JOURNAL OF CRITICAL REVIEWS

ISSN- 2394-5125 VOL 7, ISSUE 08, 2020

LINKAGE BETWEEN INFORMATION & COMMUNICATION TECHNOLOGY USE AND EXPORT PERFORMANCE: EVIDENCE FROM SOUTH ASIAN COUNTRIES

SIMISMITA BORAH[1]

[1]PH.D SCHOLAR, DEPARTMENT OF ECONOMICSCOTTON UNIVERSITY, GUWAHATI, ASSAM, INDIA

EMAIL-ID:SIMIBORAH1990@GMAIL.COM

MOBILE NO:8724079511

Received: 11.03.2020 Revised: 12.04.2020 Accepted: 28.05.2020

ABSTRACT: This study explores the two way linkages between Information and Communication Technology (ICT) use and export performance in eight South Asian countries-Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri-Lanka. Constructing an ICT index the study has conducted an instrumented variable panel regression by taking the time period from 2000 to 2018.Controlling the possible endogenity, the results shows the presence of the two way linkage between use of ICT and Export performance in the South Asian countries. In other words there is bi-directional causal relation among the use of ICT and export performance in the South Asian countries. However the estimated coefficients show that the impact of Export on the use of ICT is somewhat stronger than the impact of ICT use on Export performance of these countries.

KEYWORDS: ICT, Export Performance, South Asian Countries, ICT Index, Endogenity

JEL Classification:F14

I. INTRODUCTION

In the early 1990s South Asia has made good progress in liberalizing the trade. India adopted LPG policy to promote free trade in 1991. Sri Lanka began economic liberalization in 1997 to take away the economy from socialism. Similarly the other South Asian economies like Pakistan announced various measures in 1998 as a part of their Trade Policy. Maldives have reformed the trade laws in the year 2000. Nepalese trade policy was introduced in 1992.These measures have taken to augment international trade with the involvement of private sector. Afghanistan also rationalized the tariff structure and introduced the use of the market exchange rate so as to improve their trade policy in the year 2002.Presently South Asian economies are regarded as one of the import emerging market economies (EME) in the World. The export performance of these countries has been improving since 1997(World Bank, 2014). It was 4.8 percent in 1997 which has increased to 24.1 percent in 2011.But it has reduced to 9.7 percent in 2018.However the share of exports in gross domestic product (GDP) in this region had been even more pronounced since 2000 (Jongwanich,2007) in accordance to India's exports' boom. They are the major exporters of different goods like petroleum oil (excluding crude oil), semi milled or wholly milled rice, other medicaments of mixed or unmixed products etc. Currently the region's share in total world export is 8.34 percent (WITS,2020).Although it is lower than the world average ,but it was expected to grow till 2019.This is because of some of the reasons like new hydropower plant has been started working in Bhutan, Nepal's export will increase due to Upper Tamakoshi Hydropower Project. In addition to that depreciation of South Asian currencies may have a positive impact on export performance in the medium run.

Different scholars have presented the background factors that improve the export growth of the region. Among those supply side factors like world demand and production capacity got emphasis on discussions (Jongwanich,2007).Another important determinant of export performance is identified as 'Foreign Market Access'. Factors like knowledge of ICT, ICT infrastructure and use of ICT which are gaining tremendous importance with the progress of digital economy can be regarded as some of the vital sources of this access. The concept of ICT is defined from different perspectives. The concept has multidimensional approach. It is a socio-economic approach(United Nations,2005) as well as regarded as an economic contributor

ISSN- 2394-5125 VOL 7, ISSUE 08, 2020

too(ITU,2017).Sometimes it is also discussed as educational resource and also a medium of business communication (Lim and Dhakal, 2020).In this study the ICT use is considered as a business communicator.

The use of ICT may reduce the fixed entry cost into a market and thus stimulates exports .Further it reduces delays like advance planning that involves handling uncertainty and more efficient and accurate trade planning(Liu and Nath,2013).The relation between international trade and ICT use has increasing the attention of scholars whereby one directional studies are most common. The existing literature provides immense evidence that ICT usage helps to boost the bilateral or multilateral trade relations among different countries. However some studies also indicate the possibility of bi-directional causality or linkage among ICT usage and level of international trade by taking the issue of endogenity. In those studies this second linkage is often taken as endogenity issue. On this backdrop this study wants to investigate whether any bi-directional or two way linkage exists between ICT usage and Export performance in case of South Asian Countries.

II. REVIEW OF LITERATURE

The survey of literature has been categorized into two parts. In the first category we have included studies examining the impact of ICT on international trade (Freund and Weinhold, 2002; Fink et al., 2005; Clarke and Wallsten,2006;Vemuri and Siddiqi,2009;Demirkan et al.,2009; Choi,2010;Mattes et al.,2012;Liu and Nath,2013;Kotnik and Hagsten;2013; Lin, 2015;Crespo and Zarzoso,2019). Moreover Morgan-Thomas et al. (2009) had also established a strong and direct relationship between ICT and growth of international markets.

