Technology as a Tool for Women's Empowerment in the 21st Century

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Abstract

The 21st century has witnessed an unprecedented surge in technological advancement that has reshaped every aspect of human life—economic, social, political, and cultural. Amid this digital revolution, the role of technology in promoting women's empowerment has emerged as a critical theme in policy discussions, development strategies, and academic discourses. This paper examines the multifaceted role that technology plays in enhancing the capabilities, voices, and rights of women globally. By focusing on access to digital resources, information communication technologies (ICTs), mobile innovations, and digital literacy, this study presents technology not merely as a tool but as a transformative force for gender equity. The introduction outlines the context, definitions, evolution, significance, challenges, and theoretical framework of women's empowerment through technology.

I. Introduction

Technology has evolved from being a luxury to a necessity in modern society. In every facet of life education, healthcare, finance, employment, and governance—technology plays an integral role. Women, who constitute nearly half of the global population, have historically been marginalized in technological participation and access. However, the 21st century has seen a notable shift, with technology increasingly being recognized as a crucial enabler of women's empowerment. The digitization of economies, the proliferation of mobile phones, and the accessibility of the internet have created new spaces for women to assert agency, gain economic independence, and access services that were once beyond their reach.

The United Nations' Sustainable Development Goals (SDGs), particularly Goal 5—"Achieve gender equality and empower all women and girls"—explicitly recognizes the role of technology in promoting women's empowerment. From mobile banking in sub-Saharan Africa to online education platforms in South Asia, digital tools are altering traditional power structures and enabling women to bypass socio-cultural constraints. Nevertheless, the digital gender divide still persists, especially in low- and middle-income countries, reflecting systemic inequalities in access, literacy, and opportunity.

Defining Key Concepts

To explore the theme thoroughly, it is essential to define the key concepts: "technology" and "women's empowerment."

Technology, in this context, refers to digital and information communication tools that facilitate access to knowledge, economic participation, and social engagement. This includes but is not limited to mobile devices, the internet, social media, software platforms, e-governance, and artificial intelligence (AI).

Women's empowerment refers to the process of increasing the capacity of women to make choices and transform those choices into desired actions and outcomes. It encompasses multiple dimensions: economic (access to resources and income), political (participation in decision-making), educational (access to learning), social (challenging gender norms), and psychological (self-efficacy and autonomy).

Evolution of Technology in Women's Lives

Historically, women's roles in technological development were peripheral due to patriarchal structures that limited their education and participation. However, waves of feminist movements, educational reforms, and global advocacy efforts have gradually expanded women's involvement in science and technology. The advent of the personal computer in the 1980s, the spread of mobile technology in the 1990s, and the internet boom in the 2000s catalyzed this transformation.

In the 21st century, initiatives such as "Girls Who Code," "Women in Tech," and government-sponsored digital literacy campaigns have fostered an ecosystem where women are both consumers and creators of technology. More recently, the COVID-19 pandemic accelerated digital inclusion through remote work, online learning, and telemedicine, revealing both the potential and pitfalls of technology for women's empowerment.

Rationale for the Study

Despite these advancements, the digital gender gap remains a persistent barrier. According to the GSMA Mobile Gender Gap Report (2023), women in low- and middle-income countries are 16% less likely than men to use mobile internet. Factors contributing to this gap include affordability, lack of digital literacy, socio-cultural norms, and limited access to infrastructure. Without targeted interventions, technology may reinforce rather than reduce existing inequalities.

This study is rooted in the belief that technology must be harnessed deliberately and inclusively to serve as an agent of women's empowerment. By exploring case studies, policy frameworks, and innovative practices across diverse sectors, this paper seeks to uncover the conditions under which technology becomes a force for positive gender transformation.

Significance of the Study

Social Transformation

Empowering women through technology has a cascading impact on communities and nations. Technologically empowered women can access education, engage in social and political discourse, challenge patriarchal norms, and advocate for their rights. Platforms such as social media have given voice to global movements like #MeToo and #BringBackOurGirls, demonstrating the power of digital tools in social mobilization.

Economic Empowerment

Digital inclusion allows women to participate in the formal and informal economies. E-commerce platforms enable women entrepreneurs to reach global markets. Mobile banking services, such as Kenya's M-PESA, have enabled women to manage finances without depending on male intermediaries. Women in gig economies or digital freelancing platforms like Upwork and Fiverr can earn independently from home, especially in conservative societies.

