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## Information and Communication Technology and Women Empowerment: An Empirical Analysis

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### Abstract

This study examines the role of information and communication technology (ICT) in women's empowerment. Women's empowerment is considered the dependent variable, while ICT usage, including mobile phone and internet access, gender equality in education, and economic equality serve as independent variables. The study explores how access to ICT tools contributes to women's empowerment and investigates the impact of gender equality in education and economic opportunities. By analyzing these relationships, the study provides insights into the mechanisms through which ICT and other factors influence women's empowerment. These findings can inform policymakers, NGOs, and stakeholders in designing interventions to enhance women's empowerment through ICT and address gender disparities in education and economic participation. The results reveal a positive relationship between mobile phone and internet usage and women's empowerment. As access to ICT tools increases, women experience greater empowerment, benefiting from enhanced communication, information access, education, entrepreneurship, and employment opportunities. Consequently, it is recommended that governments prioritize expanding mobile network coverage and internet facilities to strengthen women's empowerment. Policies should focus on improving ICT accessibility, reducing costs, and providing digital literacy and skills training for women to bridge the digital gender gap. Additionally, socio-cultural barriers restricting women's ICT usage must be addressed to ensure equitable benefits. Enhancing ICT access can foster women's economic independence, social inclusion, and decision-making power, ultimately contributing to broader gender equality. By implementing strategic policies, ICT can serve as a transformative tool for empowering women and promoting sustainable development.

**Keywords:** Women empowerment, Information and Communication Technology, Internet, Gender equality

### 1. INTRODUCTION

The definition of empowerment provided highlights the importance of expanding the assets and power of marginalized individuals, particularly women, to enable them to participate more fully in society. Empowerment involves not only providing individuals with resources and opportunities but also enabling them to exercise greater control over their lives and to influence the decisions and institutions that affect them. For women, empowerment often means gaining greater autonomy and agency in decision-making processes, both within their households and in broader social, economic, and political spheres. This may involve access to education, economic resources, healthcare, legal rights, and opportunities for leadership and participation in public life (Kumar, 2018; Shahzadi & Ahmad, 2018). Empowerment is crucial for addressing gender inequality and promoting women's rights. By empowering women, societies can unlock their full potential and contribute to sustainable development and social progress (Kumar, D., 2018; Riaz & Safdar, 2018). Efforts to promote women's empowerment may include policies and programs aimed at improving education and healthcare access, increasing economic opportunities, combating gender-based violence, and promoting women's political participation and leadership roles (Mahmood & Naz, 2018).

Information and Communication Technology (ICT) serves as a potent catalyst for women's empowerment and gender equality by enabling access to information, communication, economic opportunities, education, and civic engagement. Through ICT tools such as computers, smartphones, the

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# JOURNAL OF POLICY OPTIONS

2(1), 40-51

internet, and digital platforms, women can access a wealth of resources, connect with peers and mentors, participate in the digital economy, acquire skills and education, and engage in civic and political processes (Azhar & Saboor, 2018; Ho & Ran, 2018). ICT bridges the gender gap by providing women with the means to overcome traditional barriers and navigate the challenges of the digital age, empowering them to make informed decisions, pursue economic independence, and advocate for their rights (Afzal, 2018; Shahzadi & Ahmad, 2018). Therefore, investing in ICT infrastructure, digital literacy programs, and gender-responsive policies is crucial for harnessing the full potential of ICT in advancing women's empowerment and fostering gender equality worldwide.

In many developing countries, Information and Communication Technologies (ICTs) have emerged as powerful tools for women's empowerment. The ICT sector has experienced rapid growth since the late 1980s, with the widespread adoption of ICTs escalating significantly since the 1990s. This expansion of ICT usage has opened up new opportunities for women, allowing them to access information, education, economic resources, and social networks like never before (Yen, 2018). As ICT infrastructure and connectivity continue to improve globally, women are increasingly leveraging these technologies to enhance their skills, expand their networks, and participate more actively in economic, social, and political spheres. Thus, ICTs play a pivotal role in narrowing gender gaps and advancing women's empowerment in diverse contexts around the world.

