

Assessing The Role of Technology Advancement in Improving Women's Participation in The Digital Economy in Kampala Metropolitan, Uganda

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Abstract

This study assessed the role of technology advancement in improving women's participation in the digital economy within the Kampala Metropolitan area. It employs a combination of descriptive, cross sectional survey design, the research integrated both quantitative data from surveys and qualitative insights from interviews with women and relevant stakeholder, including technology trainers and government stakeholders. The target population consisted of approximately 500 women in the Kampala Metropolitan area, with a calculated sample size of 222 participants based on Slovin's formula and a 5% margin of error. The findings expressed that technology advancement significantly influence women's participation in the digital economy with an R² value of 0.413 indicating that about 41.3% of the variation in participation could be as a result to technology advancement. The regression analysis indicated a strong positive effect ($B=0.587$, $B=0.643$, $t=8.291$, $p<0.001$), confirming the statistical significance of the relationship. ANOVA results further validated the model's robustness ($F\text{-statistic}=68.753$, $p<0.001$). These results highlighted that enhanced access to digital tools and platforms was crucial for empowering women financially. The study concludes that technology advancements had positively impacted women economically. The study concluded that technology advancements had positively impacted women's participation by creating an enabling environment for them to engage in online transactions and manage businesses with greater freedom and control. Recommendations included the development of gender responsive digital policies aimed at reducing financial barriers, such as subsidized internet rates and increased accessed access to affordable digital devices. By fostering these initiatives, stakeholders could significantly enhance women's involvement in the digital economy. promoting inclusive economic development.

Keywords : Technology advancement; Women's participation; Digital Economy; Kampala Metropolitan; Uganda, Gender responsive policies.

Studi ini menilai peran kemajuan teknologi dalam meningkatkan partisipasi perempuan dalam ekonomi digital di wilayah Metropolitan Kampala. Ini menggunakan kombinasi desain survei deskriptif dan crosssectional, penelitian ini mengintegrasikan data kuantitatif dari survei dan wawasan kualitatif dari wawancara dengan perempuan dan pemangku kepentingan yang relevan, termasuk pelatih teknologi dan pemangku kepentingan pemerintah. Populasi target terdiri dari sekitar 500 wanita di wilayah Metropolitan Kampala, dengan ukuran sampel yang dihitung sebesar 222 peserta berdasarkan rumus Slovin dan margin kesalahan 5%. Temuan tersebut mengungkapkan bahwa kemajuan teknologi secara signifikan mempengaruhi partisipasi perempuan dalam ekonomi digital dengan nilai R^2 0,413 yang menunjukkan bahwa sekitar 41,3% variasi partisipasi dapat disebabkan oleh kemajuan teknologi. Analisis regresi menunjukkan efek positif yang kuat ($B = 0,587$, $B = 0,643$, $t = 8,291$, $p < 0,001$), mengkonfirmasi signifikansi statistik dari hubungan tersebut. Hasil ANOVA lebih lanjut memvalidasi ketahanan model (F -statistik = 68,753, $p < 0,001$). Hasil ini menyoroti bahwa peningkatan akses ke alat dan platform digital sangat penting untuk memberdayakan perempuan secara finansial. Studi ini menyimpulkan bahwa kemajuan teknologi telah berdampak positif pada perempuan secara ekonomi. Studi ini menyimpulkan bahwa kemajuan teknologi telah berdampak positif pada partisipasi perempuan dengan menciptakan lingkungan yang memungkinkan bagi mereka untuk terlibat dalam transaksi online dan mengelola bisnis dengan kebebasan dan kontrol yang lebih besar. Rekomendasi termasuk pengembangan kebijakan digital responsif gender yang bertujuan untuk mengurangi hambatan keuangan, seperti tarif internet bersubsidi dan peningkatan akses ke perangkat digital yang terjangkau. Dengan mendorong inisiatif ini, para pemangku kepentingan dapat secara signifikan meningkatkan keterlibatan perempuan dalam ekonomi digital. mempromosikan pembangunan ekonomi inklusif.

