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RESPONSES: A CRITICAL LITERATURE REVIEW OF
GENDERED OUTCOMES IN THE DIGITAL ECONOMY**Noor Syafinas Muda¹, Jia Qi Cheong^{2*}, Khairul Hanim Pazim³¹Department of Business and Management, University of Teknologi MARA, Malaysia. noorsyafinas@uitm.edu.my <https://orcid.org/0000-0003-1506-187X>²Department of Business and Management, University of Teknologi MARA, Malaysia. Centre for Economic Development and Policy jiaqi@uitm.edu.my <https://orcid.org/0000-0002-2633-3458>³Faculty of Business, Economics and Accountancy, University Malaysia Sabah k_hanim@ums.edu.my <https://orcid.org/0000-0003-0720-3524>

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Abstract:

Purpose: The COVID-19 pandemic accelerated global e-commerce adoption, creating both opportunities and challenges for women entrepreneurs. This study critically reviews the gendered outcomes of e-commerce adoption during the pandemic, focusing on policy responses influencing women's digital economic participation and food security. It offers a new understanding of how digital exclusion, gendered policy blind spots, and food systems intersect to create a 'triple burden' for women. **Methodology:** A critical literature review was conducted using peer-reviewed articles, books, and institutional reports from Scopus, Web of Science, Google Scholar, and institutional databases. Publications from 2015 to 2026 were identified using keywords related to women entrepreneurs, e-commerce, COVID-19 policy responses, and food security. The analysis integrates Gender and the Digital Economy, Feminist Political Economy, and Digital Divide Theory to construct a multi-level framework linking structural inequalities to entrepreneurial outcomes. **Findings:** E-commerce served as an essential mechanism for women entrepreneurs to sustain businesses and maintain food supply chains during pandemic disruptions. Thematic analysis identified three interrelated challenges: (1) persistent gender-based digital and financial inequalities; (2) limited policy responsiveness to women's specific needs, particularly unpaid care work; and (3) weak integration of digital inclusion with food-security objectives. Consequently, while digital platforms offered a

lifeline, they often reinforced existing vulnerabilities rather than transforming them. Originality/Value: This review demonstrates that women's digital economic participation is a structural development issue, not merely technological. It offers a new theoretical integration explaining why digital inclusion policies frequently fail to improve food security outcomes for women—specifically because they ignore the feedback loop between social reproduction and digital resilience. Conclusion: Sustainable digital inclusion requires coordinated investments in digital capability, financial inclusion, care infrastructure, and gender-responsive policies. Future strategies should integrate gender equality, food security, and digital capability as interconnected priorities.

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Keyword:

COVID-19; Digital Divide; E-Commerce; Food Security; Gender; Literature Review; Policy; Women Entrepreneurs



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Introduction

The rapid advancement of digital technologies has fundamentally transformed global economic systems. E-commerce has expanded market access, lowered transaction costs, and created new entrepreneurial opportunities worldwide (UNCTAD, 2021). Digital platforms have enabled micro, small, and medium-sized enterprises (MSMEs) to participate in markets with fewer geographical and financial constraints. This transformation has been particularly significant for women entrepreneurs, who historically face structural barriers in accessing finance, formal employment, and business networks (World Bank, 2022).

Despite these opportunities, digital economy participation remains deeply gendered. Women continue to experience disparities in digital access, literacy, device ownership, financial inclusion, and technology-sector participation. These inequalities reflect broader social, economic, and institutional structures (OECD, 2018). The Food and Agriculture Organization (FAO) identifies a "triple divide" —digital, rural, and gender—which makes it exceptionally difficult for women in rural areas to access the technologies needed for food production and sales (FAO, 2020). This triple divide impacts not only women's economic empowerment but also the resilience of local food supply chains.

The COVID-19 pandemic accelerated global digitalisation at an unprecedented pace. Lockdowns, mobility restrictions, and social distancing measures forced businesses and governments to rely heavily on digital technologies (OECD, 2020). Food e-commerce expanded dramatically as consumers sought to prevent infection by avoiding public places. Governments introduced policy interventions including digital payment systems, online

business registration, financial assistance for digital adoption, and digital infrastructure investment (UNCTAD, 2021).

These policy responses created new opportunities for women entrepreneurs. However, women were disproportionately represented in sectors severely affected by lockdowns—retail, hospitality, informal trade, and food value chains—while simultaneously assuming increased unpaid domestic and caregiving responsibilities (UN Women, 2020). The pandemic exposed a critical intersection: how women entrepreneurs used e-commerce to navigate the crisis and, in doing so, played a vital role in maintaining food systems.

