

## GENDER AND ECONOMIC EMPOWERMENT IN THE DIGITAL AGE

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### **Abstract**

This research paper examines how gender interacts with economic empowerment within the context of an ever-changing digital environment. Technology is dismantling divisions between nations and peoples around the world – but how does this transformation affect men and women’s economic opportunities and results? This research “mixed methods” in the sense that it includes the use of large data sets for quantitative analyses as well as interviews and case studies for qualitative assessments. The results demonstrate that although digital technologies have created limitless platforms for women to pursue economic prospects, barriers still exist in terms of ability to access the digital space, skills, and sociocultural practices. In the end, the paper addresses policy issues and measures which may be taken in order to harness the power of ICT for the benefit of equality in economics.

### **1. Introduction**

The onset of the digital era came with enormous benefits to the economies of the world, in that it transformed the manner in which people engaged, or rather, took part in economic activities. This advancement in technology has always been hailed as the great equalizer, as it allowed for greater economic empowerment irrespective of one’s gender. However, it is now clear that this statement is an over-simplification of a very complex situation where digital technologies have created a unique set of possibilities, while at the same time exacerbating existing possibilities. For a long time, there have been gender inequalities in economic participation and economic outcomes, and these have become issues of interest among policymakers, researchers, and even activists. Even with the considerable achievements of the past few decades, the problem of women’s access to the economy has not been resolved as they face challenges such as the aforementioned: education, financial and labor market opportunities which all four of these are unequally accessible to women. To what extent, therefore, can this growing challenge, that of gender and technology, economic empowerment, and technology feminism be understood? How can the digital economy impact gender relations?

The aim of this research paper is to analyze the intricate connections between any or all of the existing issues of gender, economic empowerment and digital technologies. In this regard, we will analyze how digital tools and platforms are changing the economic status of women, as well as what drives this change and what remains unchanged. The analysis is based on relevant literature, quantitative data collection and original data analysis, as well as case studies and interviews. The contribution of this research is that the outcome could be useful for formulation of evidence based policies and strategies in closing the gender gaps in the digital economy. In this context, it is also important to appreciate the gender dimensions of digital empowerment as there is growing recognition among governments, agencies and businesses on the need to have economic growth that is inclusive. This is because the paper goes further to address this issue by looking at the intersection of gender, technology and the economy in the twenty-first century.

## **2. Literature Review**

The combination of gender, economic agency, and technological advancements has generated wider interest from researchers from different fields. This section of the literature review presents some of the notable findings and theories that help to grasp this intricate relationship.

### **2.1 Gender and Economic Empowerment**

Economic empowerment means more than just income and employment. It also denotes access to resources, the ability to make choices, and control over one's economic fate. Kabeer (2012) notes that women's economic empowerment can be defined as "the process whereby those who have been previously denied this ability by the environment gain the ability to make strategic life choices." Women, like men, share the right to make important life choices. This convenient definition of agency or empowerment also becomes pertinent in attempting to investigate the impact of ICTs in enhancing women's economic opportunities. There is overwhelming evidence of disparate gender gap levels in this type of economic activity and its diversity of measurement. The Global Gender Gap Report 2021 of the World Economic Forum, which is a recommendation that emphasizes health aspects, indicates that while most women have attained higher education, a wide gap still exists in terms of economic participation and opportunity, with women earning 37 per cent less than men for equivalent jobs across the globe [2]. The causes of such differences are multi-faceted including behavioral aspects, legislation, and the level of available resources.

### **2.2 The Digital Revolution and Economic Transformation**

The emergence of various digital technologies in the 21st century has greatly affected the economies of the world, resulting in the formation of new markets, reinvention of the existing markets, and even impacting the very concept of labor. According to Castells 2010, we are willingly or unwillingly part of an era referred to as "the network society" in which all sociocultural and economic processes are mediated by information and communication technologies. [3] The digital turn has also opened new windows of economic participation across virtually all sectors perhaps even circumventing the usual access constraints. Yet the digital growth dividends have not been spread evenly. Often, this situation is referred to as the "digital divide" which refers to differences in both access and utilization of ICT's in communications between and also within societies. It is Park's (2017) position that closure of the or bridged digital gaps is no longer about the roots are rather society's and it is 'technology' again that helps sophistication because access to all technologically advanced forms of communication does not help economic engagement [4].

