

Measuring the Impact of ICTs on Women Empowerment: A Case of South Asian Countries

Saima Iqbal¹ and Masood Javed² and Hafiz Rizwan Ahmed³

Abstract

The study empirically analyses the impact of ICT on socio-economic empowerment of women in South Asian Countries, here women empowerment is measured by secondary school enrollments and economic participation. Independent variable ICT is an index made of four variables mobile phones, landline phones, internet users and fixed broadband subscribers respectively. For this purpose panel data set is taken from WDI for the period over 2000-2013. By applying least square dummy variable model, fixed and random effects models, incorporating efficiency test, Hausman and Breuch Pagan tests, results reveal that ICT has positive and strong significant effect on the female economic participation with the coefficient value of 0.69 in first model. For the second model to measure social aspect, secondary school enrollment is taken as dependent variable and ICT as independent variable, results of this model also shows that education is highly dependent on ICT with the coefficient value of 1.138. Therefore, in both aspects ICT has positive coefficients values. As a result we can conclude that overall ICT has positive and significant role for social and economic betterment of females in South Asian region.

Key Words: Women Empowerment, ICT, South Asia, REM, FEM

Introduction

Women's empowerment refers to competence of; having decision-making power of their own, access to information and resources for taking proper decision, capability to learn skills for improving one's personal or group authority, ability to change others' perceptions by democratic means. In simple words, it indicates that increase in the political, social or economic strength of females which is necessarily needed for development of any economy. Secondly ICT,s are building new channels for resource mobilization, social awareness and networking for men as well as women who are supportive of human rights goals, and use of Information and communication technology is a strong determinant of women empowerment (Oyelude, 2012).

At first, 21st century is the era of technology revolution which plays a critical role in today's world and now it has become the backbone of almost all industries and a main key to development. Hawkrige (1983) described information technology as a revolution which has penetrated almost all fields of human activity, thus transforming economic and social life. ICTs are crucially important for sustainable development in developing countries (Crede & Mansell, 1998). There are two main branches of technology: (1) computing and (2) telecommunication, these technologies include; having computer systems, access to internet, mobile phones, fixed landline phones, and many others. Thioune (2003) investigated that for the past two decades most developed countries have witnessed significant changes that can be traced back to ICTs. These multi-dimensional changes have been observed in almost all aspects of life: economic, education, communication, health and travel. Use of information and communication technologies (ICTs) is largely concentrated in the developed world earlier, but now it's showing rapid growth in developing countries.

¹ Lecturer in Economics, University of Gujrat

² Assistant Professor in Economics, Government College Sheikhpura.

³ Lecturer in Economics, Government College Hafizabad.

At second; South Asia is the region with high gender inequality (HDR, 2014) and for development of any economy or region women's empowerment is necessarily desired. Therefore, to promote gender equality and to empower women is the third goal in list of Millennium development goals. Which include further three categories:

- 1) Ratios of girls and boys in primary, secondary and tertiary education
- 2) Share of women in wage employment in the non-agricultural sector
- 3) Proportion of seats held by women in national parliament respectively.

Investment in female education and training not only needed for economic participation but it also has some social benefits as well (Olufunke and Adeola). e.g. educated women can teach and feed their children and actively participate in social, economic, national and international affairs as well while sitting in their homes through access to ICT (Ashraf et al. 2011). Female education is a determinant of women empowerment (Barden, 2010) and if education/ skills increase it can also increase the human development index of a country because education contributes about one third part in measuring human development.

Literature Review

Some recent empirical studies have captured the status of Women empowerment through ICT usage like Ashraf et al. (2011) used interpretive approach with the traditional qualitative research. Two projects named as Grameen Phone Community Information Center (GPCIC) and Village Phone (VP) are discussed in the context of rural culture. As a result, these businesses create a source of income for women through non-agriculture sector, hence net income increased annually. Jain, S. (2006) explained two main women empowerment techniques through ICT as "employment and entrepreneurship".

Some other empirical studies like Jorgensen (2010) also argued that ICT has played important role for improving living and participation of women. Beena & Mathur, M. D. (2012) empirical elaborated that Information and Communication technology in Jaipur (India) empower women in social (85%), technological (94%), Psychological (86%), Political (78%), Educational (96%) and economical (92%) respectively. Barden (2010) investigated that sponsoring ICT related trainings, increasing ICT access and usage and encouraging ICT related employment all of these policies are helpful to empower women and to reduce the gender gap which exists in Egypt.