Most of the studies considered a panel of countries to examining the states theme. However their treatment is different from each other on various grounds. Among these studies some has undertaken the concept of homogeneity among the countries, while many others don't consider this fact (Freund and Weinhold, 2002; Vemuri and Siddiqi ,2009 and Lin,2015).On methodological front a number of studies incorporates the gravity model(Crespo and Zarzoso, 2019).In the "Gravity Model" various geographical and institutional variables are included along with ICT variables. However various studies take only internet as only ICT variable. But most these studies found a statistically positive effect of ICT on trade (Export or Import or both).Among them Freund and Weinhold (2004), Vemuri and Siddiqi (2009), Liu and Nath (2013), Barbero and Rodriguez-Crespo (2018) are notable. The difference between them is that Barbero and Rodriguez-Crespo (2018) have taken regional trade of European Union while the mentioned other studies choose to go for cross-country level. Again here are a few studies which consider heterogeneity of countries in examining the effect of ICT on trade (Crespo and Zarzoso, 2019).

Lauresan and Meliciani(2010), analyses the relationship between the strength of fourteen OECD countries in four ICT-related scientific fields and to maintain and acquire export market shares in the OECD market, across 16 manufacturing industries taking the time period of 1981–2003.The authors have found a statistically significant impact of ICT knowledge on export market share(specially in case of ICT industries).Some studies are also there which have considered a specific category of products in which impact of ICT is explored.

In case of firm level export also researches bring out the issue of effect of ICT usage. Studies like Clarke, 2008;Ganotakis and Love, 2011; Ricci and Trionfetti, 2012 ; Kotnik et al.,2018 are noteworthy. We can derive two conclusions from these studies. First if firms use ICT they can export more than those who don't(Clarke, 2008, Ricci and Trionfetti, 2012).Secondly it is not necessary that if a firm has internet facility then it can export more(Clarke, 2008). Furthermore in case of small and medium enterprise in manufacturing sector also it is found that overall ICT usage positively predicts the export performance of manufacturing SMEs (Makanyeza and Ndlove, 2016).On the contrary, considering heterogeneity among eleven European Union countries Kotnik and Hagesten(2018) examined relationship between different uses of ICT and export activity of a larger number of manufacturing as well as service firms. The basic finding of the study suggests that ICT use does not have any particular importance for firm export in countries under study.

Wheatley and Roe (2005).They found a statistically positive effect of Internet on exports and imports of agricultural and horticultural products in the USA. Similar kind of study is also undertaken by Chung et al.(2013) and found that in growth in some ICT products has significant positive effects on trade in fruit and vegetables between APEC countries. They have also revealed that the strongest impact was found in the traditional form of ICT (fixed telephone lines).

In this literature review we have also adopted the summary of literature that is designed by Liu and Nath (2013) ;Crespo and Zarzoso(2019).Liu and Nath(2013) summarized the studies from the period of 2002 to 2012.The authors have the conclusion that at that time frame there were a few studies that undertook the issue of impact of ICT on trade. In most of the studies that a common ICT component(internet) is taken to explore ICT's impact on trade. However the studies by Fleming et al. (2009) and Thiemann et al. (2012) examine the effects of ICT in terms of the use of mobile phone and fixed telephone on trade (flowers, fruits and vegetables).

ISSN- 2394-5125 VOL 7, ISSUE 08, 2020

Therefore from the above discussion it is apparent that there are two kinds of studies in regard to ICT use and trade specifically in case of export performance. One group established a positive relationship between ICT and trade or export. On the other hand the other group has established the opposite relation. On this background this study tries to investigate this issue in case of South Asian countries.

In the second category a few empirical works are done. This study has also analyzed this issue by taking the first linkage as endogenity .So far as this work's trial no such studies that investigate impact of trade on ICT use is found. Therefore an attempt is made to measure the impact of trade on ICT use in case of South Asian Countries, if any.

III. DATA SOURCE AND METHODOLOGY

3.1.Data source:

To investigate the proposed theme, the study has collected the data from World Bank open data portal and World Telecommunication ICT Indicator database maintained by the International Telecommunication Union (ITU). The sample covers a period from 2000 to 2018.Annual data series of total export (goods and services) from 2000 to 2018 is available in 2010 USD constant prices, hence we did not go for any base shifting or deflating technique. On the other hand all the five ICT indicators provided by ITU have been considered for the study.