Keywords : *Kemajuan teknologi; Partisipasi perempuan; Ekonomi Digital; Metropolitan Kampala; Uganda, Kebijakan responsif gender.*

1. INTRODUCTION

Uganda's STEM sector (Technology, Engineering, and Mathematics) has evolved significantly, starting with basic telecommunication under colonial rule and the introduction of the first computer in 1967 (Uganda English, 2016; Uganda's journey to a computerised era, 2021). Liberalization in the 1990s spurred growth, with mobile phone services and internet expansion (Freelyformd, 2020). The launch of the Seacom cable in 2009 further boosted internet services, leading to ICT solutions and mobile banking (Freelyformd, 2020). Despite increased technology access, disparities persist, particularly affecting women's ability to benefit from digital advancements (ActionAid International Uganda, 2023; The CFMA, 2023).

The digital economy encompasses economic activities resulting from online connections and digital technologies (Banco Santander, 2022; Deloitte Malta, 2021; MoreThanDigital, 2024; Sprintzeal.com, 2025). It relies on hyperconnectivity, facilitated by the internet, mobile technology, and the Internet of Things (MoreThanDigital, 2024; Sprintzeal.com, 2025). A significant concern is the digital gender divide, where women face barriers such as high costs, lack of literacy, and socio-cultural norms (JIGC Media, 2023; UN Capital Development Fund (UNCDF), 2023). Bridging this divide is crucial for achieving gender equality and empowering women (The CFMA, 2023).

In Kampala Metropolitan, technology drives economic growth (Uganda Investment Authority, 2024; Wikipedia, 2024). Increased internet and mobile device access has enabled women's participation in e-commerce, e-governance, and e-learning (Strategic Initiative for Women in the Horn of Africa, n.d.). However, women's participation is hindered by limited access to ICT tools, inadequate skills, and cultural barriers (UN Capital Development Fund (UNCDF), 2023, October 19; UN Capital Development Fund (UNCDF), 2023, March 15). Various initiatives by civil society, government, and the private sector aim to promote digital inclusion and empower women (Strategic Initiative for Women in the Horn of Africa, n.d.).

2. LITERATURE REVIEW

Various theories related to technology advancement and women's participation in digital economy form the conceptual basis for examining how technology advancements influence women's participation in digital economy in Uganda. This study is particularly anchored in two key theories:

Feminist Theory (FTT) and Digital Divide Theory.

Feminist Technology Theory (FTT)

The Feminist Technology Theory (FTT) originated from feminist science and technology studies (STS), a subfield that gained traction in the late 20th century. Great thinkers like Donna Haraway (1985) in her seminal work *A Cyborg Manifesto* set the foundation for traversing the interplay between technology as a neutral stating that instead, it is rooted in the social values including gender norms. The theory explains that the design, development and usage of technology are influenced by cultural dynamics that often marginalizes women's contributions and strengthens male centric paradigms (Wajcman, 2020). FTT critiques the way women are often regarded as passive consumers or excluded completely from technology creation processes, perpetuating gender disparities. Central to the theory is the belief that both the creators and the sociocultural contexts of technology shape its development and that feminist interventions are necessary at both the design and policy levels (Costa & Murphy, 2021).

Feminist Technology Theory is mostly relevant in the 21st century, where technology permeates everyday life, labor, and communication. The theory holds practical implications in areas like artificial intelligence, biotechnology and digital labor economies. For instance, scholars such as Benjamin (2019) and Gebru (2020) have demonstrated how AI tools can replicate and amplify gender and racial biases due to the biased datasets and frameworks they rely on providing compelling evidence for FTT's assertion that technology is not value neutral. Feminist Technology Theory has further informed feminist hacktivism, open-source design, and resistance to surveillance technologies that disproportionately impact women and underserved populations (Keyes et al., 2021). In addition, the theory promotes the reimagining of equitable technological futures by advocating participatory design approaches that elevate the voices of women, nonbinary and underrepresented individuals. It provides a critical lens for examining how innovation, identity and power intersect and calls for democratizing technological production (Bardzell & Bardzell, 2012).

