

The Impact of ICT on Women Empowerment: Evidence from Selected South Asian Countries

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Abstract

During the current epoch, information and communication technology (ICT) is considered as one of the core drivers towards women empowerment. The principal concern of the underlying study is to evaluate dynamic linkage among ICT, women empowerment, fertility rate, labour force and trade openness for selected South Asian countries from 2000 to 2016 by mean-group and pooled mean-group estimators that are robust to endogeneity and heterogeneity. The outcomes infer that ICT enhances women empowerment in South Asian countries. However, fertility rate negatively contributes to women empowerment. Sensitivity analysis using fully modified ordinary least square (FMOLS) method is applied to check the validation, consistency, and robustness of the study for future policy implications. The analytics surmise future strategy for women empowerment with confined ICT expansion and discouraging fertility in South Asian countries.

Key Words: ICT, Women empowerment, South Asia, PMG, MG, FMOLS

1. INTRODUCTION

Information and communication technology (ICT) is counted among the fastest growing domains of 21st century as it is revolutionizing the world in almost every field. By the end of 20th century, the influence of ICT is perceptible in society's social structures, economic, cultural, and politics [Mago and Mago (2015)]. Knowledge transfer and information revolution have provided greater opportunities in trade and commerce around the globe [Mago and Mago (2015)]. The social science experts and United Nations (2006) acknowledged that ICT is greatly supporting towards significant improvements in e-commerce, e-education, training and development, capital markets,

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international finance bounding, and social networks [Bon, Akkermansand, and Gordijn (2016)]. Business transformations are being made on a large scale by incorporating the ICT sector that attracts younger women [Bersin and Deloitte (2013)]. Such advancements have unlocked diverse career opportunities, particularly in developing countries. Moreover, these transformations offer mobility and time constraints to women as well as provide easy financial and information accessibility, skills training, and further support them for easy business participation. It is important to note that the application of ICT in education has opened numerous opportunities for socially marginalized individuals such as young girls and women. Leveraging ICT for women entrepreneurs has depicted large implications for women empowerment and economic independence of rural and marginalized women in South Asian countries. Modern ICT have enabled proactive and productive participation of women in the knowledge economy. It has been widely argued that economic empowerment of women is one of the main weaponry to eradicate poverty and achieving gender equality for sustainable economic development [UN (2010)].

The role of ICT is considered as a significant instrument for the progress, poverty reduction, gender disparity declination, and women empowerment. It serves as an important tool for the achievement of global Sustainable Development Goals (SDGs). The applications of ICT have made the labour market more flexible, transparent, innovative and inclusive. Usage of ICT has enabled the inclusion of low-skilled workers, women, and disabled workers into the labour market. Women empowerment is driven by several push and pull factors including overcoming poverty, increasing educational attainment, and better work opportunities. Economic, political, social, and technological factors are also required to be acknowledged for the progress of women empowerment. Technological factor, particularly ICT, can be used to increase women participation in the labour market. Its role in the skill development can shape a better labour force with reasonable participation rate from women. ICT creates job opportunities and provides the benefits of financial inclusion that lead to economic and social equality (ITU reports). Financial autonomy can significantly increase the degree of empowerment, which consequently reflects in the gender equality through financial inclusion. Hence, the Sustainable Development Goal 4 (Education) and Goal 5 (Gender equality) can be achieved through the extensive network of ICT. Various initiatives are directed towards women's economic empowerment through ICT that play a critical role in turning the SDG pledges into reality.

Faster modes of ICT enable women to bring an economic, political and social change through greater participation in labour markets. Moreover,

various leading companies and governments are developing friendly work environment to augment greater participation for women via implementation of flexible working hours, childcare leave entitlement, and work from home facility [Anjum (2012)]. Greater participation is the indication of women empowerment in a male-dominated society. It is important to note that ICT plays a significant role to decrease gender gap as well in the labour market through capacity building and women empowerment [Maier and Nair-Reichert (2008)]. Women's contribution to economy and empowerment are revealed as essential tools to support women's rights and independent decision making [Rathi and Niyogi (2015)].

In fourth World Conference on Women, the Beijing Declaration and Platform suggested women empowerment through enhancement of skills, knowledge, accessibility, and usage of information technologies [United Nations (1995)]. The World Summit on the Information Society (WSIS) emphasized on promoting a friendly environment for women in formulating ICT policies and applications such as e-health and e-employment, enforcing cultural identity and diversity using media and follow-up of gender-specific indicators [Berry (2006)].