In developing countries, women are integral contributors to various aspects of life, including family, community, and national development. However, despite their significant roles, women often face barriers to accessing education and opportunities for personal and professional growth (Riaz & Safdar, 2018; Khan, M. W., 2018). In many developing nations, there is a disparity in attention given to women's education compared to that of men. This disparity perpetuates cycles of inequality and limits the potential for progress and prosperity within these societies (Mahmood & Aslam, 2018). Recognizing the importance of education in driving social and economic development, efforts must be made to prioritize and invest in the education of females. By empowering women through education, societies can unlock their full potential and pave the way for sustainable development and gender equality (Shahzadi & Ahmad, 2018).

## 2. LITERATURE REVIEW

The study conducted by Lechman and Okonowicz (2013) examined the significance of women for economic development across 83 countries worldwide. Their findings suggest that providing women with free access to educational infrastructure plays a crucial role in enhancing their education levels, skills, and capabilities. This improved educational attainment empowers women to enter the labor market and utilize financial resources to initiate their own entrepreneurial ventures. By investing in women's education and economic opportunities, countries can stimulate economic growth and development while promoting gender equality and social inclusion.

Duflo's study (2011) focuses on randomized control trials (RCTs) to evaluate the impact of various interventions on poverty and development outcomes in different countries, particularly in low- and middle-income settings. While her work has contributed significantly to understanding the link between gender equality and economic development in the context of USA by using the data from 1992 to 2012. The study conducted by Beena and Mathur (2012) focused on examining the role of ICT education in empowering women in the context of India. The researchers utilized ICT education as the independent variable and women's empowerment as the dependent variable. The sample size for the research consisted of 200 trainees and 30 instructors from various governmental and nongovernmental organizations in Jaipur district. To select the sample for the study, the researchers employed a random sampling technique. This approach helps ensure that each member of the population has an equal chance of being selected for the sample, thereby enhancing the representativeness of the findings.

# JOURNAL OF POLICY OPTIONS

2(1), 40-51

The study conducted by Khan (2013) focused on investigating women's empowerment through poverty alleviation in the context of the United Kingdom. The researcher employed the Ordinary Least Squares (OLS) technique, with poverty alleviation as the independent variable and women's empowerment as the dependent variable.

The study conducted by Tariq and Bussry (2012) focused on investigating the educational empowerment of women in the context of Pakistan, specifically in the Khyber Pakhtunkhwa (KPK) province. The researchers examined the relationship between education, treated as the independent variable, and women's empowerment, treated as the dependent variable. To collect data for their study, Tariq and Bussry utilized a closed-ended questionnaire, which was administered to experts in the field. The questionnaire utilized a 5-point scale to gauge the experts' perceptions regarding the implementation of policies related to the educational empowerment of women in KPK. The responses obtained from the experts were then analyzed using statistical methods, including chi-square analysis and two-way analysis of variance (ANOVA). The major conclusion drawn from the study was that the implementation of policies aimed at promoting the educational empowerment of women in KPK was perceived to be highly unacceptable. This suggests that despite efforts to improve access to education for women in the region, there are significant challenges or barriers hindering the effective implementation of these policies.

The study conducted by Chaudhary, Chani, and Pervaiz (2012) delved into an analysis of various approaches to women empowerment within the context of Pakistan. They considered economic empowerment of women and women's overall development as independent variables, while women's empowerment was treated as the dependent variable. The researchers utilized data spanning from 1996 to 2009 for Pakistan. Their empirical analysis yielded significant findings. It was revealed that the awareness of women regarding their rights, along with economic empowerment of women and women's overall development, exerted a positive and noteworthy impact on women's empowerment.