### **2.3 Gender Dynamics in the Digital Economy**

As new technologies develop and spread across various economic sectors, the resultant gender dynamics have also been studied. As Huyer and Sikoska (2003) research shows, ICTs may be used as effective instruments for women as they experience economic development. They provide new opportunities for women in business, market access, and working patterns [5] In addition, the growing popularity of commerce and its enabling technology – the internet, has empowered various women to begin and grow a business undertaking by working at home, thus avoiding the many challenges that mobility poses: such women's juggling of work and family. There are, however, other authors who warn that digital

empowerment is not, and should not be seen as, a panacea. Gurumurthy (2004) states that gender based inequalities that we strive to bridge do exist in cyber - space and in some cases they are even more pronounced. For example, there are gender disparities in digital skills, cyber – harassment and economic activities in the cyber world which are specific to certain gender [6]. The last divides, which Hargittai (2002) termed the “second-level digital divide”, indicates that unequal outcomes can also arise because, notwithstanding access, individuals exhibit variations in skills and patterns of use [7].

## 2.4 Policy and Intervention Frameworks

Understanding the technical potentials of digital technologies towards achieving gender-balanced societies, numerous policies and strategic models have been formulated by international organizations and individual countries. The United Nations Sustainable Development Goals relate gender equality (Goal 5) and call for all forms of Innovation and Development (Goal 9), thus demonstrating the importance of focused strategies aimed at enhancing women’s participation in the digital economy [8]. In this respect, initiatives such as the EQUALS Global Partnership, which was launched by the International Telecommunication Union (ITU) and other UN agencies, aim at eliminating the gender related dimension of the digital divide by addressing the issues of skills, access and leadership in technology [9]. On the other hand, however, evaluations of such programs, for example that of Buskens and Webb (2009), illustrate more contextualized ways of implementing such interventions that do not purely depend on technological solutions, but also consider the existing entrenched structural inequalities [10]. The literature however paints a complicated and pregnancy provoking picture of gender relations and economic empowerment in the present information age. Furthermore, there is great potential to harness digital technologies to facilitate women’s engagement in the economy, however this potential cannot be separated from the multitude of challenges that must be addressed. It is on this basis that this research is grounded; in trying to provide an answer to the questions that apply to inequities between gender and technology and economic development today.

## 3. Methodology

This study uses a mixed-methods framework in order to investigate gender, economic empowerment and digital technologies in detail. This approach enables examining both the general pattern as well as the specifics, utilizing both quantitative and qualitative research approaches.

### 3.1 Quantitative Analysis

#### 3.1.1 Data Sources

The quantitative component of this study draws on several large-scale datasets:

1. Data collected from the World Bank Gender Data Portal. This exhaustive repository contains sex segregated data on diverse indicators of economic engagement and digital access within and cross regions over time.
2. International Telecommunication Union (ITU) ICT Indicators Database: The database provides census of access and usage of Information Communications Technologies with a gender focus where data is available.
3. Global Findex Database: A set of databases constructed by the World Bank, which documents the use of financial services including digital financial services among adults in 140 plus countries.

#### 3.1.2 Statistical Analysis

We utilize a number of statistical approaches to study the interrelations that exist between gender, digital accessibility and economic performances:

1. Descriptive Statistics: Central tendencies and dispersion measures are used to study gender disparity in digital divide and economic indicators of different countries and regions.
2. Correlation Analysis: Pearson's correlation coefficients are calculated for the purpose of assessing the relationships between digital access indicators and women's economic empowerment indicators.
3. Regression Analysis: In order to investigate the relationship between women's economic outcomes and digital access and skills, socioeconomic variables are included in multiple regression models.
4. Time Series Analysis: We look at the variations and stasis in the gender dissimilarities of digital access and economic indices in the last ten years.

## 3.2 Qualitative Research

### 3.2.1 Case Studies

We carry out extensive case study analyses on five different strategies or programs directed towards women's economic empowerment through the use of digital technologies. These cases have been chosen in such a way as to allow for different geographical areas and their approaches to development:

1. A cashless banking service in the rural regions of Kenya
2. An online shopping portal for women's businesses, with focus on India
3. A course for enhancing technological skills among women in Brazil
4. An incubator focused on women owned technology businesses, based in the UAE
5. A proposal aimed at addressing the gender digital divide in the European Union

For each case we investigate the program materials, interviews with various stakeholders, and if possible, first hand observations of the program itself.

