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Impact of Technology on Women

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Abstract

The belief that technology as the great equalizer will eradicate all problems and revolutionize the world has only partly been realized. Technology has borne inequitable growth for women across the world, as many still lag behind men in terms of growth opportunities on the internet and fully utilizing Information and Communication Technologies (ICTs). This unequal growth is attributed to pre-existing social and cultural factors that control women and their access to education and, consequently, employment. This affects their essential freedoms, such as that of expression and dissent. Because these differences are realized in the digital realm as well, it creates an alternate space for the suppression of women. The authors use a PESTEL analysis to examine the positive and negative aspects of the different spheres in which technology affects women (political, economic, social, etc.). By casting a wide net, the authors broaden the scope for understanding the all-pervasive nature of technology and rights and their confluence. While significant growth has taken place for women's digital literacy, representation, and internet use, it falls behind in comparison to men and differs from region to region. Moreover, it is outpaced by the growth of technology itself, which further risks women falling behind, being what is the future of the world.

TRIGGER WARNING: This research paper will tackle themes of sexual assault, harassment, social control, and terrorism.

Keywords - *ICTs, social media, internet, digital gender divide, education, employment, emancipation*

1.0 Introduction

The internet and other ICTs have woven the world closer together. Communication, education, and knowledge exchange across borders have propelled the growth of the global economy all the while boosting cultural heterogeneity. However, women haven't benefited from this growth equally, and find themselves in a paradox - they've benefitted from the expansion of technology, albeit far slower than their male counterparts, and in doing so, not only have they faced old hurdles in new ways in terms of accessing modern opportunities but also encountered problems wholly unique to the 'online' experience. This paper will examine the different dimensions in which women have been affected by technology, their barriers to growth, how far they've come, and how far they have to go.

***Thesis Statement**:* Women have been deprived of the opportunities technology brings with it. If anything, it is a double-edged sword for them, with benefits and harms co-existing. Socio-cultural factors translate into an uneven platform for growth for women, and gaps from the past persist. This can be reduced by recognizing how these inherent biases make their way into technology and improving quality of accessibility with a bottoms-up approach, i.e, increasing women's access to digital literacy will translate into them getting into engineering positions, thus increasing representation and improving chances of equitable growth.

1.1 Scope of Technology

Technology can be defined as *"the sum of techniques, skills, methods, and processes that enhance human capabilities."* The scope of technology lies far and wide. However, the focus of this paper lies on two divisions of this phenomenon:

- Hard Technology: *"Hard technologies are tangible components that can be purchased and assembled into assistive-technology systems." (Britannica)*. Smart devices and gadgets like smartphones and computer systems are considered here.
- Soft Technology: *"Soft technologies refer to human areas of decision making, strategy development, training, and concept formation.*" *(Britannica)*. Access to the internet and telecommunication services, along with access to data analysis tools, are considered here.

Information and Communication Technology (ICT) is the convergence of certain aspects of hard technology (like smartphones) and soft technology (like the internet). The integration of devices with telecommunication services has a wide variety of uses ranging from healthcare to economics in different capacities. This paper, however, focuses on the political, economic, sociological, technological, ethical, and legal spheres in the advancement of technology to better understand these aspects of the thesis. The advancement of medical devices like prosthetics is excluded from the analysis of this paper.

1.2 Goal 5: Gender Equality

According to UNICEF, *"nearly 1 in 4 girls between the ages of 15 and 19 are neither*

employed nor in education or training – compared to 1 in 10 boys"(UNICEF, n.d.). Gender inequality has been a prevalent barrier to societal development for decades. Women and girls of all ages across the world are discriminated against and refused equality - be it in healthcare, education, or political and economic representation. Statistically, 60 percent (*Facts & Figures*, n.d.) of chronically hungry individuals are women and girls. They make up more than two-thirds of the total illiterate population of the world and are more likely to hold seasonal, part-time, or low-wage jobs compared to men. The gender gap in India widened to 62.5 percent in 2021 *(Shettigar & Misra, 2021)*, and the wage gap in 2019 was 19 percent *(Chakraborty, 2019)*. Intending to empower all women and girls, **Goal 5 of the United Nations' Sustainable Development Goals** works towards **Gender Equality**. Through this paper, the authors explore this goal in relation to the field of technology by carrying out an analysis of the impact of technology on women and their rights.

2.0 Methodology

The authors have used PESTEL analysis for this paper. The rationale behind this is two-fold: all the factors under this method provide precise metrics to evaluate the subject matter, all the while allowing for clubbing the different spheres in which women's rights exist (social rights, political rights, economic rights, etc.). Each aspect includes positives and negatives, barring Ethical and Legal, to provide the reader a holistic picture of how that category has been affected by technology. Ethical does not have any clear-cut Positive/Negative distinctions because it serves as a segway to suggest how principles should be interpreted by examining the literature in this field. Legal does not have any such distinctions either as the authors have examined the emergence of cyber-crimes and the laws instituted to combat them. A post-facto act (a law, in this case) after the grievance has occurred does not qualify as a positive as it is only a response to the incident. Additionally, Environmental has not been considered here as no relevant research was found on the impact of technology on the environmental rights of women.

The literature consulted for this paper is drawn from various sources, including but not limited to - Organisation for Economic Co-operation and Development, GSMA, Mckinsey, Pew Research Center, U.N Women, Internet Freedom Foundation, Bot Populi, UNESCO, National Democratic Institute, and more. In addition to these, the authors referred to articles and reports from publications

such as ProPublica, The Atlantic, The Wire, The Verge, Engadget, and more. All the prior scholarly material preceding this research paper served as a comprehensive backdrop for this study, and the authors acknowledge and appropriately cite their work.

The authors would like to state that a theme like women's rights and how it is affected by external forces such as technology is deeply entrenched in regional and cultural differences. Hence, the notion of intersectionality, i.e., understanding that social factors such as race, caste, religion, region all play a major role in determining the opportunities and outcomes one is exposed to, is stated here. The authors have attempted to mention, wherever and whenever possible, the region where technology has affected women, the religion or race of those women, and any other factors such as economic class. An example of this, which finds itself detailed in the paper, is how women in Nigeria are more likely to find affordability a major barrier to using a phone and the internet, compared to women in India, for whom a lack of digital literacy and skills represents a bigger barrier *(Intel and Dalberg, 2012)*. Taking cognizance of these differences is paramount to understanding that the 'female' experience is not a monolith but rather a collection of differential experiences where the uniting factor is a culture ingrained in sexism and gender-based discrimination.

3.0 Advantages and Disadvantages of Information and Communication Technology

	Advantages	***Disadvantages***
Communication	● *"A Global Village"*. The evolution of communication technology from the postal service to smartphones has allowed the world to interact, network and gain access to information much faster. Email, social media sites like Facebook and Twitter, and video conferencing avenues all make up a part of the scope of communication through technology.	● Malicious online content is one of the biggest negative aspects of communication through technology. The anonymity afforded to social media users allows for an increased incidence of abuse in the online space - bullying among teenagers can be considered a good example of this phenomenon. This anonymity stems from the fact that a

	● The need for fast and efficient communication during the COVID 19 pandemic only increased tenfold as everything went online. Organizations, businesses, and various institutions found a multitude of ways to interact with their stakeholders to streamline enterprises.	lack of face-to-face contact among individuals takes away a sense of accountability.
Healthcare	● Automated systems for clerical tasks like paperwork management and accurate record storage have allowed healthcare workers to improve the quality of healthcare administration. ● Ease of access to information has increased transparency and patient satisfaction, and trust. ● Telemedicine apps have enabled remote medical assistance to individuals in all parts of the world. Not only does this mean increased medical efficiency due to timely e-consultations, but it also has life-saving implications.	● Technology has increased costs in the industry which has led to decreased inclusion. Individuals from economically weaker backgrounds lose access to basic facilities like consultations. ● Impersonal healthcare and a lack of physical contact have enforced the idea of reactive instead of preventative healthcare - treating problems as and when they come rather than treating their root cause. ● The automation of data storage in the absence of appropriate laws, such as in India has made patient healthcare data vulnerable to breaches and leaks.
Business and Economics	● The constant updation of technological systems has greatly impacted business organizations - both big and small. From the smallest corner shops to advanced	● Increased automation of systems is highly vulnerable to data leaks. Some of the biggest data breaches in the 21st century have weakened companies like

	leading companies, every business organization depends on technology. Every division of an organization, whether research, development, sales, manufacturing, or design and feedback, can help in lowering costs and increasing profits through automation. ● Social media facilitated the setting up of several online businesses during the COVID-19 pandemic. ● Instantaneous feedback enables companies to respond to their consumers' requirements efficiently and the automation of financial services has been tremendously aided by this progress.	Yahoo (August 2013), LinkedIn (June 2021), and Facebook (April 2019). Data leaks affect companies (e.g., potential losses at the hands of competitors) but also risk consumer safety.
Education	● Technology allows for rapid upskilling, providing students the opportunity to constantly improve their knowledge and employability, especially in the face of automation. ● Technological advancement has increased access to quality education to students across the world (e.g., online courses, seminars), making knowledge 'remote'; 'high-order thinking skills' are comparatively more accessible now. The need for a "knowledge economy" furthers the significance of this phenomenon in the 21st century.	● Technology in education has increased disparity for certain communities. The Digital Divide between demographics hinders economically weaker students' access to learning due to their lack of access to modern devices and telecommunication systems. (This divide has only increased owing to COVID 19). ● Teachers make up one-half of an efficient education system. Digital literacy for them - especially in today's day and age - becomes a prerequisite to an effective classroom. However, a lack

		of access to technology and tools needed to become digitally literate often leaves them unprepared for a digital classroom.