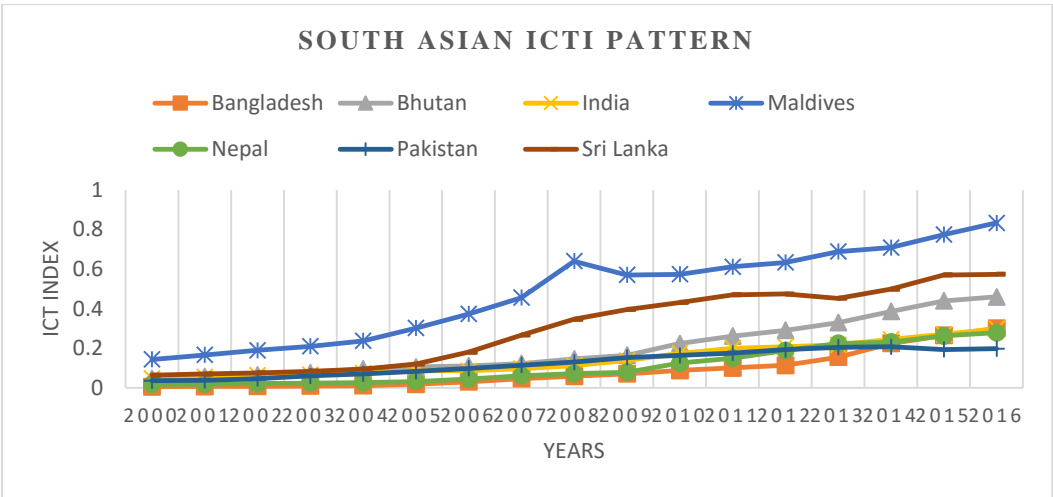
In light of the above discussion on the growth of ICT instruments in the modern era, the underlying paper aims to explore the impact of ICT tools on women economic participation and empowerment in South Asian countries. The specific objectives of the study are as follows. Firstly, limited literature is found on the impact of women empowerment and ICT in South Asia. Therefore, in this study we attempt to investigate women empowerment-ICT nexus through quantitative analysis. Secondly, advanced econometric tools such as pooled mean group (PMG) and mean group (MG) estimators are applied to elaborate women empowerment-ICT nexus that is robust to endogeneity and heterogeneity.

The rest of paper is structured as follows. In the second section, the ICT and female labour force participation profile of the selected South Asian countries are discussed. Third section reviews the recent literature, whereas section four details the data and econometrics approach to analyze the impact of ICT on economic empowerment of women. The fifth section presents the empirical results of the study. Sixth section concludes the study and draws the implications for policy.

2. OVERVIEW OF SOUTH ASIAN REGION

Information and communication technologies index (ICTI) and women empowerment patterns are reported in Figure A, and B, respectively.

Figure A: Plot of South Asian ICTI Pattern

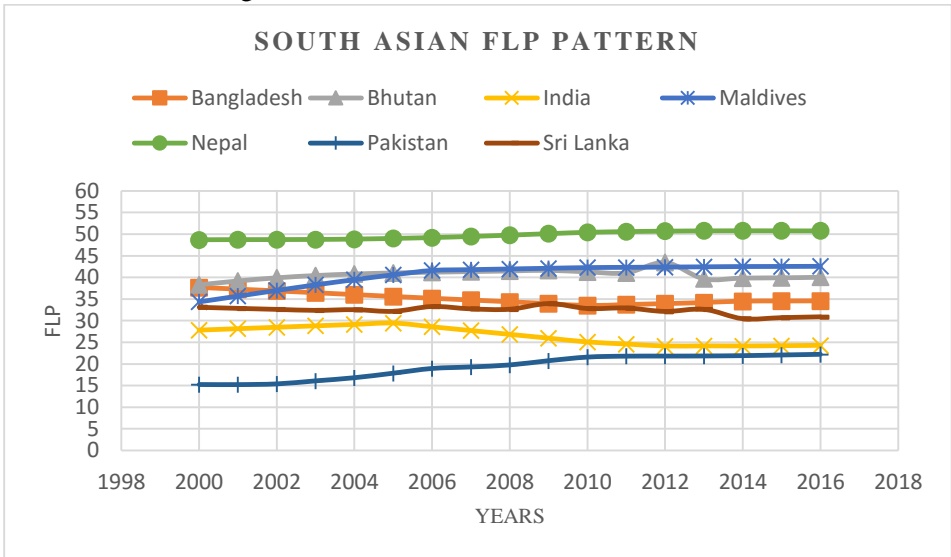


Author’s calculation based on ICTI given in Table 1.