The study conducted by Nwosu (2014) examined the role of hospitality education in the context of Nigeria, with a focus on its impact on women empowerment. In this research, hospitality education was treated as the independent variable, while women empowerment served as the dependent variable. This suggests that participation in hospitality education programs can positively contribute to women's empowerment by providing them with enhanced educational opportunities, access to diverse employment options, and increased income potential.

The study conducted by Assaad, Nazier, and Ramadan (2014) investigated the individual and household determinants of women empowerment in the context of Egypt. They utilized various individual and socio-demographic determinants as independent variables, while women empowerment served as the dependent variable. The researchers employed data from the Egypt Labor Market Panel Survey (ELMS) 2012 and estimated nine decision-making indices along with a mobility index.

Their findings revealed that context played a crucial role in determining women's empowerment, as measured by the two indices developed in the study. Moreover, the context was found to influence the impact of other individual and socio-demographic determinants on women's empowerment.

The study conducted by Azra Batool, Ahmed, and Qureshi (2014) aimed to investigate the impact of demographic variables on women's economic empowerment in the context of Pakistan. They used demographic variables as independent variables and women's economic empowerment as the dependent variable. The researchers conveniently selected a sample of 500 married women aged between 21 and 49 years from district Multan, Pakistan. Ordered probit regression was employed to assess the demographic determinants of women's economic empowerment. The findings of the study led to the conclusion that enhancing the economic empowerment of women requires a thorough exploration of the factors that determine economic empowerment in women.

The study conducted by Imai, Annim, Kulkarni, and Gaiha (2014) aimed to investigate the relationship between women's empowerment and the prevalence of stunted and underweight children in rural India.

# JOURNAL OF POLICY OPTIONS

2(1), 40-51

Specifically, the study focused on examining whether mothers' empowerment, measured by their education attainment relative to the father's, experience of domestic violence, and level of autonomy, is associated with children's nutritional status. To conduct their analysis, the researchers utilized data from three rounds of the National Family Health Survey (NFHS) conducted in India: NFHS-1 (1992-93), NFHS-2 (1998-99), and NFHS-3 (2005-06). The study employed multiple econometric techniques, including Ordinary Least Squares (OLS) regression and instrumental variable (IV) methods, to examine the relationship between women's empowerment and children's nutritional outcomes. By drawing upon rich longitudinal data from multiple rounds of the NFHS, this study provides valuable insights into the dynamics of women's empowerment and its impact on child health outcomes in rural India. The findings of the study contribute to the existing literature on women's empowerment and child nutrition, informing policymakers and stakeholders about the importance of empowering women to improve children's nutritional status and overall well-being in rural areas of India.

In Bozzano's (2014) study, the focus was on exploring the historical roots of women's empowerment across Italian provinces, specifically investigating whether religion or family culture played a more significant role. The study utilized religion and culture as independent variables and women's empowerment as the dependent variable. To analyze the relationship, Bozzano employed both Ordinary Least Squares (OLS) and instrumental variable (IV) techniques. Data spanning from 2010 to 2014 were collected for the analysis. The study found strong associations between measures of women's empowerment and religion, culture, proxied by religious marriages. These results were consistent and robust across various model specifications.

By examining the historical factors contributing to women's empowerment in Italian provinces, this study sheds light on the complex interplay between religion, culture, and women's status. The findings contribute to our understanding of the societal dynamics influencing gender equality and women's empowerment in different contexts.

Cornwall and Sardenberg (2014) conducted research on participatory pathways to investigate women's empowerment in Salvador, Brazil, within the broader context of Brazil. The study was part of an international research program involving scholars from various regions, including Latin America, the Middle East, South Africa, West Africa, UK, and the USA.

The research initiatives aimed to integrate transformative feminism into the study of women's empowerment, emphasizing collaboration and participation. The integration technique was employed to understand the multifaceted dimensions of empowerment experienced by participants. Through collaborative research projects, participants reported experiencing enhanced self-efficacy and self-esteem, aligning with psychological accounts of empowerment.