3.2 Methodology

The export performance is measured in terms of annual total export value. However the ICT use has been measured in terms of four outcome variables. Those are- Fixed broadband subscriptions (FBS), fixed telephone subscriptions (FTS), mobile cellular telephone subscriptions (MCS), percentage of individuals using internet(INT). These measured variables are taken together with the selected instrumented variables and other controlled variables. Annual growth rate of GDP and growth rate of population are selected as control variables. To select the principal variables that can explain the use of ICT better and to retain the degrees of freedom Principal Component Analysis (PCA) has been performed. On the basis of factor loadings principal components have been selected and an ICT index has been created. The procedure of the index creation is as follows-

Step 1: In this step the researcher multiplied the factor loadings of the first component with the respective values of the variables.

Step 2: In this step the variables selected as per factor loadings for ICT have been aggregated by using geometric mean to make the index association sensitive. The aggregation formula for ICT index is as follows-

$$\text{ICT Index} = \sqrt[4]{(FBS).(FTS).(MCS).(INT)}$$

ITU constructed a composite indicator called the ICT Development Index (IDI) that combines seven variables representing ICT readiness, ICT use, and ICT capability since 2007.But in this study we consider only the dimension ICT use. Hence the study has created its own index for analysis. The availability of data on these variables varies across countries and over time. For some countries, data are missing for several years. For e.g. for Afghanistan from 2004 to 2008 the data for fixed telephone subscriptions is not available. Hence the values for this particular year have been estimated through liner interpolation on the basis of the nearest possible years

As we have examined the both way linkage, clearly we have the problem of endogenity. From the previous studies (Clarke and Wallsten (2006); Vemuri and Siddiqi (2009) ;Liu and nath,2013 etc.) it is found that there may be causality between ICT use and trade. To control this possible effect, we have conceptualized two ideas. First, we take export performance as dependent variable and ICT use(Proxies by ICT index) as the independent one. In this case following the strategy of Freund and Weinhold (2004) and Liu and Nath(2013), the study has considered lagged values of ICT index(1 and 2 year lag).However Liu and Nath(2013) used up to 3 year lag. Freund and Weinhold (2004) use 1-year lag in one of their specifications. Again following Hausman and Taylor (1981), Liu and Nath(2013) the study has used lagged values of endogenous variables as instruments. Here the study uses 1-year lag of the ICT variables, 1 year lag of per capita GDP growth, and 1-year lag of population growth as the instruments.

In the second model, ICT use is taken as dependent variable and export performance is the independent one. Applying the same method to control the possible endogenity, if any, the study has selected lagged values of export performance (1 and 2 year lag).The study also uses 1-year lag of the export performance, 1 year lag of per capita GDP growth, and 1-year lag of population growth as the instruments.

ISSN- 2394-5125 VOL 7, ISSUE 08, 2020

IV. RESULTS AND DISCUSSIONS

4.1 General overview on the growth of export and ICT use in South Asian Countries

In a report of World Bank (2014), it is claimed that South Asian countries were marked a reasonable real GDP growth in the year 2013 to 2015.In that period, the two large economies of the region, India and Pakistan lead the whole region to a good start. Export growth maintains momentum and is expected to strengthen to 7 percent in the financial year 2015, led by manufacturing exports rising by an impressive 10.6 percent in the first quarter of 2015. India has begun to shift its export destinations for major product groups such as refined petroleum products in accordance to the US economy's recovery. Export performance was strongest in Sri Lanka over 43 percent of total exports in the year 2015. As per Theil's index, over time South Asia has become one of the most diversified developing regions in the world (World Bank,2019). As of 2010, diversification was highest in India, followed by Nepal and Afghanistan. Except for Afghanistan and Maldives, export diversification by product increased across the region between 2000 and 2012.

The pattern of usage of ICT shows that mobile telecommunication services are highly adopted in South Asian Countries from 2000 to 2017 than fixed-line, fixed broadband, and internet services (Lim and Dhakal, 2020). When we plot the trend of different indicators of ICT use and export performance of these countries we find some interesting results .The codes in the figures indicate the countries Afghanistan(1) ,Bangladesh(2), Bhutan(3), India(4), Maldives(5), Nepal(6), Pakistan(7) and Sri-Lanka(8).