In general, the South Asian region is depicting an increasing trend in ICT, which is a composite index of mobile-cellular telephone, fixed broadband, internet users, and fixed landline subscription. The greater use of modern ICT is evident from Figure A. Application and usage of ICT is the highest in the Maldives. The progress in India, Pakistan, Nepal, and Bangladesh is far below than Maldives. Since 2013, low ICT development has been observed in Pakistan. ICT growth in Bangladesh has been improving since 2013, similar to Nepal and India. Comparatively, expansion of ICT in Sri Lanka is higher than Bhutan.

Figure B reveals the female participation pattern in South Asian countries. All the selected countries indicate stable participation rates. However, the statistics of India depicts a decline in the female participation rate since 2005. These declining rates can be explained by raising school enrollment ratio of young women, lack of employment opportunities, and increase in the household income [ILO (2016)]. Nepal reports the highest and most stable participation rate around 50%, while Pakistan has the lowest participation rate among all of underlying countries. Nevertheless, the female participation rate in Pakistan is steadily climbing, but it is still less than other countries in 2016. Similar accent in the female participation rate is witnessed for Bhutan and Maldives. However, improvement in participation rates is observed in the Maldives during recent years. The steady increase in female participation rate can be attributed towards declining gender inequality.

Figure B: Plot of South Asian FLP Pattern



Author’s calculation based on data of FLP.

3. LITERATURE REVIEW

ICT comprises a complex, assorted, and interconnected set of things, services, and applications used to produce, develop and transmit information [Ramilo *et al.* (2005)]. ICT instruments have provided a platform for people to discover, evaluate, transmit, and deliver information deprived of discrimination, while also allowing open arms to ideas and capabilities from multicultural individuals and societies [Kwame (2010)]. ICT have generated fresh economic and social opportunities around the globe, and women have been able to use ICT to sustain new modes of information exchange and enforce empowerment [Anita (2006)]. Mainuddin *et al.* (2015) studied the relationship between ICT and women empowerment for selected South Asian countries. The study used female primary and secondary enrollment and female labour force participation as proxies for women empowerment. The authors concluded that different ICT tools are positively related to women empowerment. Laizu *et al.* (2010) discussed the role of ICT on women empowerment in two villages of Bangladesh. The authors noticed a positive change in the perception of women who were using ICT tools yearly. According to Suhaida *et al.* (2014), ICT tools provide information about different jobs opportunities and also make it easy for women to work from home. Thus, ICT plays an important role in determining a woman's decision to participate in labour market activities in Malaysia.

Arivanandan (2013) observed that women's accessibility to cell phones and internet enhanced their decision-making capacity and economic stability. Mandour (2009), and Chen (2004) elaborated that ICT infrastructure level and gender equality in employment had a statistically positive linkage. The analytics drawn that gender equality in education and employment can be improved through ICT infrastructure enhancement, which also affirms that ICT and education are main drivers of women empowerment. Huyer and Sikoska (2003) observed that the income and knowledge from ICT sector enable women to undertake independent decisions and make suitable choices about their lives. Huyer and Mitter (2003) reported that the use of ICT by women improve their well-being, because of better access to information about income, education opportunities, and health-related issues that in turn help them to become a better version of themselves.

For Non-OECD countries, Bussman (2009) used GMM estimation approach for the years ranging from 1970 to 2000 and found positive effects of trade on female labour force participation, whereas for OECD countries this effect was observed as negative. Cooray *et al.* (2012) analyzed the effects of globalization on female labour force participation in developing countries from 1980 to 2005. The authors used fixed effects model and found a negative linkage between female labour force participation and trade. Terra *et al.* (2007) concluded that trade liberalization was positively correlated with female labour participation amongst educated women in Uruguay. Siddiqui (2009) did the same analysis for Pakistan and found that female employees can be increased through trade liberalization in unskilled jobs.