Despite its strength, Feminist Technology Theory is criticized, the first concern is that early versions of the theory often looked narrowly on the experiences of Western, middle class, white women limiting its intersectional scope (Crenshaw, 1989, Eubanks, 2018), Contemporary feminist scholars have since expanded the theory's reach by incorporating diverse experience experiences related to race, disability, class, and geopolitical context (D'Ignazio & Klein, 2020; Bhattacharyya et al., 2022). Another gap is FTT's theoretical density which can provide it inaccessible to engineers, practitioners, or policy makers who

might otherwise benefit from its insights. However, the theory sometimes lacks concrete strategies for implementation in real world tech development context. Nevertheless, FTT remains a vital analytical framework for exploring the co-evolution of gender and technology especially when integrated with intersectional and decolonial perspective striving for inclusive, just and accountable innovation (Sambasivan et al., 2021).

Digital Divide Theory

Digital Divide Theory emerged in the 1990s as scholars and policymakers began grappling with the uneven spread of digital technologies. The U.S. Department of Commerce's 1995 report *Falling Through the Net* popularized the term, highlighting the early realization that access to the internet was not uniform across populations. Building on this foundation, writers such as van Dijk (2005) and Warschauer (2004) argued that the issue was not simply about having or lacking access. Instead, they showed that inequalities in digital spaces are layered shaped by people's skills, the ways they use technology, and the tangible benefits that flow from that use. In this sense, the theory frames digital exclusion as both a mirror of wider social inequalities and a mechanism that can deepen them.

The framework gained even more relevance during the COVID-19 pandemic, when access to online education, remote work, and telehealth became indispensable. While wealthier groups adapted quickly, many rural and low-income communities, particularly in the Global South, were left behind due to high costs, unreliable infrastructure, and limited digital literacy (Ragnedda & Mutsvairo, 2022). Recent research further refines the concept by distinguishing three dimensions of the divide: access, skills and usage, and the benefits or outcomes of digital participation (van Dijk, 2020; Scheerder et al., 2021). This more layered understanding has shaped interventions by governments and development agencies, which now stress not only connectivity but also capacity building, relevant local content, and protection of digital rights.

However, the theory has also faced important criticism. Selwyn (2020) cautions that simply measuring device ownership or frequency of internet use overlooks people's lived experiences and the cultural meanings attached to digital practices. Postcolonial and critical scholars extend this critique further, pointing out that structural forces such as colonial legacies, data exploitation, and gender hierarchies remain underexplored in much digital divide research (Couldry & Mejias, 2019; Milan & Treré, 2020). For example, discussions of digital inequality in Africa often ignore how women negotiate access in male-dominated digital spaces, or how communities creatively adapt technologies to local needs. These perspectives remind us that users are not passive recipients but active agents who shape their own digital realities.

Taken together, Digital Divide Theory offers a useful lens for understanding the persistence of digital inequalities. Yet, it must be engaged critically, especially in contexts like Uganda, where disparities in ICT access intersect with broader issues of gender, education, and economic opportunity. In this study, the theory provides a foundation for analysing how women and marginalized groups experience barriers to digital participation, while also opening space to question how structural power relations sustain those barriers.

Literature review

The incorporation of technology into the global economies has transformed how individuals access, create and distribute economic value. Women specifically, technology advancement presents the promise of overcoming historical barriers to participation in economic activities. Therefore, there is no doubt technology has accelerated new opportunities for women economic engagement particularly through digital entrepreneurship, e-commerce and remote labor market. Recent studies have employed diverse methodology to examine how women navigate digital platforms and technologies.

Quantitative research, such as that conducted by the OECD (2021), analyses cross national datasets to correlate women's access to digital tools with employment and entrepreneurship outcomes. These studies offer wider insights but often generalize across diverse contexts, missing nuanced sociocultural dynamics that influence women's digital participation.