4.0 Women in Relation to Technology: An Overview

Technology has disrupted traditional ways of how humans operate, be it in the social field or the economic field. Technology in the lives of women has various implications, affecting their education, representation, or employment, among other things. On the education front, the digital gender divide determines access to education and digital skills. Gender-based differential access to resources and capabilities to effectively use ICTs qualifies as the digital gender divide. Factors such as affordability and digital literacy disproportionately affect women, especially in developing countries, due to poverty and general illiteracy. In India, 25% of women are likely to own a smartphone compared to 41% of men, according to Global System for Mobile Communications (GSMA) 2021 findings. The same report found that Indian women are 53% more likely to use mobile internet compared to 69% of Indian men *(GSMA, 2021)*. Digital illiteracy and "technophobia," i.e., lack of comfort in using technology and the internet, contribute to the divide and are fuelled by factors like education, employment status, and income level. Intel and Dalberg's (2012) survey shows that more than half of the women lacking formal education were unfamiliar or uncomfortable with technology, whereas only 15% of women with high school education claimed the same. It is predicted 90% *(Intel and Dalberg, 2012*) of future jobs will require ICT skills, and some 2 million computers, mathematical, architecture, and engineering jobs will be created. Without the prerequisite skills, women may be left behind.

On the occupation front, women constitute 28% *(AnitaB.org, 2020)* of the senior technology leadership. A 2020 study by the AnitaB.org Institute found that women constitute 28.8% *(AnitaB.org, 2020)* of the tech workforce, and a 2019 Mckinsey study *(McKinsey and Company, 2019)* reveals that gender disparity can affect the very first promotion opportunity; 48% of entry-level hires are women but makeup only 38% of first-level managers. Women of color make up only 4% of the computing

workforce with almost no senior leadership roles despite constituting 16% of the general population *(McKinsey and Company, 2019)*. When in the industry, women face rampant sexism. In an interview for The Atlantic in 2017, Bethanye Blount, a senior engineer in her 30s with considerable work experience, recites her encounters with sexism *(Mundy, 2017)*. Less experienced male applicants would make flippant comments during interviews with her. When she and her male partner started a company, all the investors would ask him the questions, despite Blount being the subject matter in that case. She gives examples of some male colleagues getting 'handsy' and experienced women in this field warning young engineers to take care that their drinks are not spiked'.

5.0 PESTEL Analysis

5.1 Political Aspect

The politics of society are intrinsically linked to its social norms and values, and events in one will transpire effects in the other. Technology adapts accordingly to the context it finds itself in. Since the 2016 US Election wherein Facebook was found complacent in manipulating voters through targeted advertising, fake news, etc., it is clear that political spaces are very much affected by technology. Hence, essential political actions such as representation and voting rights need to be examined in this context and examine the confluence of women, politics, and technology.

Positive Political Impact

Many social issues are political and often overlap with each other. Grassroots activism and campaigns are assisted in no small part by technology. It's not just the latest social media trends that have helped women discuss political issues, but such examples of activism go back as far as the 90s-early 2000s or the 'Email era.' The email activist network Modemmujer, for example, helped secure the freedom of Claudia Rodriguez in Mexico, *"imprisoned for the homicide of her would-be rapist" (Martin, 2004)*. Modemmujer mailed Claudia's words to various women's organizations in Mexico, Latin America, and North America. The internet wasn't solely responsible for this, but it did result in legal and political systems recognizing Claudia's issue because of the international support and awareness that it created.

- Social media platforms such as Twitter and Facebook have become an essential commodity for women suffering under strict patriarchal control. The 2019 Sudan protests, for example, benefitted from communication and awareness posts circulating on WhatsApp and Facebook. Sudanese women, constricted by patriarchal structures, took part in these protests by recording their support statements on relevant Facebook pages. When the Sudanese government attempted to block social media, women resorted to using Virtual Private Networks (VPN) to find a way around censorship. Another example is of Afghani women utilizing technology to support the peace process in Afghanistan in 2019. Twitter was the main form of communication between the talks' facilitators and Afghan civil society, and to prevent it from being a one-sided approach, women strategized to engage the facilitators in a way conducive to a two-way conversation. Women leveraged Twitter to engage with a U.S. Congressional hearing on women's inclusion in peace and security, thus offering a hotline to peace-talk facilitators and policymakers. In households across the world, where parents or guardians are hesitant to let their daughters attend protests fearing violence or harassment, online modes provide women with a platform to participate. These examples serve as a testament to technology bolstering and, in some regions, enabling democratic rights for women, such as their right to protest, express opinions, etc.

- Social media gives female politicians greater reach with their constituents and the rest of the world. In the United States, Alexandria Ocasio-Cortez, a female politician and activist, has leveraged technology to promote her brand of politics. Understanding the role of platforms like Twitter and Instagram, she regularly posts informing people about the developments in US politics. She used Twitch to spread the word about voting amongst the youth before the 2020 US Presidential Elections. Twitch, a popular streaming platform where creators stream video games or just chat with their audiences, enjoys a massive youth footfall. Ocasio-Cortez partnered up with Twitch streamers (many of whom enjoy views and followers in millions), and her stream peaked at 435,000 concurrent viewers. In India, Trinamool Congress politician Mahua Moitra has been the subject of many viral speech videos, which further propels her image for the political and non-political crowd. These examples show that social media and its virality can be utilized by women in politics to spread awareness about their platform, urge voters to exercise their rights, and build a 'political brand' for

themselves, something men have had the monopoly over since the time of the radio. While certain exceptions (e.g., Jayaram Jayalalitha from AIADMK) certainly exist, these personalities enjoyed a cult status in their respective regions rather than widespread appeal across the world.

- On fundraising, literature comes from the 2014 'WOMEN, TECHNOLOGY AND DEMOCRACY SURVEY' published by the National Democratic Institute *(National Democratic Institute, 2014)*. The quantitative survey was distributed to 1,160 women described as 'politically engaged and politically active' from 58 countries from March to July 2014. The results are regionally grouped as Asia, Developed Nations, Europe and Central Asia, Latin America and the Caribbean, Middle East and North Africa (MENA), and sub-Saharan Africa. This survey only shows the experiences of highly educated and urban women, hence it doesn't capture the experience of women hailing from less privileged backgrounds. The survey reveals that while participants across all regions are relatively unlikely to use digital technology for fundraising, those in Asia are 17% more likely to use general technology for that purpose, whereas participants in Europe and Central Asia and MENA are 14% more likely to use social media. Latin American respondents are least likely to use either, with 6% using technology in general and 4% using social media. According to the survey, elected officials at the national level are 27% more likely to use technology in general for fundraising while elected officials at the national level (22%) and civil society and community leaders (19%) are more likely to use social media for that purpose.

- On the policy-impact side of things, certain examples such as Mexico's *"2 percent and More Women in Politics"* campaign can be cited. National Democratic Institute (NDI)-Mexico developed a program to help local groups advocate for increased women's participation in politics and to raise funds for the cause. Envisioned as a campaign to restore 2 percent of federal political party funding for women's leadership training, this program assembled a women's coalition spanning across all of Mexico's political parties, civil society members, and academics. They used Twitter and Facebook to circulate an online petition calling for reforms from Mexico's federal election commission. Soon, numbers demanding reformation from the Electoral Council increased. Subsequently, the reforms were approved unanimously by the Federal Electoral Institute in July 2011, and the new guidelines

came into play in the 2012 elections, leading to a 5% increase in women's representation in national politics from previous elections, with 184 out of 500 seats in the national legislature going to female candidates (*National Democratic Institute, 2014)*.

