implementation, data protection, and ethical standards (UNESCO, 2021).

Critically, these barriers rarely occur independently: technological, financial, organizational, institutional, and socio-cultural factors interact to shape AI adoption decisions. Yet existing research generally examines them separately, leaving limited evidence on how these constraints collectively affect sustainable entrepreneurial outcomes. Overcoming these barriers requires a holistic approach combining digital capacity building, financial inclusion, supportive public policy, and ethical AI governance.

9.10 Theme 10: Artificial Intelligence and Entrepreneurial Resilience

Entrepreneurial resilience has become an increasingly important research area as businesses face economic uncertainty, technological disruption, climate-related risks, and global crises. The reviewed literature suggests that AI is emerging as a strategic capability that enhances entrepreneurial resilience by enabling adaptive decision-making, improving business continuity, and strengthening organizational responsiveness. Tools that are particularly valuable for women entrepreneurs, who often operate under

greater financial and institutional constraints (Raisch & Krakowski, 2021).

AI significantly improves resilience through predictive analytics: AI-driven forecasting models help entrepreneurs identify demand fluctuations, monitor market trends, and anticipate supply-chain disruptions, supporting proactive rather than reactive decision-making (Verhoef et al., 2021). AI also enhances organizational agility intelligent automation and cloud-based business systems reduce response time and increase flexibility (Dwivedi et al., 2021) and played a documented role in crisis management during the COVID-19 pandemic, when digitally enabled businesses recovered more rapidly than those dependent on conventional models through AI-supported digital commerce and virtual service delivery (OECD, 2023).

Resilience, in this literature, extends beyond economic performance to include social and environmental sustainability, as AI helps entrepreneurs optimize resource allocation and strengthen stakeholder relationships (Shepherd & Patzelt, 2011). However, several studies caution that resilience cannot be achieved through technology alone organizational learning, entrepreneurial leadership, and access to financial resources remain essential complementary factors, and women entrepreneurs in resource-constrained

environments often struggle to develop these complementary capabilities (Teece, 2007). Empirical evidence linking AI adoption directly to entrepreneurial resilience among women-owned enterprises specifically remains limited, and resilience outcomes are rarely measured using standardized indicators, creating inconsistency across studies. Overall, the literature converges on the view that resilience should be conceptualized as a multidimensional capability arising from the interaction of technological, organizational, and institutional factors, rather than from AI adoption alone.

X. RESEARCH GAPS

The systematic review of the existing literature reveals that although significant progress has been made in understanding the role of Artificial Intelligence (AI) in entrepreneurship and sustainability, several conceptual, theoretical, methodological, contextual, and practical gaps remain unresolved.

Conceptual Gaps - The most significant gap is the absence of a comprehensive conceptual framework integrating AI, women entrepreneurship, and sustainability. Existing studies generally examine these constructs independently AI adoption within digital transformation research, women

entrepreneurship through socio-economic and gender perspectives, and sustainability through environmental or corporate-responsibility lenses leaving the literature without an integrated theoretical model explaining how AI simultaneously influences entrepreneurial innovation, women's empowerment, and sustainable business performance. Definitions of "AI adoption" itself also remain inconsistent across studies, complicating comparison.

Theoretical Gaps - The review indicates an overreliance on a limited set of theories the Technology Acceptance Model (TAM), the Technology–Organization–Environment (TOE) Framework, the Resource-Based View (RBV), and Diffusion of Innovation (DOI) Theory which explain technology adoption but offer limited insight into gender-specific entrepreneurial behaviour and sustainability outcomes. Theories such as Institutional Theory, Dynamic Capabilities Theory, Stakeholder Theory, and Social Capital Theory remain underutilized despite their relevance to entrepreneurial resilience and sustainable innovation.