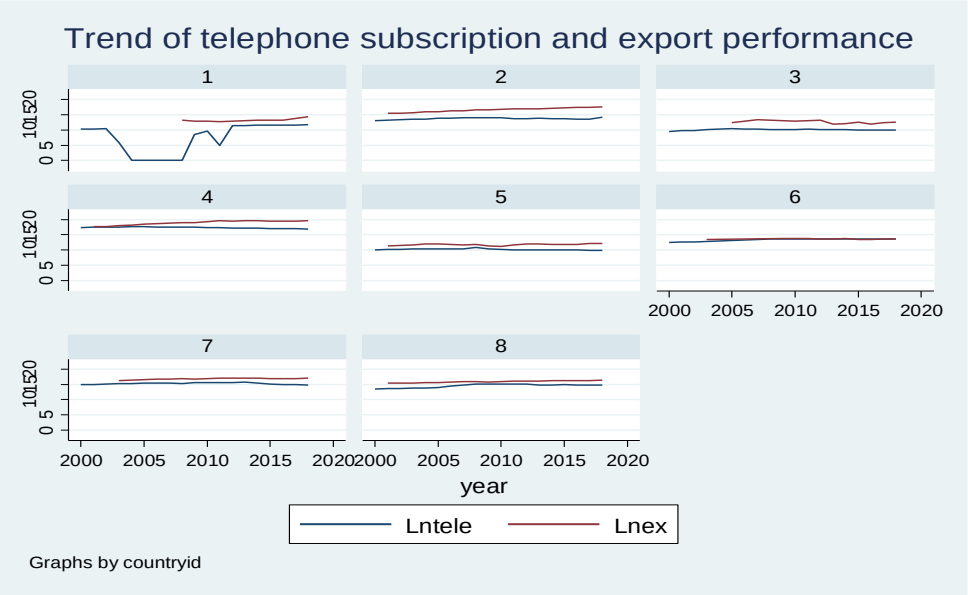

Figure 1: Trend of Telephone subscription and export performance in South Asian Countries,2000-2018.

The trend lines show a stable pattern from 2010 onwards for Afghanistan. This may be because it has officially joined South Asian Association of Regional co-operation and from then its export performance may got momentum. It is visible from the figure that the trend of telephone subscription has a stable pattern after 2010 along with the export growth. While in case of country 2, 3, 7 and 8 both the trend lines show a similar kind of growth having more growth on export. Mobile subscription pattern (figure 2) along with the export performance of all the South Asian Countries showing an upward trend. Except country 3, all other have higher growth in case of mobile subscription than export. Country 3 has two features in this case. First before 2010 it has higher growth in export, but after 2010 mobile subscription surpassed it due to government's continuous efforts to promote ICT facilities.

ISSN- 2394-5125 VOL 7, ISSUE 08, 2020

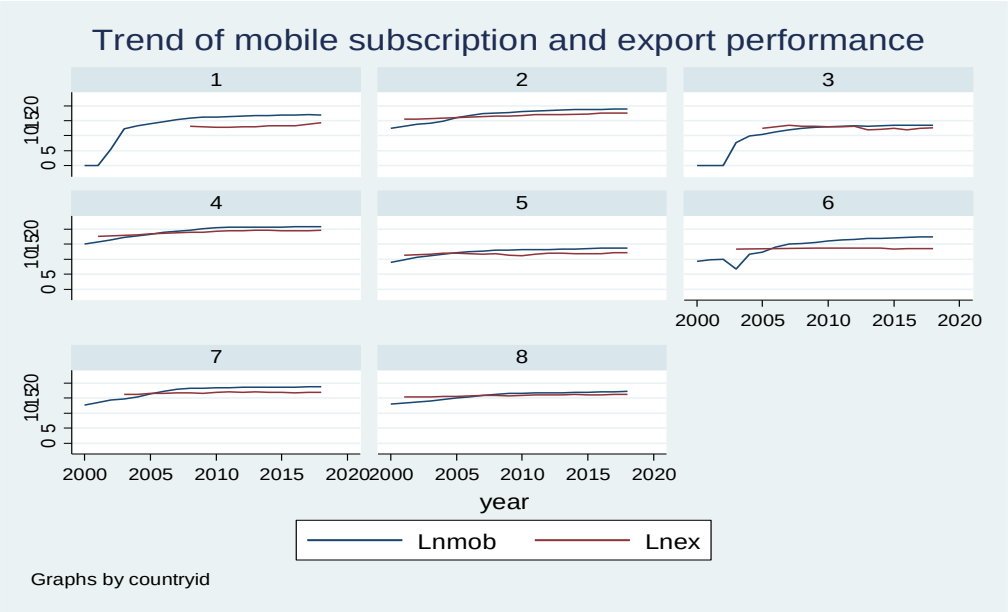

Figure 2: Trend of mobile subscription and export performance in South Asian Countries, 2000-2018.

Apart from these two ICT use indicators (figure 1 and 2), trend of broadband subscription(figure 3) also follows same kind of pattern with telephone subscription. Both are growing but growth of broadband is lower than the export in all the South Asian Countries. The reason behind growing broadband subscription is that compared to other low and middle-income countries, South Asia has the most affordable mobile broadband across all regions (GSMA,2019).

