EMPOWERING INCLUSIVE HUMAN DEVELOPMENT THROUGH ICT AND INNOVATION: INSIGHTS FOR ASIA'S EMERGING ENTREPRENEURIAL LANDSCAPE

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Abstract

In the last decade, usage of internet and the unpredictable increase in the level of innovations have been main drivers of human development. These jumps in human intellect have influenced almost every sphere of human effort including health, education, commerce, and so on. Thus, this study is set out to examine the impact of ICT adoption and innovation on inclusive human development in 26 Asian countries from 2010 to 2019. The data for this study has been taken from the World Development Indicator (WDI). The econometric techniques which have been applied to this study are fixed and random effects panel data techniques. Furthermore, to correct the problem of heteroskedasticity and autocorrelation in the model, the prais-winsten regression has been applied. The empirical results of this study show that ICT adoption and innovation have positive and significant relationship with inclusive human development. To enhance the inclusive human development, Asian countries should increase their level of innovation and adoption of ICT.

Keywords: Human Capital, ICT adoption, Innovations

1. Introduction

Inclusive human development is defined as the strategies to ensure equitable distribution of resources, rights of the people, social security and equal approach to the private and public services (ADB, 2014). There are some challenges which are faced by the countries in achieving inclusiveness including poverty elevation, employment creation, and inequality management (UNDP, 2019). To address the issues of poverty and inequality there is need of job creations in the developing regions. According to the World Bank, an underdeveloped country requires 25 percent investment of its GDP share to ensure inclusive human development (World Bank, 2008). In the report of united nations development program (UNDP), it is highlighted that in developing countries, poor human development can be associated with weak social linkage, and less economic growth, and these further hinder the efforts to attain sustainable development (UNDP, 2019). Therefore, in national and international development strategies, the enhancement of inclusive human development is the main priority in developing countries. In recent policy discussion, attention has been given to whether investment in information and communication technology (ICT)

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and innovation improves inclusive human development (Asonghu & Le Roux, 2017).

The information and communication technology (ICT) is often considered as the 8th wonder of the world as it has proved to be one of the most wonderful invention of human being (Sathiaseelan, 2013). It is defined as the technologies that with the help of internet and other modes assist in communication, information transference, information processing, analysis and storage. The adoption of ICT for inclusive human development is improving globally due to its influence in many aspects of societal and economic activities (Gulati & Kaur 2017). Thus, at micro level ICT has impact on the daily life of individuals but at macro level these kind of tools aim to participate in the development of more sustained future. Innovation and technology have been the center of human progress thus having influence on the lives of people globally through the betterment of health and education facilities, clean water and sanitation, efficiency and accessibility. The mortality rate has reduced by almost 50 percent during the years 1960-1990 due to innovations in science and technology (Hettiarachchi, 2018).

Unlike any other time in the history, the turn of 21st century indicated an unmatched jump in the step of technology adoption and innovation. Today, 95 percent of the global population live in the areas covered by the mobile cellular networks and mobile broad band networks also have reached to 84 percent of the world population. The affordability of information and communication technologies is increasing immensely. At the end of 2015, the average price of mobile broadband approximated to 5.5 percent of GNI per capita globally (Kaur et al., 2017). In the last decade, utilization of the benefits of ICTs and innovation in order to jump the phases of economic development has been a main development discussion. It is hard to debate the truth that innovations and technology have been crucial drivers of human development (Osabuohien & Karakara, 2018).

There are 12 pillars which are used by World Economic Forum to measure the global competitiveness of countries. Among these 12 pillars the adoption of ICT is the weakest growth pillar in Asian countries even though it has ubiquitous benefits (Schwab 2018). In the report of Global Competitiveness, the rank of South Korea is 91 with a score of 3 in ICT adoption while India has weakest rank 117th with score of 28. South Korea is also ranked second in Asia due to investment in innovation, it has also improved the quality of universities and performance in its scientific publications. These gaps indicate the unequal distribution of technology resources throughout the world (Schwab, 2018).

Despite the immense benefits of Innovation and ICT adoption, more than half of the population are not yet making use of internet in the developing world. Therefore, the purpose of the present study is to bring new empirical

evidence on determining the influence of ICT adoption and innovation on the inclusive human development. In this study, to observe the impact of ICT adoption and innovation on inclusive human development, a panel data has been used. The data for 26 Asian countries has been used to analyze the influence of ICT and innovation.