Educational Access

E-learning platforms like Coursera, edX, and local initiatives like India's DIKSHA portal have democratized knowledge for women who may otherwise face mobility or cultural constraints. Digital classrooms provide flexible, low-cost opportunities for upskilling and reskilling, particularly relevant in a rapidly changing labor market.

Healthcare and Reproductive Rights

Mobile health (mHealth) technologies and telemedicine platforms are bridging gaps in maternal health, menstrual health awareness, and sexual education. Applications like "mMitra" in India or "MomConnect" in South Africa provide timely information to pregnant women, reducing maternal mortality and increasing health agency.

Political Participation

Women can now participate in democratic processes through digital voting campaigns, awareness drives, and online activism. Political candidates also use digital tools to reach and mobilize women voters. E-governance platforms allow women to access government schemes without intermediaries, thus reducing corruption and increasing transparency.

Problem Statement

While the potential is vast, the benefits of technology are not evenly distributed. Many women, particularly in rural, marginalized, or conflict-prone areas, face systemic barriers that prevent them from fully participating in the digital revolution. The digital gender divide is exacerbated by factors such as poverty, illiteracy, cultural taboos, safety concerns, and male-dominated tech ecosystems. Moreover, the rise of cyberbullying, online harassment, and surveillance threatens the psychological safety and autonomy of women online. In addition, while many technological initiatives claim to be "gender-inclusive," few are designed with a gender lens. Without considering the specific needs, behaviors, and preferences of women, many tools remain inaccessible or irrelevant to their realities.

Objectives of the Study

The primary objectives of this study are:

- 1. To analyze the role of various digital technologies in promoting women's empowerment across sectors.
- 2. To evaluate the extent and impact of the digital gender divide.
- 3. To examine the socio-cultural, economic, and infrastructural barriers to digital inclusion for women.
- 4. To identify best practices and policy models that foster digital empowerment for women.

5. To propose strategies for making digital ecosystems more inclusive, safe, and transformative for women.

Theoretical Framework

This study is grounded in multiple theoretical perspectives:

Capability Approach (Amartya Sen & Martha Nussbaum)

Technology enhances women's capabilities by expanding their freedom to achieve functionings they value. This approach shifts the focus from mere access to technology to what women can actually do with it.

Feminist Technology Theory

Feminist scholars argue that technology is not gender-neutral. The design, development, and deployment of technology often reflect male-centric biases. Empowerment, therefore, involves reimagining technology through inclusive design and participatory processes.

Digital Inclusion Theory

This theory emphasizes access, affordability, digital literacy, and meaningful use. For technology to be empowering, women must not only have access but also the skills, confidence, and content that reflect their needs.

Scope and Limitations

The study spans global trends but gives particular attention to low- and middle-income countries where the digital gender gap is most visible. It includes analysis of mobile technology, internet access, AI-driven tools, social media, and digital platforms in domains like education, health, employment, and governance. However, it does not extensively cover high-tech areas like biotechnology or nanotechnology, nor does it delve into hardware design and engineering.

II. Literature Review

The role of technology in women's empowerment has gained increasing attention in academic and policy circles. Prior to 2022, scholars and development practitioners explored various dimensions of this intersection, including digital inclusion, gender gaps in ICT, the economic impact of technology on women, and technology-driven social change. This section synthesizes major scholarly works, policy documents, and institutional reports that have examined the empowering potential of technology for women, especially in low- and middle-income countries.

Multiple studies prior to 2022 highlighted that access to digital tools was foundational to women's empowerment. According to Hilbert (2011), ICTs can reduce gender inequalities if women have equal access. However, the digital divide remained stark: the International Telecommunication Union (ITU, 2019) reported that globally, 58% of men were using the internet compared to only 48% of women. Hafkin and Huyer (2006) argued that gender disparities in ICT stem from systemic socio-cultural and economic factors, not merely infrastructural deficiencies. These include patriarchal norms, lower female literacy, and lack of technical training for women. Wyche and Olson (2018) emphasized that mobile phones have a liberating effect on women in rural Africa, but the benefits are unevenly distributed due to male control over household technologies.