Existing reviews have largely examined digital entrepreneurship, gender inequality, or food security as independent phenomena. Specifically, the literature has thoroughly documented the gender digital divide and the general economic impacts of COVID-19. However, previous studies have not sufficiently examined the intersectional nexus of women's e-commerce participation, specific policy responses, and food security outcomes. Few studies have integrated these themes within the context of COVID-19 policy responses to determine how specific digital interventions (e.g., infrastructure investment vs. capacity building) differentially affect women's ability to maintain food supply chains. This review addresses that gap by providing a critical synthesis of evidence on how pandemic-era digital policies have shaped gendered outcomes in the digital economy, with particular attention to the underexplored link between e-commerce adoption and household food security.

This paper critically reviews literature examining relationships among women, e-commerce, COVID-19 policy responses, and food security. Specifically, it aims to: (1) examine theoretical foundations explaining gender inequalities in digital economies; (2) evaluate women's pre-pandemic e-commerce participation, particularly in food value chains; (3) assess government policy responses accelerating digital transformation; (4) critically analyse gendered outcomes in employment, entrepreneurship, food security, and value chain resilience; (5) identify inconsistencies and gaps; and (6) propose future research directions and policy recommendations.

Literature Methodology

This study employs a critical literature review methodology to examine scholarly evidence regarding women, e-commerce, COVID-19 policy responses, and food security. A critical literature review systematically evaluates and synthesises published research while identifying theoretical assumptions, methodological limitations, inconsistencies, and knowledge gaps (Grant & Booth, 2009). Unlike systematic reviews that seek exhaustive quantitative synthesis, critical literature reviews emphasise conceptual interpretation, theoretical comparison, and identification of contradictions across the literature.

To ensure rigour, the selection criteria required that sources explicitly address at least one of the four core themes (women, e-commerce, COVID-19 policy, or food security) and were published in peer-reviewed journals or by authoritative international institutions (e.g., World Bank, FAO). Literature was screened in three stages: (1) title and abstract screening to remove irrelevant records; (2) full-text review to assess thematic relevance; and (3) quality appraisal based on methodological transparency and theoretical contribution.

Literature Search Strategy

A comprehensive literature search was conducted using Scopus, Web of Science, Google Scholar, ScienceDirect, SpringerLink, Taylor & Francis Online, and institutional databases (UN Women, UNCTAD, ILO, OECD, World Bank, ITU, FAO, IFAD, and UNDP). Searches were performed within titles, abstracts, and keywords using Boolean operators (AND, OR) to combine terms related to women entrepreneurs, e-commerce, digital transformation, COVID-19 policy responses, food security, and digital inclusion. The principal search string was:

("women entrepreneurs" OR "women AND e-commerce" OR "gender digital divide") AND ("digital economy" OR "digital transformation" OR "digital inclusion") AND ("COVID-19 policy responses" OR "pandemic recovery") AND ("food security" OR "agrifood systems" OR "food value chains") AND ("financial inclusion" OR "informal economy" OR "digital platforms").

Additional keywords, including *feminist political economy*, *digital resilience*, *platform economy*, and *social commerce*, were used where appropriate to broaden the search. The review included English-language publications published between January 2015 and December 2026, with no geographical restrictions applied during the initial search.

Inclusion and Exclusion Criteria

The review focused on peer-reviewed journal articles, books, book chapters, conference proceedings, and institutional reports published between 2015 and 2026, incorporating seminal theoretical works where appropriate. Studies were included if they addressed at least one of the following themes: women's participation in digital economies; e-commerce adoption; COVID-19 digital policy responses; gendered labour market outcomes; food security and agrifood systems; digital entrepreneurship; financial inclusion; digital inequality. Studies unrelated to gender, digital economic participation, or food security were excluded. Duplicate publications and studies lacking empirical or theoretical relevance were also omitted.

For quality appraisal, while a formal quality assessment tool (e.g., CASP, JBI) was not applied, studies were evaluated based on methodological rigour, sample size, geographical relevance, and theoretical contribution. Institutional reports from recognised international organisations (FAO, World Bank, OECD, ILO, UN Women, UNCTAD) were included based on their authoritative status.

Data Analysis

Selected literature was analysed using thematic analysis, grouping studies into major conceptual categories organised according to the theoretical framework. Rather than treating individual studies equally, the review critically evaluates differences in research design, geographical coverage, theoretical perspectives, and methodological approaches. Particular attention is given to conflicting findings, contextual differences between developed and developing countries, and areas where empirical evidence remains limited.

