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Creating Avenues for Women to Benefit from Digitalisation – What Is Needed?

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Abstract

There is a rapid transformation in digital technologies worldwide, and digitalisation is now part of all major economic sectors, thereby impacting labour markets. However, women still lag behind men and are not fully benefiting from the opportunities that come with digitalisation. This paper aims to unpack what is needed for women to benefit from digitalisation. The PRISMA protocol was used to perform a comprehensive search across EBSCO, ProQuest, Web of Science, ScienceDirect, Scopus, JSTOR, Emerald, and Google Scholar, from which 60 papers were retained after screening. Articles were analysed in-depth using a thematic approach. Findings reveal the need for governments to design initiatives to raise awareness, increase access, and promote the usage of digital technologies, tools, and devices at affordable prices. Supporting digital infrastructure, partnerships, household conditions and a legal framework are vital. Together with educational institutions, governments should also develop strategies to boost education and digital skills development, mentorship, and networks to empower women to leverage digital opportunities. There is also a need to ensure social and work-life balance support to help women leverage digitalisation. Hence, governments, educational institutions, private entities, civil society groups, and women need to collaborate to implement tangible actions that ensure meaningful access to technology and the benefits of digitalisation. By synthesising dispersed evidence from 60 studies, this study integrates conditions, capabilities, and support systems needed for women to benefit from digitalisation and provides actionable initiatives at multiple levels. This paper highlights the relevance of access to technology, and the need for pathways, capability enhancement, and enabling conditions that make digital skills available for the entry of young women into the labour market and for their career progression in a digital era. These findings can reduce the digital gender divide, improve women's labour market participation, or inform policy and practice.

Keywords: digital literacy, digital skills, employment, entrepreneurship, gender, economic activities

1. Introduction

The world has experienced a rapid transformation of digital technologies in recent years, and digitalisation is now part of major industry segments (Massa et al., 2023). The rise of technology has greatly impacted labour markets, as technological tools perform several cognitive tasks traditionally performed by humans (Cazzaniga et al., 2025). Fan (2025) agrees that digital development offers women additional opportunities for flexible employment and entrepreneurship, reduces gender disadvantages in the labour market, enhances women's value in the labour market, and provides new employment openings and fields for practitioners. Hence, the rapid development of the digital economy has brought significant changes thereby reshaping workforce requirements and skills and enhancing women's participation in economic activities such as formal employment and entrepreneurship (Yang et al., 2025).

The recent development of digital infrastructure has increased the number of digital jobs, which are essential for digital transformation (Aly, 2022). Previous research confirms a positive link between female employment and the digital economy (Banga & Faith, 2021; Riaz, 2024; Salman et al., 2023; Yang et al., 2025). There is evidence that digital literacy can help women secure profitable non-agricultural employment (Zhou et al., 2024), hence helping them achieve economic independence. Digital literacy promotes the transition of women into employment through digitally mediated information that creates sustainable learning opportunities and shapes their career decisions (Martínez-Nicolás et al., 2025; Wang et al., 2024). Digital literacy can also help rural women balance family and work responsibilities and shifts families from traditional “male breadwinner” models to more equitable partnerships to break existing cycles of poverty and promote gender equality (Tamang et al., 2025).

Also, the digital space has created opportunities for entrepreneurship, and digital entrepreneurs need necessary skills and knowledge to capitalise on new opportunities arising from shifts in digital transactions, communication, and marketing channels (Ashfaq & Farhan, 2025). Digital skills can help women entrepreneurs obtain finance (Irwin et al., 2025), create resilience and build sustainable businesses (Razzaq et al., 2024; Yin et al., 2026) and promote entrepreneurial innovation (Fan, 2025). Thus, digital transformation in the digital economy has created a need for female labourers to adapt to new work requirements by developing digital skills to increase their human capital (He, 2024). This has become mandatory for them to leverage existing opportunities.

1.1. Women Leveraging Digitalisation Opportunities

Prior research ascertains that while creating awareness about digital technologies is vital (Guerrero-Romera et al., 2025; Seman et al., 2024; Woźniak-Jęchorek et al., 2023), it is important to facilitate access to digital technologies and devices (Chohan & Hu, 2022; Lopez-Sintas et al., 2020) at affordable prices (Banga & Faith, 2021; Wignall et al., 2024), and promote the adoption of digital tools (Perifanou & Anastasios, 2020; World Bank, 2021). Foundational education is critical for digitalisation (Juwita et al., 2024; Seman et al., 2024; Wignall et al., 2024) because it provides the base on which relevant digital skills can be built (Fitong Ketchiwou & Ngulube, 2025; Gondo et al., 2023; Vuorikari et al., 2022). Also, mentors (Mahayosnand et al., 2025; Riaz, 2024; Wignall et al., 2024), together with the right networks (Juwita et al., 2024; Perifanou & Anastasios, 2020), can help women to use digital tools and leverage opportunities of the digital age.

Furthermore, financial inclusion provides women with access to digital financial services and products (Irwin et al., 2025; Sharma et al., 2025) that can help them achieve economic independence. Gender inclusivity (Naveed et al., 2026; Riaz, 2024) and gender equality (Auclair-Ouellet et al., 2022; Picatoste et al., 2023; Sánchez-Canut et al., 2023) can empower them to leverage opportunities in the digital age (Fan, 2025; Guerrero-Romera et al., 2025). Digitalisation provides women with access to employment opportunities with better employment conditions (Salman et al., 2023; Zhou et al., 2024). Digital transformation enables women to fully benefit from digitalisation (Makowska-Tłomak et al., 2026). This will require policies around digital transformation (Naveed et al., 2026; Riaz, 2024), and relevant legislation (Banga & Faith, 2021; Gondo et al., 2023; Massa et al., 2023), with appropriate monitoring and evaluation mechanisms (Guitert et al., 2021; Wajcman et al., 2020). It is equally important to develop digital infrastructure to facilitate access to the digital resources (Aly, 2022; Wignall et al., 2024; World Bank, 2021), collaborate with different stakeholders (Guerrero-Romera et al., 2025; Juwita et al., 2024), and ensure government support (Irwin et al., 2025; Riaz, 2024).

Moreover, workplace enablers (Seman et al., 2024; Wignall et al., 2024), supportive preparation that shape professional interaction with digital tools (Shreyas & Shtaltovna, 2026) and support for work-life balance (Fan, 2025; Tamang et al., 2025) can influence the extent to which women can benefit from technological advancements. Also, social support for women's participation in the digital space (Hietajärvi et al., 2025; Wignall et al., 2024) and family dynamics (Garín-Muñoz et al., 2022; UNICEF, 2023) can further facilitate women's access to relevant technological competencies, tools, services, and related opportunities. The above notwithstanding, women's willingness and ability to leverage opportunities of the digital age are essential (Debbarma & Chinnadurai, 2023; Long et al., 2023; Sharma et al., 2025).