Ahmed et al. (2006) determined that in Bangladesh women involvement in ICT based organizations had increased and had improved their access to job market, household income, women empowerment, improved governance, social awareness, indigenous knowledge and easy-family communication. Oyelude and Bamigbola (2013) examined found that among most used means of accessing information are Radio and Television and Telephone and NGO,s were discovered as slow steady gaining ground in creating awareness and educating women. Jangra (2014) analyzed that women's access to ICT and knowledge of ICT leads to improve the quality of life by promoting their political participation, economic empowerment, education level and health care etc. Laizu et al. (2010) analyzed indicates that ICT has moved women's perception and lives in positive directions in one village but not in second, so if ICT engagement is active and learning oriented then women can be more empowered. Desai and Seshu (2009) observed that positive impact of ICT on women empowerment and their positions in society and it's a tool to eradicate poverty.

The above discussed literature review showed generally the positive impact of ICT,s on women empowerment except few e.g. in Bangladesh a village survey showed negative results because women were not learning oriented (Laizu et al. 2010). After the results of ICT's we come to know how women are more able to get opportunities and to perform well in different aspects of life. But in some countries like in case of India, women are facing some hurdles in

this regard that are Computer literacy, Social and cultural aspects, Mobility, early marriage, Poverty, Literacy etc.(Jangra, (2014))

The Model

In underlying models secondary school enrollment and labor force participation are taken as dependent variables and ICT as independent variable. ICT index is made of further four categories including access to internet, mobile phones, fixed landline phones and fixed broadband subscribers and some control variables by following existing studies (Barden, 2010).

Model 1:

$$SSE_{it} = \beta_{1i} + \beta_2 ICT_{it} + \beta_3 REM_{it} + \beta_4 GDP_{it} + \beta_5 LFP_{it} + \beta_6 PSE_{it} + \epsilon_{it} \dots \dots \dots (4.1)$$

Model 2:

$$LFP_{it} = \beta_{1i} + \beta_2 ICT_{it} + \beta_3 PSE_{it} + \beta_4 UP_{it} + \beta_5 REM_{it} + \epsilon_{it} \dots \dots \dots (4.2)$$

The overall measurability of women empowerment is divided into two categories social and economic, for social sector secondary education and to measure economic factor labor force participation variable is used which is the ratio of female labor force participation to male participation and female secondary school enrolment to male secondary school enrollment in all 8 countries.

Table 2: Variables Description

Dependent variable	Measurability	Independent variables	Measurability	Data Source
Labor force participation	Females as percentage of male in labor force participation	ICT	Broadband subscribers (0.25 weightage), internet users (0.25 weightage), Mobile usage (0.25), fixed landline phones (0.25)	WDI (World Development Indicators)
Secondary school enrollments	Females as percentage of male in secondary school enrollment	Urban population	Urban population (% of total)	
		Remittances	Remittances (% of GDP)	
		Primary school enrollment	Females as percentage of male in primary school enrollments	
		GDP	GDP per capita	

Four above given categories includes 1) Broadband subscribers 2) high-speed internet, because of its changing way the companies do business, transforming public service delivery and democratizing innovation, 3) mobile phones and 4) landline phones because of emerging as single and most powerful way to extend economic opportunities and key services to millions of people in very short period of time. A business person can make use of cellphone to maintain its contact with clients, business partners and employees.

Fixed landline telecommunication is almost 125 years old and defined as “the traditional telephone lines in which a telephone is connected to the public network by cables and is a way of voice communication throughout the country or either along the world”.

Internet is simply defined as “The world-wide network of interconnected computer networks” (e.g., commercial, academic and government) used to connect the world for performing

business & personal activities, can be used for skills enhancement and learning activities etc. Fixed broadband subscribers are defined as “the number of subscribers with a digital subscriber line, cable modem or any other high speed technology to access the internet” (World Bank, 2014).

In this study panel data of ICT, Labor force participation, and secondary school enrollment variable is used as core variables while control variables include urban population percentage of total, remittances, primary school enrollment etc. Panel data, time series and cross section are three types of data which are mostly used for empirical analysis. Panel data set have the components of both, as its measures the cross sections over time so the panel data sets have time as well as space dimensions.