Negative Political Impact

The utilization of technology in the context of politics can become a victim to social institutions and norms in which it finds itself. The digital gender divide deprives women of access and knowledge of how to operate and make use of technology for social and political purposes. The problem of inaccessibility is coupled with the issue of harassment and cyberstalking. When women do find themselves politically empowered to a degree, they are still subject to online trolls and harassment.

- Amnesty International India's 2020 report titled *'Troll Patrol India: Exposing Online Abuse Faced by Women Politicians in India' (Amnesty International India, 2020*) analyzed more than 114,000 tweets sent to 95 women politicians in the three months during and after the 2019 General Elections in the country. Female politicians, regardless of their right-wing, centrist, or left-wing affiliations, received slurs and demeaning remarks on Twitter. The nature of these slurs went beyond political leanings and showed signs of casteism, sexism, marital status bias, and religious bias. This shows that the political space is intertwined with the social space, from where identity markers are derived from. Islamophobia and casteism often made their way into these abuses when targeting female politicians. More visibility could lead to higher abuse, thus nullifying the benefits that large platforms afford women politicians.

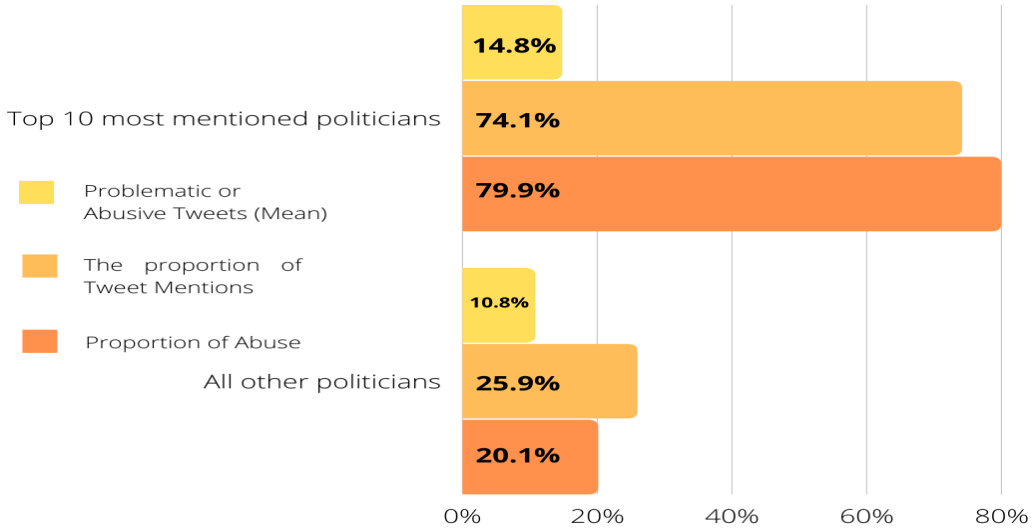

Figure 1.0: Rape threats, Islamophobia, casteism: Life of female Indian politicians on Twitter

Source: *Amnesty International India (2020) via Manavi Kapur, Quartz India (2020)*

- Other aspects of control, such as censorship, have made their way on the internet. While a certain degree of regulation is necessary, these practices, such as censorship aren't always gender-neutral. For example, in 2015, Rupi Kaur's photograph depicting her fully clothed but with a *"spot of blood between her legs and on the sheets" (Welton, 2021)* was taken down by Instagram twice on claims that her picture violated their terms of service. Similarly, Petra Collins' photograph of herself in a bikini showing her own pubic hair was removed by Instagram in 2013 on similar grounds. Both women claim that women reclaiming narratives around sexuality and menstruation did not fit with how society and the 'male gaze' deemed appropriate, and were therefore removed from the platform. Instagram's stance on banning 'mature content' and 'community guidelines' is considered by many to be flimsy, as it doesn't always ban rape, death threats comments, and the people who made them. It walks a thin line between 'creative expression' and 'harmful' content, deciding on it's own which is which.

- The Taliban banned the internet in the 1990s and their recent foray into absolute power in Afghanistan shows signs of them utilizing social media to not just silence dissidents, but also provide counter-narratives. Anti-feminist retaliations undertaken by groups, often orthodoxy consisting of

men seek to invalidate women's experiences. When videos of Afghans falling off planes taking off went viral, the Taliban embarked on its own social media campaign, assuring the world that they've turned a new leaf. The Taliban already has a history of banning women's access to jobs and education, and if their grasp over social media narratives strengthens, they could very well silence the female resistance that has built up in the country.

- A 2019 study titled 'Running While Female: Using AI to Track how Twitter Commentary Disadvantages Women in the 2020 U.S. Primaries' *(Oates et al., 2019)* found that female politicians were more likely to be attacked based on their 'character' or 'identity' compared to men who were criticized for their 'electability' or 'policy' platform. Elizabeth Warren's character was attacked because she lied about her Native American descent, whereas Amy Klobuchar was attacked because she was 'mean to her staff' on multiple occasions. Kamala Harris was attacked because of her immigrant status and history as a prosecutor. Comparatively, Joe Biden was criticized because of his inappropriate touching, rendering him unelectable, but not due to his overall character. Similarly, Bernie Sanders was supported for his policies, not his identities. Even when covered by the media, women either received less coverage or significantly more negative coverage compared to their male counterparts.

5.2 Economic Aspect

The economic impact of technology on women can be studied through an analysis of multiple factors. One factor to consider is the composition of the labor market and job opportunities available for women. Other factors could be the impact of COVID 19 and homegrown businesses on economic opportunities for them. Certain parts of this section refers to technological advancement regarding full or partial automation of jobs. *Full automation* implies a technological advancement in all activities comprising a particular job role while *partial automation* implies a technological advancement in certain (but not all) activities comprising a job role. Positive and negative impacts of technology on women in the labour market are largely analyzed through a *McKinsey Global Institute (MGI)* report *(Madgavkar et al., 2019)* that details the changes in women's jobs that are likely to come about as a result of technological evolutions.

Positive Economic Impact

The onset of COVID 19 prompted countless people who had lost their jobs to set up online ventures and businesses for alternative sources of income. Women - specifically - were able to capitalize on this through homegrown businesses that were heavily dependent on social media marketing. Homemakers (who likely did not have an income initially) make up a significant part of these business owners and can now facilitate their financial independence.

Advanced ICTs have facilitated online banking and easy access to information that has helped individuals make informed financial choices. Studies conducted to analyze the productive uses of technology showed that 41% *(GSMA & Cherie Blair Foundation for Women, 2010)* of the women surveyed reported increased financial opportunities, and 54% *(Intel Corporation et al., 2012)* reported increased use of banking services. A technologically efficient woman is a step closer to financial independence. If appropriately harnessed, women's empowerment and improved economic status could be one of technology's biggest achievements.

Studies conducted also show that women's economic development contributes to reducing poverty and the welfare of not only households but also society. However, most technological advancements today cater to men. As an example, consider the agricultural industry. Evidence *(Gill et al., 2010)* suggests that technological advancements in this field are designed for the use of men. Women - having to continue their use of traditional methods - lose the opportunity to increase their productivity and improve their economic status. This stems from a lack of representation of women in the field of tech evolution. An increase in female representation in such roles could lead to more economic opportunities coupled with increased productivity, income, and resources.