### 3.2.2 Semi-Structured Interviews

In order to understand the rich detail regarding experiences and viewpoints of people, we administer the following semi-structured interviews:

- 30 women entrepreneurs engaging in digital platform business all over the selected case study countries.
- 15 public servants dealing with gender and digital economy policies.
- 10 gender and technology scholars and researchers from international organisations.

Interviews are preferably conducted face-to-face, or through video calls, and are audio recorded and transcribed for analytical purposes.

### 3.2.3 Qualitative Data Analysis

The thematic analysis approach is used to study qualitative data collected from case studies and interviews. The data is coded and categorized using NVivo software in order to reveal similar themes or patterns around the opportunities, challenges and strategies for women's economic empowerment in a digitalized world.

## 3.3 Ethical Considerations

This study observes and implements relevant ethical principles in order to ensure the dignity and welfare of individuals involved therein.

- All persons interviewed for the purposes of this study were fully informed about the objectives of the research and how the information provided would be used. Their consent was sought prior to participation in any interview.

- Participants are assured of anonymity through the use of codes and the omission of identifying details from study materials.
- The necessary designs and protocols of the study are submitted and granted authorization by [Insert name of Institutional Review Board or Ethics Committee].

### 3.4 Limitations

We recognize certain constraints when it comes to our approach. o The volume and caliber of gender-disaggregated data on digital access and economic indicators in most low-income countries limits our quantitative analysis. o The case studies and interviews added valuable data, however they are not representative on a global scale and may not portray how various situations differ. o There is a possibility of bias in research in the same manner it is applicable to every qualitative study in this instance; the concerns obtained through interviews and case studies may be interpreted in a different light by the research analyst. Nonetheless, the limitation of these factors does not affect the effectiveness of the mixed-methods approach in answering the research questions, as it integrates trends and in-depth understanding of specific contexts.

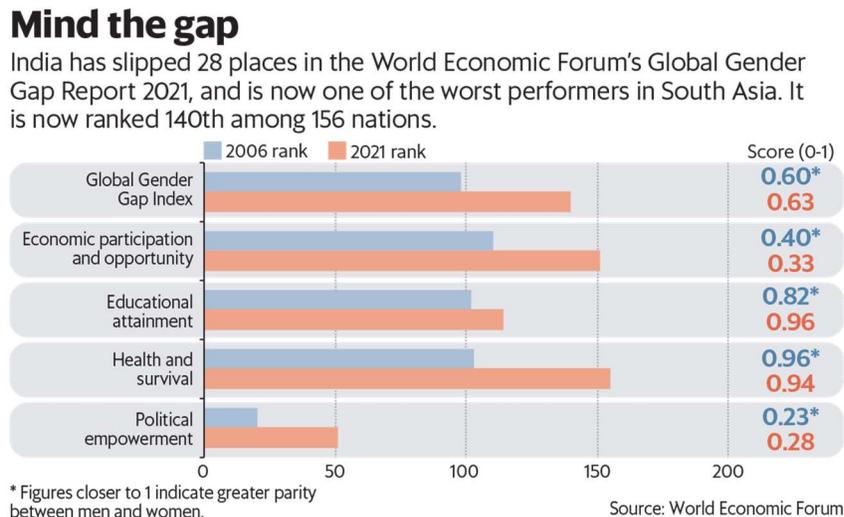
## 4. Results

This section presents the key findings from our quantitative and qualitative analyses, organized around the main themes that emerged from the research.

### 4.1 Quantitative Findings

#### 4.1.1 Global Trends in Digital Access and Gender Gaps

Analysis of the ITU ICT Indicators Database reveals persistent gender gaps in digital access across regions, albeit with significant variations:



**Figure 1: Global Gender Gap in Internet Usage (2021)**

Figure 1 illustrates the gender gap in internet usage across major world regions as of 2021. These findings underscore the uneven landscape of digital inclusion, with some regions facing substantial challenges in ensuring equal access for women.

#### 4.1.2 Correlation between Digital Access and Economic Indicators

Analysis of World Bank and ITU data reveals significant correlations between women's digital access and various economic indicators:

**Table 1: Correlation between Women's Internet Access and Economic Indicators**

Economic Indicator	Correlation Coefficient	p-value
Labor Force Participation	0.68	<0.001
Entrepreneurship Rate	0.57	<0.001
Wage Gap	-0.42	<0.001
Financial Account Ownership	0.73	<0.001

The analysis reveals a clear and significant relationship between the use of the internet by women and the participation of such women in the labor force given  $r=0.68$ ,  $p<0.001$  and ownership of a financial account where  $r=0.73$ ,  $p<0.001$ . Entrepreneurship rates have a moderate positive correlation ( $r = 0.57$ ,  $p < 0.001$ ) whereas there is also a moderate negative correlation with wage gap as captured by  $r= -0.42$ ,  $p < 0.001$ , thus affirming that women with greater access to the digital space have smaller wage inequality.