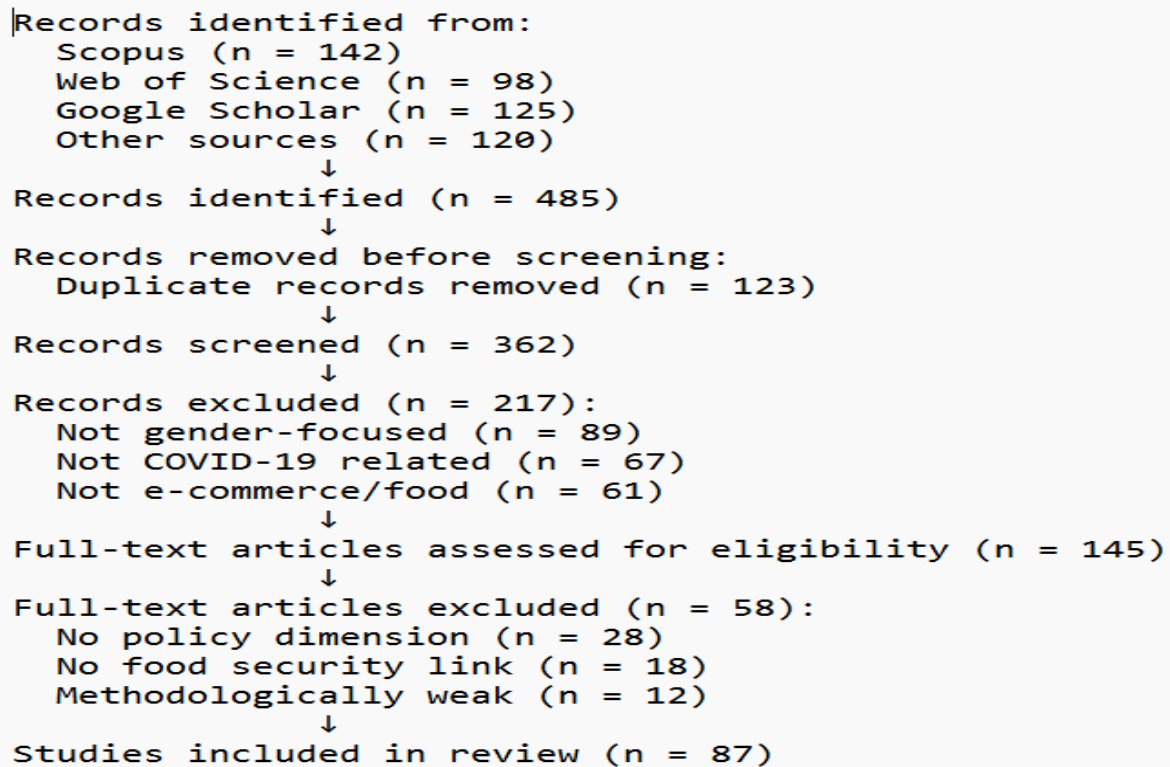


Figure 1 PRISMA 2020 Flow Diagram of Literature Selection

Source: Authors' own elaboration based on PRISMA 2020 guidelines (Page et al., 2021).

Conceptual Framework

The conceptual framework integrates three complementary theoretical perspectives: Gender and the Digital Economy, Feminist Political Economy, and Digital Divide Theory. Together, these perspectives explain how structural gender inequalities influence women's digital market participation and shape COVID-19 digital policy outcomes. In food systems, these theories reveal how the intersection of digital exclusion and gendered agricultural roles compounds food insecurity risks.

Theoretical Integration

The combination of Digital Divide Theory and Feminist Political Economy provides a more comprehensive explanation than either theory alone. Digital Divide Theory explains the multi-level nature of digital inequality—access, skills, and outcomes—but does not fully account for how gendered power structures shape these inequalities. Feminist Political Economy addresses this gap by revealing how economic policies, labour markets, and technological transformations are embedded within social systems that systematically value men's and women's work differently (Bakker & Gill, 2003). Together, these perspectives demonstrate that digital exclusion is not merely a technological problem but a manifestation of broader structural inequalities requiring both technological and institutional solutions.

Gender and the Digital Economy

The digital economy encompasses economic activities enabled by digital technologies. For women, digital platforms can lower barriers associated with traditional business ownership by enabling flexible work arrangements and direct consumer access. However, digital economy participation is not gender neutral. Women's engagement is influenced by structural inequalities in education, employment, asset ownership, digital literacy, access to finance, and sociocultural norms (UNCTAD, 2021; OECD, 2018). In the agrifood context, digital platforms can facilitate access to alternative food networks and short value chains, enabling upgrading—improving crop yields, product quality, and diversification (Foster et al., 2023).

