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Digitalization effects on women entrepreneurship and Sustaiability: A Systematic Literature Review

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Abstract

Purpose :In this article, we intend to examine how the digital revolution enables women entrepreneurs to overcome social barriers and participate more comprehensively in the entrepreneurial ecosystem. This article focuses on how technological advancements such as social media, Internet of Things, and various digital tools help women's entrepreneurship, foster innovation, sustainability, community development, and economic growth.

Method :The study uses a rigorous methodology, which integrate a systematic literature review and bibliometric analysis. This process includes comprehensive keyword identification, database selection and a targeted search strategy using the Scopus database. From this search, 97 relevant articles were first identified, of which 32 articles met the inclusion criteria after full review. Data extracted from these articles included author details, publication specifications, citation criteria, and key findings.

Findings/Contribution: These findings underscore the beneficial impact of digital technology on women's entrepreneurship and its capacity to foster a sustainable future.

Keywords: Digitalization, Women's Entrepreneurship, social media, Digital Technologies, Sustainability, Social Sustainability, Female-led Business, Female's Entrepreneurship, Environmental Sustainability, Economic Sustainability,.

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1. Introduction

In entrepreneurship, women represent a significant marginalized group (Cowden et al., 2023). Historically, women have faced oppression from various institutional forces rooted in socio-cultural norms, which shape societal attitudes and beliefs (Bendell et al., 2020; Anglin et al., 2018). These norms have imposed specific behavioural expectations on women, known as gender roles, which have restricted their participation across various fields (Yang et al., 2020). For example, women have often been perceived as lacking essential entrepreneurial

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traits such as aggressiveness, competitiveness, and risk-taking (Javadian et al., 2021). Consequently, women aspiring to entrepreneurship encounter numerous challenges, including limited access to resources and established networks (Gupta et al., 2009; Frydrych et al., 2014). However, DT has "changed the rules of the game," enabling women to overcome these barriers (Kelly & McAdam, 2023).

Building on prior research, digital technology serves as an emancipatory and democratizing force (Gregori & Holzmann, 2020). It empowers women entrepreneurs to transcend long-standing institutional barriers, creating a more level playing field. DT allows female entrepreneurs to seize new opportunities and develop innovative solutions to their challenges (Kelly & McAdam, 2022). For instance, crowdfunding platforms enable women to bypass financial barriers and attract global investors (Cumming et al., 2024; Huo et al., 2024). Additionally, DT enhances the visibility and legitimacy of female entrepreneurs, essential for market presence (Fine, 2017; Kang, 2022). Thus, DT not only facilitates a more equitable entrepreneurial environment but also promotes sustainability (Santos et al., 2023).

Literature on sustainability identifies three interconnected subsets: economic, social, and environmental (Shepherd & Patzelt, 2011). Environmental sustainability involves meeting current needs without compromising future generations (United Nations, 1987). Women's inherent "ethic of care," characterized by interdependence, compassion, expressiveness, and caregiving, positions them to address ecological concerns effectively (Zelezny et al., 2000; Sharma et al., 2023).

Social sustainability, the second pillar, is significantly linked to women's entrepreneurship. Empowering women in business drives innovation and adaptability, crucial for sustainable development (Sharma et al., 2024). Women entrepreneurs are more likely to incorporate social and environmental considerations into their ventures, promoting community development and gender equality (Salamzadeh et al., 2022). This focus on social impact enhances societal stability and equity (Chopra et al., 2024). By removing barriers to female entrepreneurship, societies can foster a sustainable future for all (Dana, Salamzadeh, Hadizadeh, et al., 2022a).

The third pillar, economic sustainability, is also bolstered by women's entrepreneurship. Empowering women in business unlocks significant potential, fostering economic growth and innovation (Salamzadeh et al., 2023a). Women-led enterprises not only generate jobs and income but also emphasize social and environmental responsibility (Khoo et al., 2023; Sun et al., 2020). Their innovative approaches contribute to economic diversification and resilience, reducing sectoral dependence (R. U. Khan et al., 2021). Additionally, women-led businesses help reduce poverty and create wealth, promoting a more equitable and sustainable economic landscape (Frydrych et al., 2014).