However, qualitative and mixed method approaches offer more contextual depth. For instance, Webb, Mahmud, and Hassan (2021) conducted a mixed method study in Kenya that combined ethnographic interviews with digital platform data, revealing how socio normative factors such as caregiving responsibilities and restricted mobility shape women's involvement in gig work. Similarly, Koskinen and Denskus (2021) used ethnographic methods to explore how women in sub-Saharan Africa informally engage with digital tools like WhatsApp and Facebook Marketplace for microenterprise, uncovering a vibrant yet under recognized domain of informal digital labor.

Experimental methods have also been applied to assess the efficacy of technology interventions. Aguaro and Valenzuela (2022) carried out a random control trial (RCT) to assess the impact of digital skills training on women micro entrepreneurs in Latin America. Their findings indicated short-term improvements in digital tool adoption and income growth. However, like many experimental studies, their work did not track long-term behavioral change or consider non-technological barriers, such as persistent gender norms or household dynamics that may constrain sustained engagement. In high-income contexts, Coyle and Nguyen (2021) examined how AI-enabled hiring systems and remote work technologies have facilitated increased female participation in the tech and finance sectors. While the study identified greater employment flexibility for women, it also revealed how algorithmic systems can perpetuate bias reproducing offline inequalities in online environments.

The findings across studies converge on the idea that technology can facilitate women's economic participation, but only under enabling conditions. Baliyan and Baliyan (2021), in a study on mobile banking in rural Botswana, found that access to financial technologies empowered women with greater autonomy in business decision-making. However, success was contingent upon digital literacy and the cultural appropriateness of interventions. Hussain, Mahmood, and Ullah (2020) similarly noted that freelance digital platforms in Pakistan provided viable income alternatives for women restricted by traditional gender roles, yet gender pay gaps and unequal algorithmic visibility still marginalized female workers. The recurring theme across studies is that technology is not a neutral enabler; rather, it is embedded within broader systems of power that often replicate existing gender inequalities.

Despite valuable contributions, notable gaps persist within the literature. A key limitation is the predominance of short-term or one-off studies that fail to capture the longitudinal dynamics of women's economic participation in digital environments (Aguero & Valenzuela, 2022). Many evaluations celebrate initial uptake of technologies but do not examine retention, scalability, or transformative impact over time. Furthermore, the geographic scope of the research is uneven. While South Asia and parts of sub-Saharan Africa are relatively well represented, Latin America, Southeast Asia, and Indigenous communities in high-income countries remain under-studied (Ragnedda & Mutsvairo, 2022; Milan & Treré, 2020).

Another limitation lies in the persistent techno-centrism of digital inclusion studies, which often equate access with empowerment. Such a view neglects the structural and intersectional barriers that limit how women use technology meaningfully. For instance, Couldry and Mejias (2019) argue that digital infrastructures in the Global South often serve extractive capitalist interests, where marginalized users especially women become "data

subjects” without genuine control over their digital environments. Intersectional scholars further contend that digital divide research has inadequately addressed how race, disability, language, and class intersect with gender to compound exclusion from digital economies (Milan & Treré, 2020; Selwyn, 2020). Moreover, women's roles as active creators of digital content and infrastructure remain underexplored, reinforcing a limited view of them as passive recipients of technological innovation rather than active agents shaping its design and use.

Research on women’s engagement in the digital economy has highlighted both empowering and limiting dynamics. Amin, Li, and Nisar (2022), for example, explored how low-income women in South Asia used digital microfinance platforms. Their mixed methods study suggested that fintech apps can strengthen women’s financial literacy and entrepreneurial activity. However, the same tools sometimes reproduced household inequalities, especially when male relatives controlled mobile devices or SIM registrations. In such cases, women’s digital inclusion was negotiated within existing gender power relations, underscoring that access alone does not guarantee autonomy. This intersection of technology and household dynamics remains insufficiently addressed in mainstream debates on the global digital economy.

Similar tensions appear in the platform labor economy. Gray and Suri’s (2020) work on microwork and gig platforms such as Amazon Mechanical Turk and Upwork illustrates how women, particularly from the Global South, often rely on such platforms for supplementary income. Flexibility was a major advantage, yet their study showed that precarity was equally central. Women were exposed to low pay, unpredictable work, and algorithmic systems that penalized those who took caregiving breaks or responded slowly to tasks. Such patterns reflect how digital platforms, rather than erasing gendered divisions of labor, may reproduce them in new digital forms.