Feminist Political Economy

Feminist Political Economy (FPE) provides a critical framework for understanding how economic systems are structured by gendered power relations. A central contribution is its emphasis on social reproduction—unpaid activities such as childcare, eldercare, household management, and domestic labour. During COVID-19, school closures and healthcare disruptions substantially increased unpaid care responsibilities, disproportionately affecting women and limiting their capacity for paid employment and digital entrepreneurship (UN Women, 2020; Bakker & Gill, 2003). In food systems, digital platforms can both alleviate and amplify traditional gender orders and responsibilities, potentially increasing women's workload on top of existing food-related care work (Craig & Churchill, 2021).

Digital Divide Theory and Digital Resilience

Digital Divide Theory explains inequalities in access to, use of, and benefits derived from digital technologies. Gender intersects with all three levels: the first-level digital divide (physical access), the second-level digital divide (digital skills), and the third-level digital divide (unequal socioeconomic outcomes) (Van Deursen & Van Dijk, 2019; Helsper, 2021). In the food security context, online food provisioning can expand access during crises, yet digital platforms may reinforce existing inequalities. Rural areas have fewer online grocers, and home delivery may be more costly, creating geographic disparities (FAO, 2020).

Digital resilience has emerged as a critical concept in post-pandemic discourse, referring to the capacity of individuals, enterprises, and systems to adapt, recover, and thrive in the face of digital disruptions (Helsper, 2021). For women entrepreneurs, digital resilience encompasses technological adoption, sustaining digital operations during crises, diversifying digital income streams, and leveraging digital networks for business continuity. This concept bridges the gap between digital access and sustainable economic outcomes.

Integration and Feedback Relationships

Together, these perspectives demonstrate that gendered outcomes arise from broader institutional, economic, and sociocultural structures. In the food security context, digital exclusion compounds existing vulnerabilities, making it essential to address the triple divide—digital, rural, and gender (FAO, 2020). Importantly, relationships are not unidirectional:

- Women's empowerment increases digital capability, which further promotes e-commerce adoption.

For women, particularly those operating MSMEs, e-commerce represented a promising avenue for overcoming barriers related to geographical mobility, access to physical marketplaces, and limited business networks (UNCTAD, 2019; World Bank, 2022).

Nevertheless, pre-pandemic literature consistently demonstrates that women's e-commerce participation remained constrained by structural inequalities rather than technological limitations alone. According to ITU (2019), women globally were less likely than men to access the internet, own smartphones, or possess advanced digital skills. These disparities were particularly pronounced in low- and middle-income countries where inadequate digital infrastructure, affordability issues, and sociocultural norms restricted women's digital market participation (ITU, 2022).

Digital financial exclusion further limited women's e-commerce engagement. Women were more likely than men to remain unbanked or underbanked, limiting their capacity for online commercial activities (Demirgüç-Kunt et al., 2018). Limited access to formal credit also constrained investment in technology, digital marketing, inventory management, and business expansion. In the agrifood context, women play a critical yet under-researched role in global digital agri-food value chains. Women small-scale farmers face limited access to information, resources, and technical knowledge, leading to a significant gender gap in agricultural productivity (FAO, 2020; Foster et al., 2023).

In Malaysia, research demonstrated that rural communities face distinct technology adoption challenges, with women in rural Sabah experiencing infrastructural barriers including poor road access, costly delivery services, lack of food processing knowledge and equipment, and limited warehousing and storage facilities (Cheong, 2022). Gendered household responsibilities continued to influence women's entrepreneurial activities, with many establishing home-based enterprises to balance income generation with childcare and domestic responsibilities (Elson, 2017). This pre-pandemic context is essential for understanding why the COVID-19 crisis disproportionately affected women—the structural inequalities that existed before the pandemic were amplified, not created, by the crisis.

COVID-19 Policy Responses and Digital Transformation

The COVID-19 pandemic fundamentally altered global digital transformation trajectories. Government-imposed lockdowns, travel restrictions, and social distancing measures disrupted conventional business operations while accelerating digital technology adoption across nearly every economic sector (OECD, 2020). Digital platforms became essential for maintaining commercial activities, preserving employment, delivering public services, and supporting economic recovery.

Governments implemented policy interventions facilitating online economic participation, including expanding broadband infrastructure, supporting digital payment systems, promoting online business registration, subsidising digital technology adoption, providing financial assistance to small businesses, and investing in digital skills training (UNCTAD, 2021). The pandemic generated unprecedented global e-commerce growth, with the most significant "pivot" being the boom in e-commerce for food retail sales, as consumers sought to prevent infection by avoiding public places (UNCTAD, 2021).

For women entrepreneurs, policy responses created both opportunities and challenges. Digital platforms enabled many women-owned businesses to continue operating despite movement restrictions. Social media platforms, online marketplaces, and mobile payment applications became increasingly important for maintaining customer relationships and generating income (UNCTAD, 2021).