2. Literature Review

Over the past two eras, various scholars have examined the role of ICT played in economic growth, but there has been lesser research that has considered the ICT influence on the inclusive human development. Aksentijevic et al. (2021) studied the differentiating impacts of Information and communication technology (ICT) usages on the human development among different countries based on the income classification of World Bank 2020. Knowledge is created by research that can be utilized to enhance workplace institution and therefore gives very large payoffs in the form of productivity which further stimulate economic growth. Azuh et al. (2020) took a panel data set of 15 West African countries for the period 2004 to 2014 to examine the relationship between innovation (R&D) and human development. West African countries can enhance the impact of research and development on human development by invigorating innovation (R&D) through the different ways like university-industry partnership and scholarships.

Using the capabilities approach Hoz-Rosales et al. (2019) undertook a study to examine the impact of use and adoption of ICT, by individuals, businesses, and government, on human development. Considering the impact of ICT on government, it has been confirmed that it is significant in developed countries. This means that policymakers should use this study as a tool particularly in developing countries, to support their intentions to reinforce the use of ICT's. Chege and Wang (2019) observe the role played by the information technology innovation in developing countries for the creation of jobs through small enterprises. The consequence of this study is that innovation in technology acts as a driving force for the development of economy and its impact on the job creation in small businesses is positive. The major impact of information technology is observed in the competitiveness of small businesses in the international markets. Alshubiri et al. (2019) took 6 Gulf Cooperation Council countries to observe the ways in which information and communication technology has influence on the financial development. To observe the impact of ICT, two proxy variables internet users and fixed broadband are used in the study. The results show positive effect of fixed broadband on the financial development's proxies (broad money supply/GDP and GDP).

In the last decade use of internet and the rise in innovation have been the major factors of human growth. Such rises in human intelligence have influenced every sphere of human development including health, political

involvement, education, and finance. Ejemeyovwi (2019) observed the impact of innovation and internet usage on human development. The study show that the interaction of innovation and internet usage have positive influence on human development. Information and communication technology (ICT) plays an important role in the development and growth of the economy. Ejemeyovwi and Osabuohein (2018) examine the role of mobile technology adoption on human growth. The results of this study show that the impact of mobile cell subscription on inclusive human growth is statistically insignificant for West African countries. The factors that are responsible for the insignificant results as found by the study are low investment in research and ICT development funds, the use of these technologies for non-productive reasons by the population and low diffusion of these technologies enough to have positive impact on the inclusive growth.

Women in Ghana are not allowed to have access to financial services, 4/5 Ghanaian women do not have access to a financial account as compared to men to about 1/4. Osabuohien and Karakara (2018) have conducted study to observe access status of Ghanaian women to financial accounts and ICT usage. As the development and growth of a country could be enhanced by letting the women to use financial accounts and ICT. For the analysis this study has used the data from World Bank inclusion demographic and health survey of Ghana. Niebel (2017) has analyzed the economic growth of emerging, developing and developed countries due to the application of information and communication technology. The results show that developed countries are gaining more from ICT investment as compared to emerging and developing countries. Asongu et al. (2017) observed the influence of information and communication technology and environmental degradation on inclusive human development in 44 sub-Saharan African countries. This study has founded that complementarity among carbon dioxide emission per capita and mobile phones have positive influence on inclusive human development. Similarly, Asongu and Nwachukwu (2016) employed the system of Generalized Method of Moments (GMM) to determine models the possibility of common policies for inclusive human development. The major finding of this study is that the inclusive human development is constantly conditional on cell phones in knowledge penetration.

Asongu and Roux (2016) examined by utilizing the data for 49 sub-Saharan African countries whether the improvement in information and communication technology influences inclusive human development. To enhance the policy inferences, the analysis is disintegrated into several fundamental features that include income level, spiritual dominations, political firmness, legal sources, and resource wealth. Asongu and Nwachukwu (2016) studied the combine effect of governance in mobile phone penetration to observe their influence on inclusive human