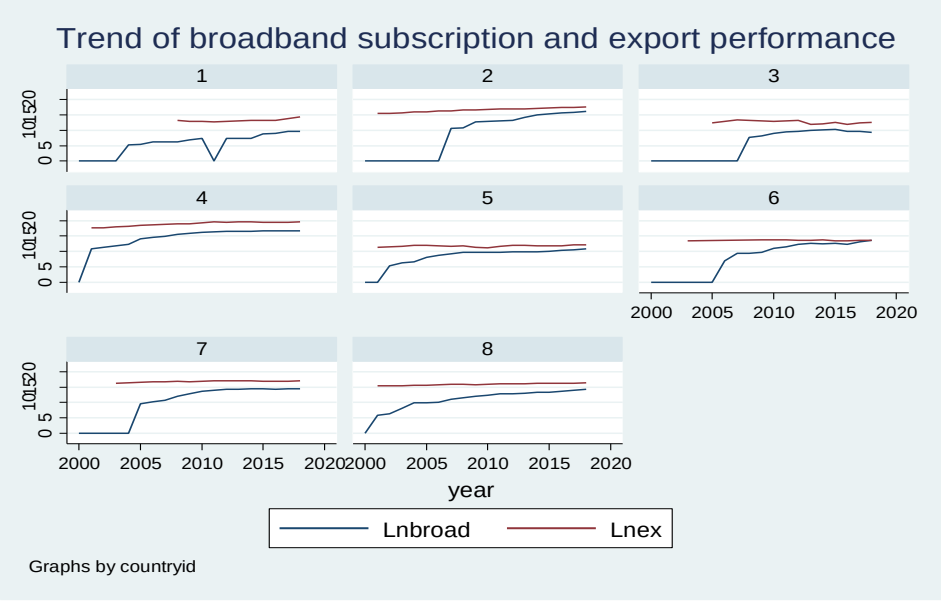

Figure 3: Trend of broadband subscription and export performance in South Asian Countries,2000-2018.

Regarding internet subscription it is found that country 1, 2 and 7 have lower growth of it than their export. However country 3,4,5 ,6 and 8 have mixed trend following similar type of progress in case of these two. Consumers of South Asia revealed about the two largest barriers to mobile internet adoption. They are a lack of digital skills and literacy, followed by a lack of relevance (GSMA,2019).These may be the reasons behind slowdown of internet subscription after 2015 in the South Asian countries.

ISSN- 2394-5125 VOL 7, ISSUE 08, 2020

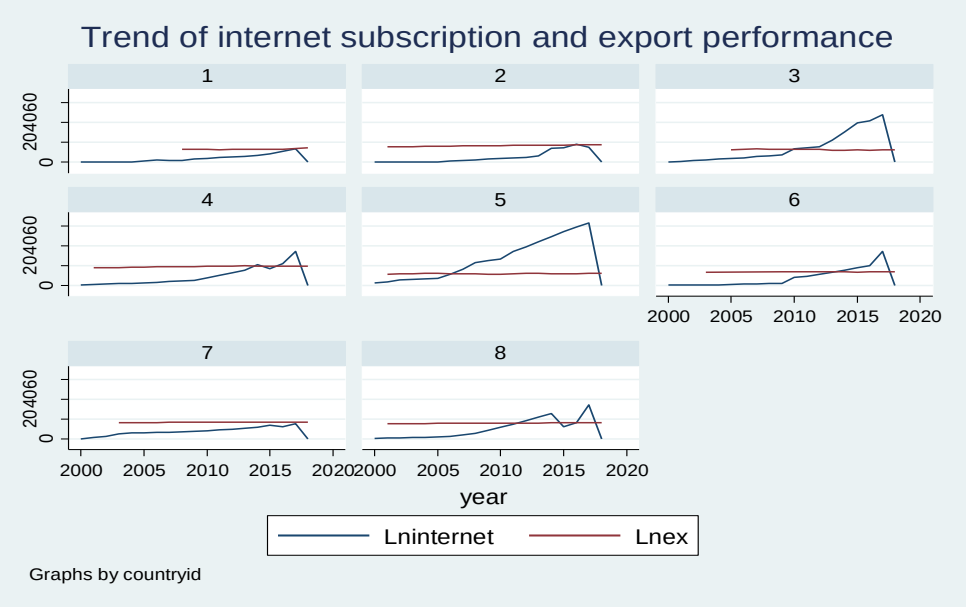

Figure 4: Trend of internet subscription and export performance in South Asian Countries 2000-2018

4.2. Test for Univariate normality

In the first step the study has taken up a normality test for the entire dataset. Doornik-Hansen Skewness test is applied to check the Univariate normality in the panel on original data series. The test has been applied and results for the following null hypothesis is as follows-

H_0: The series doesn't not has a normal distribution

H_a: The series has a normal distribution

Univariate normality test shows the following results for the variables-

Table 1: Results of-Hansen Skewness test of normality

Variable	Pr(Skewness)	Decision	Remarks
Broadband	**0.9445**	**H_0 Accepted**	**Not-Normal**
Telephone	**0.5803**	**H_0 Accepted**	**Not-Normal**
Internet	**0.1428**	**H_0 Accepted**	**Not-Normal**
Mobile	**0.3710**	**H_0 Accepted**	**Not-Normal**
Export	**0.9072**	**H_0 Accepted**	**Not-Normal**

Normality test confirms that all the variables in the panel data series don't possess a normal distribution. Hence log-transformation is done to make them normal.