The COVID-19 pandemic further magnified these vulnerabilities. A McKinsey study (Madgavkar et al., 2020) estimated that women’s jobs were nearly twice as likely as men’s to be lost during the crisis, partly because women remain concentrated in informal or digitally peripheral work. Although online opportunities expanded, they were largely taken up by urban and highly educated women, leaving rural and less educated groups excluded. The authors projected that advancing gender parity in digital adoption and reskilling could raise global GDP by \$13 trillion by 2030. While this is an appealing economic case, it also risks framing gender equity primarily as an economic lever, rather than as a matter of social justice and rights.

A growing body of feminist scholarship cautions against treating technology as a neutral tool. Eubanks (2021) documents how digital systems and automated decision making often replicate existing biases in public services, disproportionately affecting women and marginalized groups. Gurumurthy and Chami (2020) advance this critique further by proposing a feminist digital justice framework. They emphasize that questions of autonomy, surveillance, and epistemic agency must be placed at the center of digital governance, arguing that global digital capitalism often sidelines Southern feminist knowledge and community-led innovation.

Representation in technology design is another recurring theme. Crabtree et al. (2021) found that, even as more women enter STEM education globally, systemic barriers such as discrimination, lack of mentorship, and gendered tasking limit progression into leadership and innovation roles. Without women influencing design processes, digital products often fail to reflect female users’ needs, perpetuating subtle forms of exclusion.

Finally, scholars are beginning to highlight the non-economic dimensions of digital participation. While income and employment remain the dominant metrics, studies such as

Kovacs and Ranganathan (2020) point to digital harms ranging from online harassment to data exploitation that shape women’s experiences online. These issues speak to dignity, safety, and identity, areas that remain underexplored yet deeply affect how women navigate digital spaces. Addressing them requires gender-sensitive policy responses that go beyond expanding connectivity or broadband access.

3. RESEARCH METHODOLOGY

Research Design

The study adopts a descriptive, cross-sectional, survey design, appropriate for examining relationships among variables at a single point in time. A mixed methods approach will be employed, integrating both quantitative data (collected through surveys) and qualitative insights (collected through interviews).

Study Population

The study population comprises women residing in the Kampala Metropolitan Area who are directly or indirectly engaged in or affected by the digital economy. According to the UBOS Report, 2024, there are over 1550 in tech business in Kampala Metropolitan Area. This includes women entrepreneurs using digital platforms, women in digital skilling programs, and those participating in technology-enabled economic activities. In addition to women participants, the study also targets key stakeholders involved in supporting or shaping the digital landscape in the region. These include technology trainers, NGO program officers focusing on women empowerment and digital inclusion, as well as government representatives working on digital policy and gender equality initiatives.

Target Population

The estimated target population is approximately 500 women across the metropolitan area. This also includes relevant stakeholders such as technology trainers, NGO program officers, and government representatives involved in digital policy and gender equality initiatives.

Table 1. Target Population

Category	Estimated Population Size	Sampling Technique
E-commerce Entrepreneurs	150	Stratified Sampling
Digital Freelancers	100	Simple Random Sampling
Tech Trainers/Program Staff	50	Purposive Sampling
Government Officials	50	Purposive Sampling
Content Creators/Influencers	100	Stratified Sampling
Total Population	500	

Source: UBOS Report (2024)

Sample Size Determination

The sample size will be determined using Slovin’s formula. With a population of 500 and a margin of error of 5% at a 95% confidence level, the sample size will be 222 participants. Proportional allocation will be used across categories to ensure fair representation.