development. From the results of the study the insignificant relation of political governance can be explained by the fact that economic governance is prioritized over the political governance according to previous literature for the better public goods and services at the early stages of development. Similarly, a study was conducted by Andres et al. (2016) to observe the effects of good governance on the adoption of ICT for 49 sub-Saharan African countries. Low-income countries have more impact of formal institutions to ICT adoption as compared to middle income countries. While economic growth and population in low-income countries restrict the adoption of ICT. Ghosh (2016) observed the growth of the economy because of mobile telephony by utilizing the data for 2001-2012 on Indian states. The results also show the positive effect of mobile telephony on the financial additions, specifically the deposit accounts and use of loan. Farhadi et al. (2013) observed the scientific ranking of 14 Middle East countries as measured by H-index due to the growth of information and communication technology. By observing the data over the period 1995-2009 for the Middle East countries the results of this study show that H-index increase due to ICT development.

Application of information and communication technology in agriculture sector can be a resource of betterment for agriculture sector. Salampasis and Theodoridis (2013) has given editorial paper which presents a summary of suggestions of ICTs in agriculture. It also describes the main domains of agriculture sector in which the application of ICT can have significant effects in the improvement of this sector. A study on the application of ICT in the agriculture sector has conducted by Chavula (2013). The results show that significant role is played by the ICT in improving the production of agriculture sector, and despite the spread of mobile phones the application of telephones lines has played positive role in agriculture growth. Osabuohien and Efobi (2012) observe the part of technological diffusion has been played in the growth of economy in Africa. The study shows that sub-regions in Africa having higher level of technological diffusion have observed increased growth as compared to other regions which gives a positive sign that there is significant relationship among technological diffusion and economic growth. Bankole et al. (2011) observe the human development due to the impact of ICT investment in Africa. The indicators of development are GDP per capita, life expectancy and education used in this study. This study has extended the method of Kim et al. (2008) to observe the effect of ICT investment dimensions on the several components of human development. The findings of the study show that impact of ICT dimensions on the development have significant effect. Moreover, interaction of telecommunication and internal spending have a significant effect in high income countries while in mid and low-income countries their effect is insignificant showing the lag of investment.

Weber and Kauffman (2011) purpose the study to observe the academic literature on the globally increasing adoption of ICT and the ways of research for future work. This study analyzes the various factors that cause adoption of ICT and organizational, individual, and economy effects. Heeks (2010) has studied whether information and communication technology play any role in the development of a country. Kuppusamy and Santhapparaj (2005) concluded that ICT has positive impact on the economic growth of Malaysia. Oulton (2001) observed the contribution of information and communication technology towards the growth of output The literature shows that researchers have mainly observed the influence of information and communication technology (ICT) and innovation on the human development (Aksentijevic et al., 2021; Azuh et al., 2020; Ejemeyovwi, 2019; Bankole et al.,2011; Kim et al., 2008) and economic growth (Niebel, 2017; Ghosh,2016; Osabuohien & Efobi, 2012; Kuppusamy & Santhapparaj, 2005;). There are few studies in which the effect of ICT has been observed on the inclusive human development (Asongu & Nwachukwu, 2016; Asongu & Roux, 2016), but these empirical studies have not actively observed the relationship of innovation, ICT adoption and inclusive human development for Asian countries. This study is set out to fill the research gap and it will put up to the literature by observing the effect of ICT adoption and innovation on the inclusive human development by using the data of 26 Asian countries.