4.2. 1.PANEL UNIT ROOT TEST

To test the Stationarity of the panel data series, the study has applied Im-Pesaran-Shin unit-root test for all the five variables separately. The null and alternative hypothesis for the test is as follows-

Ho: All panels contain unit roots

Ha: Some panels are stationary

The results of Im-Pesaran –Shin test are as follows-

Table2: Results of Im-Pesaran-Shin Unit root Test

ISSN- 2394-5125 VOL 7, ISSUE 08, 2020

Variables	No of lags(ADF regression)	Test-statistic	p-value	decision
Ln.Fixed broadband	**1**	**-5.0005**	**0.0000***	**Accept H_0**
Ln.Fixed telephone	**1**	**0.0811**	**0.5960**	**Reject H_0**
Ln.Internet	**1**	**-0.7515**	**0.2262**	**Reject H_0**
Ln.Mobile	**1**	**-6.1955**	**0.0000***	**Accept H_0**
Ln.export	**1**	**-0.8949**	**0.1854**	**Reject H_0**

As per the panel unit root test it is seen that for the variables Fixed telephone, internet and export the p –value is greater than 0.05,i.e., more than 5 percent level of significance. It means that the null hypothesis is rejected in implying that all these series are stationary at I(1).But the series fixed broadband and mobile are non-stationary. To make this two series stationary, first differencing is done.

4.2.2. Principal component analysis: Selection of principal components of ICT.

To retain degrees of freedom and also to avoid the problem of multicollinearlty due to the large number of variables in this study the study is proposed to perform of Exploratory Factor Analysis. The Principal component analysis technique has been applied to do the same. The results are presented in the following tables-

Table 3: Results of PCA (Total variance explained and factor loadings)

Component	Eigen-value	Percentage of variance explained
Comp1	**2.40257**	**0.6006**
Comp2	**1.0426**	**0.2606**
Comp3	**0.5277**	**0.1319**
Comp4	**0.0271**	**0.0068**

Rotated component matrix(factor loadings)

Variable	Comp1
Ln.Fixed broad subscriptions	**0.615**
Ln.Fixed telephone subscriptions	**0.4788**
Ln.Percent of individuals using internet	**0.0569**
Ln.Mobile cellure subscriptions	**0.6239**

The Eigen values as per the table indicate that the first component explains about 60 percent of the standardized variance. On the other hand the second principal component explains about 26 percent of the standardized variance. Hence the first principal component is a more relevant measure of ICT, as it explains the variations of the dependent variable better than any other linear combination of explanatory variable. For regression analysis, after doing principal component analysis the rule of thumb is that the Eigen values of those variables in the principal component is more than 0.05should be selected for regression analysis. Table 2 indicates that the Eigen values of Ln.Fixed broadband subscriptions (0.615), Ln.Fixed telephone subscription (0.478) and Ln.mobile cellular subscriptions (0.62) are more than 0.05. Therefore these variables are selected for construction of ICT index for further regression analysis.

4.2.3. Model Estimation

To examine the two way linkages between the ICT and Export Performance of South Asian Countries this study has adopted panel data regression analysis.

ISSN- 2394-5125 VOL 7, ISSUE 08, 2020

4.2.3.1. Impact of ICT use on export performance : The first linkage

To estimate the impact of total export on ICT use, the model takes the following form-

$$\text{lnexport}_{it} = \alpha + \beta \text{ICT}_{it} + \delta Z_{it} + u_{it} \quad \text{(ii)}$$

Where i =South Asian Countries 1,2,3,…,8 ; t = 2000 to 2018 and u_{it} is the idiosyncratic error term. Where lnexport_{it} is the total values of export for country i in year t ; ICT_{it} is the ICT index for country i in year t and Z_{it} is the vector of control variables. The results of the estimated model is presented below-

Table 4: Results of IV2SLS regression

	Dependent variable: Lnexport	
IV2SLS	**Fixed effects model**	**Random effects model**
ICT	**0.436**	**0.618**
Number of observations	**120**	**120**
R^2	**0.644**	**0.683**

Note: * Denotes significant at 5 percent level. The robust standard errors clustered at country level in parentheses. One year lagged GDP annual growth rate, One year lagged ICT and One year lagged population growth rate are being instrumented with Ln export. However one and two year lagged of ICT is taken to control the endogenity.

After estimating the models, Hausman specification test is required to run to select the appropriate model between fixed effects model and random effects model. The null hypothesis for this test is-

H_o: Random effects model is appropriate and H_a: Fixed effects model is appropriate

Table 5: Hausman specification test results

Chi^2 (b-B)	**Prob>Chi^2**	**Accept/Reject**
19.23	**0.002**	**Accept**

Hausman specification test implies that the probability value is less than 5 percent. Therefore we have no statistical evidence to reject the null hypothesis that RE model is appropriate and accept the alternative hypothesis that FE model is more appropriate. Therefore the RE model is selected for interpretation. The coefficient of ICT is significant at one percent level .From the RE model it is seen that the coefficient of ICT is significantly positive which is also in favour of previous research studies.1 percent increase in the use of ICT will increase the export level by 0.62 percent.