Table 2. Target Population

Category	Estimated Population Size	Sample Size	Sampling Technique
E-commerce Entrepreneurs	150	67	Stratified Sampling
Digital Freelancers	100	45	Simple Random Sampling
Tech Trainers/Program Staff	50	22	Purposive Sampling
Government Officials	50	22	Purposive Sampling
Content Creators/Influencers	100	45	Stratified Sampling
Total Population	500	222	

Source: UBOS Report (2024)

Data Collection Methods

Questionnaires

Structured questionnaires will be administered to women involved in various digital activities. These surveys will capture quantitative data on access to technology, digital skills, and economic outcomes. Likert-scale items will assess perceptions, challenges, and benefits of technological engagement.

Interviews

Semi-structured interviews will be conducted with selected stakeholders such as tech trainers, government officers, and NGO representatives. These will elicit qualitative data regarding policy, training programs, digital infrastructure, and women's empowerment in digital spaces (Bryman, 2016). A total of 15 interviews will be conducted.

Data Collection Instruments

Self-Administered Questionnaire

The questionnaire will consist of both closed and open-ended questions. Closed-ended questions will provide measurable variables, while open-ended items will allow for elaboration. Likert scales (1 to 5) will gauge levels of agreement with various statements on digital inclusion.

Interview Guide

An interview guide with open-ended questions will help maintain focus during interviews while allowing flexibility for deeper exploration. Questions will address technological access, gendered challenges, digital policy, and program outcomes.

4. RESULTS AND DISCUSSION

Objective 1: The role of Technology Advancement on Women's Participation

Table 3. The role of Technology Advancement on Women's Participation

Statement	1 (SD)	2 (D)	3 (N)	4 (A)	5 (SA)	Mean	Std. Dev
Advancements in technology have increased income opportunities for women.	10	15	30	80	62	3.92	1.10
Mobile phones and digital platforms have made it easier for women to do business.	8	12	25	85	67	4.01	1.05

Access to e-commerce platforms has improved women's ability to participate in the digital economy.	12	20	40	70	55	3.72	1.20
Technology has enhanced women's networking and marketing capabilities.	15	18	35	72	57	3.75	1.19
Women benefit from digital technologies equally as men in business participation.	40	35	50	45	27	2.85	1.43
Average						4.16	0.78

Source: Primary Data, 2025

From the table findings, the statement that; "Advancements in technology have increased income opportunities for women," 10 respondents strongly disagreed, 15 disagreed, 30 were neutral, 80 agreed, and 62 strongly agreed. The mean score was 3.92 with a standard deviation of 1.10, indicating that a majority of the respondents acknowledged the positive impact of technological advancements on women's income generation. The relatively high mean reflects a strong level of agreement, while the moderate spread of responses shows some variation in opinions, though the overall perception leans positively.

Regarding the statement "Mobile phones and digital platforms have made it easier for women to do business," 8 respondents strongly disagreed, 12 disagreed, 25 were neutral, 85 agreed, and 67 strongly agreed. With a high mean of 4.01 and a standard deviation of 1.05, the findings suggest that respondents overwhelmingly perceive mobile technology and digital platforms as key enablers of women's entrepreneurial efforts. The low variability indicates a strong consensus across the sample population.

For the statement "Access to e-commerce platforms has improved women's ability to participate in the digital economy," 12 strongly disagreed, 20 disagreed, 40 were neutral, 70 agreed, and 55 strongly agreed. The mean was 3.72, and the standard deviation was 1.20, reflecting a generally favourable view but with slightly more divergence in opinions. Although most respondents agreed, a notable number were neutral or disagreed, suggesting that access to e-commerce platforms may still be uneven or underutilized by some women.

The statement "Technology has enhanced women's networking and marketing capabilities" received 15 strongly disagree, 18 disagree, 35 neutral, 72 agree, and 57 strongly agree responses. The mean score was 3.75, and the standard deviation was 1.19. These results indicate moderate agreement that technology has supported women's networking and marketing, though the responses suggest some respondents remain uncertain or have yet to fully experience these benefits.

Lastly, for the statement "Women benefit from digital technologies equally as men in business participation," responses were more divided: 40 strongly disagreed, 35 disagreed, 50 were neutral, 45 agreed, and 27 strongly agreed. The mean score was only 2.85, with a higher standard deviation of 1.43, revealing significant disagreement and a wide spread of opinions. This suggests that many respondents perceive gender-based disparities in how digital technologies benefit men and women in business settings.