Methodological Gaps - The literature is dominated by cross-sectional quantitative surveys, with relatively few longitudinal, mixed-method, or qualitative investigations, limiting understanding of how AI

adoption evolves over time. Most empirical studies also rely on small samples from single industries or countries, restricting generalizability, and few employ advanced analytical techniques such as longitudinal structural equation modelling, fsQCA, or multi-level modelling.

Geographical Gaps - Most empirical studies originate from developed economies (the United States, United Kingdom, Germany, Australia, China), while evidence from South Asia, Africa, and Latin America remains comparatively limited despite these regions experiencing rapid digital transformation and significant growth in women-led enterprises. Countries such as India, Bangladesh, Nepal, Kenya, and Nigeria remain substantially underrepresented, meaning existing findings may not accurately reflect the institutional, cultural, and economic realities of emerging markets.

Sectoral Gaps - Most reviewed studies investigate AI adoption within technology-intensive industries (manufacturing, finance, IT, e-commerce), while women entrepreneurs operating in agriculture, rural enterprises, handicrafts, tourism, healthcare, social enterprises, and creative industries receive comparatively limited attention.

Policy and Governance Gaps - Although many studies acknowledge the importance of government support, relatively few investigate the actual effectiveness of AI policies, digital entrepreneurship programmes, financial incentives, and regulatory frameworks designed specifically for women entrepreneurs, ethical AI governance, algorithmic accountability, and cybersecurity preparedness remain similarly underexplored.

Sustainability Measurement Gaps - Most existing studies evaluate AI adoption using indicators such as business performance, productivity, innovation capability, and customer satisfaction, while comparatively few assess environmental sustainability, social inclusion, women's empowerment, community development, long-term resilience, or SDG contributions. The absence of standardized sustainability indicators makes cross-study comparison difficult.

Integrated Research Gap - Taken together, AI, sustainability, and women entrepreneurship have evolved as interconnected but largely independent research domains, and there is currently no widely accepted framework explaining how AI capabilities interact with entrepreneurial competencies, institutional support, digital readiness, and sustainability practices to generate sustainable business outcomes for women-owned

enterprises. Addressing this integrated gap represents the most significant opportunity for future theoretical and empirical advancement.

XI. FUTURE RESEARCH AGENDA

Based on the gaps identified above, this study proposes the following future research agenda to guide scholars, practitioners, and policymakers.

11.1 Development of an Integrated Theoretical Framework- Future research should integrate isolated theories TOE, TAM, RBV with sustainability frameworks and gender-based entrepreneurship theories to explain how AI capabilities contribute to sustainable entrepreneurial outcomes, improving theoretical coherence and cumulative knowledge development.

11.2 Longitudinal Investigation of AI Adoption- Future studies should move beyond cross-sectional designs to examine how AI adoption evolves across different stages of entrepreneurial development, providing deeper insight into its long-term influence on growth, innovation, resilience, and sustainability.

11.3 Comparative Cross-Country Research- Comparative studies across developed and developing countries are needed to examine how institutional

environments, digital infrastructure, cultural context, and public policy jointly influence AI adoption among women entrepreneurs, contributing to a more globally representative understanding.

11.4 AI Readiness and Digital Capability Assessment- Future research should develop standardized measurement frameworks for AI readiness among women-owned enterprises covering digital capability, organizational preparedness, leadership commitment, and data governance to assist policymakers in designing targeted capacity-building initiative

11.5 Artificial Intelligence and the Sustainable Development Goals (SDGs)- Future research should more explicitly examine how AI-enabled entrepreneurship contributes to SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), and SDG 12 (Responsible Consumption and Production), strengthening the link between entrepreneurship research and global sustainability policy.

11.6 Responsible AI and Ethical Governance- Empirical research is needed on how responsible AI governance influences trust, technology adoption, and sustainable business performance among women entrepreneurs across different institutional contexts.

11.7 Emerging AI Technologies and Entrepreneurial Innovation- Future research should move beyond general AI applications to examine emerging technologies specifically Generative AI, Large Language Models, intelligent virtual assistants, and autonomous business systems and their influence on entrepreneurial innovation and sustainability.