Subramaniam, Tan, Maniam, and Ali (2013) conducted a study on workplace flexibility, empowerment, and quality of life within the context of London. The research aimed to explore how empowering women to participate more actively in the economic sphere could enhance the quality of life for women, families, and communities. One key finding highlighted in the study was the issue of women exiting the formal labor market, which has led to stagnation in women's participation rates, hovering around 40 percent since the 1990s. This phenomenon suggests that despite efforts to empower women and promote workplace flexibility, significant challenges persist that hinder women's full engagement in the workforce.

The study conducted by Subramaniam, Tan, Maniam, and Ali (2013) utilized a mixed-method approach to investigate the potential impact of workplace flexibility on women's empowerment and quality of life. Their research involved a sample of 400 female employees from the services sector who completed a self-administered questionnaire, which was supplemented by 30 structured interviews. Through multivariate analysis and structured interviews, the study aimed to explore whether workplaces designed with flexibility have a positive influence on women's empowerment and quality of life. The findings

# JOURNAL OF POLICY OPTIONS

2(1), 40-51

likely revealed correlations between workplace flexibility initiatives, such as flexible work hours, remote work options, and job sharing, and indicators of women's empowerment and well-being.

The study conducted by Bushra and Wajiha (2014) aimed to assess the socio-economic determinants of women's empowerment in Pakistan within the context of the USA. The research explored various factors that influence women's empowerment in the Pakistani context, using a sample of 200 female respondents from two well-known universities in Lahore.

The empirical findings of the study revealed several significant determinants of women's empowerment. Firstly, the level and quality of education, particularly the content of education, were identified as influential factors. Education plays a crucial role in providing women with knowledge, skills, and confidence, which are essential for their empowerment.

The research conducted by Nikkhah, Redzuan, and Abu-Samah (2010) delved into the impact of women's socio-demographic variables on their empowerment within the context of Malaysia. The study aimed to elucidate the relationship between various socio-demographic factors such as education, occupation, family income, and marital status, and their influence on women's empowerment. Data for the study was collected from 195 women who participated in empowerment processes organized by non-governmental organizations (NGOs) across the city of Shiraz.

The study conducted by Weiss, Hussain, and Sathar (2001) explored the intricate interplay between social development, the empowerment of women, and the expansion of civil society within the context of Pakistan. Using the debt and poverty trap as an independent variable and women's empowerment as the dependent variable, the researchers employed the Ordinary Least Squares (OLS) technique to analyze the data spanning from 1990 to 2000. The research aimed to investigate how the burden of debt and poverty impacts women's empowerment and the broader development of civil society in Pakistan. By examining the socio-economic conditions prevalent during the specified period, the study sought to uncover the underlying dynamics shaping women's empowerment within the context of economic challenges and structural inequalities. Through the OLS regression analysis, the researchers aimed to ascertain the extent to which factors such as debt accumulation and poverty levels influenced women's empowerment outcomes.

The study conducted by Hashemi, Schuler, and Riley (1996) delved into the impact of rural credit programs on women's empowerment in Bangladesh, within the context of the USA. Employing rural credit as an independent variable and women's empowerment as the dependent variable, the authors utilized a combination of sample survey and case study data to examine the efficacy of these programs. The research focused on analyzing the success of the Grameen Bank in empowering women, attributing its effectiveness to both its central focus on credit provision and its adept utilization of rules and rituals to facilitate the functioning of the loan program. By investigating the mechanisms through which rural credit programs operate and their implications for women's empowerment, the study aimed to provide insights into effective strategies for promoting gender equality and socio-economic development.