1.2. Research Problem, Gap and Objective

Despite interventions, gender inequalities in the labour market, such as restricted participation, wage disparities, and disparities in STEM (Science, Technology, Engineering, and Mathematics) persist (Rani et al., 2022). Women need high-quality and full-time employment to successfully play their role in the digital economy (Fan, 2025). Digitalisation can create an environment in which diversity is celebrated and gender parity is achieved (He, 2024). Yet, women are more vulnerable to job losses than men as they perform unskilled tasks that are now being automated (Jeche, 2023). Women are more susceptible to a double digital and social divide that hinders their full social inclusion and equality (Guerrero-Romera et al., 2025). Hence, technology can mitigate or exacerbate gender disparities (He, 2024).

Despite growing interest in how digitalisation impacts on aggregate employment, significant knowledge gaps remain concerning how digitalisation affects women, particularly in terms of skill disparities, job displacement risks, and access to reskilling opportunities (Cazzaniga et al., 2025). There is a negative stereotype about women's deficiency in technology skills associated with digital transformation stress (Makowska-Tłomak et al., 2026). More boys than girls are likely to be highly skilled in information navigation and processing and content creation (Hietajärvi et al., 2025). Also, women and older job seekers face a greater risk of lacking digital skills (Wunsch et al., 2025). Awang et al. (2023) found no differences in technology readiness and technology knowledge by gender. Seman et al. (2024) reveal no significant difference between practicing digital skills of male and female students; however, they agree that students need digital upskilling

to meet the current demands of the workplace. The unequal allocation of household resources and limited access to mobile devices restrict young females' access to education and other vital services that impact their well-being (Asongu et al., 2021; UNICEF, 2023; United Nations, 2025). The probability of using the internet on a daily basis depends on gender; women use less eCommerce, eBanking, eMail, eGovernment, eNews and iCloud services and use more use more Chat, eHealth, eLearning, eTourism, Social networks, and VoIP (Voice over Internet Protocol) (Garín-Muñoz et al., 2022). This could point to their advanced interest in health and social issues rather than the economic benefits of digitalisation. In this digital economy, there is a need for efforts to protect women's legitimate rights and interests, promote their equal participation, and ensure that they benefit from technological development equally (Fan, 2025). There is also a need to carefully consider the emergence of new technologies with regard to their possible implications for vulnerable groups, including women (Picatoste et al., 2023). Hence, the purpose of this systematic review is to synthesise fragmented findings and examine strategies for creating avenues for women in the digital world. The research question is therefore the following: What is needed to create avenues for women to benefit from digitalisation?

Picatoste et al. (2023) argue that the gender gap exists in all countries and achieving more egalitarian societies, specifically by closing digital gender gaps has become a priority for leading national and international organisations. The same authors argue that although the gender digital divide gap is decreasing, the reduction is slower than anticipated. The United Nations 2030 SDGs prioritises gender equality (Goal 5), decent work for sustainable employment (Goal 8), and reduced inequalities (Goal 10) (United Nations, 2025). The continuation of this research is critically required to address gender disparities, mitigate job displacement risks, and advance gender-responsive digital labour policies and institutional responses, thereby contributing to an understanding of gendered labour market transformations and inclusive workforce development strategies.

2. Theoretical Underpinning

The human capital theory promulgated by Schultz (1961) highlight that investments in people generate personal and national economic benefits. Improving education, work experience, skills, and work levels will increase human capital, which will in turn promote employment and increase labour productivity (Mincer, 1974). Digitally mediated information creates sustained learning opportunities and shapes career decisions (Martínez-Nicolás et al., 2025; Wang et al., 2024) and the transformation of digital literacy into business and practical skills enhances women's employment resilience and future sustainability (Razzaq et al., 2024). Individual capabilities relevant to the digital space can influence women's transition to employment by helping them overcome immediate employment obstacles and gain independence, autonomy, and sustainability. Hence, creating avenues for capacity building can secure women's employment, increase their competitiveness, and their careers in the current digital economy.

3. Methodology

The Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) (Page et al., 2021) was used in the selection of articles. This is a time and cost-efficient approach to conduct in-depth synthesis of articles with rigor, unbiasedness, and transparency in a replicable manner to answer research questions that cannot be answered by single studies (Fan et al., 2022; Page et al., 2021; Snyder, 2019).

A comprehensive search was conducted across multiple academic databases, including EBSCO, ProQuest, Web of Science, ScienceDirect, Scopus, JSTOR, Emerald, and Google Scholar. The search was conducted using such specific search terms as ‘Digital’; ‘women’ or ‘gender’; and ‘necessities’, ‘prerequisites’ or ‘recommendations’. The focus on publications from the last five years (2020-2025) was to ensure timeliness and contemporary relevance of the findings. The inclusion and exclusion criteria that guided the search as advised in the protocol proposed in Page et al. (2021) are presented in Table 1.