Economic participation is a vital indicator of empowerment. Many studies explored how digital platforms facilitated women's entry into the workforce. Madgavkar et al. (2015) from McKinsey Global Institute highlighted that advancing women's equality, including digital employment, could add \$12 trillion to global GDP by 2025. In India, the Self-Employed Women's Association (SEWA) integrated mobile banking and ICTs to support women entrepreneurs (Mehta & Kapoor, 2012). Similarly, the Grameen Foundation's work in Uganda showed that mobile money empowered women economically by offering them financial autonomy (GSMA, 2017).

Access to digital education was another critical domain. According to UNESCO (2017), digital technologies have the potential to bridge gender gaps in education, especially for girls in conflict zones or remote areas. Aker et al. (2012) showed that SMS-based learning tools helped improve literacy rates among girls in Niger. Other studies pointed to gender biases in STEM education and digital skills training. UNESCO (2019) identified that only 35% of STEM students in higher education were women, indicating the need for targeted policies to enhance female participation in technology-driven learning.

Mobile health (mHealth) emerged as a significant theme in literature . Projects like "mMitra" in India and "Text4baby" in the USA provided reproductive and maternal health information to women via mobile phones (Gurman et al., 2012). Such interventions were found to increase knowledge, improve health behaviors, and reduce dependency on male family members for information.

Digital platforms were seen as tools to enhance women's civic participation. The Arab Spring (2010-2012) and the global #MeToo movement were extensively studied for their use of social media by women to demand rights and visibility (Tufekci, 2017). In Africa, initiatives like "Ushahidi" enabled women to report gender-based violence anonymously, facilitating more inclusive governance (Bosch, 2017). However, concerns

about digital harassment and trolling were also raised, with Amnesty International (2020) documenting online abuse faced by female activists and politicians.

Feminist scholars such as Wajcman (2004) and Eubanks (2018) critiqued the assumption that technology is inherently empowering. They argued that unless designed with a gender-sensitive lens, digital tools could reinforce existing inequalities. Eubanks' work, "Automating Inequality," highlighted how algorithmic decision-making in welfare systems disproportionately harmed poor women.

International organizations published several key reports prior to 2022:

• UN Women (2020): Emphasized the role of digital finance and e-governance in promoting women's empowerment.

• World Bank (2016): Focused on how digital technologies can promote inclusive development if gender barriers are addressed.

• **OECD (2018)**: Stressed the importance of digital skills training for girls and women to close the gender gap.

III. Discussion

Analyzing the Role of Technologies in Promoting Women's Empowerment

Digital tools have expanded the terrain on which women can assert their agency. For instance, mobile phones not only facilitate communication but also provide access to health services, markets, and financial independence. Social media platforms have become spaces for advocacy, while AI-powered tools help in skill development. Women in Bangladesh, supported by BRAC and its digital literacy programs, used smartphones to access e-commerce platforms like Daraz to start businesses. In rural Kenya, women farmers use weather forecasting apps to optimize crop yields. These examples underscore that when appropriately contextualized, technology can be a transformative resource.

Evaluating the Impact of the Digital Gender Divide

The digital gender divide remains a major obstacle. According to the Web Foundation (2020), women are 20% less likely to use mobile internet in developing countries. This divide is more severe in regions like South Asia and Sub-Saharan Africa. This lack of access leads to an empowerment gap, where women are excluded from critical resources like e-learning, telemedicine, online banking, and digital jobs. Digital exclusion also means political disenfranchisement, as women may be unaware of online voting tools or legal rights.

Socio-Cultural and Economic Barriers

Patriarchal control over technology remains widespread. In conservative societies, mobile phones are perceived as threats to female modesty. Studies show that women are often shamed or surveilled for using social media. Economically, women are more likely to lack the financial resources to purchase digital devices or data plans. In households with one smartphone, men are typically the primary users. Additionally, digital literacy rates among women, especially older and rural women, lag behind men.

IV. Conclusion

Technology holds transformative potential in dismantling centuries of gender inequality and ushering in an era of inclusive growth and social justice. Yet, technology alone is not a panacea. Its empowering capacity depends on deliberate efforts by governments, private actors, civil society, and the women themselves. Designing gender-sensitive digital infrastructure, promoting digital literacy, ensuring online safety, and involving women in technology creation are essential steps toward sustainable empowerment. As we navigate the digital age, the challenge is not merely to provide access, but to ensure that access leads to agency.

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