Gaddis and Pieters (2012) investigated the impact of trade liberalization on female labour force participation in Brazil. The study observed a positive effect of trade liberalization on female labour force participation and employment in Brazil during underlying period of analysis. Aguayo-Tellez *et al.* (2010) observed that trade liberalization is associated with an increase in women's share in employment in developing countries. But, on the other hand, Kucera (2001) suggested that female employment was adversely affected by trade liberalization. Bloom *et al.* (2009) found a negative relationship between fertility and female labour force participation. Mishra and Smyth (2010) also observed a negative relationship between fertility and labour force participation among women for OECD countries. He and Wu (2015) explored the effect of a birthing second child on the mother's employment status in urban China. The study concluded that having more than one child significantly reduces the female labour force participation. As the women's wages rise, their participation in the labour force also increases, so does the demand for childcare services. The same findings were supported by Del Boca *et al.* (2000) that the

number of children has a negative impact on mothers' probability of employment, while a positive impact was found with the availability of childcare services. Ahn and Mira (2002) investigated the relationship between average total fertility rates and female labour participation rates for 21 OECD countries. The study highlights the negative correlation between two variables until the late 1980s; a positive correlation was observed during the 1990s, potentially due to developments in market childcare services.

4. DATA DESCRIPTION AND ECONOMETRIC APPROACH

The current study utilized panel data of seven South Asian countries, except Afghanistan, to investigate the relationship between women empowerment and ICT from 2000 to 2016. The variables of fertility, labour force, and trade openness are also included in the set of explanatory variables as the role of these variables are important for women empowerment [Kucera (2001); Aguayo-Tellez *et al.* (2010) and Cooray *et al.* (2012)]. The confounding variables are presented in Table 1. Women empowerment is measured by female labour participation rate. Data constraints in South Asian region restricted to develop the composite index of women empowerment. Before calculating information and communication technologies index (ICTI), it is necessary to convert all dimensions into the same scale for aggregation. The individual's indicators index is normalized as follows:

$$\text{Indicators index} = \frac{[C_i - C_{\text{Min}}]}{[C_{\text{Max}} - C_{\text{Min}}]} \quad \dots (i)$$

where, C_i = Indicator Value of a Country, C_{Max} = Maximum Value of an Indicator and C_{Min} = Minimum Value of Indicator. The standard approach is adopted for assigning equal weights of all indicators to compute aggregate index value. The ICTI mathematical notation is formulated as follows:

$$\text{ICTI} = \frac{[\text{MC} + \text{FB} + \text{IU} + \text{FT}]}{4}, \quad \dots (ii)$$

where, MC = Mobile-cellular telephone, FB= Fixed-broadband, IU= Internet Users and FT=Fixed-telephone. Trade openness is calculated as $[(\text{exports} + \text{imports})/\text{GDP}] * 100$, expressed in percentage.

Table 1. Variables Description

Indicator name	Notation	Description	Data source
Women Empowerment	FLR	Female labour participation rate	WDI ¹
Fertility	FR	Fertility rate, total (birth per woman)	WDI
Labour force	LF	Labour force participation rate	WDI
Trade openness	TPN	[(exports + imports)/GDP]*100	WDI
ICITI Dimensions			
Mobile-cellular telephone	MC	subscriptions per 100 inhabitants	ITU ²
Fixed-broadband	FB	subscriptions per 100 inhabitants	ITU
Internet Users	IU	Individuals using the Internet (%)	ITU
Fixed-telephone	FT	subscriptions per 100 inhabitants	ITU

This study tests the hypothesis that ICTI has a positive impact on women empowerment. Panel co-integration methodology is applied to test the aforementioned hypothesis. The long-run estimates at a level should be equal to short-run estimates at the first difference in residuals based on co-integration tests. Moreover, the panel OLS, fixed effects and random effects models have some disadvantages. For instance, in case of panel OLS, same estimates are derived for all countries and common time trend; however, estimates are deemed biased if the independent variables are endogenous or correlated with the error term [Pesaran (2006)].