Data is taken from World Development Indicators 2014 because its provides a long time comparable data for all economic variables which are used in analysis, based on benchmark data, consists of Broadband subscribers, internet users, Mobile usage, fixed landline phones, labor force participation and Control variables GDP per capita, Urban population, Remittances as percentage of GDP, Primary and Secondary school enrollment including eight South Asian countries, i.e. Pakistan, Bangladesh, India, Sri-Lanka, Bhutan, Afghanistan, Nepal, Maldives. Secondary data for each country on the above mentioned variables is taken for the period 2000-2013.

Panel data estimation approach

A panel data, also known as longitudinal data, it is a data set following an arranged sample of individuals over time, and hence offer multiple explanations on each individual in the sample (Hsiao 2003). Consequently, explanations in panel data involve at least two dimensions; a cross sectional dimension, designated by the subscript i , and a time series dimension, designated by the subscript t .

A general panel data regression model is written as:

$$Y_{it} = \alpha + \beta x_{it} + u_{it} \dots \dots (4.4)$$

The use of panel data is valued due to the multiple advantages it offers and these are listed as follows:

1. It controls individual heterogeneity.
2. It contains more degrees of freedom and sample variability compared time series data or cross sectional data.
3. It has greater ability for seizing the complexity of human behavioral than a single cross section or time series data.
4. Unobserved or mis-measured variables are controlled in panel data.
5. Panel data has the ability to observe effects that cannot be recognized through the use of cross sectional or time series data.
6. Complex behavioral models are easier to construct and test on panel data than on purely cross sectional or time series data. (Basic Econometrics 5th Edition, Gujarati).

Results and Discussions

On basis of our econometric models which have been used in analysis, this chapter focuses on impact of the independent variable (ICT) on labor force participation with some control variables in the model. In second model dependent variable is secondary school enrollment is measured by independent variable which is again ICT with some other control variables.

Empirical analysis

To check the models efficiency F-test is applied for both models and later between OLS/REM/FEM comparisons HST and BP-LM test are performed. This chapter includes the

results analysis and discussions, based on the methodology discussed in chapter 5, which includes OLS, LSDV, FEM and REM methods respectively.

Results of Model-1

Table No. 3: Descriptive Analysis of Model 1

Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
PSE	112	88.66	18.53	28.63	108.51
LFP	112	59.77	21.15	18.31	91.73
REM (% OF GDP)	112	5.2752	5.89	0.1385	28.772
UP (% OF TOTAL)	112	27.24	7.47	13.431	43.416
ICT	112	12.0092	12.98	0.3533	59.43
SSE	112	87.34	26.46	12.94	194.09
GDP (PER CAPITA)	112	1419.84	1542.01	101.90	7100.91

The descriptive analysis of the study consists of 112 observations which include five independent and one dependent variable. The targeted independent variable in the model is ICT (which is the index consisting of four variables) and dependent is LFP includes the working ratios of female to male. To check the efficiency of desired model we applied F-test between FEM and OLS to choose appropriate estimation technique.

$$F_{Groups\ effect} = \frac{(R_{LSDV}^2 - R_{pooled}^2)/(N - 1)}{(1 - R_{LSDV}^2)/(NT - N - K)}$$

$$\frac{(0.9773) - (0.4527) / 8 - 1}{(1 - 0.9773)/(112 - 8 - 4)} = 268.45$$

As the calculated value of F-test is greater than 10, showing high significance of the model. We can conclude that FEM/ REM are more appropriate to apply for this model as compared to OLS.

Table No. 4: Model Selection Test:

Specification test	P-value	Tested	Selected Model
F-test	268.45	OLS/FEM	FEM
Breusch and Pagan	0.0284	OLS/REM	Random
Hausman test	0.9640	REM/FEM	Random

The above discussed table shows fixed effects model for the first test but overall Random effect is dominant, for further analysis we incorporate the results of random effects for the first model.