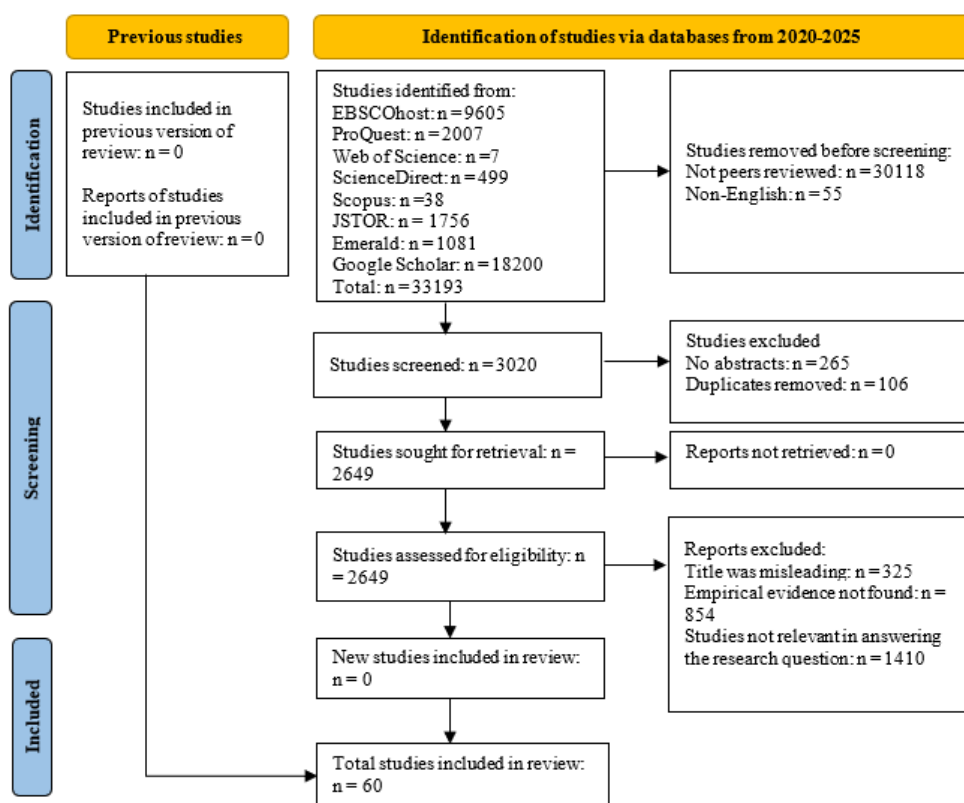
TABLE 1. INCLUSION AND EXCLUSION CRITERIA

Criteria	Inclusion	Exclusion
Language	English	Non-English
Type of publication	Empirical, peer-reviewed articles	Reviews, grey literature, opinion papers, and editorials
Year of publication	2020-2025	Pre 2020 and post 2026
Subject area	Women + digital	Subjects outside women + digital

Source: Own compilation based on inclusion and exclusion criteria set in the study

Documents that are not peer-reviewed and those in languages other than English were excluded, and the researcher used the Cadima web tool to screen 3020 articles to identify duplicated articles and articles without abstracts, resulting in 2649 articles from which irrelevant, non-empirical ones were removed. After using the Mixed Methods Appraisal Tool proposed by Hong et al. (2018) to assess the quality of the article, bias, and the soundness of the methodology employed, 60 articles were retained for in-depth analysis (Refer to Figure 1). The supplementary file provides full details of articles reviewed (Supplementary file, 2026).

FIGURE 1. PRISMA PROTOCOL FOR THE STUDY



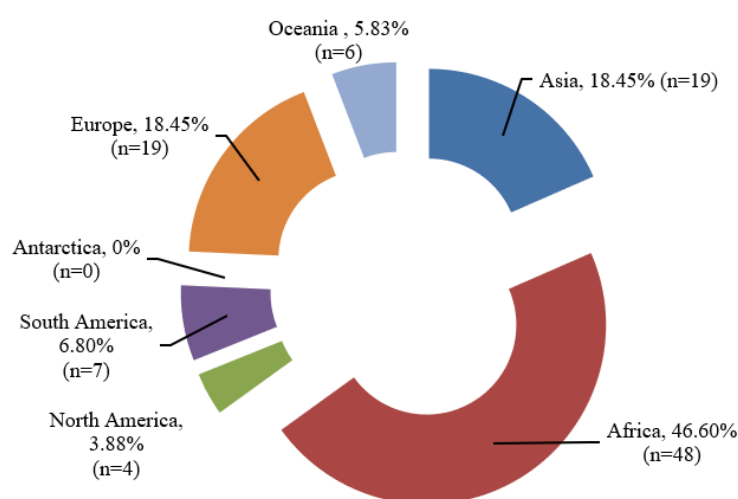
Source: PRISMA protocol adapted from Page et al. (2021, p.5)

A thematic approach was used to identify and synthesise similarities in the 60 articles reviewed. This approach is appropriate to organise large volumes of text by into meaningful conceptual categories (Fan et al., 2022; Snyder, 2019). First, each article was read in depth, data extracted and consolidated into a Microsoft Excel spreadsheet. After this, a coding sheet was designed. Then the color-coding function, available in Microsoft Excel, was used to code data. Axial coding was performed to refine the categories obtained during the open coding process. The analysis was performed and reviewed to form themes from logical patterns and ensure consistency. Refer to the Table 2 for codes and themes generated. The process was systematic to guarantee credible, accurate, and reliable interpretations (Fan et al., 2022; Snyder, 2019).

4. Findings

The studies were mainly conducted in several countries in different continents as presented in Figure 2 below.

FIGURE 2. DISTRIBUTION OF STUDIES REVIEWED ACROSS CONTINENTS



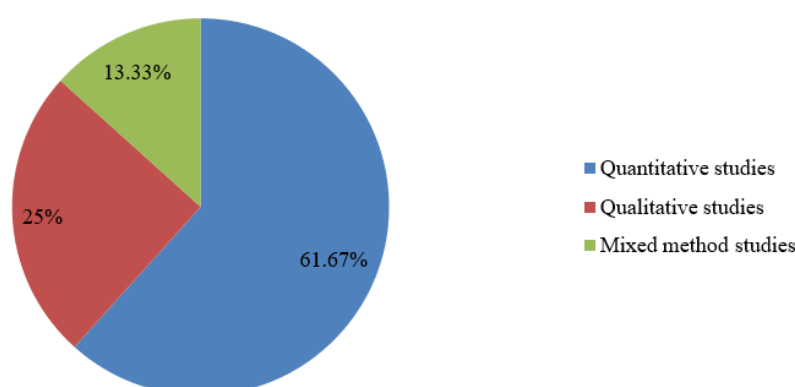
Source: Author, 2026

A majority of the studies reviewed were conducted in Africa (46.60%, n=48), followed by Europe and Asia (18.45%, n=19). No study was conducted in Antarctica (See the details of countries in the Supplementary file in the reference list (Supplementary file, 2026).

These studies spanned small and medium businesses, digital banking, digital financial services, digital technology, gig economy, education, tourism, domestic services, agriculture, manufacturing, Information and communication technologies, digital marketing, financial services, artisan, real estate, and textile and fashion businesses.

Eight (8) of the 60 articles reviewed used a mixed research approach, while 15 used a qualitative approach and 37 used a quantitative methodology (See Figure 3). Hence, most studies used an objective approach with measurable and statistically reliable results.