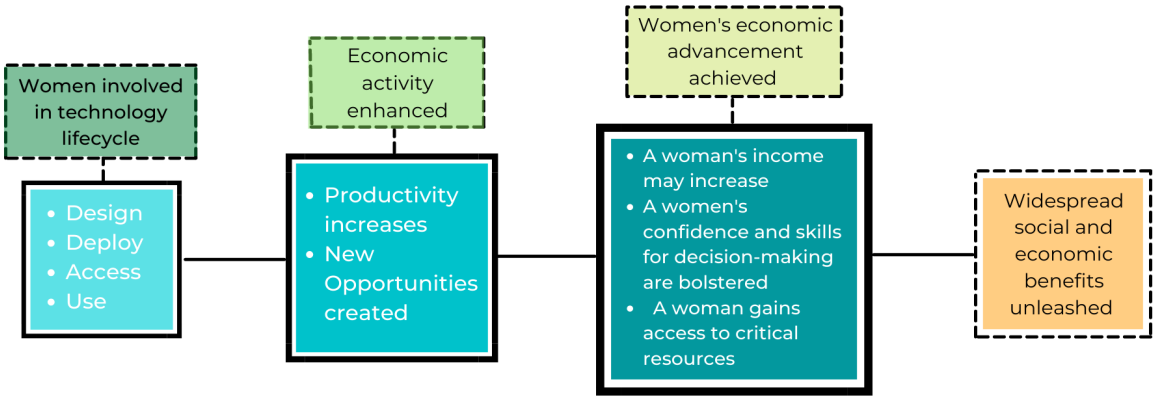

Figure 2.0: How technology can facilitate the economic advancement of women

Source: Bridging the Gender Divide: How Technology can Advance Women Economically, 2010

Focussing on the labor market sheds light on another aspect of this study. The analysis is based on the number of jobs gained, lost, and the prospective composition of employment owing to full or partial automation. According to MGI *(Madgavkar et al., 2019)*, women will have the opportunity to maintain their current level of employment and go a step further to gain 20% in jobs (as compared to 19% for men) if they can upskill with technology. This is due to women's concentration in the healthcare industry, which is the least likely to be automated. (However, due to COVID 19, the number of job transitions women might have to make could grow by 25%). A future expansion of the economy, demand and healthcare sector could prove beneficial for employment for women.

Statistically, women are marginally less likely to lose jobs to automation compared to men due to their concentrated representation in certain work fields that are less likely to get automated. However, this trend varies among enterprises, sectors, and countries. Industries with a higher concentration of the female workforce are likely to get automated - like clerical roles (52% job loss compared to 27% for men), spelling a higher percentage of unemployment for women *(Madgavkar et al., 2019)*. A noteworthy benefit lies in the prospect of a significant percentage of women's jobs experiencing partial automation. While this implies the requirement of upskilling, advanced technological systems that perform more routine work will allow women to participate in the interactive and analytical aspects of their jobs.

Negative Economic Impact

The negative impacts of the advancement of technology on the economy in the context of women can be seen in the future of female labor participation and its composition. Automation is likely to cause job displacement for both sexes, either a complete loss or during the transition between jobs. According to the study, between 40 and 160 million *(Madgavkar et al., 2019)* women would need to change occupations in the near future due to automation and technological advancements (Not including COVID 19 and its effects on the labor market).

Automation is likely to bring about advancement in job roles and, consequently, the skills required for those professions. If women upskill in tune with technological advancements, they have the potential to capture a larger market and maintain the current percentage of labor participation across the spectrum, capturing higher-skilled roles. However, failing to do so will result in becoming susceptible to an **increased wage gap** in the economy. The problem arises in the face of the gendered digital divide; to have access to higher-skilled jobs and upskilling, women require access to technologically concentrated education resources. The divide builds the basis for a myriad of obstacles. The acquisition of these skills and training alone will not solve the problem. The gap will continue to exist as long as issues like increased caregiving duties, lack of mobility and infrastructure, and a lack of representation in the STEM industry remain unresolved.

The study *Madgavkar et al., 2019* suggests that automation will likely bring about a fall in demand for low-wage and middle-wage jobs. The portion of men falling under these groups that get displaced will eventually compete with women for jobs, which will lead to **downward pressure** on wages. The study also reiterates that women's wages are more amenable to external pressures compared to men which lead to a higher chance of leading to job loss for women. Another contributing factor here is the cultural significance of men being primary earners - downward pressure on women's wages could outweigh the benefits of a double-earning household and further increase the precariousness of female employment. In India and China - partially contrary to the analysis mentioned above - the demand for middle and high-wage jobs is increasing. As a result, the pressure on women in low-wage jobs to upskill has increased (in India, 60% of the working women are employed in the agricultural sector - a low-wage sector).

COVID-19 brought with it the "Work From Home" culture. Technological evolution became the most significant contributor to the functioning of the economy during the pandemic. The shift in paradigm to the online mode of operations has been celebrated in the name of convenience. Women suffer from a cultural and social disadvantage - as reported in a study conducted by Deloitte *(Deloitte, 2020)*. A convergence in home and professional life for women meant a loss of work/life balance (as reported by 41% of the women surveyed). Women are almost always perceived as the primary caregivers in their families. Caregiving responsibilities have been reported to have increased as women spend long hours at home. 46% of the women surveyed reported that they felt the need to be incessantly available for professional assignments, 29% reported the fear that a failure to work efficiently would hinder their professional growth *(Deloitte, 2020)*. Combining these two aspects of a woman's commitments sheds light on women's double burden - an increased career workload as well as increased household chores. As reported by women, this puts a strain on not only their physical but also mental health.

The last aspect of this analysis deals with the composition of the future/potential workforce rather than the current workforce. Multiple studies conducted by research groups concluded that algorithms of social media sites like Facebook showed a disparity in the categories of targeted ads shown to women and men when promoters in any study did not specify a target audience. This is detailed in the technological aspect.

5.3 Social Aspect

Social control is deeply rooted in the idea that women 'belong' to a family, to men. Thus, control over the bodies, opinions, and actions of women both inside and outside domestic confines, is exercised. This control manifests in different ways such as restricting women's access to education and limiting them to household work. When women do manage to work outside, the nature of their work is largely limited to low-income job brackets. This affects how women move about in society and to what extent they're suppressed by the systemic consolidation of societal structures and norms.

Positive Social Impact

To adapt a pre-2014 Facebook adage, technology can 'move fast and break things'. While this motto

hasn't aged well, it can be understood differently in the context of female emancipation - move fast and break the shackles imposed on women. Social media has facilitated positive changes in education, employment, and lifestyle changes that contribute to empowerment. This sentiment was echoed in the 1995 Beijing Platform for Action, recognizing the media's *"potential to make a far greater contribution to the advancement of women" (Loiseau and Nowacka, 2015)*. Social media has bolstered female voices in the social space. Women now have a space for advocacy, mobilization, and to initiate and advance conversations that were earlier restricted. The global reach of platforms such as Twitter, YouTube, and Facebook allows for the transmission of ideas and opinions pervading geographical boundaries and borders. Similar to the Arab Spring Movement utilizing social media to show the world what was happening during the uprising, a similar case of 'spreading the word' about female issues can be made.

Social media can, and has worked for women in some of the following ways :

1. **Hashtag Activism:** There are multiple examples of women spearheading hashtag campaigns to bring global attention to issues, such as #EverydaySexism, #YesAllWomen, and #GenerationEquality. Campaigns such as #MeToo and #TimesUp have had social and political ramifications. These campaigns shed light on experiences of sexual assault and harassment and crossed racial, geographical, and age frontiers, bringing to the fore viral conversations about consent. The publicized nature of these accusations forced many big names from media, politics, and industry, to step down and face legal (and professional) repercussions. These forums created a safe space for women who had undergone a crucible while increasing accountability on part of the abusers. Other instances of hashtag activism, such as #BringBackOurGirls shed light on the abduction of 276 teenage girls in Chibok, Nigeria abducted by Boko Haram. Before the hashtag, the case received very little attention from the media. Another example is #HeForShe, inviting men to declare their commitment to gender equality.
2. **Knowledge Exchange:** Open-source apps such as HarassMap, launched in Egypt in 2010, allow victims of sexual harassment to report such incidents directly using their mobile phone using the online mapping tool. Besides reporting, technology allows some of the world's toughest-to-reach communities to join the global conversation. Media Matters for Women (MMW), for example,

operates in the Democratic Republic of Congo and Sierra Leone and uses podcasting technology and mobile phones to deliver crucial information on menstrual health, covid protocols, etc to women. Another example is that of the Mpowered project by TrickleUp in Odisha and Jharkhand in collaboration with Tata Communications in 2015. It provided 1,800 women living in extreme poverty with mobile phones loaded with a livelihood coaching application.

3. **Healthcare and Lifestyle**: Smartphones promote positive health behavior related to understanding chronic illness, stress management, breast cancer awareness, etc *(Mackey & Petrucka, 2021)*. Lifestyle changes are not just limited to nutrition, but also building social support circles online, very similar to Women's Self-Help Groups that became forums to discuss and support members.

Negative Social Impact

At a point when technology structures are dominated by men at all levels, with women only accounting for 11% of the senior leadership in tech companies, it raises the question - is cyberspace really equal? Sir Tim Berners-Lee, credited as being the inventor of the World Wide Web, has stated that "the web is not working for women and girls" *(Sample, 2020)*. He identified the digital divide, threats of harassment and assault, and badly designed artificial intelligence systems as areas that require 'urgent attention'. The internet is vulnerable to age-old biases. AI systems and social media often cause grief for women.