However, there is ongoing scholarly debate regarding the relationship between entrepreneurship and sustainability (Shepherd and Patzelt, 2011). Some studies suggest that entrepreneurship identifies and addresses problems in the environment, society, and economy, paving the way for sustainability improvements (Dean & McMullen, 2007). Conversely, other studies argue that while

entrepreneurship offers numerous benefits, it can also lead to the depletion of non-renewable resources, greenhouse gas emissions, and societal stratification (Sun et al., 2020). This debate is particularly pronounced when focusing on women's entrepreneurship.

In connecting the important subjects of digital technology and female entrepreneurship, this study seeks to examine the relationship between digital technology and sustainability in the context of women's entrepreneurship. Specifically, this research seeks to answer the following questions: (1) How does digital technology empower women entrepreneurs to overcome traditional socio-cultural and institutional barriers? (2) How does women's entrepreneurship contribute to the three pillars of sustainability: economic, social, and environmental? (3) What is the role of digital technology in shaping the relationship between women's entrepreneurship and sustainability? Through a comprehensive review of existing literature and analysis of selected cases, this study aims to provide a deeper understanding of these critical issues.

To answer the above questions, we aim to synthesize the existing literature on women's entrepreneurship and sustaiability to offer a comprehensive understanding of the topic. Furthermore, we will explore the role digital technology plays in influencing this relationship. However, there is ongoing scholarly debate regarding the relationship between entrepreneurship and sustainability (Shepherd and Patzelt, 2011). Some studies suggest that entrepreneurship identifies and addresses problems in the environment, society, and economy, paving the way for sustainability improvements (Dean & McMullen, 2007). Conversely, other studies argue that while entrepreneurship offers numerous benefits, it can also lead to the depletion of non-renewable resources, greenhouse gas emissions, and societal stratification (Sun et al., 2020). This debate is particularly pronounced when focusing on women's entrepreneurship.
Therefore, further research is needed to elucidate the relationship between entrepreneurship and sustainability, specifically the role of women (Dean & McMullen, 2007; Shepherd & Patzelt, 2011). Achuo et al. (2022) and Jie et al. (2023) call for more investigations to provide a holistic perspective on the relationship between women's entrepreneurship and sustainability pillars.

2. Introduction

2.1. Women Entrepreneurship

Despite significant progress in gender equality, entrepreneurship is still often seen as a predominantly male domain. This perception is closely tied to social norms and expectations that define gender roles (Bendell et al., 2020). Gender congruity theory suggests that individuals who deviate from these established norms risk facing social sanctions and negative evaluations (Boggio et al., 2020; de Los Dolores González & Husted, 2011). When behaviors align with societal expectations

(injunctive norms) and lived experiences (descriptive norms), individuals are perceived more favorably (Yang et al., 2020). However, for women entering entrepreneurship—a field frequently associated with stereotypically masculine traits—achieving this alignment can be challenging. Social identity theory, introduced by Tajfel and Turner (2004), provides additional insight into this phenomenon. People naturally strive to present themselves in ways that align with their social identities (Bendell et al., 2020). Research, such as the Iowa Gambling Task, indicates that these social pressures may influence decision-making strategies, potentially leading to gender differences in entrepreneurial behavior (Cornwall et al., 2018). Furthermore, the ubiquity of gender roles across various institutions, including labor markets, family structures, and academic settings, reinforces the pressure to conform and avoid social sanctions (Bendell et al., 2020; Harrison et al., 2020; Koskinen Sandberg, 2017). The stereotypical image of the successful entrepreneur as aggressive, autonomous, competitive, and risk-taking (Fine, 2017) further disadvantages women in entrepreneurship. These traits often conflict with cultural expectations of femininity, which emphasize compassion, kindness, modesty, and communality (Javadian et al., 2021). This perception can discourage women from pursuing entrepreneurial ventures or compel them to downplay their capabilities to conform to societal expectations. However, this narrative is not immutable. Recent research highlights the unique strengths women bring to entrepreneurship. Studies suggest that women may possess higher emotional intelligence (Hassan & Ayub, 2019), a crucial asset for navigating the complex entrepreneurial landscape. Additionally, emerging research by Cowden et al. (2023) challenges the notion of male dominance in entrepreneurship, indicating that women may even surpass men in this field. These findings pave the way for a future where the entrepreneurial landscape celebrates diversity and recognizes the diverse skill sets that contribute to success, irrespective of gender.