Namadi and Aliyu (2014) conducted a study to assess the impact of the Subsidy Reinvestment Program (SURE-P) on women's empowerment in Kaduna state, within the context of Nigeria. They used SURE-P as the independent variable and women's empowerment as the dependent variable. The sample for the study consisted of 120 beneficiaries of the SURE-P program and 40 community leaders, selected using stratified random sampling, purposive sampling, and snowball sampling techniques. The findings of the study revealed that the SURE-P program had succeeded in providing vocational skills training, materials, and assistance to women in Kaduna state. Through these interventions, the program aimed to empower women by enhancing their skills, economic opportunities, and socio-economic status.

Kabeer (2001) conducted a study titled "Conflicts over Credit: Re-evaluating the Empowerment Potential of Loans to Women in Rural Bangladesh," within the context of the UK. The study focused on positional access to credit as the independent variable and women's empowerment as the dependent variable. The

# JOURNAL OF POLICY OPTIONS

2(1), 40-51

method employed in this study was ordinary least squares (OLS) regression analysis. The research aimed to assess the empowerment potential of providing loans to women in rural Bangladesh and to understand the dynamics of credit access in shaping women's empowerment outcomes.

Nazier and Ramadan (2014) conducted a study on the determinants of women's empowerment within the context of Egypt. Their research aimed to explore the factors influencing women's empowerment, using women's empowerment as the outcome of interest. They defined various socio-demographic determinants within households and estimated an ordered logistic model using micro-level data from the Egypt Labor Market Panel Survey (ELMPS) 2006. The study focused on understanding how factors such as education, employment status, marital status, age, household size, and social norms affect women's empowerment in Egypt.

Bera (2014) conducted a study on women's empowerment through education within the context of India. The research aimed to explore the relationship between education and women's empowerment, with education being the independent variable and women's empowerment as the dependent variable. The study utilized data spanning from 2011 to 2013. The findings of the study revealed that education plays a crucial role in empowering women in various aspects of their lives.

Mason and Smith (2003) conducted a study on women's empowerment within the social context of five Asian countries, namely India, Malaysia, Pakistan, the Philippines, and Thailand. The research aimed to analyze various measures of married women's empowerment in the domestic sphere across 56 communities in these countries. The study utilized multiple indicators to assess women's empowerment, focusing on factors such as age at marriage, education level, and employment opportunities.

Schuler, Hashemi, Riley, and Akhter (1996) conducted a study on the relationship between credit programs, patriarchy, and men's violence against women in rural Bangladesh, with a focus on women's empowerment as the dependent variable. The study utilized various independent variables such as respondents' age, education, religion, and wealth to analyze their impact on women's empowerment. The findings presented in the paper were derived from ethnographic research conducted by resident researchers in six villages across two regions of Bangladesh between 1990 and 1994. Additionally, a random sample survey of approximately 1300 women was conducted in 1992 as part of a larger study investigating microenterprise credit programs and their effects on women's status and productive norms in Bangladesh.

Shahbaz, Luqman, and Cho (2014) conducted a comparative analysis of rural development timelines in Korea and Pakistan, with a focus on identifying lessons that Pakistan could learn from Korea's experiences. The study aimed to sequentially analyze the major themes in rural development within the contexts of both countries, utilizing the framework proposed by Ellis and Biggs. By examining the rural development trajectories of Korea and Pakistan, the researchers sought to uncover key factors and strategies that contributed to the success of rural development initiatives in Korea, while also identifying challenges and shortcomings in Pakistan's rural development efforts.

### 3. METHODOLOGY

Women's empowerment is a complex, multi-dimensional, fluid and emerging concept with in feminism and development literature. It has economic, political, educational, social, cultural, religious, personal, psychological, and emotional elements. Empowerment appears to be context-specific and has multiple determinants. Women are capable of empowering themselves while external actors and agencies can create supportive environment.