Some examples dealing with how tech has merely translated old structures online are detailed below :

1. **Harassment, Doxxing, and Threats**: Doxxing is a uniquely online phenomenon where an individual's personally identifying information (name, job, address, age, race/caste) is revealed on the internet without their permission. Women have been at the receiving end of insults, slurs, and demeaning language since before the 'tech revolution', and while the threats in the offline realm had a chance of manifesting in reality, tech exacerbates the severity of how these issues can pan out.

- For one, the same reach of the internet that allows for the propagation of positive ideas can result in deep fake nudes and revenge porn circulating en masse. An AI is used to morph pictures of victims into nudes that are then circulated on pornography websites. Revenge porn is posted on the

same websites/forums by resentful partners (with women usually being the target).

- Women who speak out against the government/organized religion, or celebrities find themselves victims of harassment at the hands of 'aggrieved' groups. In the August of 2021, when news of Cristiano Ronaldo joining Manchester United coincided with his rape accusation reports, women who called him out were targetted by the athlete's fans. They were harassed, sent death threats, and found themselves on inappropriate group forums. Instagram, instead of banning commenters who left rape and death threats, found no breach of their guidelines. All of this is in addition to the toxic culture of sending women inappropriate DMs on social media websites.
- During the second wave of Covid-19, when volunteers were organizing resources for hospital beds and other medical supplies, women found themselves being the victim of online stalking and continued harassment.

2. **Gender, Surveillance, and Control:** Feminists who deal with themes of big tech and data write about how we're increasingly becoming more than the sum of flesh and blood, but also digital ones-and-zeros from the digital realm. Data feminists operating in the space between feminism and data science believe that data exposes and expands ideas about labor, shedding light on societal power relations. Data narratives around big data are overwhelmingly white and male, the data 'cannot speak for itself' *(D'Ignazio & Klein, 2020)*. Hence, there is a need for intersectional analysis of data, who produces it, and where it comes from. When identities are being re-evaluated, so are concepts like autonomy and consent.

- A phone in many parts of rural India is seen as a 'shared' property of the household, if not the outright property of the man of the household. For women in these parts, the 'permissible' use of a phone includes calling relatives or 'informing about their whereabouts'. Hence, appropriate usage of phones joins the list of 'appropriate things women should do' alongside dressing manners, behavior, and other forms of control. An example of this is from 2016 when villages in the Mehsana and Banaskantha districts in Gujarat, India banned girls and unmarried women from owning mobile phones, citing distraction from studies as the reason. Similarly, in 2012, on grounds of "debasing the social atmosphere", villages in Eastern Bihar did the same for women, with authority figures stating that until they weren't married, girls could use their father's phone, the village authorities stated to a

Reuters reporter *(Al Jazeera, 2016)*.

- In Saudi Arabia, the Absher App has been used by men to track women's whereabouts and activities, enforcing a system of male guardianship. This system is similar to restricting women's choices in terms of where they go out, whose company they keep, monitoring their activities, and hampering their autonomy.
- In August 2021, the Delhi Government and a Forbes India report *(Forbes India, 2021)* announced that Delhi is by far the most surveilled city in the world - with 1,826.6 cameras per square mile. Many believe that Increased surveillance can be a major deterrent to criminals but it is not corroborated by evidence. There is a significant financial cost incurred by installing CCTV cameras at this scale, as the total allotment for CCTV deployment stands at INR 1,184.73 crore. However, data released by the Delhi Police on crime against women between January to August in 2020 and 2021 shows that crime against women has risen exponentially in 2021. In 2020, 5,095 cases of crime against women were recorded. In 2021, within the same time frame, the number of cases listed by the Delhi Police rose to 8,106 *(Internet Freedom Foundation, 2021)*. 'Gendering Surveillance', a study by Nayantara Ranganathan from the Internet Democracy Project reveals from the accounts of female garment workers in the textile industry in Bengaluru that CCTV footage was **not** useful in a single case of sexual harassment *(Ranganathan, 2017)*.
    - The rationale behind implementing lies in the notion of controlling the bodies and movement of women. The CCTVs in Delhi can be used by Resident Welfare Associations, Market Associations, and Public Work Departments as per a non-Legal Standard Operating Procedure. Currently, no legal safeguards or personal data protection act exist to regulate the deployment and usage of CCTV data.
    - In January of 2021, the Lucknow police announced a plan to set up cameras equipped with AI that will automatically snap a photo of 'distressed' women based on facial expressions. The science behind it has already been debunked *(Internet Freedom Foundation, 2021)*, and crime rates show no indication of going down. Relevant authorities stated that 200 "hotspots" will be identified from across Lucknow based on where women are most active and from where the highest number of complaints are received. This drew ire from female professionals and privacy advocates.
    - In the same month, the Madhya Pradesh Government suggested interest in creating a new

system for the safety of women. They will be required to register themselves at the nearest police station when they are going out of home for work, and this information will be used by the police to protect women.

3. **Gender, Consent, and Technology**: All of the points mentioned above drive towards the concept of consent. How do women consent, if at all to be surveilled? Is there an aspect of the masculine need to 'protect women'? Is consent in the online realm the same as it is in the real world?

- In July 2021, an app named 'Sulli Deals' made its way on the internet. The word 'sulli' is a derogatory term used by right-wing trolls in India for Muslim women as the 'deal of the day'. The app hosted photographs of more than 80 Muslim women in India. After public outcry, it was taken off GitHub and found a new home on a GoDaddy domain. By essentially 'auctioning' women, this app (and its creators) undermine the choice of women, specifically Muslim women on how they carry on with their digital existence. This example serves to show that consent over bodily autonomy and sharing 'how much of one is out there' works in the online realm.
- In June of 2021, an app called "MDM 360 shield" was forcefully downloaded on the phones of Accredited Social Health Activists (ASHA) workers in Haryana by local health department officials. The app allowed senior officials to track locations of ASHA workers and add/delete information on the handsets provided by the department, often the only ones they possess as most ASHA workers do not earn enough to have two phones. In February of 2020, the Municipal Corporation of Panchkula, Haryana forced sanitation workers to wear GPS-enabled "Human Efficiency" trackers strapped to their wrists. The physical wearable device came equipped with a microphone and camera so supervisors could monitor their 'work ethic'. The act of switching off the tracker during duty hours or straying from the GPS-monitored geo-fence was penalized by potential salary cuts. Women were hesitant to go to the washroom out of fear of being monitored while in a private setting but knew there were costs to it.

5.4 Technological Aspect

Technology, as one of the main drivers of education, employment, and social-political factors, has had a massive impact on women, their rights, their choices, and their autonomy. The promise of

technology for women is contingent on social and political structures and their will to improve access to technology to women, but at the same time, this 'promise' can be appropriated by women for themselves, using it to emancipate themselves and others like them.

Positive Technological Impact

Technology provides an alternate access point to education and employment prospects. The fact that remote access to upskilling opportunities has only increased with the development of the internet shows that the adage of 'world at your fingertips' is becoming a reality for women. "Leapfrog" opportunities, as the 2018 'Bridging the Digital Gender Divide' by OECD calls it *(OECD, 2018)*, affords women opportunities where earlier there were none. Some positives spill into the social realm as well, seeing as how freedom makes itself known in different ways.

- Technology facilitates the free flow of knowledge, improving access to crucial information for women. A 2014 study based in Bangladesh showed that women utilized ICTs to teach themselves English, which further contributed to their confidence to teach themselves more about how the internet and other ICTs work *(Tyers, 2014)*. English as a global language allows access to global opportunities through online businesses, internships, etc., and learning the language can be handy for women deprived of this opportunity. Knowledge growth goes beyond education and can extend to the field of healthcare as well, as information about specific medical treatments or prophylaxis, reducing the risks and costs of early pregnancy *(Billari, Gintella, and Stella, 2017)* can be widely circulated using the internet. Other examples can include knowledge sharing about partner violence, ovarian and breast cancer, stress management, etc.

- The roll-out of fast broadband connection in Australia in 2018 boosted female entrepreneurship, especially for rural women. Self-employed women's number grew at a 2.3% average every subsequent year, compared to only 0.1% on average in non-NBN (National Broadband Network) regions *(NBN, 2018)*. Dettling (2016) shows that high-speed broadband could increase married women's workforce participation by 4.1 percentage points in the Indo-Pacific region *(OECD, 2018)*.

- Gig economies and freelance platforms have allowed women a degree of economic emancipation wherein they can reduce their dependency, if not eliminate, on their male figureheads, in addition to providing the benefits that other opportunities may not.