In Malaysia, initiatives such as eUsahawan, Go-eCommerce, and UNDP's rural e-commerce project represent efforts to bridge digital gaps for women. At the height of the pandemic in 2020, UNDP Malaysia piloted an e-commerce ecosystem for rural producers and artisans in Sabah, supporting business continuity during the Movement Control Order while improving long-term financial health by widening access to markets (UNDP, 2023). The project successfully trained 300 women entrepreneurs and producers, with participating women's enterprises increasing from average revenue of USD137 to USD989 per month—illustrating transformative potential of targeted capacity-building (UNDP, 2023).

In Vietnam, ethnic minority women in Lai Chau province used livestream selling on TikTok Shop to sell agricultural products, with 300 tons of wild yam completely sold out in just two days, demonstrating strong economic resilience when given access to larger markets (Duong, 2025). In Indonesia, the Berikan Protein Initiative empowers fisherwomen by producing Fish Protein Hydrolysate sold on e-commerce platforms, providing nutritional benefits and new income streams. However, policy effectiveness varied considerably across countries and socioeconomic groups, with digital policy interventions frequently benefiting those already possessing adequate technological resources while excluding more vulnerable populations (UNCTAD, 2021).

Gendered Outcomes of COVID-19 Policies, Including Food Security

The COVID-19 pandemic produced profound and uneven socioeconomic consequences across the global labour market and food systems. While governments implemented various digital transformation policies to support business continuity, outcomes were not gender neutral. This section critically examines these outcomes, explicitly linking empirical findings back to the theoretical framework.

Synthesis of Key Themes

- The review of the literature reveals three distinct but interconnected themes regarding gendered outcomes:
- The 'Double Burden' of Digital Adoption: Across the literature, a consistent pattern emerges where women adopt e-commerce not as a choice for growth, but as a necessity for survival, while simultaneously absorbing increased unpaid care work. This contradicts the narrative of e-commerce as a purely liberating force.
- The 'Resilience Gap' in Policy Design: There is a clear pattern showing that supply-side policies (e.g., infrastructure, broadband) are necessary but insufficient. The most successful outcomes (e.g., in Malaysia and Vietnam) occurred when policy interventions combined digital access with targeted capacity building and market integration, whereas purely infrastructure-focused policies left women in the informal sector behind.

- **Food Security as a Gendered Outcome of Digital Exclusion:** The literature consistently links women's digital exclusion to reduced food security. The pattern is not merely that women earn less, but that when women are excluded from e-commerce platforms, local food value chains lose critical resilience, leading to increased food waste and reduced household nutrition.

Comparative Synthesis of Country Experiences

Table 1 Comparative Synthesis of Women's Digital Participation and Food Security Outcomes

Country	Policy Model	Key Initiative	Primary Outcome	Remaining Barrier	Food Security Impact
Malaysia	Government-led capacity building	eUsahawan, Go-eCommerce, UNDP rural e-commerce	Income growth (USD137→989/month)	Rural infrastructure	Reduced food waste, enhanced local food security (UNDP, 2023)
Vietnam	Platform-based market integration	Livestream commerce, SME digital transformation	Market expansion for ethnic minority women	Product diversification	300 tons wild yam sold; improved market access (Duong 2025; Noor et al., 2024)
Indonesia	Community-based innovation	Berikan Initiative, digital literacy	Protein digital entrepreneurship resilience	Financial access, digital literacy	Nutritional benefits for coastal families (Husein, et al., 2021)
Thailand	Digital infrastructure investment	ICT promotion	High online adoption (women +10% vs men)	Urban-rural divide	Improved consumer food access (Liao & Paweenawat, 2025)
Bangladesh	Informal social commerce	F-commerce, NGO support	Financial independence, recognition	Formal social platform trust	Local food access (Sarker et al., 2024)

Country	Policy Model	Key Initiative	Primary Outcome	Remaining Barrier	Food Security Impact
Philippines	Digital agriculture extension	IFAD project	SEEDS Digital adoption	Infrastructure, gender-blind policy	Enhanced smallholder productivity (IFAD, 2026)

Source: Authors' synthesis of reviewed literature

Critical Interpretation

The comparison between Malaysia and Vietnam illustrates two distinct policy models. Malaysia adopted a government-led capacity-building strategy through structured training, while Vietnam relied more heavily on platform-based market integration. These contrasting approaches suggest that successful digital inclusion depends not merely on technological access but also on institutional context, market infrastructure, and entrepreneurial ecosystems (Braun et al., 2023).

From a Feminist Political Economy perspective, the Malaysian approach addresses the second-level digital divide (skills) but does not fully address the care infrastructure that constrains women's time for training participation—an issue highlighted by the significant care burden increases during COVID-19 (UN Women, 2020; Craig & Churchill, 2021). Without childcare support or flexible training schedules, many women cannot participate regardless of programme availability. This explains why structured training programmes have shown limited uptake among women with significant care responsibilities.