3. Theoretical Framework

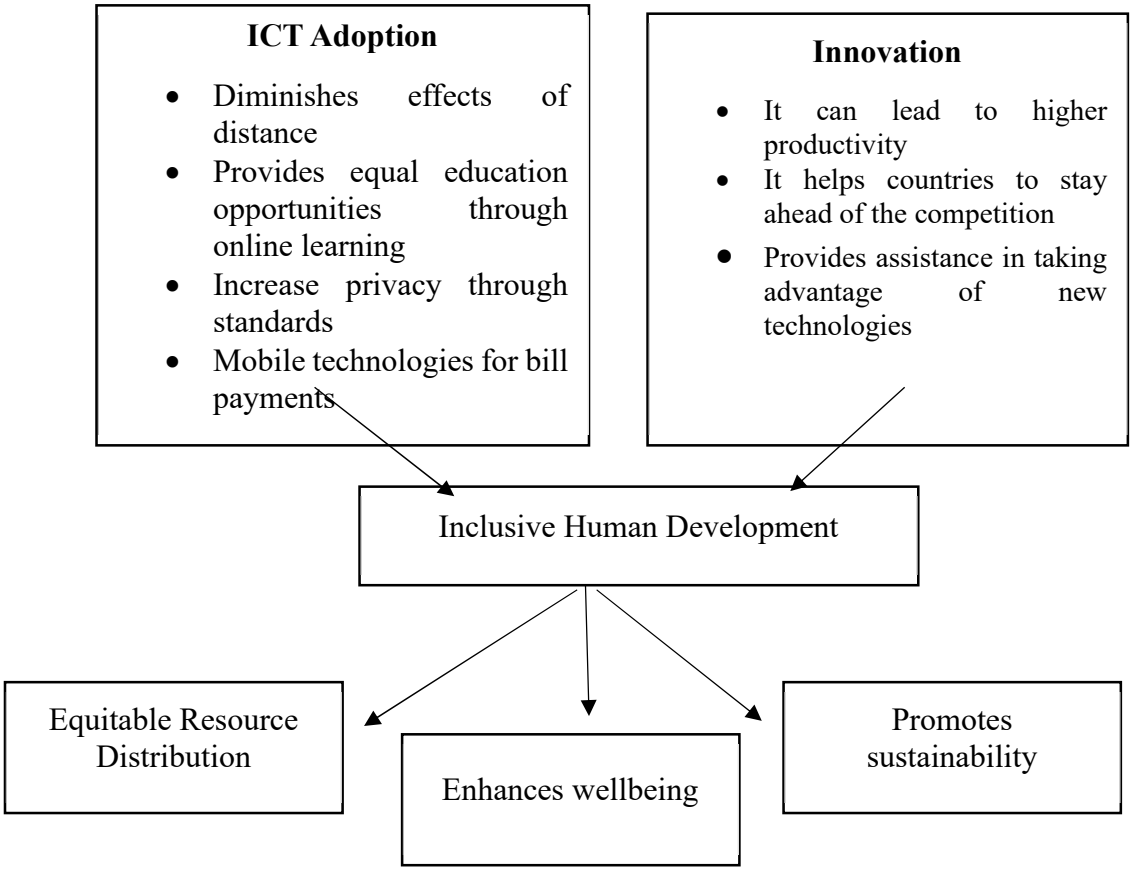
The ICT is playing major part in changing the face of contemporary world. The adoption of ICT plays an important role in gaining knowledge. In the past there was no access to technology and people of villages were unable to avail the better opportunities. This was creating an inequality in the resources for people. But now due to innovation and better access to technology people can get all possible benefits. The television broadcast is the best source in providing education to the students in villages, sportsman, and farmers. One of the main advantage of ICT adoption in education is that the human mistakes can be avoided by taking into consideration on line examination. The innovation in technology and adoption of ICT is accessible for every person and it is less time consuming. Instead of going to school or college and getting education in traditional way, now students who can afford the fee of school and colleges can get education by staying at home more comfortably through online tutoring and with the help of various websites. It is reducing the gaps of development among rural and urban areas by providing equal opportunities and education to every individual. By adopting ICT, the developing countries can also catch up with developed countries.

Two early contributions are made in the adoption of technology by Beal and Bohlen (1957). There were categorization of five chronological stages in the process of diffusion namely awareness, interest, evaluation, trial, and adoption. With the help of these stages, comparison can be made in the countries. For example, we can consider a country who is in mobile payments at the trial stage of technology adoption, while the other country has just entered into the stage of interest. As a consequence, the first country could be characterized as a long way towards the adoption of mobile payments technology as compared to the other country. In view of Smith (2014) the diffusion occurs from stage to stage until the desired innovation reached acceptance and implementation or rejection. According to Smith there are three stages including knowledge stage, persuasion stage, and confirmation stage. The countries can also be categorized in term of their progress with diffusion of technology by five different adopter categories (Roger, 1995). These five categories are innovators, early adopters, early majority, majority, and non-adopters.

Theory of reasoned action which is given by Ajzen and Fishbein (1975) defines the behaviors of individuals which are based on their behavioral attention. This theory has been used in research as a theoretical framework and in ICT adoption. Both the subjective norm and attitude were considered as important determinants of people's intentions to use and adopt ICT (Brown et al., 2002). The neoclassical growth theory which is an economic model of growth and it describes that when three economic forces come into play how the steady economic growth occurs. The theory tells that the overall functioning of an economy can be significantly influenced by the technological changes.