An important issue is potential serial correlation or heteroskedasticity in the idiosyncratic error term u_{it}. Wooldrige test (2002) implies presence of serial correlation as null hypothesis is rejected at 5 percent level. Clustering on the panel id variable (here country) produces an estimator of the VCE that is robust to cross-sectional heteroskedasticity and panel (serial) correlation. Hence, here also the standard errors by country are clustered to deal with these problems.

4.2.4. Impact of export performance on ICT use: The second linkage

To estimate the impact of total export on ICT, the model takes the following form-

$$\text{ICT}_{it} = \alpha + \beta \text{lnexport}_{it} + \delta Z_{it} + u_{it} \quad \text{(ii)}$$

Where i =South Asian Countries , 1,2,3,…,8 ; t = 2000 to 2018 and u_{it} is the idiosyncratic error term. Where lnexport_{it} is the total values of export for country i in year t ; ICT_{it} is the ICT index for country *i* in year *t* and $Z_{it}$is the vector of control variables. The results of the estimated model is presented below-

Table 6: Results of IV2SLS regression

ISSN- 2394-5125 VOL 7, ISSUE 08, 2020

	Dependent variable: ICT	
IV2SLS	**Fixed effects model**	**Random effects model**
Ln Export	**0.767**	**0.588**
Number of observations	**120**	**120**
R^2	**0.8448**	**0.8459**

Note: * Denotes significant at 5 percent level. The robust standard errors clustered at country level in parentheses. One year lagged GDP annual growth rate, One year lagged lnexport and One year lagged population growth rate are being instrumented with Ln export. However one and two year lagged of ln.export is taken to control the endogenity.

After estimating the models, Hausman specification test is required to run to select the appropriate model between fixed effects model and random effects model. The null hypothesis for this test is-

H_o: Random effects model is appropriate and H_a: Fixed effects model is appropriate

Table 7 : Hausman specification test results

Chi^2 (b-B)	**Prob>Chi^2**	**Accept/Reject**
0.01	**0.998**	**Reject**

Hausman specification test implies that the probability value is less than 5 percent. Therefore we have no statistical evidence to accept the null hypothesis that RE model is appropriate and hence the alternative hypothesis that FE model is more appropriate is accepted .Therefore the FE model is selected for interpretation. The coefficient of lnexport is significant at 5 percent level .From the FE model it is seen that the coefficient of lnexport is significantly positive which is also in favour of previous research studies. One percent increase in lnexport will increase the use of ICT by 0.76 percent. In this model also Wooldrige test (2002) implies presence of serial correlation as null hypothesis is rejected at 5 percent level.

V. CONCLUSION

The results of the study bring out the evidence of bi-directional linkage between ICT use and export performance of the South Asian countries. However all the indicators of ICT s prescribed by ITU may not significantly explore by the countries. Unlike most of the previous research the study doesn't consider only one indicator of ICT use. Rather using Principal Component Analysis it has taken the important factors of ICT for the countries. Results of estimated coefficients show that there is a statistically significant positive relation between ICT use and export performance of South Asian Countries. The study also found that in South Asian countries the impact of export performance on ICT use is stronger. But the results cannot be generalized as it is limited to a specific region only. The wake of COVID-19 pandemic may change the scenario. But the findings are consistent with previous studies and hence it is recommended that the ICT infrastructure should expanded in these countries so that export growth can be boost up in this digital era.

VI. REFERENCES

[1] World Bank[internet]:The Export Opportunity South Asia Economic Focus Fall 2014.c2014.[cited 14th May 2020] Available from https://www.worldbank.org/content/dam/Worldbank/document/SAR/south-asia-economic-focus-export-opportunity.pdf

[2] Jongwanich J (2007) Determinants of Export Performance in East and Southeast Asia. ERD Working Paper Series No. 106, Asian Development Bank .

[3] World Integrated Trade Solution database [internet].Available from [cited 2nd july 2020]https://wits.worldbank.org/CountryProfile/en/Country/SAS/Year/2018/TradeFlow Export .

[4] United Nations [internet]:Developing countries in international trade and development index 2005, United Nations Conference on Trade and Development.c2017-[cited 17th May 2020]

[5] International Telecommunication Union [internet]:Measuring the Information Society Report.c2017-[cited 10th June 2020].Available from https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2017/MISR2017_Volume1.pdf

[6] Lim DE, Dhakal T (2020) Understanding ICT adoption in SAARC member countries.Letters in Spatial and Resource Sciences 13:67–80

[7] Liu,L. and H.Nath,2013. Information and Communications Technology (ICT) and Trade in Emerging Market Economies Emerging Markets. Finance and Trade 49(6):67-87.