2.2 Digitalization and Women Entrepreneurship

Digital technology, as a transformative force, has revolutionized nearly all domains, including entrepreneurship (Huang et al., 2024). Digital technology (DT) encompasses Artificial Intelligence, cloud computing, the Internet of Things, big data, and social media (Kelly & McAdam, 2022). This technology has shifted business operations from a linear and predictable model to a more dynamic and non-linear approach (Nambisan, 2017). Previous research has highlighted DT as a "game changer" for marginalized and disadvantaged groups, allowing them to bridge the gap with their more privileged counterparts (Dy et al., 2017).

The proliferation of digital tools, including social media, the Internet of Things (IoT), Artificial Intelligence (AI), and 3D printing, has profoundly transformed global markets and social structures, simultaneously unveiling new entrepreneurial opportunities (Gregori & Holzmann, 2020; Huang et al., 2024). Nambisan (2017) argues that digital technology functions as a disruptive force, facilitating a transition from traditional, linear business models to more flexible, unpredictable, non-linear approaches.

Consistent with social inclusion theory, previous research positions digital technology as an equalizing and liberating instrument. It enables underprivileged individuals to narrow the gap with their more advantaged peers (Dy et al., 2017). Gregori & Holzmann (2020) and Holzmann & Gregori (2023) illustrate how digital technologies provide entrepreneurs with innovative solutions to surmount business challenges and improve operational efficiency and effectiveness.

Nambisan (2017) dissects digital technology into three interconnected components: digital artifacts, digital platforms, and digital infrastructures. Digital artifacts, as described by Kelly & McAdam (2022), are standalone applications, services, or media content. Digital platforms, according to Nambisan (2017), serve as shared architectures hosting complementary offerings, including digital artifacts. These platforms afford entrepreneurs unprecedented opportunities to enter new markets, diversify product and service offerings, create customer value, gain a competitive edge, and ultimately engage in a more equitable playing field (Nambisan, 2017). Lastly, digital infrastructure, as outlined by Kelly & McAdam (2022), encompasses the technological equipment and systems that enable collaboration, communication, and computing capabilities.

Women entrepreneurs can harness digital technologies to expand their networks, enhance their knowledge base, circumvent resource constraints, improve productivity, and seize a multitude of opportunities (Bachmann et al., 2024). This utilization fosters a sense of self-efficacy and confidence among female entrepreneurs, ultimately leading to greater participation in entrepreneurial activities and a stronger entrepreneurial intention, paving the way for increased entrepreneurial behavior (Rahman et al., 2023).

It is essential to acknowledge that empowering women's entrepreneurship extends beyond individual benefits. Studies by Khoo et al. (2023), Kamberidou (2020), and Ongo Nkoa & Song (2023) underscore the broader national-level effects. These studies highlight the numerous social and economic advantages associated with women's entrepreneurship, such as job creation, economic growth, and poverty reduction, all of which benefit governments. Despite the compelling case for supporting female entrepreneurs who utilize digital technologies, only 13 developed countries have implemented policy changes that favor women and cultivate a more supportive environment for their digital ventures (Khoo et al., 2023).

2.3 Women Entrepreneurship and Sustainability

Sustainability is defined as meeting the needs of the present population without compromising the ability of future generations to meet their own needs (United Nations, 1987). This concept includes three interconnected components: social, economic, and environmental (Shepherd & Patzelt, 2011). In the following paragraphs, we will explore the connection between female entrepreneurship and

the pillars of sustainability.

2.4 Environmental Sustainability and Women Entrepreneurship

Environmental sustainability involv\es meeting current needs without compromising the ability of future generations to meet their own (Shepherd & Patzelt, 2011). A critical method to achieve this is through pollution prevention, which minimizes environmental harm and safeguards ecosystems (Han et al., 2021). Due to a focus on care, women are often perceived to naturally prioritize the needs of others, a tendency known as the ethic of care. This inclination is likely due to qualities such as cooperation, empathy, communication, and nurturing, which are frequently influenced by societal gender role expectations (Zelezny et al., 2000). Consequently, women possess a significant potential to address environmental issues. Therefore, it can be concluded that women-led businesses have a greater potential to be environmentally friendly.