Amartya Sen (1983) has played the critical role in defining human development. According to Sen's capability approach, development is defined as the freedom and quality of life which is in terms of capability extension. Capabilities are brought about by 'entitlements' of a person within society, which is not only measured as income but also as the collection of opportunities and rights available to a person. From Sen's approach there are three values of development including the potential to keep a person alive, self-respect, and freedom from poverty and slavery. The adoption of ICT and innovation will lead to the inclusive human development in a country. As the adoption of ICT assists in providing equal education opportunities through online learning, helps in bill payments through mobile technologies, and reduces distances. On the other hand, innovation in technology will lead to more productivity, provides help in taking advantage of new technologies, and keeps countries stay ahead of the competition. All these things will lead to the inclusive human development in a country which will in turn improves the standard of living of individuals. As the people through inclusive human development will have equitable distribution of resources which enhances their well-being and promotes sustainability.

Figure 1: Schematic diagram of theoretical framework



Source: Author's own compilation

4. Methodology

In this study secondary source of data is utilized. The panel data is collected for 26 Asian countries and the time period is covered from 2010 to 2019. The data for dependent variable inequality adjusted human development index (IHDI), independent variable mobile subscriptions (MSPH), individual using internet per hundred people (INTUPH), industrial design applications (INDDA) and control variable health expenditure (HE) is taken from the World Development Indicator (WDI). All the independent variables are converted into log except for control variable as it was already in percentage term. The presence of innovation and ICT have a strong influence on the inclusive human development. The effect is significantly greater for those countries which have higher ICT adoption and innovation.

The impact of ICT adoption and innovation on inclusive human development is examined for the selected Asian countries. The countries have been taken

to conduct this study are Armenia, Azerbaijan, Bangladesh, Cambodia, China, Georgia, Indonesia, India, Iran, Israel, Japan, Jordan, Kazakhstan, Kyrgyz Republic, Mongolia, Nepal, Oman, Pakistan, Philippines, Singapore, Sri Lanka, Tajikistan, Thailand, Turkey, Uzbekistan, Vietnam, Some countries have been excluded due to the non-availability of data. The HDI indicates a national average of human development attained in the three main categories health, income and education. The IHDI is measured as the geometric mean of aspect indices adjusted for inequality. The estimation of each aspect is done through Atkinson inequality measure, which is based on the proposition that society has a fixed level of aversion to inequality.[2] Mobile cellular subscription per hundred people is defined as the subscription to a public mobile cellular service by using cellular technology to provide access to the public switched telephone network (PSTN). It consists of prepaid and postpaid subscriptions. It is measured by dividing the number of mobile cellular subscriptions to the total population of a country and then multiplying it with hundred.[3] Internet users is defined as those individuals who use internet from any location. Internet provides access to various communication services including entertainment, news, World Wide Web, and data file. Internet can be accessed through computer, android mobile, and game machine. The unit of measurement for internet is the number of internet users per hundred people.[4] Industrial design applications is defined as the applications which are required to register an industrial design with a regional or national intellectual property (IP) offices.[5] Health expenditure which is used as a control variable is defined as the total expenditure on health which is expressed as the percentage of GDP. It consists of all the expenditures that are utilized in the provision of all the activities related to health like family planning, emergency aid designated for health, nutrition activities.[6]

The model used in this study estimates the impact of ICT adoption and innovation incident on the inclusive human development. There are two proxy variables namely mobile subscriptions and individual using internet which are used for ICT adoption to examine its impact on inequality adjusted HDI for the Asian countries. The proxy variable for innovation is industrial design applications and Health expenditure is used as a control variable. The inclusive human development is best measured by the inequality adjusted human development index which is used as a proxy variable for the dependent variable in this study. The higher IHDI represents the greater

[2] 2020 Human Development Report
[3] International Telecommunication Union (ITU) World Telecommunication/ICT indicators Database
[4] International Telecommunication Union, ICT Development Report and database
[5] World Intellectual Property Organization (WIPO), Statistics Database at www.wipo.int/ipstats/.
[6] WHO. Health expenditure as percentage of GDP. Data by country. http://apps.who.int/gho/data

inclusive development for a country which could be achieved by greater innovation and technology adoption. The representation of the model is given below:

$$IHDI_{it} = \alpha + \beta_1 LMS_{it} + \beta_2 LINTUPH_{it} + \beta_3 LINDDA_{it} + \beta_4 HE_{it} + \varepsilon_{it} \ldots\ldots (1)$$