#### 4.1.3 Regression Analysis: Impact of Digital Skills on Economic Outcomes

In order to examine the link between digital skills and women's economic outcomes, regression analyses were performed. In this case women's income (log transformed) was treated as a dependent variable and a range of independent variables included digital skills score, education level, age and urban/rural residence. The score on the digital skills scale was based on survey responses addressing the respondent's competence on a number of digital tasks which were both basic (for example using email) and complex (for instance doing some coding).

The results of the regression analysis are presented in Table 2:

**Table 2: Regression Results - Impact of Digital Skills on Women's Income**

Variable	Coefficient	Standard Error	t-statistic	p-value
Intercept	7.245	0.182	39.808	<0.001
Digital Skills Score	0.312	0.028	11.143	<0.001
Education Level	0.186	0.015	12.400	<0.001
Age	0.009	0.002	4.500	<0.001
Urban Residence	0.153	0.037	4.135	<0.001

The regression model accounts for about 47% of the variation in women's income ( $R^2 = 0.472$ ). The main results include:

1. Data Skills Score affects income significantly and positively ( $\beta = 0.312$ ,  $p < 0.001$ ). This indicates that if you enhance digital skills by one unit, to the extent the other factors are held constant, income will increase by 31.2%.
2. Education Level also gives a statistically significant positive impact ( $\beta = 0.186$ ,  $p < 0.001$ ), which

reiterates how formal education is relevant together with digital skills.

3. Age and Urban Residence also have a smaller but still positive impact on income in effect.

These findings indicate high economic benefits of digital skills for women, regardless of other essential factors such as education and locality that are taken into consideration.

## 4.2 Qualitative Findings

Our qualitative research, comprising case studies and interviews, revealed several key themes regarding women's experiences with digital technologies and economic empowerment.

### 4.2.1 Opportunities Created by Digital Technologies

**Favorable Work Settings:** Numerous interviewees mentioned how digital platforms allowed them to work from home or follow flexible hours and this promoted a balance between work and family. “E-commerce made it possible for me to start a business without neglecting my little children. I can run my online shop during their nap time or after they go to bed.” - Entrepreneur, India

**Ability to Explore New Customers:** The emergence of digital platforms was often mentioned as a way of growing customer base both in national and global context. “Social media marketing has allowed me to have customers all over the country. My crafts have gone from being locally made to nationally marketed modern crafts.”- Artisan, Brazil

**Economic Participation:** Women were said to gain more independence and have better access to services due to the introduction of mobile banking services and digital payment systems. “M-Pesa has turned everything upside down. I can receive payments directly, keep money in safe places and get small loans. It has made me manage my finances.” - Small business owner, Kenya

### 4.2.2 Persistent Challenges

In spite of these prospects, a number of challenges to full participation in the digital economy came forth:

**1. Digital Skills Gap:** Several of the respondents, particularly women in rural and older age demographic groups, stated that they did not have the necessary capabilities to exploit the technological opportunities available. „I understand that selling products on the internet has its benefits but I find it hard to navigate the system. The whole thing is so complicated and I fear I will mess up,” – A market seller, Rural Brazil

**2. Access to Devices and Internet:** Cost and infrastructure aspects were mentioned as prohibitive especially in the case of the under developed regions. „Smartphones can be so expensive such that even buying internet data is costly. For the women in this region, accessing the internet on a regular basis is quite expensive.” – Community leader, Kenya

**3. Online Harassment and Security Concerns:** Issues concerning online harassment and privacy were fears that some women entrepreneurs expressed which in some ways limited their use of digital spaces. „When I started selling my products online, I got disturbing messages. This makes me wary of growing my business digitally.” – E-commerce seller, UAE

**4. Social and Cultural Norms:** In some settings, the norms governing individuals and the roles assigned to different genders prevented women from participating actively in the use of technology. „Where we live, there is still a stereotype that equates technology with men and their capabilities. Some households prevent their women members from wasting time on the internet.” – Trainer on digital skills, Indian Village

### 4.2.3 Effective Intervention Strategies

Research and insights collected from discussions held with relevant government officials and programme Heads offered a number of suggestions the aim of which was promoting the digital economic empowerment of women:

**1. Dedicating programming for digital skill improvement:** Those programs which incorporate advanced skills training for women, hold sessions only for women at convenient times and provide training relevant to women's entrepreneurial activities have better participation and performance outcomes. – “Our mobile digital skills workshops, which are carefully designed around the daily routines of women have been quite popular and effective.” – Program manager, Brazil.