From a Digital Divide Theory perspective, Vietnam's platform-based model enables rapid market access but risks platform dependency, reflecting concerns about algorithmic governance and platform power structures—an underexplored dimension of the third-level digital divide (Van Deursen & Van Dijk, 2019). Women who rely solely on a single platform are vulnerable to algorithm changes, fee increases, or platform policies that may disadvantage small-scale sellers.

From a Digital Resilience perspective, Thailand's digital infrastructure investment has created a foundation for sustained participation, with women who have diverse platform engagement better positioned to adapt to disruptions (Helsper, 2021). Bangladesh's informal F-commerce model demonstrates how women leverage existing social networks when formal platforms are inaccessible, yet this approach raises concerns about regulatory oversight and consumer protection that affect long-term sustainability.

Employment

Labour market consequences were disproportionately borne by women due to their concentration in sectors most affected by lockdowns—retail, hospitality, tourism, domestic services, and education (ILO, 2021). Women experienced higher unemployment rates and labour force withdrawal compared to men in many countries (UN Women, 2020). In agrifood value chains, impacts evolved over the course of the pandemic, with women-owned agrifood

enterprises sometimes less resilient than enterprises led by men, varying by country and product (IFPRI, 2023). This variation reflects the intersection of Digital Divide Theory's third-level outcomes with Feminist Political Economy's emphasis on how gender norms shape labour market structures. Women's sectoral concentration in care and service industries—themselves undervalued by gendered labour market structures—meant they were disproportionately affected by lockdowns. This reinforces the theoretical argument that digital employment policies must address both technological access and institutional discrimination.

Entrepreneurship and Food Security

Digital entrepreneurship emerged as a visible economic adaptation dimension during COVID-19. Women-owned enterprises increasingly relied on digital platforms to maintain customer engagement and generate income (UNCTAD, 2021). In Senegal, women demonstrated capacity for resilience through e-commerce, continuing to supply markets and households with vegetables despite immense difficulties. In rural Sabah, Malaysia, women entrepreneurs processed agricultural produce into higher-value products, reducing wastage and enhancing food security (UNDP, 2023). In Thailand, women are 10 percentage points more likely to shop online than men (Liao & Paweenawat, 2025).

Research on agricultural platform-driven value chains shows women upgraded through the shock in crop productivity and quality more successfully than men, yet experienced downgrading in product diversification (Foster et al., 2023). This suggests coping mechanisms during crises may involve specialisation rather than diversification. From a Digital Resilience perspective, women who had pre-existing digital skills and diverse platform engagement were better positioned to maintain business operations, while those lacking digital resilience were more likely to experience business closure. This finding underscores the importance of investing in digital resilience as a policy priority.

Informal Sector and Food Systems

The informal sector represents a significant employment source for women worldwide. Women were disproportionately represented in informal retail, domestic work, home-based production, and street vending (ILO, 2018). Government lockdowns severely affected informal businesses, while the transition to digital was far from universal. Women in the informal economy frequently lacked technological infrastructure, digital literacy, and financial resources (UN Women, 2021). In Malaysia, low-income women entrepreneurs were compelled to adopt technology, mostly utilising social media marketing, yet trust issues including payment delays and high commission fees make formal e-commerce platforms less appealing (Cheong et al., 2020). Informal food traders were particularly vulnerable as domestic supply chains deliver approximately 80 percent of food consumed (by value) in many African and Asian countries (IFPRI, 2023). This confirms Digital Divide Theory's first and second-level divides: without physical access and digital skills, women in the informal economy could not participate in the digital transformation, regardless of their entrepreneurial capabilities.

Digital Skills, Financial Inclusion, Care Burden and Digital Resilience

Digital skills emerged as critical determinants of women's ability to benefit from COVID-19 digital transformation policies. The SEEDS project in Cambodia, the Philippines, and Viet Nam deployed Digital Agriculture Arrowheads—primarily women and youth—across 28

locations, reaching nearly 12,000 participants (IFAD, 2026). Financial inclusion barriers continued restricting women's ability to obtain business financing or expand digital enterprises (Demirguc-Kunt et al., 2018). Dramatic increases in unpaid care work due to school closures and healthcare disruptions significantly expanded labour performed by women, with digital platforms potentially increasing workload on top of existing food-related care work (UN Women, 2020; Craig & Churchill, 2021). This care burden directly contradicts the assumption underlying many digital skills programmes—that women have time to participate in training—and reflects Feminist Political Economy's critique of policies that ignore social reproduction. Women who successfully maintained digital businesses during the pandemic often had access to childcare support or household help, demonstrating that digital resilience is enabled not just by individual capability but by institutional support structures.