Where IHDI = Inequality Adjusted Human Development Index, LMS = Log of Mobile Subscriptions, LINTUPH = Log of Individual Using Internet per Hundred People, LINDDA = Log of Industrial Design Applications, HE = Health Expenditure, $\varepsilon =$ Residual. The subscript "i" and "t" indicates the number of cross sections and time as the data is of panel nature. The α, β represents the coefficients of equation and "ε" is residual. There are various econometric approaches which can be used to estimate equation At first pooled OLS technique is applied on the model for Asian countries. To find the heteroskedasticity, multicollinearity, and omitted variables problem in the model, the post estimation techniques of pooled OLS, Breusch-Pegan test, Variance inflating factor, and Ramsey test are applied respectively. The F-test is applied after the pooled OLS estimation to check if country-specific or time-specific effects need to be considered in the estimation. The F-test confirms the use of either fixed or random effects panel data techniques. Furthermore, the presence of heteroskedasticity in the estimates of pooled OLS provides rationale to move towards random and fixed effect model. The Hausman test has been applied to select the most appropriate model between fixed and random effect. Then, post estimation techniques are applied including modified Wald test and Wooldridge test for autocorrelation. Lastly, due to the presence of heteroskedasticity and serial autocorrelation in the model, the Prais-Winsten regression has been used to find the results.

5. Results and Interpretation

In this study, to find the impact of ICT adoption and innovation on the inclusive human development, the econometric techniques chosen to apply on selected Asian countries are pooled OLS, random effects (REM) and fixed effects (FEM). To determine the most appropriate econometric technique among fixed and random effects, the Hausman test is usually applied. The other Diagnostic tests like Wald test, Wooldridge test have also been applied to find the autocorrelation and heteroskedasticity in the data. Lastly, Prais-Winsten regression is applied to take into account the autocorrelation and heteroskedasticity.

The estimated equation is presented as follow:

$$IHDI\_it = 0.375 + 0.037LM\ 〖SPH〗\_it + 0.028LINTUPH\_it + 0.003LINDDA\_it + 0.001HE\_it + \varepsilon\_it \ldots\ldots\ldots\ldots\ldots (5.1)$$

The results of the test indicate that ICT adoption and innovation has positive and significant relationship with inclusive human development. The coefficient of mobile subscriptions per hundred people (MSPH) indicates the positive and significant relationship of ICT adoption and inclusive human development. The one percent increase in the MSPH would cause a 0.037 unit increase in the inequality adjusted HDI. Similarly, the coefficient of internet users per hundred people shows that inequality adjusted HDI increases by 0.028 unit due to perceived 1 percent change in internet users per hundred people. These results show that ICT adoption is an effective tool for development as applied by not only developed countries but also by developing countries. Those countries in which the adoption rate of ICT is high are usually distinguished by high levels of inclusive development (Johnson, 2016). As through the adoption of ICT, it is easier to get education certificates and degrees with the assistance of online courses and without being present in school, thus ICT adoption increases productivity and technical know-how (Azuh et al., 2020). The results of the study are consistent with the findings of Ejemeyovwi & Osabuohien (2018).

The relationship between innovation and inclusive human development is positive and significant. The 1 percent increase in the industrial design applications (INDDA) would lead to 0.003 unit increase in the inequality adjusted HDI. The results of the study show that innovation is important in the matter of solution provision and knowledge betterment to inclusive development as indicated by Ejemeyovwi et al., (2019). As the advancement in technology occurs, the adoption of innovation becomes essential for the development of different dimensions of human development, like security, education, health, and income. Innovation is considered and proven as a driving force for the inclusive human development (Romer, 1990).

The control variable has positive but insignificant relationship with inclusive human development. The one unit increase in the health expenditure would cause a 0.001 unit increase in the inequality adjusted HDI. The insignificant relationship of health expenditure with the inclusive human development is due to less GDP share on the health for developing Asian countries. The increasing level of health expenditure is associated with improved health outcomes, especially in developing countries (World Health Organization). As the developing countries have less per capita income so the GDP share of health expenditure is less for developing Asian countries.