**2. Mentoring and linking:** Activities that introduce women business owners to mentors and provide access to support networks have instilled a sense of self-belief and continuous encouragement. “Participating in the online platform for allowing members to counsel each other has been very helpful. I have been able to overcome issues thanks to other women who have been in business before. Their appreciation of me has helped me advance my enterprise.” – Tech entrepreneur, UAE.

**3. Gender-sensitive meaning of policies:** Gender specific strategies addressing the inequalities in digital access and usage of digital technologies – have contributed to building more gender balanced digital economies. “The national digital strategy we have now has an area on women's digital inclusion with denoted targets and initiatives. Women's engagement in the digital economy is improving.” – Policy maker, European Union.

**4. Cost Effective Access Programs:** Initiatives that foster the cooperation of the government, non governmental organizations and private sector firms in the distribution of low cost devices and internet access have reduced the hindrances of access. “Praise the Lord! she says, the scheme Digital Access for All, which distributes heavily subsidised smartphones and internet services to poor women has worked wonders in internet connectivity and usage amongst the targeted women population.” – NGO director, India.

These qualitative findings provide context and depth to our quantitative results, highlighting the complex interplay of factors influencing women's economic empowerment in the digital age.

## 5. Discussion

Both qualitative and quantitative research findings individually and together exhibit the complexities that exist between gender and digital technologies and economic empowerment. This chapter combines the results and explores the implications of the results vis-à-vis the literature and other wider trends.

### 5.1 The Digital Divide: A Great Virtue

Our quantitative analysis shows persistent significant gender divides in access to digital technologies, which varies in degree across different regions but is worse in Africa and Arab States. This is consistent with findings from the GSMA (2020) study where it was indicated that women from low and middle economies were 20 % less likely to access the mobile internet than their male counterparts [11]. The fact that such a digital gender divide still exists highlights the fact that there are cultural and economic barriers that prevent women from accessing and using portable data technologies despite the digital expansion of the infrastructure. Additionally, the regional disparities in the digital gender gap demonstrates that there is no ‘one-size-fits-all’ approach to the issue of digital inclusion. As Sey and Hafkin (2019) discuss, there are strategies that may work in one region, which cannot be applied as they are to another region, for instance, because of differences in infrastructure, cultural practices, or economies [12]. The present study also highlights the need for customized responses that take cognizance of the realities of women facing different societal hurdles.

## 5.2 Digital Skills: A Key Driver of Economic Outcomes

Moreover, our regression analysis highlights a sizable earnings esteem for digital skills among women which reflects the worth of digital literacy in today's world of work. Expressive of the finding, there is a study conducted by the International Labour Organization (2019) that explains the reason why women in the digital economy have digital skills as one of the most sought after requirements in such employment [13]. Nonetheless, the interviews provide an answer to this question as they depict the existing gap of digital skills which is more pronounced among the older women and rural women. This gap hampers the chances of women actively engaging in the digital economy and it may worsen the current economic disparities. As Mariscal et al. (2019) contend, the danger of a 'second-level' digital divide is valid where the possession and use of the digital resources do not yield the economic equality among the users due to the differences in the levels of digital skills and the usage practices [14].

## 5.3 The Double-Edged Sword of Digital Platforms

Our focus group discussions conducted with women entrepreneurs identified that the inclusive design of digital structures facilitates a great deal of mobility and access to new markets without any additional costs associated with geographical placement. This is consistent with the 'liberating potential' of digital technologies in commerce as outlined by Nguyen et al. (2020) who observed that e-commerce enabled women to break cultural barriers of engaging in the market [15]. Out of a few interviewees, however, some voiced concerns on their experiences with online abuse and security. These concerns cannot be taken lightly and speak to the matters raised by Gurusurthy and Chami (2017) on the reiteration of offline gender discriminatory practices taking place online [16]. These issues still resonate and bring to fore the need for holistic frameworks of digitalization, which entails not only access and skills but also security and digital rights.