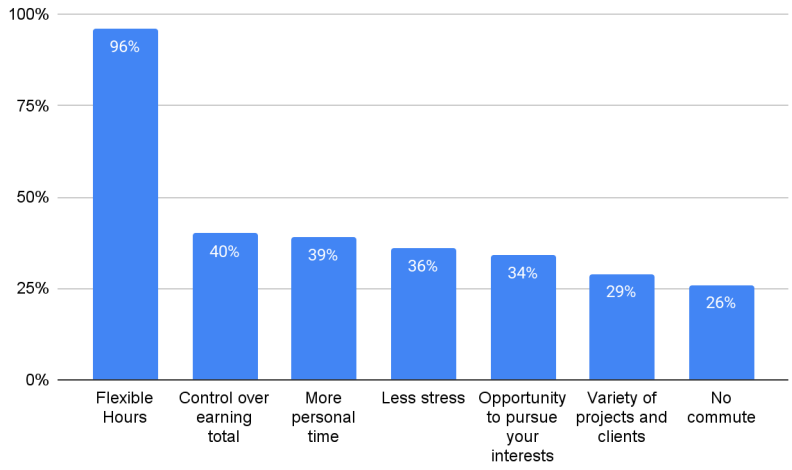

Figure 3.0: Bridging the Digital Gender Divide

Source- Hyperwallet (2017) via OECD (2018)

- Possessing a mobile phone can contribute to women's growth. In India, Internet Saathi (Internet Friend), developed by the combined efforts of Tata Trust and Google, is used to train young women hailing from rural villages in the ways of basic digital skills of Android (Google-provided smartphones), such as Google Chrome (internet browsing) and WhatsApp (communication). The app has reached more than 2.6 million women spanning across 60,000 villages as of 2018 *(OECD, 2018)* and promotes digital literacy and consequently access to welfare schemes and female entrepreneurship.

- Digital wallets and 'mobile' money provide leapfrog opportunities for the poorest and unbanked parts of society, especially women in developing economies. Mobile banking is a product of the formal banking system, whereas mobile money constitutes what is known as "shadow banking", wherein mobile money is provided by telecom companies, and operates via software installed on SIM cards. According to *GSMA 2017 (OECD, 2018)*, mobile money has reached market coverage in two-thirds of Low-and-Middle-Income Countries. As of 2018, registered mobile money

accounts have surpassed more than half a million worldwide. For women, reduced reliance on formal bank accounts (having to make one with permission or in the presence of a male figurehead) has allowed them to venture out to start their own businesses and reduce the need to carry out multiple part-time occupations *(Suri and Jack, 2016)*. According to GSMA *(2015a from OECD, 2018)*, 64% of working women across 11 Low-and-Middle-Income Countries have greater access to business and employment opportunities because of mobile phone technologies *(OECD, 2018)*.

Negative Technological Impact

Basic access to phones and the internet remains a problem. Leapfrog opportunities mentioned above are hindered by the digital gender divide - how do women access education, employment, and financial freedom when they lack access to a phone or the internet? How successful has the penetration of digital literacy initiatives been? The positives that exist are contingent on certain factors, which are linked to social, political, and economic biases that disproportionately affect women. While this divide shows signs of shrinking, its pace is not matched by the pace of technology growth in the relevant industries, potentially leaving women behind in terms of the latest know-how.

- The digital gender divide makes itself known in different ways such as skill gap, and access gap, either through possession of a smartphone or surfing/making use of the internet.

Report	Women's Internet Use	Men's Internet Use	Use Gap (men's reference)	Use Gap (alt.) (women's reference)
EIU Inclusive Internet Index	59%	65%	13%	21%
ITU Facts and Figures	48%	58%	16%	21%

Table 1.0: The gender gap in internet access: using a women-centered method, *Carlos Iglesias, Senior Research Manager - World Wide Web Foundation (2020)*

The *GSMA Mobile Gender Gap Report 2021* reveals a few facts about this digital gender divide in Low-and-Middle-Income Countries :

- While 58% of women now use mobile internet, their numbers are still staggeringly low compared to men, with about 234 million fewer women than men using mobile internet;
- Women are 7% less likely than men to own a smartphone. That translates to 143 million fewer women than men owning a mobile;
- Key barriers cited for mobile ownership for women include affordability, skills and literacy, safety and security, and family restrictions;
- Key barriers cited for mobile internet use for women include skills and literacy, affordability, safety and security, and relevance.

- Factors affecting the digital gender divide, such as family restrictions and safety and security are detailed in the Social aspect, but explanations about other factors are as follows :
  - **Affordability** as a barrier is not equal across the globe but has been consistently cited as a key hurdle. *Intel and Dalberg's 2012* study finds that affordability represents a problem in duality - it is a barrier for those who are not yet Internet users and further prevents Internet users from using the World Wide Web to its full extent. An example of this is if Internet data allowances increase with the number of megabits included in the contract. The cost of accessing the Internet varies across regions and partly depends on the level of development of the country. India, for example, ranks 20th in terms of internet affordability *(Inclusive Internet Index, 2021)* and JioPhone provides cheap access to an LTE-enabled smartphone but the Intel and Dalberg report shows that the same cannot be said for African households. Even in India, a big part of affordability comes down to who gets to buy and use the phones and internet, as gender-based differential access to the internet is deeply rooted in the idea of social control.
  - **Relevance** as a barrier has gone down in rankings across the surveyed regions by the GSMA (2021) report but exists nevertheless. It refers to how relevant do people feel the internet is to their lives, despite not owning a phone. Video consumption through platforms such as YouTube and TikTok has increased the knowledge about the importance of technology and the internet amongst men and women. The Intel and Dalberg report state that a big part of relevance understanding has to

do with women thinking 'they do not need' or 'do not want' to use the internet. Despite being a declining barrier, the low representation of regional languages online and low levels of digital literacy still determine how women perceive the importance of the internet and ICTs.

- **Skills and Literacy** refer to digital literacy and is a major factor affecting how women use the internet. Gender-based access to digital literacy is no different from gender-based access to STEM fields, and women often lack opportunities to learn job-worthy skills. The field of technology, coding, and engineering is culturally associated with men, often leading to society undermining the technical and engineering talent of women. Ironically, *Miltner (2018)*, among others, argued that computer programming as a field, which would go on to evolve into modern computing, was originally dominated by women. When the field's status shifted from a 'low-status, female-type' of work and was seen as central to controlling corporations and state resources, women were pushed out. Digital literacy plays a major role in financial literacy, political and social awareness and determines how women govern their online identities. Digital skills such as Microsoft Office and Photoshop for design/video editing have grown as marketable skills for employment in recent years. If women are deprived of the opportunities to upskill themselves, it will only add up to the lack of women in the workforce. This lack of diversity hurts the global economy; *Mckinsey's 2015* report states that advancing women's equality could add $12 trillion to the global economy. The gender skill gap is narrowing, but clear differences between the Global North and the Global South persist.

- **Algorithmic biases** refer to biases harbored by artificial intelligence systems against women. No AI is objective, or neutral, contrary to popular opinion. They are the product of their developer, just like the developer is a product of their socio-economic environment. In an April 2021 podcast between Mckinsey and Citi, titled 'A conversation on artificial intelligence and gender bias' *(Madgavkar, 2021)*, Dr. Muneero Bano stated that an AI learns from whatever data set is provided to it, and if the data is inherently sexist, the AI will simply replicate it. She notes that - *'Only 20 percent of employees in the technical roles at major machine learning companies are women. According to the UNESCO report, 12 percent of the artificial intelligence researchers probably are women, and 6 percent of professional software development in the field of artificial intelligence are women.'(Madgavkar, 2021).* If the purpose of AI systems is to remove the 'human error', then human

biases prevailing within AI are worrying signs. AI is a black box, with observers (and at times, creators) finding it difficult to understand why the system did something, which is why there is a push for an explainable AI, which could further lead to increased accountability. Regardless of its black-box nature, the fact that gender biases still make their way across this unknown method of processing raises questions, and concerns.