Women's empowerment is defined in a wide variety of ways some of which include access to material resources such as land, money, credit and income, availability of decent employment opportunities that involve good working conditions, access to power through representation in political and decision-making bodies, the freedom to make choices in life, enjoyment of basic rights granted in the constitution

# JOURNAL OF POLICY OPTIONS

2(1), 40-51

and international agreements, equal success to quality education and health facilities, mobility to be able to access various facilities, and control over one's body, sexuality and productive choices. Empowerment is believed to be the road to women's own equality, rights and fulfillment, while the instrumental view regards women's empowerment as the means to a better family, economy, society and nation.

To understand the extent of the influence of ICTs education on women's empowerment, an exploratory research was conducted. Primary data was collected using survey questionnaires for women of the Jaipur region. The method use in this study was aimed at eliciting response from women who are participants in the use of burgeoning ICT technologies. These ICTs factors include computer, mobile telephony technology, the internet and other facets of the changing methods and means of communication to man today. In the recent past, ICTs have been added to the women and gender equality debate. ICTs are being presented as a tool having potential to benefit women's empowerment and a number of ICT projects that specifically target women have been established in several developed and underdeveloped countries.

Role of education in achieving women empowerment: In spite of constitutional guarantees, legislative provisions, judiciary mandate and administrative efforts, the women empowerment India is still lacking in some areas. Mere enactment of laws and chalking out of schemes are not much effective for women empowerment. Hence education is need for this. The national curriculum framework of women pointed out, education of women is an important key to improving health, nutrition and education in the family and also empowering them participate in decision making".

Moreover education enables women not only to acquire knowledge but also help them to achieve economic security, self-confidence, vocational and technical skills and guidance, good health and safety, courage and inner-strength to face challenges in every spheres of life and enable them to play equal role as men in nation-building. Education can be used as a tool for reduction of inequalities and gender bias so that women can move from weak position to execute their power or capabilities in society. The

The national policy for the empowerment of women, 2001 stated, equal access to education for women and girls will be ensured, special measures will be taken to eliminate discrimination, universalize education, eradicate illiteracy and create gender sensitive educational system, increase enrolment and retention rates of girls and improve the quality of education to facilitate life-long learning as well as development of vocational or technical skills of women.

Economic empowerment has been defined in several ways by various researchers and or Health is a state of complete physical, mental and social well being and not merely the absence of disease or infirmity. (WHO, 1948) This definition adopted by the world health organization in 1948 has continued to inform policy development, including the recent SDGs, which emphasize this broader understanding of health as well-being not limited to policy in the health sector. The theory of social determinants of health (SDOH) underline that our health is affected by divers influences including work, ethnicity, food security, gender, the environment, social relationships and of course, education. The WHO engages directly with this recognition of how social and economic inequalities affect health through its constitution, which emphasize a rights approach (WHO,2006).

Underpinned by a human rights approach to literacy and health, most programmers reviewed here adopted a participatory pedagogy, drawing particularly on a freirean critical literacy approach, involving awareness-raising and action. Though functional literacy certainly played a part in women's empowerment (such as enhancing economic roles through learning to keep records and budgets), there was also evidence of the symbolic value of literacy in enhancing women's identities and roles in public space. This kind of empowerment had indirect impact on health and well- being-whether giving women the skills and confidence to advocate for or set up new health facilities or become more assertive within sexual relationship within the household. The emphasis on critical approaches to health and literacy as connected to relationships of power challenged the common practice within many women's literacy programmers of incorporating didactic health messages into literacy primer. Although current literature

# JOURNAL OF POLICY OPTIONS

2(1), 40-51

(UNESCO, 2014c) suggests that mobile phones and another technologies can be used to critically engage learners with digital ways of communicating, there is surprisingly little evidence of digital practices within adult literacy and health programmers.