Food Security and Agrifood Value Chains

The intersection of e-commerce and women's entrepreneurship proved critical for food security during the pandemic. The pandemic was associated with increased food insecurity among women, with prevalence increasing from 6% higher than men in 2019 to 10% higher in 2020, with 126 million more women struggling to access adequate and nutritious food in 2021 (Mane et al., 2024). Eliminating gender gaps in farm productivity and wages could result in USD 1 trillion increase in global GDP and lift approximately 45 million people out of food insecurity (Mane et al., 2024). Individuals aged 25–34 and women residing in rural areas were disproportionately affected, with gender norms and discrimination continuing to impede women's access to food security (Mane et al., 2024). From an integrated theoretical perspective, these food security outcomes represent the third-level digital divide—unequal socioeconomic consequences resulting from digital technology use—compounded by Feminist Political Economy's structural inequalities. The amplification of food insecurity among rural women reflects the triple divide (digital, rural, gender) that the FAO identifies as a critical barrier (FAO, 2020).

Critical Analysis and Research Gaps

Critical Analysis

Several conceptual and methodological limitations warrant examination. First, there is a persistent technology-centric perspective within the literature. Much literature assumes that expanding access automatically produces inclusive outcomes, which is inconsistent with Feminist Political Economy perspectives that emphasise technology operates within gendered power structures (Bakker & Gill, 2003). This assumption is particularly problematic in the food security context, where digital platforms may reinforce rather than reduce existing inequalities in food access. The evidence from rural Sabah, where infrastructure barriers persist despite training programmes (Cheong, 2022), demonstrates that technological solutions alone are insufficient.

Second, there is a significant geographical imbalance in the existing research. Most empirical research originates from high-income economies, which restricts the generalisability of findings (Foster et al., 2023). This imbalance means policy recommendations may not translate effectively to low- and middle-income countries where digital exclusion, informal employment, and food insecurity are more pronounced.

Third, there are notable methodological limitations. The dominance of cross-sectional studies provides only snapshots but offers limited insight into long-term structural change (Killion et al., 2025). Without longitudinal data, we cannot determine whether pandemic-induced digital participation reflects lasting transformation or temporary coping mechanisms that will revert as restrictions ease.

Fourth, there is a clear lack of policy evaluation. Policies are often developed without evaluative frameworks, making it difficult to determine programme effectiveness (Henry et al., 2023). This represents a significant gap: policymakers cannot learn from what works without systematic evaluation.

Finally, there is contradictory evidence on women's digital adoption, which is explained by differences in country context, sector, education levels, and urban-rural location. Women in Thailand with university education were significantly more likely to adopt digital tools (Liao & Paweenawat, 2025), while women in rural Sabah without formal training faced persistent barriers (Cheong, 2022). This confirms the theoretical framework's emphasis on education and institutional context as mediating factors.

Research Gaps

Key research gaps include: (1) longitudinal studies assessing durability of digital transformation; (2) comparative and cross-country research across diverse contexts; (3) intersectional analysis examining age, ethnicity, disability, income, and location; (4) quality of digital employment and entrepreneurship; (5) policy evaluation using robust frameworks; (6) digital resilience and policy interventions; (7) artificial intelligence and emerging technologies; and (8) gendered impact of e-commerce and food policies in the Asia-Pacific region.

Policy Implications

Digital Infrastructure and Skills: Short-Term and Long-Term

Governments should prioritise universal digital infrastructure by expanding affordable broadband access, improving rural connectivity, and ensuring equitable access to digital devices (UNDP, 2023). Digital skills programmes should move beyond basic literacy to incorporate advanced competencies and build digital resilience—the capacity to adapt digital operations during disruptions.

Short-term (1-2 years): Immediate investments in mobile connectivity and subsidised devices for women entrepreneurs; emergency digital literacy programmes targeting women in the informal sector; and flexible, accessible training that accommodates caregiving responsibilities (IFAD, 2026). Long-term (3-5 years): Comprehensive digital infrastructure development in rural areas; integration of digital skills into formal education curricula; establishment of sustainable digital training ecosystems with community-based trainers.

Financial Inclusion and Care Economy

Governments should expand access to affordable credit, promote women-focused fintech innovations, reduce collateral requirements, and strengthen financial literacy (Demirguc-Kunt et al., 2018). Investments in affordable childcare, parental leave, flexible work arrangements,

and social protection systems are essential for enabling women's full participation in digital labour markets (UN Women, 2020). Without addressing care infrastructure, digital skills programmes will continue to have limited effectiveness for women with significant care responsibilities. This directly addresses the Feminist Political Economy critique that policies ignoring social reproduction will fail to achieve gender equality.