## 5.4 The Role of Policy and Interventions

The analysis of successful intervention strategies provides information on the need for women economic empowerment policies that are gender sensitive and intervention strategies that multi-pronged. The appropriateness of specific training on digital skills, mentoring and access programs is in line with the best practice sited in the world banks women, business and the law 2021 report [17]. The effectiveness of gender responsive policy frameworks witnessed in our cases makes the case for top bottom strategies in that such methodologies can help to create conducive surroundings for women to engage in technology. Therefore, this supports the position of Sorgner et al. (2017) who claimed that some forms of policy are required to achieve gender equity in the processes of digitalisation [18].

## 5.5 Intersectionality and Digital Empowerment

For the most part, our study was singularly focused on gender, but the qualitative data suggest that digital exclusion is intertwined with other variables. Age, rural and urban setting, and socioeconomic status were all found to be significant determinants of women's digital participation. This finds resonance in the idea of 'intersectional digital exclusion' which has been advanced by Robinson et al. (2020) which argues that we need to be alive to the interaction of different types of social disadvantage in the context of the digital [19].

## 5.6 Future Directions and Emerging Trends

As the present trends usher us deeper into the future, a number of projections can be made that will help build the case for or against the case of gender and economic empowerment in the age of technology:

1. The evolutionary use of artificial intelligence and neoteric ways of automation could turn out to be a

double – edged sword for women’s contribution to economies, thus necessitating adjustments in skills and policies on every occasion.

2. There are promising developments in the platform economy and gig work, which have advanced flexible conditions of employment; however, there are also concerns regarding these forms of work leading to precarious conditions of employment, especially among women.

3. Advancements in technology such as blockchain technologies and decentralized finance (DeFi) can help enhance financial inclusion and economic empowerment, however if not approached properly, they may also lead to the emergence of new types of digital exclusion.

4. The transition to a predominantly remote mode of work, which has been spurred on by the COVID 19 crisis, could potentially shift the gender balance within job positions and avail a larger scope of women’s engagement in economic activities.

In light of these developments, it is apparent that the digital economy is quite fluid and hence more research coupled with adaptive policy measures are necessary to achieve the objective of using technology as an enabler of gender equity rather than as a discriminative tool.

## 6. Conclusion

This study has uncovered the multifaceted nature of the interaction of gender, economic empowerment, and digital technologies. In the course of the research, it became evident that the digital instruments have the power to change the status quo when it comes to women’s economic activity, but there are still challenges that need to be solved for this power to become more evident.

The main argument of this study is supported by the following findings

1. Women had lower access to internet and possessed lower digital skills than men in all the regions studied, with the highest women to men disparity found in the African and Arab States.

2. Women out there in economies that are digitalized, digital skills positively contribute to women’s economic results making the case for investment in digital literacy programs, especially targeting those women economic activities sectors.

3. All these digital platforms create an enabling environment for a women’s business or a job to easily be started; however challenges of using such platforms range from insecurity to social vices that were previously experienced off the internet.

4. Examples for successful interventions for women’s digital economic empowerment include adequate and specific skill training, sponsorship, developing appropriate policies and ensuring affordable technology access.

5. In understanding the digital divide, it is important to acknowledge that gender inequalities do not occur in isolation from other social and economic processes and are influenced by them.

These conclusions draw vital attention for the policymakers, development practitioners and the private sector actors who wish to use the digital sphere in advancing gender equality and economic uplift. It is suggested that the following measures be taken:

1. Create gender inclusive digital strategies that take into consideration not only access but skills, content and online safety in addition.

2. Provide digital skills training services that are designed for the women’s peculiar needs, time and interests.

3. Formulate and implement strategies and action programs aimed at achieving digital devices and internet usage for women, especially in rural areas, at lower costs.

4. Assist in women’s online business advancement through supportive coaching, financing options and websites promoting women’s ventures.

5. Foster improvements to the existing legal and policy frameworks that aim at protection of women from cyberbullying and articulating women's rights to engagement in cyberspace.
  6. Mobilizing the private sector towards enhancing women's economic development through building up appropriate gender aware digital platforms.
  7. Consider funding for the collection and analysis of data on access and skills and economic outcomes in a gendered way and for digital incorporation of these in the policy decision making processes.
- As the world progresses in the digital evolution of the economy, it is of great concern that the inclusivity of women in the changes comes along or is part of the equality issue. Economic development and social development is achieved without questions by eliminating the gender disparity. This is because if certain sections of the society which are women in this case are technologically barred, then it narrows down the chances of progression which is unfair.

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