Table No. 5: Random Effect Model

Variable	Co-efficient	Std. Error	t-statistics	P-value
ICT	0.6920***	0.1328	5.21	0.000
PSE	0.2235***	0.08413	2.66	0.008
UP (% OF TOTAL)	-0.9456	0.2335	-4.05	0.000
REM (% OF GDP)	-1.7685	0.2627	-6.73	0.000
CONSTANT	66.7377***	10.09	6.61	0.000

$R^2 = 0.4527$
Wald $\chi^2(4) = 88.15$
Prob > $\chi^2 = 0.000$

Table 5 showed the positive and highly significant impact of ICT on women labor force participation with coefficient value of 69% and t-value 5.21 with p-value of 0.000, which shows that a one unit increase in ICT leads to 0.69 unit increase in female labor force participation for all South Asian countries. In control variables, primary school enrollments also have positive and significant relation with independent variable, urban population and remittances have negative and insignificant relation with female labor force participation

Results of Model 2

Same like the first model, efficiency test is applied for the second model and results showing greater than 10 value which means OLS is not appropriate to apply here.

$$F_{Groups\ effect} = \frac{(R_{LSDV}^2 - R_{pooled}^2)/(N - 1)}{(1 - R_{LSDV}^2)/(NT - N - K)}$$

$$= \frac{(0.9179) - (0.7654) / 8 - 1}{(1 - 0.9179)/(112 - 8 - 5)} = 26.2726$$

Table No. 6: Model Selection Test:

Specification test	P-value	Tested	Selected Model
F-test	26.015	OLS/FEM	FEM
Breusch and Pagan	0.7897	OLS/REM	REM
Hausman test	-7.42	REM/FEM	FEM

The above discussed table 6 shows fixed effects model for the first F- test and Breusch Pagan test but in third Random effect is dominant, so for further analysis , we will incorporate the results of fixed effects for the second model.

Table No. 7: Fixed Effect Model

Variable	Co-effecient	Std. Error	t-statistics	P-value
Primary school enrollment	1.150***	0.0723	15.89	0.000
Labor force participation	0.129**	0.0663	1.95	0.054
GDP (PER CAPITA)	0.0029**	0.0014	2.05	0.043
Urban Population (% OF TOTAL)	0.558**	0.2014	2.77	0.007
Information and Communication Technology	1.138***	0.27	4.08	0.000
CONSTANT	-55.54***	9.53	-5.83	0.000
$R^2 = 0.7319$				
F – Test = 71.18				
Prob > F = 0.000				

Table 7 labels the results of FEM for the second model where secondary school enrollment is dependent variable and independent variable is ICT while Urban population, GDP, labor participation, primary school enrollment are control variables. Results reveal the positive and significant relation of independent variables with dependent one. The main variable ICT intercept value is 1.138, with t-value of 4.08 and P-value of 0.000 significant. Its means a 1 unit increase in ICT leads to 1.138 unit

increase in number of secondary school enrollments. The explained variation in model is 73% and model efficiency value is 71.18 with Probability of 0.000.

Conclusion

The study investigated the impact of ICT on women empowerment in south Asian countries. Here the women empowerment includes two dimensions social and economic respectively. For Economic measurement labor force participation (female/male) ratio is used and from social empowerment secondary education enrollment variable is used. These two jointly describes the women empowerment and independent variable ICT is an index of four variables fixed landline phones, mobile phones, fixed broadband subscribers and internet users respectively. After model specification tests random effect is chosen as appropriate for the first model and fixed effect for the second. After estimations of both models results show the following, from the first model where economic participation is taken as dependent variable and ICT as independent reveals that ICT intercept value is 0.69 and highly significant for all South Asian countries. Its means a one unit increase in ICTs leads to 0.69 unit increase in female labor participation, here ICT has positive role in improving economic participation of females in all south Asian countries.

In second model, where secondary school enrollment is used as dependent and ICT is independent variable. Results reveal that ICT intercept value is 1.138 and highly significant, which means a one unit increase in ICT can leads to more than 1 unit increase in secondary school enrollments. Therefore in both cases ICT has strong and positive role on economic and social participation of females.

As the results of empirical analysis have clearly shown that there exists positive relation between the use of ICT and female labor force participation and secondly ICT is playing significant role in improving educational status of women. In both cases these technologies are contributing an effective and positive role and improving social and economic position of women. Need of the hour is to improve and encourage more and better technologies e.g. to improve internet services and make sure its availability and coverage to remote areas, Usage of landline and mobile phones has make it easier to do business while sitting in homes and on a far distance so Government with coordination of these companies can improve network services.

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