2.5 Social Sustainability and Women Entrepreneurship

It is undeniable that women, who make up about half of the global population, play a crucial role in social sustainability (Salamzadeh et al., 2023b). Empowering women to become entrepreneurs contributes to the development of a culture of innovation, creativity, and adaptability, which are essential for achieving sustainable development goals (Dana, Salamzadeh, Mortazavi, et al., 2022; Ongo Nkoa & Song, 2023). Successful female entrepreneurs act as role models, inspiring other women and girls to pursue entrepreneurial and leadership roles (Kumar et al., 2020). According to Bachmann et al. (2024), this fosters a sense of self-efficacy and self-confidence among women and girls, thereby enhancing their participation in the entrepreneurial realm. Promoting women's entrepreneurship not only enhances their socio-economic status but also contributes to the overall development of societies (Cowden et al., 2023; Gupta et al., 2009). Additionally, it increases women's financial independence, improves living standards, and enhances decision-making power (Outsios & Farooqi, 2017). Studies have shown that women entrepreneurs are instrumental in job creation, economic growth, and poverty reduction, playing a critical role in social sustainability (Dal Mas & Paoloni, 2020). Furthermore, women entrepreneurs play a vital role in social development by integrating social and environmental concerns into their business activities (Raman et al., 2022). They are more likely to engage in social responsibility initiatives, such as community development projects, environmental conservation efforts, and advocacy for marginalized groups, contributing to the social stability of societies (Kamaludin, 2023). By providing resources such as education, training, and networks, women can benefit from a more equitable playing field and contribute to a more inclusive and socially sustainable society (Al-Qahtani et al., 2022; Ferdousi & Mahmud, 2019).

2.6 Economic Sustainability and Women Entrepreneurship

Women entrepreneurs play a significant role in driving economic development (Figueroa-Domecq et al., 2022). Their involvement unleashes the full potential of communities by stimulating growth, fostering innovation, and creating inclusive economies (Kamaludin et al., 2024). Women are also recognized for their innovative spirit. They bring unique perspectives and devise creative solutions, leading to economic diversification (Kumar & Divya, 2021). This diversification reduces reliance on specific industries, enhancing the adaptability and resilience of economies (Kumar & Divya, 2021; Olaleye et al., 2020). Moreover, women entrepreneurs contribute to wealth generation and poverty alleviation. Their businesses create income for themselves, their families, and their employees, promoting a more equitable and prosperous society (Olaleye et al., 2020). This economic empowerment diminishes income inequality and fosters social cohesion. Despite facing challenges, women entrepreneurs persist and achieve success (Dal Mas & Paoloni, 2020). Eliminating barriers through training, mentorship, and financial support can further unlock their potential and strengthen the connection between women's entrepreneurship and economic sustainability (Jiatong et al., 2021). Additionally, women entrepreneurs are often motivated by social responsibility (Chatzichristos & Nagopoulos, 2020). They prioritize sustainable practices that benefit the environment and communities, thereby contributing to the long-term vitality of the economy and society (Kamaludin et al., 2024)

2.7 Digitalized Women Entrepreneurship and Sustainability

Digital technology (DT) has emerged as a liberating and empowering tool for marginalized groups, particularly women (Kelly & McAdam, 2022). These digital tools provide women with various capabilities. Female entrepreneurs can use DT to navigate the challenges posed by gendered attitudes prevalent in entrepreneurship and develop innovative and sustainable solutions for their business-related issues (Sharma et al., 2023). Historically, gendered beliefs have impeded women's efforts to establish their own businesses (Javadian et al., 2021). Accessing essential resources, established distribution channels, and adequate education has posed challenges for women in the entrepreneurial context. As a result, women have been perceived to run smaller, less profitable businesses in narrower market segments (Javadian et al., 2021; Vershinina et al., 2020). However, DT has empowered them to effectively and efficiently overcome these obstacles (Kelly & McAdam, 2022).