FIGURE 3. METHODOLOGIES EMPLOYED IN STUDIES REVIEWED



Source: Author, 2026

TABLE 2. FINDINGS: THEMES AND SUB-THEMES

Codes	Sub-themes	References	Reference counts
Theme 1. Awareness, use, and access to affordable digital tools and services			
Create awareness, popularise digital technologies and services, digital awareness, awareness campaigns, new media campaign, raise awareness of digital technologies	Create awareness	Adewale, 2025; Al-Alawi et al., 2023; Alateeg & Al-Ayed, 2024; Mousa et al., 2024; Mutesi et al., 2025; Ndjokou et al., 2024; Sarker, 2024; Tunçsiper, 2025	8
Promote the use of ICT technologies, use digital technologies, tools and digital platforms, encourage and enhance the use of digital tools, adopt digital technologies, digital technology usage, ownership of digital and technological devices (mobile or smartphones), digital engagement of technology, early exposure	Promote the use of digital tools	Alam et al., 2022; Altinay et al., 2024; Amber & Chichaibelu, 2023; Azeema & Rubab, 2025; Hua & Zhichao, 2023; Jain et al., 2024; Khoo et al., 2024; Latiep et al., 2025; Makkar et al., 2024; Maon et al., 2021; Mouraz & Nobre, 2024; Sarker, 2024; Yates & Plagnol, 2022	13
Improve access to technology and technological devices and tools, access to digital technologies, access to digital technologies and the internet, improve digital access, access to ICT, access to technology hub, internet connectivity, ensure reliable internet connectivity	Provide access to digital technologies and devices	Abubakari et al., 2023; Amber & Chichaibelu, 2023; Avanesian et al., 2025; Azeema & Rubab, 2025; Bhagat & Banerji, 2025; Cobo & Levano, 2023; Javed, 2025; Makkar et al., 2024; Mouraz & Nobre, 2024; Sarker, 2024; Scott et al., 2021; Thompson & Paul, 2020; Tunçsiper, 2025	13
Affordable digital tools and services, affordable gadgets and internet connections, offer price value for digital tools and services, affordable broadband access, low prices, free or low	Provide affordable digital tools and services	Amah et al., 2024; Amber & Chichaibelu, 2023; Ethné et al., 2022; Gupta & Ravi, 2024; Imran et al., 2025; Jain et al., 2024; Kodithuwakku & De Silva, 2025; McAdam et al., 2020; Merhi,	13

cost access to internet and mobile devices, digital technology affordances		2020; Mukherjee et al., 2024; Parthiban et al., 2025; Pillai et al., 2025; Sarker, 2024	
Theme 2. Education and digital skills development			
Increase number in ICT education, promote education of girls to higher educational levels, promote gender equity and inclusivity in pedagogical practices and feminist education pedagogy	Encourage education	Abubakari et al., 2023; Alateeg & Al-Ayed, 2024; Altinay et al., 2024; Amber & Chichaibelu, 2023; Bradić-Martinović et al., 2024; Ethné et al., 2022; Hamdan et al., 2024; Krchová & Švejnová Höesová, 2021; Mouraz & Nobre, 2024; Mutesi et al., 2025; Pillai et al., 2025; Yates & Plagnol, 2022	12
Train on cyber security and privacy, promote digital learning and digital skill and competencies, have comprehensive and inclusive digital educational training programmes and centers, digital entrepreneurship training programmes, tailored training, upskill women to close the gender digital divide, train women to use new/emerging technologies, offer online and offline training of digital skills, promote digital literacy and capabilities, skilling in digital technologies	Develop digital skills/proficiency	Abubakari et al., 2023; Adewale, 2025; Al-Alawi et al., 2023; Alam et al., 2022; Altinay et al., 2024; Amber & Chichaibelu, 2023; Azeema & Rubab, 2025; Bai & Yang, 2025; Bradić-Martinović et al., 2024; Bueno-Baquero et al., 2025; Cobo & Levano, 2023; Imran et al., 2025; Jain et al., 2024; Javed, 2025; Jevtić, 2023; Khoo et al., 2024; Kodithuwakku & De Silva, 2025; Latiep et al., 2025; Li & Chen, 2025; Makkar et al., 2024; Maon et al., 2021; Mouraz & Nobre, 2024; Mousa et al., 2024; Mukherjee et al., 2024; Mutesi et al., 2025; Oggero et al., 2020; Parthiban et al., 2025; Peng & Feng, 2025; Pillai et al., 2025; Saakha & Discetti, 2024; Sarker, 2024; Srebro et al., 2023; Su & Xihao, 2025; Sun & Li, 2025; Thompson & Paul, 2020; Tunçsiper, 2025; Wang et al., 2023; Wang et al., 2024; Wiig et al., 2024	39
Theme 3. Digital infrastructure and transformation			
Improve digital infrastructure, enhance technology infrastructure, develop digital economy, construct digital network, promote digital development, enhance regional development levels	Develop digital infrastructure	Avanesian et al., 2025; Jevtić, 2023; Li & Chen, 2025; Makkar et al., 2024; Peng & Feng, 2025; Pillai et al., 2025; Sarker, 2024; Sun & Li, 2025; Tunçsiper, 2025; Wang et al., 2024	10
Promote the rapid expansion /transformation on digital technologies, digital culture transformation, technological culture	Enhance digital transformation	Alam et al., 2022; Cobo & Levano, 2023; Latiep et al., 2025	3

Theme 4. Adequate support opportunities

Mentoring, mentorship initiatives	Ensure mentoring	Adewale, 2025; Alateeg & Al-Ayed, 2024; Azeema & Rubab, 2025; Ethné et al., 2022; Imran et al., 2025	5
Social network platforms to share experiences and resources, women's networks for mutual support, networking programmes	Establish Networks	Alam et al., 2022; Alateeg & Al-Ayed, 2024; Imran et al., 2025; Khoo et al., 2024; Su & Xihao, 2025; Thompson & Paul, 2020	6
Support the economic empowerment of women, financial empowerment of women by promoting access to technology, implement empowerment strategies	Empower women	Bai & Yang, 2025; Javed, 2025; Latiep et al., 2025; Wiig et al., 2024	4
Promote digital transformation of households, improve socioeconomic levels of households, wealthier households, shape family and norms, increase household income, family support to women, increase, household economic resources	Improve household/family conditions	Amber & Chichaibelu, 2023; Avanesian et al., 2025; Bai & Yang, 2025; Imran et al., 2025; Oggero et al., 2020; Peng & Feng, 2025; Su & Xihao, 2025; Ye & Cai, 2024	8
Community awareness campaigns to encourage women to engage in the digital and break stereotypes among rural women, shape social influence- People who made it seem possible, challenge traditional and societal norms, promote social support	Ensure social support	Alateeg & Al-Ayed, 2024; Gupta & Ravi, 2024; Javed, 2025; Makkar et al., 2024; Mashapure, 2024; Oggero et al., 2020; Peng & Feng, 2025; Su & Xihao, 2025; Thompson & Paul, 2020; Yates & Plagnol, 2022	10