Dedicated Women's Entrepreneurship Policies

Henry et al. (2023) argue that "one size does not fit all" and gender-neutral policies are less than optimal. A dedicated national women's entrepreneurship policy would ensure women-owned firm contributions are recognised and valued. Direct involvement of women in designing, developing, and evaluating policies is crucial—providing women entrepreneurs with a seat at the policy table facilitates better policy formulation. This aligns with Feminist Political Economy's emphasis on participatory policy development.

Food Systems Integration and Policy Evaluation

The FAO recommends establishing gender-responsive extension and rural advisory services, optimising labour-saving technologies, and leveraging digital solutions for post-COVID-19 recovery targeted to rural women (FAO, 2020). Governments should integrate gender and food security impact assessments into digital economy strategies. Henry et al. (2023) identify four key areas: (1) embedding evaluation into programme design; (2) developing dedicated national women's entrepreneurship policy; (3) directly involving women in policy development; and (4) linking women's entrepreneurship policy to the broader entrepreneurial ecosystem. Evaluation frameworks must capture not just digital adoption metrics but also business sustainability, food security outcomes, and changes in women's empowerment—addressing the third-level digital divide concerns.

Conclusion

The COVID-19 pandemic accelerated digital transformation at an unprecedented scale, fundamentally reshaping global employment, entrepreneurship, commercial activity, and food systems. E-commerce emerged as a critical mechanism for economic continuity, while governments introduced extensive digital policy interventions. For women, these developments created important opportunities to participate in online markets, adopt digital business models, maintain food supply chains, and access new financial technologies.

However, this critical literature review demonstrates that digital transformation benefits were unevenly distributed. The findings reveal that while e-commerce provided a critical lifeline, it did not act as a great equalizer. Persistent inequalities in digital access, financial inclusion, employment opportunities, entrepreneurial resources, and unpaid care responsibilities limited many women's ability to capitalise fully on emerging digital opportunities—and in the context of food systems, limited their ability to contribute to resilient local food supplies. The gender gap in food insecurity widened during COVID-19, from 6% higher among women in 2019 to 10% higher in 2020 (Mane et al., 2024).

The integration of Gender and the Digital Economy, Feminist Political Economy, and Digital Divide Theory provides a comprehensive framework for understanding these complex dynamics. It revealed that the relationship between policy, digital adoption, and food security

outcomes is mediated by institutional context, care infrastructure, education, and entrepreneurial ecosystems. The introduction of digital resilience bridges the gap between digital access and sustainable economic outcomes. In the food security context, the triple divide—digital, rural, and gender—represents a critical barrier that must be addressed to build resilient and equitable food systems (FAO, 2020). Throughout this review, we have demonstrated that the relationship between policy, digital adoption, and food security outcomes is mediated by institutional context, care infrastructure, education, and entrepreneurial ecosystems.

Empirical evidence from the Asia-Pacific region reveals that women entrepreneurs face distinct challenges, yet capacity-building interventions have demonstrated transformative potential—empowering women as producers and entrepreneurs reduces food waste, improves income, and enhances food security (UNDP, 2023). Examples from Vietnam, Indonesia, and Malaysia show that e-commerce can open new economic opportunities for women in food systems when combined with appropriate training and support.

Contribution and Actionable Recommendations

This review contributes to the literature by demonstrating that women's digital inclusion should be understood as a structural development issue rather than solely a technological issue. and that sustainable digital economy participation alongside food system resilience requires coordinated investment across multiple sectors. Based on the findings of this review, several specific actions are recommended for key stakeholders. For policymakers, it is imperative to move beyond "one-size-fits-all" digital infrastructure policies; instead, governments should integrate gender and food security impact assessments into all digital economy strategies. This includes specifically investing in affordable childcare and flexible training schedules to address the "care burden" identified as a primary barrier to women's participation. Furthermore, policymakers must embed evaluation frameworks into programme design to measure not just adoption rates, but also business sustainability and food security outcomes. For financial institutions, the review found that financial exclusion remains a critical barrier; therefore, these institutions must expand access to affordable credit, promote women-focused fintech innovations that reduce collateral requirements, and strengthen financial literacy specifically for rural and informal sector entrepreneurs. Finally, for digital platforms, the literature highlights risks of platform dependency and algorithmic exclusion. Consequently, platforms should develop more transparent governance structures and fee models that do not disadvantage small-scale women sellers. They should also partner with NGOs to provide digital literacy training that goes beyond basic use to advanced market navigation, ensuring women can fully leverage these digital ecosystems. By adopting such integrated approaches, governments can ensure future digital transitions contribute to sustainable, equitable, and inclusive development aligned with SDG 2 (Zero Hunger), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), and SDG 10 (Reduced Inequalities).

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