11.8 Policy-Oriented and Multi-Stakeholder Research- Future investigations should adopt a broader ecosystem perspective, examining the joint roles of governments, universities, incubators, financial institutions, and technology providers in facilitating AI adoption among women entrepreneurs, generating practical recommendations for strengthening innovation ecosystems and digital inclusion.

Table 2: Future Research Matrix

Research Gap	Future Research Direction	Expected Contribution
Fragmented theories	Develop integrated AI–entrepreneurship–sustainability frameworks	Theory development

Cross-sectional evidence	Conduct longitudinal studies	Understanding long-term AI impact
Limited developing-country evidence	Comparative cross-country research	Greater contextual understanding
Lack of AI readiness measures	Develop AI readiness scales	Practical assessment tools
Weak SDG integration	Link AI adoption with SDGs	Sustainability contribution
Limited ethical research	Study responsible AI governance	Policy and ethical implications
Emerging AI applications	Investigate Generative AI and LLMs	Future technology insights
Limited ecosystem perspective	Multi-stakeholder and policy research	Better institutional recommendations

XII. PROPOSED CONCEPTUAL FRAMEWORK

The systematic review demonstrates that AI contributes to sustainable women entrepreneurship through multiple technological, organizational, and institutional mechanisms. However, the existing literature largely investigates these relationships independently, resulting in fragmented theoretical explanations. Based on the synthesis of the reviewed studies, this review proposes an integrated conceptual framework explaining how AI capabilities influence sustainable entrepreneurial outcomes through digital transformation, innovation, and entrepreneurial capability, while

considering the moderating role of institutional support and AI readiness.

The framework positions Artificial Intelligence Capability an enterprise's ability to acquire, implement, and effectively utilize AI-driven technologies such as machine learning, predictive analytics, intelligent automation, generative AI, and business intelligence systems as the primary antecedent. Organizations with stronger AI capability are expected to show improved decision-making quality, operational efficiency, innovation performance, and customer engagement, thereby strengthening sustainable business development (Dwivedi et al., 2021).

The relationship between AI capability and sustainable entrepreneurial performance is not direct but operates through three mediating mechanisms:

Digital Innovation - enabling women entrepreneurs to redesign business processes, introduce innovative products and services, and improve market responsiveness.

Entrepreneurial Capability - strategic decision-making, opportunity recognition, and adaptive learning that convert technological resources into sustainable competitive advantage.

Business Resilience - organizational flexibility and preparedness for environmental uncertainty, allowing enterprises to sustain long-term growth despite economic or technological disruption.

Two contextual factors are proposed as moderators: AI Readiness (technological infrastructure, organizational culture, digital competencies, and leadership commitment) and Institutional Support (government policy, financial assistance, entrepreneurship programmes, incubators, and regulatory frameworks). These are expected to strengthen or weaken the effectiveness of AI capability in generating sustainable outcomes.

Finally, the framework positions Sustainable Women Entrepreneurship as the ultimate outcome extending beyond financial profitability to include social inclusion, environmental responsibility, business resilience, innovation capability, women's economic empowerment, and long-term organizational sustainability, consistent with the United Nations SDGs.

XIII. THEORETICAL, PRACTICAL, POLICY, AND SOCIETAL IMPLICATIONS

The findings of this systematic literature review contribute to the growing body of knowledge on AI, sustainable entrepreneurship, and women entrepreneurship by providing an integrated understanding of these interconnected domains.

13.1 Theoretical Implications

This review makes several theoretical contributions. First, it consolidates fragmented streams of research on AI, sustainable entrepreneurship, and women entrepreneurship previously examined largely independently into a unified conceptual perspective, advancing the understanding of AI as a strategic capability that simultaneously enhances innovation, resilience, and sustainable entrepreneurial development.