Theme 5. Economic enablers

Promote financial inclusion, and entrepreneurship to foster economic growth	Ensure financial inclusion	Alateeg & Al-Ayed, 2024; Javed, 2025	2
Provide better employment conditions, increase access to employment, increase average wage, increase women participation in labour market, enhancing labour force quality, provide inclusive employment, expand employment opportunities through digitalisation to reduce unemployment, integrate digital technologies in employment	Improve employment access and employment conditions	Amber & Chichaibelu, 2023; Kerras et al., 2022; Krchová & Švejnová Höesová, 2021; Sarker, 2024; Sun & Li, 2025; Wang et al., 2024; Ye & Cai, 2024	7

Theme 6. Legislation, policy framework and government

Legislation against cyberbullying, legislation that supports digital safety and rights, legal mechanisms, legislation that support the development of advanced digital skills for women	Design and implement the right legislation	Bradić-Martinović et al., 2024; Imran et al., 2025; Javed, 2025	3
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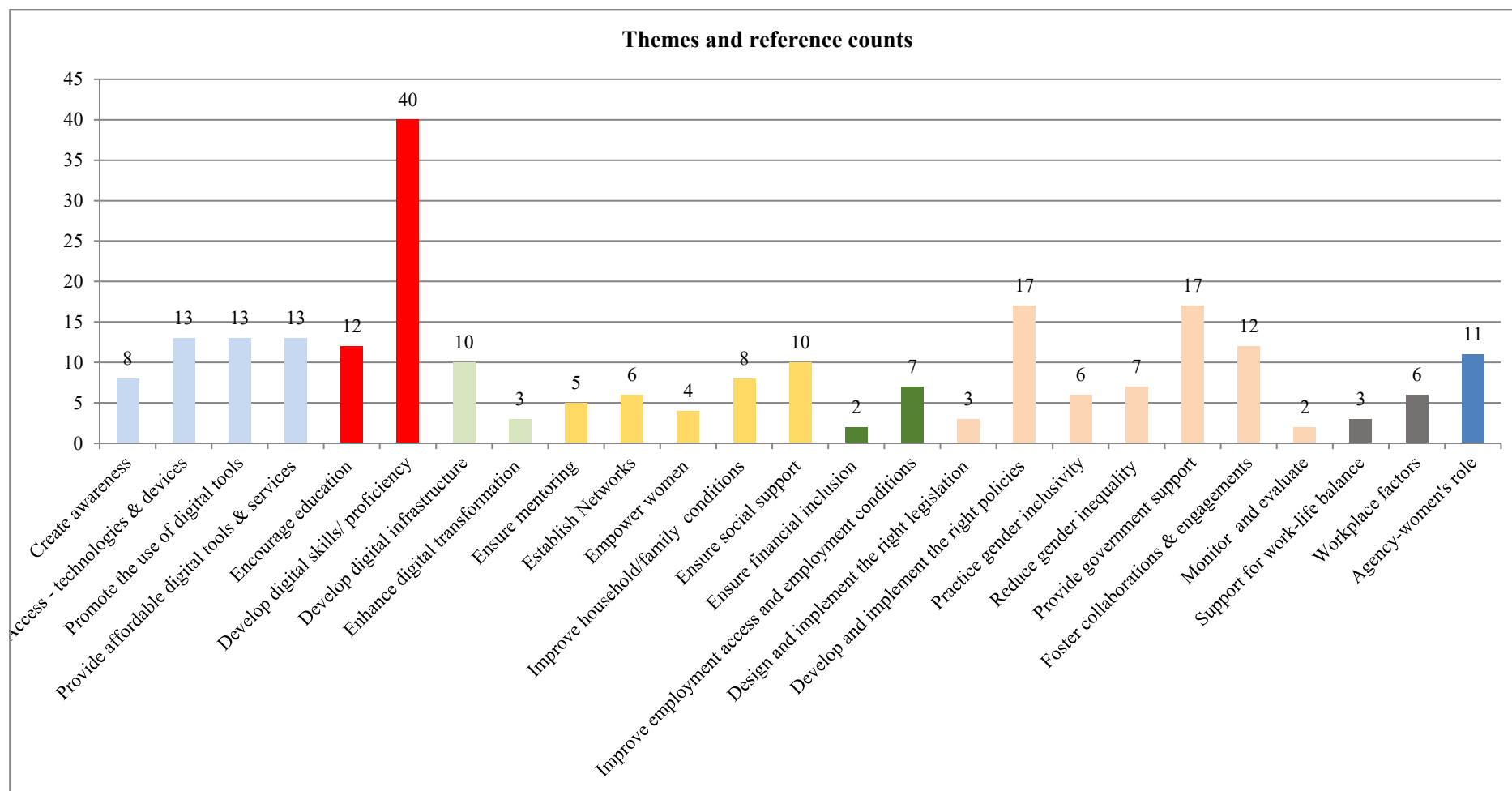
Policies around gender composition and digital literacy, policies to prepare the workforce for technological shifts and, policy to reduce gender bias and gender gaps in digital skills, policies that support the development of advanced digital skills among women, policy-level interventions, policy for women to pursue various fields, inclusive policies as regulatory structures, policies to promote and protect women in the digital space, policies on education, gender-neutral employment policies	Develop and implement the right policies	Abdelwahed et al., 2025; Alam et al., 2022; Avanesian et al., 2025; Azeema & Rubab, 2025; Bai & Yang, 2025; Bradić-Martinović et al., 2024; Imran et al., 2025; Javed, 2025; Khoo et al., 2024; Kodithuwakku & De Silva, 2025; Li & Chen, 2025; Peng & Feng, 2025; Pillai et al., 2025; Srebro et al., 2023; Su & Xihao, 2025; Tunçsiper, 2025; Wang et al., 2023	17
Ensure digital inclusion and gender inclusivity, bridge and reduce the digital divide, encourage gender diversity and inclusion, address gender disparities through the creation of inclusive environments	Practice gender inclusivity	Javed, 2025; Jevtić, 2023; Khoo et al., 2024; Kodithuwakku & De Silva, 2025; Ndjokou et al., 2024; Sarker, 2024	6
Reduce gender gaps and inequalities (at work and homes), promote gender equity and equality, promote gender equality, eradicate gender gaps in digital settings, promote gender equality through grants and incentives that encourage the development of technical-skill for women	Reduce gender inequality	Bradić-Martinović et al., 2024; Kerras et al., 2022; Krchová & Švejnová Höesová, 2021; Makkar et al., 2024; Sánchez-Rivero et al., 2023; Sarker, 2024; Sun & Li, 2025	7
Increasing GDP in the ICT sector, provide government support, promote female-oriented tech development spaces, technology orientation of country, promote the development of emerging industries, government support programmes and facilitating conditions, develop supportive ecosystems, social protection for female workers, targeted support system, promote all round development (rural or urban)	Provide government support	Abdelwahed et al., 2025; Alateeg & Al-Ayed, 2024; Altinay et al., 2024; Amah et al., 2024; Azeema & Rubab, 2025; Gupta & Ravi, 2024; Hua & Zhichao, 2023; Imran et al., 2025; Jevtić, 2023; Krchová & Švejnová Höesová, 2021; Mousa et al., 2024; Peng & Feng, 2025; Rohatgi et al., 2024; Saakha & Discetti, 2024; Srebro et al., 2023; Sun & Li, 2025; Thompson & Paul, 2020	17
Bottom up collaborative approach, insights and research and collaborations to inform Gender-sensitive policies, Collaborative to eradicate barriers to digital empowerment, collaborations among stakeholders, engagements and collaborations	Foster collaborations and engagements	Adewale, 2025; Al-Alawi et al., 2023; Alateeg & Al-Ayed, 2024; Hamdan et al., 2024; Imran et al., 2025; Jain et al., 2024; Khoo et al., 2024; Makkar et al., 2024; Parthiban et al., 2025; Peng & Feng, 2025; Su & Xihao, 2025; Thompson & Paul, 2020	12