Therefore, Johansen Fisher Panel Co-integration Test is utilized to elaborate a number of co-integration equations. Panel ARDL is applied to the longtime series and panel dataset to estimate short-run and long-run dynamics. The fact is that Panel ARDL (PMG and MG) computes robust estimators in the presence of endogeneity due to lags on independent and dependent variables [Pesaran (2006)]. In our case, Panel ARDL model is minimized as follows:

$$FLR_{i,t} = \theta_i + \sum_{j=1}^p \pi_{i,j} FLR_{i,t-j} + \sum_{j=1}^p \delta_{i,j} ICTI_{i,t-j} + \sum_{j=0}^q \rho_{i,j} X_{i,t-j} + \mu_{i,t} \quad \dots (1)$$

where, $FLR_{i,t}$ is depicting women empowerment in “ i ” country and “ t ” time, θ_i is incorporated to investigate the fixed effects, and $ICTI_{i,t-j}$ is referring to ICTI in “ i ” country at “ $t-j$ ” time. $X_{i,t-j}$ denoting set of independent variables (FR , LF and TPN). Each country’s long-run coefficients are averaged after estimation through ARDL. Short-run coefficients and convergence rate are

¹ World Development Indicators.

² International Telecommunication Union; An agency of United Nations specialized in information and communications technologies.

estimated through ARDL difference form. The ARDL difference is expressed as follows:

$$\Delta LR_{i,t} = \alpha_{ij} + \vartheta_i(ECT)_{t-1} + \sum_{j=1}^p \pi_{i,j}^* \Delta FLR_{i,t-j} + \sum_{j=1}^p \delta_{i,j}^* ICTI_{i,t-j} + \sum_{j=0}^q \rho_{i,j}^* X_{i,t-j} + \varepsilon_{i,t}, \dots \quad (2)$$

where, ECT is the error correction term, ϑ_i is speed adjustment between short-run and long-run equilibrium (convergence or divergence rate), $\pi_{i,j}^*$, $\delta_{i,j}^*$ and $\rho_{i,j}^*$ are depicting short dynamics with respect to FLR, ICTI and X, respectively, in “i” country at “j” time.

5. EMPIRICAL RESULTS AND DISCUSSION

The descriptive statistics are reported in Table 2. The balance panel dataset elaborates the descriptive statistics using one hundred and nineteen observations. LF and TPN have greater values as compared to FLP, ICTI, and FR, while ICTI and FR have less variation in their data as compared to FLR, LF and TPN. Jarque-Bera test concludes that all variables have a normal distribution. So, we can move to next step i.e. estimation of short-run and long-run dynamics.

Table 2. Descriptive Statistics

	FLP	ICTI	FR	LF	TPN
Mean	34.912	0.207	2.766	63.705	44.064
Median	34.527	0.150	2.521	62.150	41.925
Maximum	50.802	0.833	4.580	85.781	159.276
Minimum	15.199	0.005	1.984	50.704	0.000
Std. Dev.	9.506	0.188	0.660	10.271	29.501
Skewness	-0.172	1.337	0.926	0.814	0.956
Kurtosis	2.304	4.123	2.757	2.652	4.709
Jarque-Bera	9.278	41.754	17.307	13.752	32.639
Probability	0.003	0.000	0.000	0.001	0.000
Observations	119	119	119	119	119

5.1. Correlation Analysis

Table 3 illustrates correlation analysis. FLR is positively correlated with ICTI, LF, and TNP, while negatively correlated with FR. The variation in ICTI is described by 29.3% of the variation in FLR, while FR and LF are negatively correlated with ICTI. Correlation matrix establishes the nature of the

relationship between the variables to compute the short- and long-run estimates using panel ARDL.

Table 3. Correlation Analysis

	FLP	ICTI	FR	LF	TPN
FLP	1.000				
ICTI	0.293	1.000			
FR	-0.669	-0.517	1.000		
LF	0.891	-0.005	-0.366	1.000	
TPN	0.360	0.009	-0.438	0.302	1.000

5.2. Panel Unit Root and Panel Co-integration Test

The results of panel unit and panel co-integration tests are presented in Tables 4 and 5, respectively. One parametric unit root test, LLC test, two non-parametric unit root test, PP and ADF tests are incorporated to check the order of integration for our model. Table 4 concludes that all under considered variables are stationary at the first difference and none of them is integrated at the second difference. Johansen Fisher Panel Co-integration Test is used to elaborate the number of co-integration equation(s). Table 5 affirms the co-integration existence and rejects the null hypothesis of the co-integration test, which is stated as “there is no co-integration equation”.