2.8 Digitalized Women Entrepreneurs and Environmental Sustainability

Research demonstrates a robust link between digital technologies and environmental sustainability (Salamzadeh et al., 2022). The integration of these technologies can substantially enhance sustainability by facilitating eco-friendly production processes and models, particularly through artificial intelligence and the synergistic use of various digital tools (Broccardo et al., 2023). Specifically, digital technology can foster the development of

environmentally focused businesses by embedding sustainability into an organization's core identity and operations. This approach transcends traditional optimization, creating value that incorporates ecological, economic, and technological dimensions (Szabó et al., 2023). Furthermore, digital technologies present revolutionary opportunities for environmental monitoring, protection, and the promotion of global sustainability (Rosário & Dias, 2023). Additionally, the implementation of digital technologies in sustainable business models can generate, deliver, and capture value, despite the challenges in their execution (Cricelli & Strazzullo, 2021).

However, digital technologies also present environmental challenges. Data processing and electronic waste production contribute to harmful carbon emissions (Wang et al., 2022). This underscores the necessity for a comprehensive understanding of environmental sustainability in the digital sector, extending beyond mere carbon reduction (Szabó et al., 2023). For instance, Dean & McMullen (2007) illustrate that the application of digital technology in businesses can lead to various environmental issues such as electronic waste, high energy consumption, increased carbon emissions, unequal access (digital divide), job insecurity, growing monopolies, and data protection concerns.

Despite these contentious viewpoints regarding the relationship between digitalization and environmental sustainability, these technologies offer significant advantages for women entrepreneurs striving to create a sustainable and eco-friendly future (Salamzadeh et al., 2022). Women entrepreneurs, due to their inherent eco-friendly characteristics, can leverage digital technologies to develop sustainable products, discover renewable energy sources, and create value through green innovation (Zelezny et al., 2000). Moreover, women-led businesses are more likely to integrate sustainability into their business models and policies, creating a virtuous cycle. By prioritizing sustainability, these female-led enterprises can enhance their reputation and legitimacy among customers and stakeholders (Dana, Salamzadeh, Hadizadeh, et al., 2022b; Frydrych et al., 2014).

2.9 Digitalized Women Entrepreneurs and Economic Sustainability

The relationship between economic sustainability and digital technologies is complex and multifaceted. Digital technologies offer opportunities for companies to adopt sustainable business strategies and develop products that align with sustainability goals, such as renewable energy solutions, smart cities, and tools for promoting sustainable consumption (Rosário & Dias, 2023). Both startups and established enterprises are exploring digital sustainable business models that integrate environmental and economic considerations, leading to positive outcomes (Böttcher et al., 2024). However, the adoption and implementation of digital technologies in sustainable business models present challenges. These challenges include limitations in effectively utilizing these technologies for sustainability purposes (Fuerst et al., 2023). Research by Broccardo et al. (2023) and Chopra et al. (2024) emphasize the importance of integrating sustainability into strategies supported by digital technologies to enhance performance and profitability. This illustrates the strong

correlation between digitalization, sustainability, and financial performance. At the same time, addressing challenges such as e-waste, energy consumption, and data protection is crucial to fully harness the potential of digital technologies for economic sustainability (Sun et al., 2020; Wang et al., 2022). To achieve ecological and economic sustainability, companies, including established entities, must simultaneously transform both digital and sustainable business models (Böttcher et al., 2024). In this context, digital technologies enhance the efficiency, performance, and profitability of individuals and organizations, thereby contributing to economic sustainability (Chopra et al., 2024).

2.10 Digitalized Women Entrepreneurs and Social Sustainability

The integration of digital technologies plays a crucial role in advancing social sustainability. By enhancing connectivity, communication, and access to information across various sectors (Rosário & Dias, 2023), these technologies contribute to improved social outcomes. This includes greater access to education, healthcare, and employment opportunities, thereby bolstering social sustainability (Xiao & Su, 2022). Effectively leveraging digital technologies enables societies to better address social challenges, promote inclusivity, empower individuals and communities in decision-making processes, and foster overall social sustainability (Khan et al., 2022). It is widely acknowledged that digital technologies facilitate social inclusion, enhance connectivity, and promote broader stakeholder integration (Fuerst et al., 2023).

1. Materials and Methods

This section describes the methodology used to produce original and substantial research outcomes. The study combined a systematic literature review with a bibliometric approach for analysis and synthesis. The research involved several methodological steps. Initially, preparatory work was undertaken, which included identifying keywords and selecting appropriate databases.