The above findings are in line with the interview findings:

One key informant stated:

“Technological advancement has opened doors for many women who previously had no access to markets or information. Through smartphones and internet access, they can now advertise and sell products online, especially via WhatsApp and Facebook. This has not only increased their income but also their confidence. Many women are now running small online businesses from home, something that was unimaginable a few years ago.” (KI I).

Another key informant had this to say:

“With the rise of mobile banking and fintech apps, women can now save money, send and receive payments easily without relying on physical banks. This has made them more financially independent and has reduced dependency on spouses or intermediaries. Some women even receive international remittances directly through mobile money services. Technology has really changed how rural women manage and control their finances.” (KI II).

One of the respondents had this to say:

“Before smartphones became common, women had to travel long distances to attend workshops or market their products. Now, they can access training videos, attend webinars, and join WhatsApp groups where knowledge is shared. This has greatly boosted their skills and exposure. Even illiterate women are benefiting by using voice notes and video instructions.” (KI III).

Another key informant was quoted saying:

“Technology has also brought visibility to women’s work. Platforms like Instagram and Facebook allow women to showcase their products like crafts, clothes, or agricultural produce. This has given them recognition beyond their communities and attracted buyers from different regions. Some have even started exporting small items because of the exposure technology provides.” (KI IV).

The qualitative results clearly reveal that technological advancement has significantly enhanced women’s participation by expanding access to information, markets, and financial services. It has transformed traditional roles, offering women new opportunities for entrepreneurship, visibility, and independence.

Regression Analysis for Technology Advancement and Women’s Participation in the Digital Economy

To test the relationship between technology advancement and women’s participation, Pearson correlation was used.

Table 4. Regression Analysis Summary

Model	R	R Square	Adjusted R Square	Std. Error of Estimate
1	0.643	0.413	0.406	0.114

Source: Primary Data, 2025

The regression output in Table 4.14.1 reveals that technology advancement significantly predicts women's participation, with an R^2 value of 0.413, meaning that approximately 41.3% of the variation in women's participation in the digital economy can be explained by the advancement in technology.

Table 5. Coefficients

Model	Unstandardized B	Std. Error	Beta	T	Sig.
(Constant)	1.764	0.311		5.673	0.000
Tech Adv.	0.587	0.071	0.643	8.291	0.000

Source: Primary Data, 2025

The unstandardized coefficient ($B = 0.587$) and the standardized beta coefficient ($\beta = 0.643$) indicate a strong positive effect, and the t-value (8.291) with a p-value of 0.000 confirms this relationship is statistically significant. These results suggest that improvements in access to digital tools and platforms significantly contribute to women's empowerment in digital economic spaces.

ANOVA for Technology Advancement and Women's Participation

Table 6. ANOVA Results for Technology Advancement and Women's Participation in the digital economy

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	10.129	1	10.129	68.753	0.000
Residual	14.289	196	0.147		
Total	24.418	197			

Source: Primary Data, 2025

The ANOVA results in Table 4.12.1 further support the model's significance, showing an F-statistic of 68.753 with a p-value of 0.000, which is well below the threshold of 0.05. These results indicate that advancements in technology have a meaningful and statistically significant effect on women's participation in the digital economy. In practical terms, this suggests that expanding access to digital tools, improving platform availability, and implementing digital

literacy initiatives could encourage greater engagement by women, ultimately supporting more inclusive economic growth.

Discussion of Study Findings

The findings of this study suggest that digital technologies have meaningfully expanded women's participation in economic activities. Mobile platforms, e-commerce sites, and electronic payment systems allow women to transact, market products, and manage businesses with greater autonomy. Many participants noted that mobile technologies enable them to conduct transactions independently, while social media platforms broaden their access to customers and markets.