Policy monitoring, monitoring and evaluation system	Monitor and evaluate	Li & Chen, 2025; Peng & Feng, 2025	2
Theme 7. Workplace enablers			
Promote work-life balance, promote flexible working time and space for women, provide equal sharing responsibilities and caregiving at home, support work-life balance	Support for work-life balance	Al-Alawi et al., 2023; Bhagat & Banerji, 2025; Krchová & Švejnová Höesová, 2021	3
Establish digitalisation as a workplace culture, continuing professional development especially in digital skills, promote women's progression in skilled occupation, promote gender-sensitive workplace policies/cultures, workplace support, organise workplace training	Workplace factors	Alam et al, 2022; Bhagat & Banerji, 2025; Jevtić, 2023; Khoo et al., 2024; Kodithuwakku & De Silva, 2025; Liu et al., 2025	6
Theme 8. Agency			
Intention to learn, seize learning opportunities, digital skills readiness, self-efficacy, personal characteristics, effort expectancy digital technologies, performance expectancy of the technology and its tools, self-directed learning and skills improvement, desire to learn technology for free, perceive prospect of higher income, motivation, habit, personal innovativeness	Agency-women's role	Alateeg & Al-Ayed, 2024; Altinay et al., 2024; Amah et al., 2024; Bai & Yang, 2025; Gupta & Ravi, 2024; Mashapure, 2024; Merhi, 2020; Sarker, 2024; Wang et al., 2023; Yates & Plagnol, 2022	10

Source: Own compilation based on data in the supplementary file, 2026

Sub- themes in colour coded themes are presented in Figure 4 below.

FIGURE 4. SUB-THEMES AND REFERENCE COUNTS



Source: Author, 2026

LEGEND

Themes	Colour code	Themes	Colour code
Awareness, use, and access to affordable digital tools and services		Economic enablers	
Education and digital skills development		Government, legal and policy framework	
Digital infrastructure and transformation		Workplace enablers	
Adequate support opportunities		Agency – women’s role	

5. Discussions

This section discusses emerging themes and subthemes that highlight changes necessary for women to fully benefit from digitalisation presented in Figure 4, and how these findings are linked to previous research.

5.1. Awareness, Use, and Access to Affordable Digital Tools and Services

Findings reveal that raising awareness of digital tools and promoting affordable access to and use of digital technologies and devices are prerequisites for women to benefit from digitalisation. These findings are presented in tandem with prior scholarship affirming the importance of women's awareness of digital tools and their benefits (Guerrero-Romera et al., 2025; Seman et al., 2024; Woźniak-Jęchorek et al., 2023). Previous research also confirms that access to digital technologies remains a challenge for many women, especially in informal markets and rural areas, thereby limiting their access to education, employment, and other essential services relevant for their well-being (Irwin et al., 2025; Rani et al., 2022; UNICEF, 2023). Access to digital technologies is also a key driver to eradicate gender gaps in digital skills (Lopez-Sintas et al., 2020), in attaining digital competency (Chohan & Hu, 2022), as well as economic and social empowerment, and inclusivity (Picatoste et al., 2023; World Bank, 2021) across geographic and economic contexts (Riaz, 2024). Other studies confirm the importance of affordability of digital services and tools (Banga & Faith, 2021; Perifanou & Anastasios, 2020; Wignall et al., 2024). Moreover, past research highlights the need to encourage women to use digital tools, arguing that digital tools can increase women’s earnings, reduce gender wage gaps, and reduce the digital divide (Perifanou & Anastasios, 2020; Picatoste et al., 2023; World Bank, 2021). Media campaigns can dismantle existing gender biases and create awareness of digital tools. Early exposure, affordable access, and ownership of mobile phones, computers, laptops, tablets, internet connectivity, Wi-Fi, smart devices, and user-friendly digital platforms can also increase the desire, use, and usage frequency of digital technologies and devices for poor, vulnerable, or disadvantaged women experiencing digital barriers in rural areas and underdeveloped regions.

5.2. Education and Digital Skills Development

The review also revealed that encouraging education and digital skills development will increase women’s ability to leverage digitalisation. Digital skills development has the highest reference count (40) which indicated its importance. Garín-Muñoz et al. (2022) confirm that the probability of using the internet daily depends on education and digital skills. Picatoste et al. (2023) argue that the education level significantly affects the digital divide and the digital gender gap. Yet, gender limitations, the gender digital divide, affordability and financial

barriers, and limited digital training in schools impede the development of digital skills women need for employment (UNICEF, 2023; Wignall et al., 2024). Fitong Ketchiwou and Ngulube (2025) ascertain the need for women to possess digital skills in the contemporary society, while Irwin et al. (2025) affirm that female entrepreneurs require new digital skills to operate in the digital space. Gondo et al. (2023) propose skills required for the workforce to interact with technological devices and to engage with emerging technologies, artificial intelligence, and big data. These include critical thinking, cognitive skills, and advanced skills. Vuorikari et al. (2022) further argue that training on digital competencies should include safety, problem-solving, information and data literacy, communication and collaboration, and digital content creation. Auclair-Ouellet et al. (2022) add that digital training should be aligned to the modern labour market and address barriers to gender equity and inclusion for women. Thus, it is essential for educational institutions to prioritise digital competencies through well-designed teaching and learning materials (Seman et al., 2024) within a safe and supportive learning environment for girls (Wignall et al., 2024). Reducing technophobia and gender stereotypes through educational institutions, curricula, teachers, mass media, opinion leaders, pedagogy, and initiatives can dismantle ingrained biases against women and attract young girls to technology fields and artificial intelligence (Garín-Muñoz et al., 2022). Hence, there is a need for inclusive, customised, accessible, and outcome-oriented digital training, digital training centres, and digital hubs (e.g., social media platforms, YouTube) to educate women on digital technologies and their implications.