Second, the review extends established theories such as the Resource-Based View (RBV), the Technology-Organization-Environment (TOE) Framework, Dynamic Capabilities Theory, and Institutional Theory by demonstrating that technological capability alone is insufficient for sustainable entrepreneurial success. AI creates value only when combined with organizational readiness, entrepreneurial capability, and supportive institutional environments.

Third, the proposed conceptual framework addresses a significant gap by introducing mediating mechanisms (digital innovation, entrepreneurial capability, business resilience) alongside contextual moderators (AI readiness, institutional support), offering a more comprehensive explanation of AI adoption than traditional technology-acceptance models.

Finally, the review contributes to sustainability research by positioning women entrepreneurs as active contributors to inclusive economic development, demonstrating that AI should be evaluated not solely on technological efficiency but also on its capacity to promote gender equality, social inclusion, and environmental sustainability.

13.2 Practical Implications

For women entrepreneurs, the review shows that AI should be treated as a strategic business resource rather than merely a technological tool. Applications in customer analytics, digital marketing, financial management, and demand forecasting can significantly improve operational efficiency and competitive advantage, though successful adoption requires continuous investment in digital skills and organizational learning.

Business development organizations, incubators, and accelerators should expand AI-focused entrepreneurship training programmes specifically designed for women-owned enterprises, covering machine learning applications, generative AI, digital marketing automation, and AI-assisted business planning.

Technology developers should prioritize affordable, transparent, and user-friendly AI solutions suitable for micro, small, and medium-sized enterprises (MSMEs), since simplified platforms requiring limited technical expertise would encourage wider adoption among women entrepreneurs in resource-constrained environments.

Financial institutions can leverage AI to improve financial inclusion through intelligent credit-assessment systems that reduce information asymmetry, while regularly auditing these systems to minimize

algorithmic bias and ensure equitable lending.

13.3 Policy Implications

Governments and policymakers play a critical role in fostering AI-enabled sustainable women entrepreneurship. National AI strategies should incorporate gender-inclusive policies, financial incentives, tax benefits, and AI-adoption subsidies to reduce technological barriers faced by women-owned enterprises. Governments should also strengthen digital infrastructure particularly broadband connectivity in rural and underserved regions to ensure equitable access to AI-enabled business opportunities.

Educational institutions and universities should integrate AI literacy and digital entrepreneurship into entrepreneurship education programmes, supported by collaboration between universities, industry partners, and government agencies. Policymakers should further establish comprehensive regulatory frameworks governing responsible AI covering algorithmic transparency, data privacy, cybersecurity, and accountability to build trust in AI systems while ensuring technological innovation contributes to inclusive economic development.

13.4 Societal Implications

Beyond business performance, AI-enabled women entrepreneurship has broader societal implications. Increased participation of women in AI-driven entrepreneurship can contribute to employment generation, poverty reduction, digital inclusion, gender equality, and community resilience, accelerating progress toward SDGs related to gender equality, decent work, innovation, and sustainable economic growth. Promoting responsible AI adoption among women entrepreneurs can further reduce digital inequality and strengthen inclusive innovation ecosystems that benefit both local communities and national economies.

XIV. LIMITATIONS OF THE STUDY

While this systematic literature review provides a comprehensive synthesis of existing knowledge on AI for sustainable women entrepreneurship, several limitations should be acknowledged.

First, the review is limited to peer-reviewed journal articles indexed in Scopus and Web of Science, relevant studies published in conference proceedings, books, dissertations, industry reports, and regional journals were excluded, meaning some emerging or practitioner-oriented evidence may not have been captured. Second, the review considered only English-language publications, which may have i

introduced language bias and reduced representation of research from non-English-speaking countries. Third, the review focused on publications between 2015 and 2026, while this captures contemporary AI developments, some earlier foundational studies may not be fully incorporated.