These results align with research showing that digital tools reduce barriers related to mobility, time, and finance (ITU, 2021; UN Women, 2020). Technology acts as a catalyst for self-employment and financial inclusion, but sociocultural norms continue to influence engagement. Studies in Kenya by Webb, Mahmud, and Hassan (2021) found that caregiving responsibilities and limited mobility shape women's participation, even when digital platforms offer flexible work options.

Ethnographic research by Koskinen and Denskus (2021) in sub-Saharan Africa highlights how women operate microenterprises through WhatsApp and Facebook Marketplace, though these contributions often remain invisible in official statistics. Controlled trials, such as Aguero and Valenzuela (2022) in Latin America, show short-term gains in skills and income but emphasize the lack of long-term behavioral studies. Even in high-income contexts, technology is not a panacea: Coyle and Nguyen (2021) found that AI-driven recruitment and remote work technologies increased access but also replicated offline gender biases.

Other research points to structural limitations. Baliyan and Baliyan (2021) show that mobile banking can empower women's decision-making in rural Botswana, but effectiveness depends on digital literacy and culturally relevant interventions. Hussain, Mahmood, and Ullah (2020) report that online freelance platforms provide alternative income, yet gender pay gaps and algorithmic visibility biases continue to constrain participation.

Critiques of the literature note short-term studies and uneven geographic focus, leaving regions such as Southeast Asia, Latin America, and Indigenous communities underexplored (Ragnedda & Mutsvaio, 2022; Milan & Treré, 2020). Technocentric approaches equating access with empowerment overlook how digital infrastructures can reinforce exploitative practices (Couldry & Mejias, 2019). Intersecting factors race, disability, language, class combine with gender to compound barriers (Milan & Treré, 2020; Selwyn, 2020).

Women's representation in digital creation remains limited. Crabtree et al. (2021) highlight barriers such as workplace discrimination, lack of mentorship, and gendered roles that hinder progression into leadership and innovation positions. Amin, Li, and Nisar (2022) report that fintech applications improve financial literacy and entrepreneurial activity but can introduce new forms of surveillance when male relatives control devices. Gray and Suri (2020) emphasize that digital labor platforms offer flexible income yet perpetuate precarity, particularly for women with caregiving responsibilities. Non-economic challenges, such as online harassment and data exploitation (Kovacs & Ranganathan, 2020), further limit meaningful participation.

Overall, the findings suggest that digital technologies can enhance women's economic participation, but their effectiveness depends on enabling conditions, supportive policies, and attention to cultural and household dynamics.

5. CONCLUSION

This study demonstrates that technology has become a powerful enabler of women's participation in the digital economy. Tools such as mobile applications, social media, and digital payment systems provide women with new ways to transact, market products, and manage businesses. For many, these platforms reduce barriers related to mobility, time, and access to markets, offering flexibility that was previously unavailable.

Importantly, digital participation is not solely about economics. Women using these technologies gain autonomy, reach broader customer networks, and strengthen their influence within households and communities. These trends align with global patterns of digital inclusion, while highlighting the importance of tailoring interventions to local realities in Uganda, where infrastructure, affordability, and skills remain uneven.

While technology alone cannot resolve structural inequalities, it offers critical opportunities for financial independence, empowerment, and inclusive growth. Supporting women to meaningfully use digital tools through policy, training, and infrastructure will be essential to sustaining these gains.

Recommendations:

Role of Technological Advancement in Improving Women's Participation in the Digital Economy

Expanding women's participation in the digital economy requires gender-responsive policies and practical interventions. Government agencies and ICT regulators should consider subsidized internet data rates and affordable digital devices to reduce financial barriers, which GSMA (2022) identifies as a key limitation.

Infrastructure improvements are equally important. In Kampala Metropolitan and other underserved areas, unreliable network coverage restricts women's engagement in online platforms and services (Uganda Communications Commission, 2023). Strengthening connectivity in these communities would provide the foundation for sustained participation.

Beyond connectivity, policies should support women in meaningful use of technology. Training programs, mentorship, and localized content can ensure that women are not only online but able to use digital tools effectively. Collectively, these measures can narrow the gender digital divide, enabling women to expand enterprises, diversify income, and strengthen decision-making power in both households and communities.

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