5.3. Digital Infrastructure and Transformation

Findings also reveal that digital infrastructure and digital transformation facilitate digital access for all (especially women experiencing the digital divide), thereby enabling them to benefit from digitalisation. Past research deplores the lack of meaningful access to ICT infrastructure which impedes women's access to basic digital skills (Wignall et al., 2024) and highlight the relevance of digital infrastructure in fighting gender discrimination (Perifanou and Anastasios, 2020) while more scholars advocate for government investments in digital infrastructure to encourage fair access to technology and facilitate women's employment (Aly, 2022; Riaz, 2024; World Bank, 2021). Similarly, Fan (2025) and Makowska-Tłomak et al. (2026) argue in favour of digital transformation, while Guerrero-Romera et al. (2025) add that digital transformation should be used to build more inclusive societies by prioritising digital rights and principles, protecting human rights, and improving lives. Digital infrastructure serves as the backbone of the digital economy, driving internet access, digital services, and businesses, and includes 5G networks, fibre-optic cables, cloud computing, and data centres that enable data transmission, storage, and connectivity, which are vital for women to access, engage, and fully benefit from digitalisation.

5.4. Adequate Support Opportunities

The review reveals that empowerment initiatives, such as mentors who can guide women within the digital space and help them take advantage of opportunities, and networks that facilitate access to digital opportunities, can increase women's ability to maximise opportunities. Also, household or family conditions determine women's/girls' access to relevant competencies, technological tools and services. In addition, social support is relevant for women's participation in the digital space. Previous studies confirm this finding and

advocate for women's technological empowerment to enable them to leverage existing opportunities and be more autonomous (Fan, 2025; Guerrero-Romera et al., 2025; Juwita et al., 2024;). Wignall et al. (2024) also argue that female mentors and role models who work in the technology field can guide, inspire, and motivate other women. Riaz (2024) adds that mentorship for female entrepreneurs can address gender-specific hurdles to digital skills. Likewise, previous studies confirm the relevance of networks for women to benefit from the digital age (Juwita et al., 2024; Perifanou & Anastasios, 2020). Some authors acknowledge that family expectations and priorities can act as barriers to basic digital skills for employment (Wignall et al., 2024), and the unequal distribution of resources within households restricts young females' ability to access essential services, including education and employment (UNICEF, 2023). Other scholars go further, confirming the role of societal and cultural norms (Riaz, 2024) and social expectations and priorities (Hietajärvi et al., 2025; Wignall et al., 2024) in girls' access to digital skills development and job opportunities. Empowerment and support mechanisms such as mentorship and networking are vital for women and girls who may encounter technophobia and digital challenges related to knowledge, access, and use. This can help women overcome barriers such as gender stereotypes, gender bias, family/child responsibilities, age, background, and others.

5.5. Economic Enablers

Ensuring the financial inclusion of women through access to financial products and services, as well as employment opportunities, can boost their ability to leverage digital resources. Past research affirms that one avenue to promoting entrepreneurship in the digital era is to reduce ethnic or gender biases in entrepreneurial funding (Irwin et al., 2025). For women entrepreneurs, access to digital financial services can help them access opportunities for greater financial autonomy, thereby balancing their professional and personal lives (Sharma et al., 2025). Similarly, past scholars affirm that the probability of using the internet daily depends on employment status (Garín-Muñoz et al., 2022), digital literacy positively impacts rural women's employment and increases their employment probability (Salman et al., 2023; Zhou et al., 2024) and investing in female entrepreneurs' digital skills can promote technical innovation and increase economic productivity and competitiveness within the digital economy (Riaz, 2024). Hence, equitable access to funding, digitalisation, and better employment are critical for gender-inclusive economic growth, and resources can enhance women's opportunities for development, long-term decent employment, and career advancement in the digital space. Some initiatives could include digital employment incubation centres and entrepreneurship incubation centres to ensure that labour demand matches supply.

5.6. Legislation, Policy Framework and Government

Legal and policy frameworks, including guidelines, rules, and plans, together with other government support initiatives, can facilitate women's adoption and use of technology in an equal and inclusive manner. Together with these, there should be initiatives to foster stakeholder collaboration and engagement, as well as monitoring and evaluation to ensure women's participation in the digital world. Past scholars agree on the need for relevant laws to promote and guide digitalisation, increase participation, and protect women within the digital space (Banga & Faith, 2021; Gondo et al., 2023; Massa et al., 2023). Previous research also confirm that policy documents are active agents that shape social realities to inform

digital equality, inclusivity, and contextual relevance (Naveed et al., 2026). Governments should implement gender-sensitive policy interventions that encourage fair access and participation and prioritise the development of digital infrastructure, particularly for women in left-out areas (Riaz, 2024). Likewise, previous studies highlight the need for a gender-inclusive digital economy reflected in policy (Fan, 2025; Naveed et al., 2026; Riaz, 2024). Similarly, past scholars deplore gender bias in educational resources and practices that create barriers to basic digital skills for women (Wignall et al., 2024), arguing that gender skills gaps are usually the result of systemic inequities (Auclair-Ouellet, 2022). Again, government digital investment opportunities can help female entrepreneurs (Irwin et al., 2025), and rural-urban government regulations can influence the relationship between female employment and the digital economy (Riaz, 2024). Guerrero-Romera et al. (2025) and Juwita et al. (2024) agree that much is not possible without alliances between diverse stakeholders. In addition, Guitert et al. (2021) also confirm the need for a holistic evaluation of implemented programmes, while Wajcman et al. (2020) recommend periodic auditing and monitoring.

Designing and implementing the right legislation provides the bedrock on which countries can increase inclusive participation of women in the digital world. This should be supported by policies, regulations, and support strategies that protect people in the digital space, regulate digital employment benefits (especially for women), and support the development of the digital ecosystem. A gender-inclusive environment can curb gender inequalities and gender exclusion within the workplace since women tend to perform most of the routine functions that are now being automated. Government grants, incentives, workshops, training programmes, campaigns, funding mechanisms, relevant platforms, and other support initiatives can help women leverage digital opportunities. Governments need to spearhead stakeholder engagement and collaborations with relevant social, media, educational, and civil groups at different levels within the ecosystem. These should be accompanied by monitoring and evaluation structures to track periodic, evidence-based progress with digital indicators and quality performance evaluation metrics that inform strategy refinement.