Table 4. Panel Unit Root

Variable	With common unit root		With Individual unit root			
	LLC test		PP test		ADF test	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
FLP	-4.426*	-3.601*	31.913*	67.184*	25.587**	45.975*
ICTI	-0.770	-3.609*	12.327	29.100**	8.894	20.891
FR	-1.844	-1.760**	135.214*	60.878*	36.124*	27.347**
TPN	-1.507***	-4.073*	7.0462	45.194*	9.599	29.251**
LF	-4.020*	-3.534*	25.857***	46.304*	18.471	38.704*

*, **, *** at the level of significance of 1%, 5%, and 10%, respectively.

Table 5. Johansen Fisher Panel Co-integration Test

No. of CE (s)	Fisher Stat.	Prob.	Fisher Stat.	Prob.
	Trace test		Max Eigen test	
None	11.09	0.803	11.09	0.803
At most 1	60.81	0.000	79.23	0.000
At most 2	147.4	0.000	147.4	0.000
At most 3	220.1	0.000	155.7	0.000
At most 4	109.3	0.000	87.62	0.000
At most 5	48.21	0.000	48.21	0.000

5.3. Panel ARDL Results

Panel ARDL structure is used to compute the short-run and long-run relationship between women empowerment and ICTI for South Asian countries. The short-run and long-run estimates reported in Table 6 elaborate the long-run impact of ICT on women empowerment. The results of PMG and MG indicate that ICT has a positive impact on female labour force participation that is a proxy for women empowerment in selected South Asian countries. This finding is in agreement with other studies [Mainuddin *et al.* (2015)].

Table 6. Panel ARDL

Long Run Estimate	PMG		MG	
	Coefficient	t-statistic	Coefficient	t-statistic
ICTI	13.248*	7.21	4.192	0.26
FR	-1.127*	-4.56	-1.889	-0.62
LF	0.645*	13.21	2.140	1.35
TPN	-0.003	-0.72	-0.038	-1.32
Short Run Estimate				
ECT	0.134***	1.71	0.498**	2.11
DICTI	2.170	0.78	6.619***	1.89
DFR	1.779	1.27	3.787	0.91
DLF	0.584*	3.56	0.617*	3.52
DTPN	-0.001	-1.08	-0.014***	-1.90
Constant	0.668	1.42	0.738	0.04
Hausman Statistic	0.16	Prob.	0.997	

PMG = pooled mean group, MG = mean group and *, **, *** at the level of significance of 1%, 5%, and 10%, respectively.

Hausman test is typically used to select the best estimator between PMG and MG. The probability value of Hausman Statistic concludes that PMG estimator is better than MG estimator. Therefore, further analytics are carried out using PMG estimators as PMG provides heterogeneous short dynamics for panel dataset. In the same way, labour force enhances women empowerment, while the increase in fertility rate deteriorates female labour force participation in the South Asian region. ECT provides evidence of 13.45% divergence rate in short-run to long-run equilibrium in the South Asian region.

Next, the short-run impact of ICT on women empowerment and convergence (or divergence) rate is estimated for each country. The short-run outcomes suggest that ICT has a statistically significant positive impact on women empowerment in Bangladesh, Nepal, and Pakistan. It indicates that in these countries ICT is critical in increasing the female participation rate. However, ICT has an adverse impact on women empowerment in India because

of higher fertility rate and less number of women in labour force³. ICT use is statistically insignificant in small South Asian countries like Bhutan, Maldives, and Sri Lanka as compared to India and Pakistan. Fertility rate has a significant positive impact on female labour force participation that serves as a proxy for women empowerment in Bangladesh and Nepal; negative impact in India and Maldives and an insignificant effect in Bhutan, Pakistan, and Sri Lanka was found because of higher women empowerment rate than the fertility rate [World Bank (2016)].

Table 7. Panel ARDL Cross-Sectional Results

Country	ECT	DICTI	DFR	DLF	DTPN	Constant
	0.290*	4.369*	4.180*	0.779*	0.000	1.858*
Bangladesh	[5.78]	[6.04]	[2.92]	[14.91]	[0.23]	[2.29]
	0.534	-10.264	9.559	0.027	-0.011	3.197
Bhutan	[1.12]	[-0.46]	[0.59]	[0.05]	[-0.37]	[1.00]
	-	-4.354*	-1.242***	0.875*	0.001	-0.312***
	0.041*	[-5.03]	[-1.61]	[58.38]	[0.65]	[-1.80]
India	[-3.71]					
	0.028*	0.177	-3.262*	0.518*	0.000	-0.004
Maldives	[3.36]	[0.69]	[-6.76]	[12.61]	[1.33]	[-0.04]
	0.337*	2.712*	3.353*	-0.251**	0.002	1.263
Nepal	[8.39]	[4.24]	[6.22]	[-2.37]	[1.48]	[1.00]
	-0.0765	12.820**	1.418	0.734*	-0.004	-0.654
Pakistan	[-0.76]	[2.41]	[0.68]	[6.17]	[-0.29]	[-0.60]
	0.013	-0.545	0.884	0.928*	-0.007	0.249
Sri Lanka	[0.19]	[-0.16]	[0.09]	[6.34]	[-0.17]	[0.88]