Table 1: Estimated Results

Variables	Pooled OLS	Fixed Effect	Random Effect	Prais-Winsten Regression
MSPH	0.091*** (0.019)	0.052*** (0.015)	0.050*** (0.016)	0.037*** (0.007)

	[4.58]	[3.39]	[3.19]	[5.24]
INTUPH	0.093*** (0.007) [12.42]	0.037*** (0.006) [5.97]	0.044*** (0.006) [6.93]	0.028*** (0.003) [9.25]
INDDA	0.003 (0.003) [1.13]	0.002 (0.003) [0.60]	0.005* (0.003) [1.55]	0.003** (0.002) [1.89]
HE	0.010*** (0.002) [5.04]	0.007* (0.004) [1.87]	0.009*** (0.003) [2.91]	0.001 (0.002) [0.29]
Constant	-0.219*** (0.081) [-2.69]	0.177*** (0.062) [2.87]	0.137** (0.064) [2.15]	0.375*** (0.039) [9.55]
Diagnostic	F-Test: prob = 0.0000*** Breusch-Pagan for heteroskedasticity: 0.064* Ramsey Test = Prob > F = 0.0000*** VIF = 1.50	Hausman test: Prob>chi2=0.0000*** Wald test: prob>chi2=0.0000 Woolgridge test: prob > F=0.000		

Note: ***, **,* significant at 1%, 5%, and 10% respectively. Standard errors are given in brackets ( ). t statistics are given in parenthesis [ ]. Source: Authors own calculation.

6. Conclusion

This study has investigated how ICT adoption and innovation impact inclusive human development in 26 Asian countries for the time period 2010 to 2019. Inclusive human development is proxied by the inequality adjusted human development index (IHDI). ICT adoption is measured with individual using internet per hundred people (INTUPH) and mobile subscriptions (MSPH) whereas innovation is examined in terms of industrial design applications (INDDA). The empirical evidence is based on pooled OLS estimation. To nullify the effect of heteroskedasticity in the model, fixed and random effect techniques are applied. The fixed and random effect technique is applied on the model at first and Hausman test is applied afterward to choose between one of them. The results suggest that the estimates of fixed effect are more suitable. As the model is detected with heteroskedasticity and serial auto correlation, so pooled estimation is not enough therefore Prais-Winsten regression has been applied to find the estimates of variables.

The results of Prais-Winsten regression show the positive and significant relationship of ICT adoption and innovation on inclusive human development. As the one percent increase in mobile subscription per hundred people (MSPH) would cause a 0.037 unit increase in the inequality adjusted HDI. Similarly, 0.028 unit increase would occur in the inequality adjusted HDI due to 1 percent change in internet users per hundred people (INTUPH). The proxy variable of innovation also has positive and significant effect on the inclusive human development as one percent change in industrial design application (INDDA) would lead to 0.003 unit increase in the inequality adjusted HDI. All of these variables have positive contribution towards the inclusive human development of a country. The innovation in technology and adoption of ICT serve various purposes like improved quality of education, better health facilities, and improved business opportunities.

The findings have broadly proved that innovation and ICT adoption can be employed to enhance inclusive human development. Accordingly, it has been established that (i) ICT adoption complements inclusive human development; (ii) Innovation has significant effect on inclusive human development. (iii) The net effect of both ICT adoption and innovation is positive on inclusive human development. It is concluded that adoption of ICT through innovation in technology could improve the standard of living of people by enhancing inclusive human development. The results of the study support the findings of Asonghu et al., (2017); Ejemeyovwi et al., (2019); Azuh et al., (2020); Ejemeyovwi & Osabuohien, (2018).

The results of the study have some strong policy recommendations for both developing and developed countries. Some recommendations and policies which should be put forth to emphasize the importance of ICT and innovation are: On the basis of findings, it is suggested that emerging entrepreneurial Asian countries should encourage (i) the mobile subscription (ii) adoption of internet (iii) innovation as increase in the adoption of ICT and innovation significantly improve lives of individuals.

Compliance with Ethical Standards

- **Conflict of Interest:** There is no conflict of Interest.
- **Informed consent:** NA
- **Funding information:** NA
- **Ethical approval:** Not Required
- **Data Availability Statement:** The data will be provided upon request anytime.

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