5.7. Workplace Enablers

Findings further reveal that workplace dynamics and support for work-life balance facilitate women's ability to maximise the benefits of technological advancements. Seman et al. (2024) agree that the workplace can be an enabler of digital skills development, highlighting that businesses should upskill future and existing employees with digital competencies and bridge gender gaps in digital skills, while Makowska-Tłomak et al. (2026) suggest that organisations should develop online participatory workshops or interventions to cope with stress related to digital transformation. Fan (2025) and Tamang et al. (2025) also confirm that support for work-life balance can enhance women's ability to leverage digital opportunities. Women often shoulder several family responsibilities that limit their participation in developmental and economic activities (Fitong Ketchiwou et al., 2022). Hence, workplace and work-life balance support play a pivotal role in digital inclusion and are essential for women to leverage digitalisation. Such support could include training female staff in the digital skills needed for their career advancement (especially junior employees) and investing in relevant digital tools and infrastructure. Organisations also need the right work-life balance policies and a digital gender-friendly culture that support digitalisation.

5.8. Agency – Women’s Role

Women also have a role to play in leveraging opportunities of digitalisation. Prior studies agree with this and highlight that a lack of ownership hinders women’s development of digital skills, while interest in digital skills is vital for building digital confidence (Long et al., 2023; Wignall et al., 2024). Other studies also show that self-efficacy (Debbarma & Chinnadurai, 2023; Hietajärvi et al., 2025) and readiness and proactive behaviour (Sharma et al., 2025) are vital for developing digital skills. Women should embrace the digital society and actively engage to improve their skills and benefit from digitalisation.

6. Implications of the Study

This paper not only highlights the relevance of access to technology, but also the need for capabilities, pathways, and enabling conditions that make digital skills available for entry into the labour market and for career progression in a digital era.

As industries move to full digitalisation, there is a need for a digitally skilled labour force globally. Young women often experience challenges when transitioning from unemployment to securing a first job. By acquiring and applying digital competencies, young women (between 18 and 35 years) can access employment opportunities in different sectors of the economy. Skills development, work experience, career support, networks, role models, and mentorship can reduce early-career risks and enhance women’s digital readiness for work pathways. Women can compete in the labour market and have sustainable careers if they are equipped to leverage opportunities of the digital age through ongoing learning, adaptability, structural and supportive ecosystems, infrastructure, legislation and policy frameworks, and enabling workplace practice. Women’s ability to translate digital opportunities into employment depends on early exposure and awareness, affordable access to digital tools and devices, relevant education and skills development, and ongoing support from government, business, and educational institutions. If adequately prepared for digitalisation, women can convert digital skills into employment, thereby matching the demand and supply skills relevant for the contemporary labour market. Also, women who continuously improve on their digital skills stand a better chance of progressing in their careers as they now qualify for a wider range of jobs.

These findings provide practical levers for improving job readiness, strengthening adaptability to changing digital work, and supporting sustained career participation for young women. Employers and educational institutions can use findings from this paper to design digitalisation and employability initiatives for the next generation of young professional women in rapidly evolving workplaces. The themes found in this review could help support empowerment and training initiatives for young women.

7. Originality, Contribution and Novelty

The review synthesises dispersed evidence and requirements for digitalisation from 60 studies to translate into benefits for women, thereby providing an integrated synthesis of what conditions, capabilities, and support systems are needed for women to benefit from digitalisation. It structures the literature into a set of actionable initiatives at multiple levels (individual, workplace, institutional, and policy), unpacking how they function together to enable women to benefit from digitalisation. Compared to prior studies, this review suggests

an integrated set of system-level and capability requirements for policymakers and practitioners to help women realise the benefits of digitalisation from the Human Capital Theory perspective.

8. Conclusion

This paper aimed to use a systematic approach to identify requirements for women to benefit from digitalisation, using human capital theory as a theoretical anchor. Findings reveal that for women to benefit from digitalisation, the government, educational institutions, private entities, civil society groups, and women themselves need to play their part and collaborate to ensure women engage meaningfully in the digital space. These key role players need to ensure that digital technologies, tools, and devices are affordable for women to access and use. Education and digital skills development, alongside proper mentoring and networking, are needed to empower women to leverage digital opportunities. Governments should develop adequate digital infrastructure, gender-inclusive and equality legislation and policies with appropriate monitoring and evaluation mechanisms, improve household conditions, and engage diverse stakeholders to ensure that women are benefiting from the opportunities that come with digitalisation and can access employment with better working conditions. While social and workplace support initiatives can further enhance women's ability to leverage digitalisation, women need to take steps to capitalise on avenues created for them to benefit from the digital age.

While digitalisation comes with several opportunities, investment in digital infrastructure, restructuring the digital space, optimising the employment environment, providing mechanisms for flexible employment, eliminating existing gender bias, providing gender sensitive digital literacy training, and offering talent development services and career guidance in Information and Communication Technology (ICT) fields, providing family-friendly support could improve entrepreneurship and employment opportunities for women in the digital era. Female-led companies within the digital, e-commerce, robotics, and automation spaces should receive customised support to help them grow (e.g., access to finance). Collaboration between government agencies, policymakers, civil society groups, and the private sector should empower and support women in the digital economy at all levels. These practical initiatives can enable female entrepreneurs and workers to move up in the digital value chain.

9. Limitations and Recommendations for Further Studies

The methodological, theoretical, and interpretive choices shaped the analysis and conclusions in this review. Although the methodological approach was rigorous, the search terms and keywords used during the literature search could have limited access to other relevant articles. There could be other broader limitations related to publication bias, database and language restrictions, heterogeneity of the evidence, generalisability, the quality of included studies, and the interpretive nature of thematic analysis. Further studies could implement the suggested approaches needed for women to benefit from digitalisation found in this study and assess their effectiveness in eliminating gender inequality in the labour market in the digital era. Other scholars can also examine the long-term impacts of implementing suggested initiatives across diverse sociocultural contexts.

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Conflict of Interest

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Data Availability

Data supporting the conclusions of this study can be made available online (Figshare) (Supplementary file, 2026)

AI Use

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Ethics Statement

This review did not require ethical approval, the author confirms that the study adhered to applicable ethical guidelines.

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