The "Scopus" database was selected for its comprehensive coverage of indexed journals. Full-length articles were prioritized due to their rigor and established credibility in scholarly discourse (Phan et al., 2009; López-Duarte et al., 2016; Urbano et al., 2019), while books, conference proceedings, and doctoral theses were excluded. A targeted keyword search strategy was employed using combinations such as "digitalization" and "women-entrepreneurship".Keywords like ("digitalization" or "social-media" or "digital-technologies") were combined with terms such as ("sustainability", "environmental-sustainability", or "economic-sustainability") to further refine the search. Inclusion and exclusion criteria were rigorously applied, limiting results to academic journals and publications in the English language.

So we utilized the following search code to gather relevant articles: (TITLE-ABS-KEY (

digitalization) OR TITLE-ABS-KEY (social-media) OR TITLE-ABS-KEY (digital-technologies) AND TITLE-ABS-KEY (sustainability) OR TITLE-ABS-KEY (environmental-sustainability) OR TITLE-ABS-KEY (economic-sustainability) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English"))

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After applying these criteria, a total of 97 relevant articles were identified from the initial search. Each article underwent a thorough reading, analysis, and review to determine its relevance to the research topic. Data extracted for analysis included authors' names, publication titles, publication years, journal sources, citation counts, links to articles, abstracts, keywords, and main findings. Following careful evaluation, 32 articles met the predetermined criteria for inclusion in the final analysis. These articles formed the basis for synthesizing insights into the intersection of digitalization and women's entrepreneurship within the context of sustainability.

2. 4. Developing a model based on analysis of literature

In examining the profound effects of digitalization on women's entrepreneurship, our methodology is prominently influenced by the seminal contributions of Nadler and Tushman (1980) by reviewing comprehensive literature and frameworks rooted in systems theory and complexity. These researchers believe that every component in a system is interrelated, so that changes in one component will inevitably reverberate throughout the system (Katz and Kahn, 1978). This perspective emphasizes the idea that all elements in a system work together to achieve a common goal (Boulding, 1956).

Based on the framework outlined by Nadler and Tushman, which identifies specific inputs, processes, and outputs, we first carefully reviewed and categorized the content of relevant scientific articles. Expanding on this assumption, we applied a foundational conceptual framework derived from previous research (Schmidt et al., 2018; Schleicher et al., 2018), further through inductive reasoning to identify emerging themes related to strategic refining responses. Let's discuss companies. Sanctions. This step also involves identifying diverse sub-themes to deepen our understanding of the adaptation strategies and resilience mechanisms that businesses use in navigating the complexities introduced by digitalization. This comprehensive approach facilitates a methodical exploration and explanation of the multifaceted interactions and consequences of sanctions and illuminates the established and innovative components necessary to understand economic and strategic responses in sanctioned contexts.

5. Results and Discussion

The integration of digital technology has profoundly transformed the landscape of entrepreneurship, particularly for women, as explored in this article. Historically perceived as a male-dominated domain, entrepreneurship is increasingly being reshaped by women who bring unique strengths such as emotional intelligence and a capacity to surpass expectations

(Cowden et al., 2023; Hassan & Ayub, 2019). This transformation is facilitated by digital tools encompassing social media, the Internet of Things, Artificial Intelligence, and 3D printing, which have dismantled traditional business models and created new avenues for innovation and market expansion (Nambisan, 2017).

Driven by an "ethic of care," women entrepreneurs prioritize environmental sustainability, integrating eco-friendly practices and innovations such as renewable energy solutions (Sharma et al., 2023; Zelezny et al., 2000). They also embed social considerations into their business operations, contributing to community development and promoting gender equality (Salamzadeh et al., 2022). Economically, women-led businesses foster growth, innovation, and job creation, thus supporting economic diversification and reducing poverty (Khoo et al., 2023; Frydrych et al., 2014).

Research question 1 was, ‘How does digital technology empower women entrepreneurs to overcome traditional socio-cultural and institutional barriers?’

Digital technology serves as a powerful equalizer, providing women entrepreneurs with enhanced networking opportunities, access to knowledge, and the ability to overcome resource constraints (Kelly & McAdam, 2022). These advancements empower women to cultivate self-efficacy and confidence, thereby increasing their participation and enriching the entrepreneurial ecosystem with diverse perspectives and skills (Bachmann et al., 2024).

Research question 2 was, ‘In what ways does women's entrepreneurship contribute to the three pillars of sustainability: economic, social, and environmental?’