Examples are as follows :

- On the same podcast, the host Anu Madgavkar gives an example of an AI that goes through members of Congress in the United States to know what kind of labels it assigns to them, *'because those labels actually are a way of saying how is the AI responding to that image; and this is actually what gets fed then into various kinds of screening software'(Madgavkar, 2021).* All the senators and members were dressed identically and some had the American Flag behind them. The AI labeled male politicians as "official", "senior executive" or "attorney" but marked the female politicians as simply "kid" or "girl".
- In April of 2021, an audit by researchers at the University of Southern California found that Facebook's ad delivery algorithm discriminates against women. It shows men certain ads while excluding women from its target base. For research purposes, the team bought ads on Facebook for delivery driver job listings with similar qualifications for two different companies - Instacart drivers and Domino's pizza delivery. The ads did not specify a demographic. According to the researchers, Instacart has more female drivers whereas Domino's has more male drivers. The researchers were right, as the study found that Facebook targeted women for the Instacart delivery job and men for the Domino's delivery job. Did the ad algorithm recognize the existing demographic to mainstream the delivery of ads? The researchers don't know, because Facebook is tight-lipped about how the ad delivery system works, further contributing to the black-box system's opaque-ness Understanding why this wasn't a mistake is important and is corroborated by the fact that this isn't a one-time incident.
- In 2019, a settlement forced Facebook to prohibit advertisers on the new ad portal to explicitly target users by age or gender. A ProPublica report found that gender-based advertising for jobs still existed. A construction and supply company based out of Oklahoma, USA put an ad on

Facebook for the job of a qualified driver. The ad was seen by 20,000 people within 10 days, and 87% of the viewers were men *(Kofman and Tobin, 2019)*. There are other examples of Facebook using predictive algorithmic sorting to decide who gets to see what. A research group at Northeastern University *(Ali et al., 2019)* put out ads for bodybuilding products and beauty products, with the former being seen by 86% men and the latter being seen by 97.7% women *(Vox, 2020)*. The algorithm chooses which ads a user will show based on interests, but the fact that for the sake of ease, an entire demographic is losing out on opportunities borders segregation. Similarly, the researchers put out ads for nursing positions, and 70.5% of women saw those ads, just like 94.5% of women saw ads for preschool teachers.

- Non-Facebook algorithms are still prone to bias. A 2021 study by Nithya Sambasivan and others at Google Research found that Indian AI systems can reproduce biases inherent in Indian society *(Kunhitty, 2021)*. Algorithms require datasets to learn and improve, and the researchers found that those with internet access are overrepresented, which is just 50% of the population *(Sambasivan et. al, 2021)*, but the algorithm assumes this to be representative of the entire society. Hence, safety apps that invite users to identify unsafe areas in a city will mark Muslim and Dalit areas as unsafe, mirroring the prejudices of Indian society.

5.5 Ethical Aspect

In this section, a broad overview of technology in the general field of ethics will be examined, and then narrowed down to the Feminist Principles of the Internet, introduced at the Imagine a Feminist Internet meeting that took place in Malaysia in 2014.

Far from being detached from the ethical implications rooted in any social and cultural setting, technology can amplify existing ethical notions held by people in a society. The transformation of society that has ensued out of this process has given shape to a multitude of new ideas and goals but also widened the pre-existing gap. The assumption that technology is 'always aligned to the greater good' is false, as is the assumption that humans are powerless to control its development direction. A 2018 White Paper by the World Economic Forum titled 'Values, Ethics, and Innovation: Rethinking Technological Development in the Fourth Industrial Revolution' posits that technology is *'deeply socially constructed, culturally situated, and reflective of societal values. They are how we engage*

with the world around us. They affect how people order their lives, interact with one another and see themselves' (Philbeck et. al, 2018). Conversations around 'ethical tech' are paramount to removing the biases that humans instill in technology. Ethical tech revolves around the understanding that the moral utilization of technologies is reflected by the interests, actions, and desires of their creators, and shapes how the people using them can realize their goals, identities, and potential. Rather than being a simple compliance checklist, it calls for principles inculcated in how individuals and corporate entities use and regulate the technology at their disposal.

Various forms of tech ethics can be clubbed under different categories of the 'social layer' of the internet. A few of them are :

Content	**Security and Trust**	**Commerce**	**Access**
Freedom of Expression	Privacy and Data Protection	Consumer Protection	Digital Divide
Open Data	Surveillance	Free Trade	Women's Access
Online Education	Behavioural/Gender/ Racial Targeting	Cryptocurrencies	Net Neutrality
Neutral Search Engines	Cyber Warfare	Online Gambling	Internet Affordability
Freedom of Expression	Identity Management	E-commerce	Rights of People with Disabilities
Big Data Ethics in Storage and Usage	Encryption	Labour Law	Cloud Computing
Multilingualism	Internet Jurisdiction and Regulation	Taxation	Right to Access

Table 2.0: Values, Ethics, and Innovation: Rethinking Technological Development in the Fourth Industrial Revolution - *World Economic Forum, August 2018*

Certain ethics, and morals, such as Labour Laws apply to workers such as content moderators and developers who often work overtime ('crunch hours'). They are similar to ethics in real life, such as proper work conditions for factory workers. Similarly, the Right to Access extends to education as well as ICT facilities. Hence, certain forms of morals and ethics, that humankind codifies into laws, find a parallel in the digital realm as well and need legal oversight in this sphere as well. Many of our preconceived notions, whether positive or negative, find themselves in the digital realm. Proper implementation of moral values relies on engagement from consumers, policymakers, educators, civic leaders, citizens, engineers, executives, and boards.

Feminist Internet Principles build upon these general foundations. Broken down into 17 principles, they detail how these broad ethical principles can be viewed from the feminist lens. Adapted here from the source itself *(Feminist Principles of the Internet*, *2014),* they are as follows :

1. **ACCESS**: Enable women and queer persons to enjoy universal, acceptable, affordable, unconditional, meaningful, and equal access to the internet;
2. **INFORMATION:** Provide unrestricted access to information that may be relevant to women and queer persons, particularly about sexual and reproductive health and rights, access to justice, pleasure, safe abortion, and LGBTIQ issues. Diversity in languages, interests, and other such areas are also included in this;
3. **USAGE:** Women and queer persons have the right to make sustainable use of ICT's via various mediums like coding and designing and reclaiming technology as a platform for their creativity and expression, as well as to use these platforms to challenge sexism and discrimination in all spaces;
4. **RESISTANCE:** Social norms are often negotiated and imposed - as an extension of spaces shaped by pre-existing issues like patriarchy and heteronormativity- on the internet. The struggle for a feminist internet forms part of a continuum of *"resistance in other spaces, public, private, and in-between" (Association for Progressive Communications, 2016)*;

5. **MOVEMENT BUILDING:** The internet is a transformative space that has the potential to facilitate the expression of genders, sexualities, and individuals. This also includes connections across territories and creating opportunities for sustained feminist movement building;

6. **GOVERNANCE:** Challenge the patriarchal spaces and processes that control internet governance, as well as put more feminists and queers at the decision-making tables; democratize policy-making that affects the internet space and decentralized ownership of power in global and local networks;

7. **ECONOMY:** Wrestle control away from a capitalist logic of utilizing technology for privatization and profit. Create alternative forms of economic power grounded in principles of cooperation, solidarity, commons, environmental sustainability, and openness;

8. **OPEN SOURCE:** Commitment to creating and experimenting with technology, including digital safety and security, and using free/libre and open-source software (FLOSS), tools, and other platforms. The promotion and spread of knowledge about FLOSS and its uses is central to a feminist internet practice;

9. **AMPLIFY:** Harness the power of the internet to amplify women's narratives and lived realities. Resist all those forces (like the state and the religious right) that monopolize discussions of morality "while silencing feminist voices and persecuting women's human rights defenders" *(Association for Progressive Communications, 2016)*;

10. **EXPRESSION:** The right to sexual expression as freedom of expression is no less important than political or religious expression. Resist and object to state and non-state control, surveillance, and restriction of feminist and queer expression on the internet through the use of technology, legislation, or violence. It is a part of the larger political project of moral policing, censorship, and the hierarchization of citizenship and rights;

11. **PORNOGRAPHY:** Recognize that the issue of pornography online has to do with agency, consent, power, and labor. Reject simple causal linkages made between the consumption of pornographic content and violence against women and further refuse the umbrella term "harmful content" to label any and all expression of female and transgender sexuality. Support reclamation and creation of alternative erotic content that resists the mainstream patriarchal gaze and places women and queer persons' desires at the center;

12. **CONSENT:** Integrate the ethics and politics of consent in various spaces like culture, policies, and the terms of service on internet platforms. Women's agency and freedom lie in their ability to make informed decisions on what aspects of their lives they wish to share online;

13. **PRIVACY & DATA:** Support the right to privacy and full control over personal data and information online at all levels. Reject norms of states and corporations to use data for profit maximization and manipulation of online behavior. Surveillance has been the biggest supporter of patriarchy, used to control and restrict not only women's bodies but also their speech;

14. **MEMORY:** Exercise and retain the right to control personal history and memory on the internet, including access to all personal data, and have the power to exercise control over this information, including knowing its reach of access and the ability to delete it as desired;

15. **ANONYMITY:** Defend the right to be anonymous and reject all claims to restrict anonymity online. Anonymity facilitates free expression, furthering aid in the rejection of taboos surrounding sexuality and heteronormativity, experimentation with gender identity, and the creation of a safe space for women and queer persons affected by discrimination;

16. **CHILDREN:** Inclusion of opinions and suggestions of the youth on safety and security in the online space and promoting their privacy and access to information. Recognizing children's right to a healthy emotional and sexual development, which includes not only the right to privacy but also access to information and a positive understanding of sex, gender, and sexuality;

17. **VIOLENCE:** Call on internet users, policymakers, the private sector, and other stakeholders to address online harassment and technology-related violence. Recognizing that this harassment through various mediums like threats, intimidation, and policing experienced by women and queers is detrimental to growth.