[8] Freund, C, Weinhold D (2002) The Internet and International Trade in Services. American Economic Review 92(2): 236 – 240

[9] Fink C, Mattoo A, Neagu IC (2005) Assessing the impact of communication costs on international trade. Journal of International Economics, 67:428–45

[10] Clarke G, Wallsten G (2006) Has the internet increased trade? developed and developing country evidence. Economic Inquiry 44:465–484

[11] Vemuri VK, Siddiqi S (2009) Impact of Commercialization of the Internet on International Trade: A Panel Study Using the Extended Gravity Model. The International Trade Journal 23(4): 458 – 484

[12] Demirkan H, Goul M, Kauffman RJ, Weber DM (2009) Does Distance Matter? The Influence of ICT on Bilateral Trade Flows. Proceedings of the Second Annual SIG GlobDev Workshop, Phoenix USA.

[13] Choi C , (2010) The effect of the Internet on service trade. Economics Letters 109: 102 – 104

[14] Mattes A, Meinen P, Pavel F(2012) Goods Follow Bytes: The Impact of ICT on EU Trade.DIW Berlin Discussion Papers.

[15] Kotnik P , Hagsten E [internet]: ICT as Enabler of Exports .c2013-[cited 12th may 2020] Available from https://www.frbatlanta.org/-/media/documents/news/conferences/2013/caed/E2Kotnik.pdf.

[16] Lin F (2015) Estimating the effect of the internet on international trade.Journal of International Trade and Economic Development 24: 409–428

[17] Rodríguez-Crespo E, Martínez-Zarzoso I (2019)The effect of ICT on trade: Does product complexity matter?. Telematics and Informatics 41: 182–196

[18] Morgan-Thomas A, Jones MV (2009) Post-entry Internationalization Dynamics. International Small Business Journal 27(1):71-97

[19] Freund CL, Weinhold D (2004) The effect of the Internet on international trade. Journal of International Economics, 62(1):171-189.

[20] Barbero, J, Rodriguez-Crespo E (2018) The effect of broadband on European Union trade: a regional spatial approach. World Economics 41 (11):2895–2913

[21] Laursen K, Meliciani V (2010) The role of ICT knowledge flows for international market share dynamics. Research Policy 39(5): 687–697.

[22] Clarke GR (2008) Has the internet increased exports for firms from low and middle-income countries?.Information Economics and Policy 20(1):16–37.

[23] Ganotakis P, Love JH (2011) R&D, product innovation, and exporting: evidence from UK new technology based firms .Oxford Economic Papers 63(2): 279–306.

[24] Ricci LA, Trionfetti F (2012) Productivity, Networks, and Export Performance:Evidence from a Cross-country Firm Dataset. Review of International Economics 20(3):552–562

[25] Kotnik P and Hagsten E (2018). ICT use as a determinant of export activity in manufacturing and service firms: Multi-country evidence, Zbornik Radova Ekonomskog Fakulteta u Rijeci / Proceedings of Rijeka School of Economics 36(1):303-327

[26] Makanyeze C, Andiswa N (2016) ICT Usage and its Effect on Export Performance: Empirical Evidence from Small and Medium Enterprises in the Manufacturing Sector in Zimbabwe.Botswana Journal of Business 9 (1):21-36.

[27] Wheatley WP, Roe TL (2005) The effects of the internet on U.S. bilateral trade in agricultural and horticultural commodities. Paper presented at the American Agricultural Economics Association Annual Meeting, Providence, Rhode Island 24–27 July.

[28] Chung, KC, Fleming P, Fleming E (2013) The impact of information and communication technology on international trade in fruit and vegetables in APEC. Asian- Pacific Economic Literature 27:117–130.

[29] Fleming ER, Mueller AE, Thiemann F (2009) ICT and the blooming bloom trade. EFITA Conference '09: 767 – 774.

[30] Thiemann F, Fleming E, Mueller RAF (2012) Impact of information and communication technology (ICT) on international trade in fruit and vegetables: A gravity model approach. Selected paper prepared for presentation at the International Association of Agricultural Economists (IAAE) Brazil 18-24.

ISSN- 2394-5125 VOL 7, ISSUE 08, 2020

[31] Hausman J, Taylor,W (1981) Panel Data and Unobservable Individual Effects. Econometrica 49 (6): 1377 – 1398.

[32] World Bank [internet]: The Cursed Blessing of Public Banks. South Asia Economic Focus Spring 2020.c2019-[cited 2nd June].Available from https://openknowledge.worldbank.org/handle/10986/33478

[33] GSMA[internet]: Mobile Internet Connectivity 2019,South Asia Factsheet.c2019-[cited 1st June 2020]. Available from https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/09/Mobile-Internet-Connectivity-SouthAsia-Fact-Sheet.pdf.