Women entrepreneurs play a pivotal role in advancing sustainability across social, economic, and environmental dimensions. Driven by an "ethic of care," they prioritize environmental sustainability by integrating eco-friendly practices and innovations such as renewable energy solutions (Sharma et al., 2023; Zelezny et al., 2000). Socially, they embed considerations into their business operations, contributing to community development and promoting gender equality (Salamzadeh et al., 2022). Economically, women-led businesses foster growth, innovation, and job creation, thus supporting economic diversification and reducing poverty (Khoo et al., 2023; Frydrych et al., 2014).

Research question 3 was, ‘What is the role of digital technology in shaping the relationship between women's entrepreneurship and sustainability?’

The relationship between digitalization and sustainability presents complexities, including challenges related to e-waste and energy consumption (Dean & McMullen, 2007; Wang et al., 2021). Moving forward, it is imperative to harness digital technologies responsibly to empower women entrepreneurs and facilitate a sustainable future. By leveraging these tools thoughtfully and integrating sustainable practices into business models, we can foster an environment where women entrepreneurs continue to thrive, contributing to a more just, equitable, and prosperous society globally (Salamzadeh et al., 2022).
However, the relationship between digitalization and sustainability presents complexities, including challenges related to e-waste and energy consumption (Dean & McMullen, 2007; Wang et al., 2021). Moving forward, it is imperative to harness digital technologies responsibly to empower women entrepreneurs and facilitate a sustainable future. By leveraging these tools thoughtfully and integrating sustainable practices into business models, we can foster an environment where women entrepreneurs continue to thrive, contributing to a more just, equitable, and prosperous society globally. (Salamzadeh et al., 2022).

5.1 Implications and Research Limitations

The findings of this study have several important implications for theory and practice. First, the role of digital technology as an empowering tool for women entrepreneurs cannot be overstated. (Bachman et al., 2024) Digital technology not only levels the playing field for women by providing enhanced networking opportunities, access to knowledge, and the ability to overcome resource constraints. It also enriches the entrepreneurial ecosystem with diverse perspectives. (Kelly and McAdam, 2022) This suggests that policymakers and educators should focus on increasing access to digital tools and resources, especially for women in underrepresented communities, to foster more inclusive entrepreneurial growth.

In addition, this study shows the significant contribution of women entrepreneurs in sustainability in its three pillars - economic, social and environmental. Women's natural "ethic of care" uniquely positions them to address sustainability challenges through environmentally friendly practices, social impact initiatives, and economic growth strategies (Sharma et al., 2023). Emphasizes business models and policies that integrate gender perspectives into sustainability strategies and promotes an environment where women-led companies can thrive and contribute to a more equitable and sustainable global economy.
Despite its contributions, this study has several limitations that should be addressed in future research. Firstly, while the study draws on a wide range of literature, it is primarily conceptual and the empirical validity of the findings is limited. Future research should incorporate more empirical studies, possibly using longitudinal data, to examine the long-term impact of digital technology on women entrepreneurs in different regions and industries.

Secondly, this study acknowledges the complexities and challenges associated with digitization and sustainability, such as e-waste and energy consumption, but does not fully

explore these aspects. More research is needed to examine the negative externalities of digitalization on women's entrepreneurship and develop strategies to mitigate these effects. Finally, the generalizability of the findings may be limited due to the focus on specific digital technologies and sustainability practices. Future studies should aim to examine a wider range of
technologies and diverse entrepreneurial contexts to provide a more comprehensive understanding of the relationship between digitalization, women's entrepreneurship, and sustainability.

5.2. Suggestions for future research

Future research can investigate the direct and indirect impact of digital technologies on the success of female entrepreneurs in different regions, especially in developing countries, using empirical methods and field data. These studies can help clarify the complex relationship between digitization and sustainability and compare local and global business models. On the other hand, due to challenges such as increasing electronic waste and energy consumption that arise as a result of digitalization, future research should investigate the negative effects of digitalization. These researches can develop strategies and solutions to reduce these negative effects, especially in women's businesses.

Finally, more research is needed to examine how gender perspectives, particularly women's "ethics of care," influence the sustainability strategies of different businesses. These studies can contribute to the development of new business models that better integrate gender perspectives into strategic decision-making and have a more positive impact on social and environmental sustainability.

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