NO nation can rise to the height of glory unless your women are side by side with you; we are victims of evil customs. It is crime against humanity that our women are shut up within the four walls of the houses as prisoners. There is no sanction anywhere for the deplorable condition in which our women have to live. You should take your women along with you as comrades in every sphere of life. (Muhammad Ali Jinnah, 1944) With the advent of the Pakistan Movement, women's participation in the freedom struggle became a dire necessity, both for increasing the Muslim vote bank and for displaying numerical strength at the Muslim League's political rallies. In 1940 Mr. Jinnah announced, "Women are supposed to create a sense of general political consciousness. They should stand shoulder to shoulder with men in practical politics." This saw the removal of cultural and social restrictions on their traveling for purposes of attending political gatherings. Unfortunately, in spite of the Quaid's personal views, 1948 saw an abrupt end to this temporary political freedom. However, a few determined women continued to play very important roles in the political empowerment of the women of Pakistan. This article seeks to record and eulogies their successes, while simultaneously analyzing the effects of their failures on the body politic of Pakistan. The first such lady was Miss Fatima Jinnah who was an inspiration to the women of Pakistan and continues to be held in high esteem even today. She formed the Women's Relief Committee, which played a vital role in the settlement of refugees in the new state of Pakistan.

## 4. THE MODEL

The equation which researchers estimate is the follows:

$$WEP_i = \beta_1 + \beta_2 ICT_i + \beta_3 EEQ_i + \beta_4 POL_i + \beta_5 ECOEQ_i + \beta_6 HEA_i + \mu_i, \quad i = 1, 2, \dots, 127.$$

In this equation the WEP represents women's empowerment which is dependent variable and ICT represents information and communication technology, EEQ represents education equality, POL represents political empowerment ECOEQ represents economic equality and HEA represents health which are independent variables.  $i$  represents the number of countries which are 127. The study use the women's empowerment as dependent variable and use of mobile and internet education and ICT as independent variable. The data of women's empowerment is taken from Global Gender Gap Report (2014) by World Economic Forum. The data for mobile, internet, education and ICT is taken from global competitiveness report 2013-2014 by world economic forum and world development indicators by world bank.

## 5. RESULTS

The regression results in Table 1 provide insight into the determinants of women's empowerment (WPE) using the least squares method. The key explanatory variables include proxies for information and communication technology (ICT), educational equality (EEQ), and economic equality (ECOEQ and its squared term,  $ECOEQ^2$ ), with the constant term capturing the baseline level of WPE.

The coefficient for MOBILE usage, representing mobile phone penetration, is positive (0.000604) with a marginal p-value of 0.0654. This suggests that increased mobile usage is positively associated with women's empowerment, though only weakly significant at the 10% level. Access to mobile technology can enhance communication, access to information, and participation in digital services, which collectively contribute to economic and social empowerment for women.

Internet usage (INTNET) shows a significant and positive coefficient of 0.0035 ( $p = 0.0079$ ), indicating that greater internet access strongly contributes to women's empowerment. This aligns with existing research highlighting how internet access can improve women's access to education, health information,



# JOURNAL OF POLICY OPTIONS

2(1), 40-51

financial tools, and political engagement platforms (Hilbert, 2011). The digital environment creates opportunities for skill-building and autonomy, particularly in developing countries.

Educational equality (EEQ) has a positive coefficient (0.1948) but is statistically insignificant ( $p = 0.2268$ ), suggesting that while education equality likely supports empowerment, its effect may be indirect or already captured through other variables in the model. In other words, the variation in WPE attributed to education equality may not be strong in the presence of ICT or economic equality variables. However, prior studies still stress the long-term role of equitable education in improving women's status across social and economic spheres (Kabeer, 2005).

Economic equality (ECOEQ) has a negative coefficient (-1.3126) and is statistically significant ( $p = 0.0065$ ), while its squared term (ECOEQ<sup>2</sup>) is positive and also significant (1.2894,  $p = 0.0023$ ). This reveals a nonlinear, U-shaped relationship between economic equality and women's empowerment. Initially, increases in economic equality may be associated with reduced empowerment—possibly due to structural adjustment effects or transitional labor market dynamics—but beyond a certain threshold, further economic equality leads to improvements in empowerment. This kind of nonlinearity is often discussed in development economics, where early reforms may disrupt traditional roles before long-term gains materialize (Seguino, 2000).