5.6 Legal Aspect

The scope of the legal impact of technology on women can be extended to consider two broad horizons - (i) Cyber Crimes and (ii) Cyber Laws. Further segregation of these broad horizons could help in understanding the positive and negative implications of technology in this study. Cyber Crimes may be defined as *"Any unlawful act where a computer or communication device or computer network is used to commit or facilitate the commission of crime" (Ministry of Home*

Affairs, Government of India). Up until a few years ago, cybercrimes were focused on the e-commerce industry and its related aspects. Majorly, crimes like fraud and hacking were considered to fall under this category. Writers of cyber laws (IT Act of 2000) failed to understand the magnitude of crimes that were taking place against women at that time. These crimes were covered under other sections of the law in the IPC, Criminal Procedure Code, and Indian Constitution. An update in cyber laws - that came about as a result of outrage in the public after the Nirbhaya Case - has now brought about a change in the scope of cybercrimes. The most relevant cyber crimes concerning women today stand as harassment through emails, cyberstalking, cyber pornography, cyber defamation, morphing, phishing, and email spoofing.

In India, approximately 3 (704 out of 23722) % *(National Commission for Women, 2021)* of the crimes reported by women in 2020 were cybercrimes. This number stands to be the highest only after heinous crimes like harassment and domestic violence. While this number may not entirely convince one of the negative legal ramifications of technology, it's noteworthy that **only those crimes that have been reported are being considered here**. Evidence suggests that cybercrimes are more probable to go unnoticed than most other categories of crimes. This stems from the fact that society is relatively unaware of (i) what constitutes cybercrimes and (ii) the laws that are in place to curb cyber crimes.

Furthermore, societal norms follow women to online spaces as they hesitate to report cybercrimes, afraid of 'defaming' their family's name. The anonymity that comes with the online space reduces the confidence of women in seeking justice as well.

While the slow and steady rise in the scope and coverage of cyber laws is proving to be positive for women, the ground reality of the implementation of these laws helps in understanding an opposing perspective. Evidence shows that cyber laws are hard to enforce for a multitude of reasons. In India, the following reasons contribute to this fact *(Misra, 2013):*

- *Cyber laws are new*. Cyber laws in the country came into existence with the Information Technology Act of 2000. Any reported instance of a cybercrime, after making its way to a court of law, stands as a relatively unseen and new scenario for judicial figures to judge. Judges find that they have no benchmarks to base their judgments on and often end up approving penalties mismatched or

lighter than the harm caused by crimes.

- Generalizing the first point could also help us conclude that a lack of experience and data often leads to the incorporation of penalties lighter than crimes.
- The online space brings with it anonymity and difficulty in assigning responsibility to cybercriminals. Jurisdiction is dependent on the location of a crime and perpetrator. In a scenario where a perpetrator's location could be constantly changing, the enforcement of cyber laws proves itself problematic.

The plight of women at the hands of technology could be better explained with cybercrimes of the past.

The Ritu Kohli Case *(Misra, 2013)* stands as one of the first in the realm of cyber crimes and cyberstalking. Mrs. Ritu Kohli was the victim whose identity - by virtue of her contact details - was stolen and not only used but also distributed in the online space. Her name was used to chat online while her number and address were distributed leading to her receiving a multitude of inconvenient and inappropriate calls. The culprit was eventually arrested after Kohli filed a complaint but was released on bail.

The most recent addition to the cyber rules - the Cyber Crime Prevention Against Women and Children (CCPWC) Scheme - is perhaps the biggest step towards women's safety in the online space with its aim to curb cyber crimes against women and spread awareness on the issue. The scheme includes the following main divisions:

- Online cybercrime reporting platform
- One national-level cyber forensic laboratory
- Training of Police officers, judges & prosecutors
- Cybercrime awareness activities
- Research & Development

While the scheme has been in the planning process for years, its first training session for Police Officers was held on the 9th of February 2021 with a total of 125 officials.

6.0 Analysis and Way Forward

Women's access to the internet and owning mobile phones has gone up. GSMA 2021 reports that South Asia has seen a significant reduction in the mobile internet gender gap, going down to 36% in 2020 from 50% in 2019 *(GSMA, 2021)*. Apps and services such as Internet Saathi in India, Black Girls Code for African-American girls, non-profit organizations such as Girls Who Code are taking the initiative to bolster women's education and presence in this field. This can boost women's access to the digital world, improving prospects for their growth, both academically and professionally. It allows them to be a part of the global conversation about rights and society. Reducing the digital literacy gap during women's childhood can improve their chances of getting into the technology field. Currently, women account for 34.4% *(Daley, 2021)* of the workforce across the five largest tech companies to exist (Amazon, Apple, Facebook (Meta), Google, and Microsoft). The numbers are increasing, but issues persist.

During the hiring and recruitment process, about 48% of women in STEM jobs report discrimination. Being passed up for promotions because of gender bias is cited as a reason by 39% of women. About 66% (Daley, 2021) of women believe there is no clear career trajectory for them at their current companies. As per research by Mastercard, 93% (Tripathy, 2021) of Indian girls between ages 12-14 consider STEM-related careers early on, but their numbers dwindle as they enter college and reduce further while entering the workforce. Similar examples can be seen on social media, where 52% of young women have experienced online abuse and 87% (Chami & Kanchan, 2021) girls think the problem is getting worse. This points to a problem rooted in social and cultural systems, barring women's access to technology and avenues for growth.

- Throughout this research paper, the authors have examined reports from firms such as Deloitte and NGOs such as Amnesty India. However, very little scholarly material or content that supports our overall findings on (and potentially incriminates) platforms such as Facebook actually comes from direct, self-admitting sources. As such, even if certain findings are commissioned by Facebook, as in the case of ITU, they do not practice those principles. As such, this means that statements made during state testimonies, whistleblower aftermaths, etc. are essentially hollow, as no efforts are made to take accountability. According to the authors, an inclusivity audit using

parameters such as childcare, mental health, domestic duties, etc. can be considered metrics to evaluate how friendly tech organizations are to women, and their representation in numbers, from cubicles to boardrooms.

- We've covered a research gap, and contributed to the field by connecting different spheres in which technology affects women. For example - job loss and job automation (under Economics) are generally understood in isolation. We connect the social development of women, or lack thereof, by writing about how a general lack of digital literacy and hesitancy to educate girls in STEM-fields can contribute to them not upskilling themselves, falling behind of the subsequent learning curve, and hence lose out on jobs due to automation.
- By focusing on the positives and negatives, the authors stress the development that technology has afforded women, especially in underdeveloped regions. Negative facets emphasize the remaining journey. Through this paper, the authors have shed light on the specifics, wherever possible, of where technology has succeeded, which efforts can be bolstered, and which processes need to be initiated.

The concept of gender mainstreaming, i.e an approach to policy-making that takes into account both women's and men's interests and concerns can be a helpful tool in assessing how technology negatively affects women, taking stock of the positives and their causes, and understanding that a tech-based view of solving issues can only be useful in the short run. For a long-term impact, societal conditions for women in terms of their access to education, removing gender-based barriers and stereotypes associated with masculine jobs and feminine jobs can go a long way in making situations conducive for women.

7.0 Conclusion

The progress potential for technology to change women's lives is linked to the socio-cultural contexts in which people find themselves. While factors such as affordability and automation affect men and women, it is women, as has been examined in this paper, who face an additional barrier in terms of access and usage of technology. The solution to these problems lies not in simply believing that technology will solve everything slowly but surely, rather recognizing that women face more

discrimination, and actively taking steps with women as the stakeholders and preparing specific solutions for them.

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