The reviewed literature is also highly heterogeneous in theoretical foundations, methodologies, sectors, and geographical settings – a diversity that enriches the review but limits direct comparison across studies. Additionally, this review adopts a qualitative thematic synthesis rather than a quantitative meta-analysis, meaning it identifies patterns and conceptual relationships but does not estimate statistical effect sizes. Future meta-analytic research could provide stronger empirical evidence on the magnitude of these relationships.

The review further identifies a limited number of studies focusing specifically on women entrepreneurs, as much of the literature investigates AI adoption among SMEs or entrepreneurs generally, requiring careful interpretation when drawing conclusions specific to women-owned enterprises. Finally, given the rapid evolution of Generative AI, Large Language Models, and autonomous AI agents, some very recent technological

developments may not yet be adequately represented in the academic literature, underscoring the need for continuous updates to this review as the field evolves.

Despite these limitations, the review provides a rigorous and transparent synthesis of current knowledge by following the PRISMA 2020 guidelines, offering valuable theoretical insight, practical implications, and future research directions for scholars, practitioners, and policymakers working at the intersection of AI, sustainability, and women entrepreneurship.

XV. CONCLUSION

Artificial Intelligence (AI) has emerged as a transformative force reshaping entrepreneurial ecosystems and creating new opportunities for sustainable business development. This systematic literature review synthesized the existing body of knowledge on AI and sustainable women entrepreneurship, demonstrating that AI is no longer merely a technological innovation but a strategic capability that enables women entrepreneurs to improve decision-making, optimize business operations, enhance customer engagement, and develop sustainable competitive advantages.

The review identified ten dominant research themes spanning AI adoption and

digital transformation, digital innovation, financial inclusion, digital skills and capacity building, sustainable business practices, ethical AI governance, collaborative digital ecosystems, policy and institutional support, adoption barriers, and entrepreneurial resilience. Collectively, these themes indicate that AI has considerable potential to address structural barriers traditionally faced by women entrepreneurs limited access to markets, finance, business networks, and technological expertise but also reveal that successful AI adoption depends on complementary organizational capabilities, digital skills, institutional support, and ethical governance. Technology alone is insufficient to generate sustainable entrepreneurial outcomes without an enabling ecosystem.

A major contribution of this review lies in identifying significant gaps within the existing literature: research remains fragmented across technological, entrepreneurial, and sustainability perspectives, with empirical evidence concentrated in developed economies while research on AI-enabled women entrepreneurship in developing countries remains comparatively limited. To address these gaps, this study proposed an integrated conceptual framework positioning AI capability as a strategic resource influencing sustainable

women entrepreneurship through digital innovation, entrepreneurial capability, and business resilience, while recognizing the moderating role of institutional support and AI readiness providing a foundation for future empirical research employing SEM, PLS-SEM, longitudinal analysis, or mixed-method designs.

From a practical perspective, the findings emphasize the importance of developing AI literacy, strengthening digital infrastructure, promoting financial inclusion, and designing entrepreneurship support programmes specifically tailored for women entrepreneurs requiring coordinated efforts from governments, universities, financial institutions, incubators, and technology providers. Policymakers, in turn, should integrate AI into national entrepreneurship strategies while ensuring ethical governance, algorithmic transparency, data protection, and equitable access to digital technologies, given that AI-enabled women entrepreneurship carries implications well beyond business performance supporting gender equality, economic inclusion, and sustainable development more broadly.

Ultimately, this review reinforces the view that the future of sustainable women entrepreneurship will increasingly depend on the intelligent integration of Artificial Intelligence with entrepreneurial capabilities.

ity, institutional support, and sustainability-oriented business practices. By providing a comprehensive synthesis of the existing literature, identifying critical research gaps, proposing a future research agenda, and developing an integrated conceptual framework, this study establishes a strong foundation for advancing scholarship and practice in the emerging field of AI-driven sustainable women entrepreneurship.

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