Note: Values in bracket show t-statistics, *, **, *** at the level of significance of 1%, 5%, and 10%, respectively.

The labour force is positively linked with women empowerment in all South Asian countries except Nepal and Bhutan. Trade openness has a statistically insignificant impact on women empowerment in short-run estimates in all cases. Indian economy has 4.1% convergence rate towards long-run equilibrium, while Bangladesh, Maldives, and Nepal have divergence rates of 29.06%, 2.81% and 33.73%, respectively, in the short run.

5.4. Sensitivity Analysis

Panel FMOLS is applied to check the robustness that estimates whether the validity of long-run estimate is reliable and valid to devise policy. Panel

³ World development indicator; fertility rate and women empowerment have almost same variation.

FMOLS results (Table 8) are found to be consistent with Panel ARDL estimates. The results suggest that ICT and labour force have a statistically positive impact on women empowerment while fertility rate has an adverse impact on women empowerment. The FMOLS also confirms that trade openness is a statistically insignificant factor for women empowerment in the South Asian region.

Table 8. Panel Fully Modified Least Squares Results

Dependent variable		FLP	
Variable	Coefficient	t-statistic	
ICTI	0.606*	19.636	
FR	-1.327*	-101.279	
LF	0.526*	18.267	
TPN	-0.033	-1.288	
Wald test			
Test Statistic	Value	df	Probability
F-statistic	6.261	(5, 99)	0.000
Chi-square	31.305	5	0.000

6. CONCLUSIONS AND RECOMMENDATIONS

This paper examines the impact of ICTI, fertility rate, labour force, and trade openness on women empowerment in seven South Asian countries using the panel dataset from 2000 to 2016. We construct a novel ICT index from all available ICT drivers. Panel unit root tests and co-integration tests were applied to check the stationary level and the long-run relationship among concerned series, respectively. Panel ARDL was applied to compute short-run and long-run dynamics. Furthermore, FMOLS was also applied to validate long-run estimates from panel ARDL as part of the sensitivity analysis. Lastly, Wald test was used to affirm the significance level of the FMOLS coefficient.

The empirical outcomes endorse ICTI importance for women empowerment in seven South Asian countries. ICTI and labour force have a significant positive impact on women empowerment. Short run labour force and ICTI have a different impact within South Asian countries as it depends upon ICTI usage, human capital skills, and economic diversification. The fertility rate has a negative significant effect on women empowerment while trade openness has a statistically insignificant impact on women empowerment. Moreover, the magnitude of fertility rate is higher as compared to ICTI, labour force and trade openness. It indicates that fertility rate is a prime factor for women empowerment. In short, the fertility rate is negatively affecting women empowerment in India and Maldives, while it is insignificant in Bhutan,

Pakistan, and Sri Lanka. Therefore, there is a need to recognize and reduce the barriers to women's access and use of ICT in the South Asian countries so that advances in ICT do not widen gender disparities. These findings can help devise certain policy implications. With regards to the fertility rate being the prime factor, the governments must improve laws and policies regarding early marriage, child policy, and women health safety programs. Since ICT positively influences women empowerment, there is a need to create women-friendly and culture-sensitive points for ICT, i.e., women only internet clubs. It is also important to initiate ICT skill-building programme for women, both basic (basic know how to use the internet) to advance level (IT related services and certifications). Lastly, South Asian countries need to enforce ICTI exchange programmes and remove cultural barriers to promote the use of ICT tools in rural areas.

Due to the availability of fewer data, aggregate panel dataset was used to estimate women empowerment. Further research can include a comprehensive micro and macro level study analysis to provide a deeper understanding. Further, more parameters can be included to estimate the impact of ICTI on women empowerment.

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