The constant term (C) is not statistically significant ( $p = 0.2395$ ), indicating that in the absence of the explanatory variables, the model does not explain variation in women's empowerment well, reinforcing the relevance of the included independent variables.

In summary, Table 1 highlights the significant positive impact of internet usage on women's empowerment, a marginal contribution from mobile technology, and a nuanced, nonlinear effect of economic equality. Education equality, while conceptually important, does not show a direct effect in this model. These findings underscore the importance of expanding digital infrastructure and promoting inclusive economic policies to advance women's empowerment.

**Table 1: Method: Least Squares**  
Dependent Variable: WPE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MOBILE	0.000604	0.000321	1.881593	0.0654
INTNET	0.003525	0.001298	2.715716	0.0079
EEQ	0.194831	0.159722	1.219968	0.2268
ECOEQ	-1.312586	0.473807	-2.769353	0.0065
ECOEQ <sup>2</sup>	1.289412	0.417269	3.089381	0.0023
C	0.241805	0.203811	1.186587	0.2395

## 6. CONCLUSIONS

The purpose of this study is to investigate the role of Information and Communication Technology (ICT) in women's empowerment. The study aims to assess the relationship between women's empowerment and various factors related to ICT usage, as well as other indicators such as gender equality in education and economic equality. For this study, women's empowerment is considered as the dependent variable, while ICT usage (including the use of mobile phones and the internet), gender equality in education, and economic equality are considered as independent variables. The study will employ quantitative research methods to analyze data collected from a sample of women across different demographics. Surveys or questionnaires may be utilized to gather information on ICT usage, education, economic status, and perceptions of empowerment among women. Statistical analysis techniques such as regression analysis

# JOURNAL OF POLICY OPTIONS

2(1), 40-51

may then be employed to examine the relationships between the independent and dependent variables. By investigating these relationships, the study seeks to provide insights into the extent to which ICT usage, along with other factors such as education and economic opportunities, contribute to women's empowerment. The findings suggest a positive relationship between the use of mobile phones and the internet and women's empowerment. As women's use of mobile phones and the internet increases, their level of empowerment also tends to increase. Furthermore, statistical analysis indicates that this relationship is significant at the 10% level of significance, implying that it is unlikely to have occurred by random chance alone. These results underscore the potential role of Information and Communication Technology (ICT), specifically mobile phones and the internet, in enhancing women's empowerment. Access to these technologies may provide women with opportunities for education, communication, economic participation, and access to information, all of which are essential components of empowerment. Policymakers, organizations, and stakeholders interested in promoting women's empowerment may consider investing in initiatives that improve women's access to and usage of ICTs. This could involve measures such as providing affordable mobile phone and internet services, offering digital literacy training programs targeted at women, and creating supportive policies and environments that encourage women's participation in the digital economy. The findings suggest that there is a positive relationship between gender equality in education and women's empowerment. When gender equality in education increases, women's empowerment also tends to increase. However, it's noteworthy that the statistical analysis indicates that this relationship is not significant at the 10% level of significance. While the positive relationship between gender equality in education and women's empowerment aligns with expectations and existing literature, the lack of statistical significance suggests that other factors may also play a role in determining women's empowerment. It's possible that additional variables, such as access to economic opportunities, social support networks, or cultural norms, may interact with gender equality in education to influence women's empowerment outcomes. These results highlight the complexity of the relationship between gender equality in education and women's empowerment and underscore the importance of considering multiple factors in efforts to promote women's empowerment. Policymakers and stakeholders interested in advancing gender equality and women's empowerment may need to adopt a multifaceted approach that addresses various dimensions of women's lives and opportunities.

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