

**Capacity Building for Sustainable Human Development: A Panel PMG/ARDL Analysis of East and South Asia**

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**ABSTRACT**

One of the biggest challenges of today’s world is to ensure, now and in the future, sustainable human development across the globe. The idea of this study is developed from Agenda 2030. During the last couple of decades, improvement in human development has been observed across the globe. However, many disparities are found in developing countries. People in developing countries are still not able to fully utilize their talent in economic activities. East Asian and South Asian regions are chosen for analysis in this study. The panel data of ten selected countries from both regions are collected from 1996 to 2016. After checking the stationarity of variables, PMG estimator is applied to estimate a model of study. The long-run estimated results confirm that simultaneous development of the economy, society, and environment is necessary to build the capacity of selected countries for sustainable human development.

**Keywords:** Agenda 2030, Capacity Building, Sustainable Human Development, Disparities, East Asia and South Asia, PMG Estimator

**INTRODUCTION**

There has been an improvement in human development over the past couple of decades. The basic indicators of human development have been showing improvements such as life expectancy, per capita income, school enrolment of both boys and girls, nutrition of child and mother, and other basic social services. Both Millennium Development Goals (MDGs) by UNO in 2000 and the commitment of its member countries have contributed to the growth of human development. The improvement in some indicators of human development is shown in the following table.

**Table 1: Improvement in Human Development**

Variables	Across the Globe		
	1990	2015	Improvement from 1990 to 2015
Number of Extreme Poor	1,926 million	836 million	1,090 million people have come out of the circle of extreme poverty
Malnourished People	23.3 % of the total population	12.9 % of the total population	10.4 percentage point improvement
Literacy Rate Among Youth (15-24)	83%	91%	8 percentage point improvement
Number of Child Mortality annually	12.7 million	6 million	6.7 million annual decreases in child mortality
Maternal Mortality per 100,000	380	210	Decrease in maternal mortality by 170 per 100,000
The ratio of Birth Control Among Women	55% of total women care about birth control	64% of total women care about birth control	9 percentage point increase in women population who care about family planning
Access to Improved Drinking Water Source	76% of the total population	91% of the total population	15 percentage point increase in the population who has access to an improved drinking water source

Source. Report of UNO on MDGs 2015

However, human development has not been consistent across the globe and there exit a lot of deprivations. For instance, 1 out of 9 persons lives below the poverty line, one out of three persons is a victim of malnutrition. In every minute, approximately 11 children (under age 5) die and approximately 24 people are included in migrants or homeless. In every hour, 35 pregnant women die due to lack of delivery treatment, in everyday environmental problems cause the death of 18,000 people across the globe. And in every year, approximately 15 million girls marry before 18 and 2 million people are infected by HIV.

There are three types of challenges which are hurdles in improving human development across all the regions of the world. One is economic issues (such as the vicious circle of poverty) which are prolonged, other is social problems (like inequality, gender discrimination in economic activities) which are deepened, and finally concerns about the environment (e.g. CO`2 emission) which are emerging.

These challenges are circulated around three sectors which are economy, society, and environment and when we include simultaneously all three sectors in development agenda it is called sustainability of people, planet and prosperity. There are two types of sustainability i.e. weak and strong sustainability.

Weak sustainability is equal to the constant sum of human-made capital (machinery, infrastructure etc.) and natural capital (air, water, soil, living organisms etc.), both human-made capital and natural capital are fully substitutes of each other. In weak sustainability, the constant sum of human-made capital and natural capital will be handed over to the future generation. Strong sustainability is equal to the constant sum of each capital since the productivity of one capital depends on the other and the substitution of each capital is possible only to some extent. Hence, according to the strong sustainability constant level of natural resources must be hand over to the next generation.

Under this concept of sustainability, in September 2015 UNO has approved 17 sustainable development goals and 169 targets to be achieved by 2030. The objects of Sustainable Development Goals (SDGs) people, planet and prosperity. Due to both the 2030 Agenda and Paris Agreement on Climate change, the concept of sustainability has been on main priority in policy making of all member countries of UNO. This increased attention is due to changes in climate and natural resources that we can all observe. Worse environmental changes have made it compulsory to modify our ways of production and consumption in order to save abilities & capabilities of natural and human resources prosperity of not

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only this generation but also of the future generation. Sustainable development is a ring of three sectors which are economy, society and environment (Hardi & Zdan, 1997; West Midlands Round Table, 2000)

The human development and 2030 Agenda are linked with similar features. Like, both agendas primarily stress on the well-being of everyone across the globe and hence these agendas are universal. The human development includes the concept of economic prosperity via a rise in per capita income, concepts of social prosperity via a rise in years of education per person, an increase in life expectancy. And 2030 also includes both concepts i.e. economic and social prosperity with additional concepts of environmental prosperity (UNDP, 2016). Hence, human development indicators can be used with additional indicators to assess the progress towards 2030 Agenda.

The term capacity building (CB) means an increase in one's own capabilities in order to achieve certain goals and targets. In this particular study, goals, and targets are circulated around the sustainability of human development in developing countries. Hence there is a need to identify such major determinants from the economy, society, and environment, which will enhance the capabilities of developing countries in order to achieve the goal of sustainable human development.

The role of women in the production process is crucial to enhance economic and social capabilities. According to the UN Food and Agriculture Organization, in Asia, the female labor force is 80 percent of the total labor force in the Agriculture sector and they are producing 50 percent of total agri-output. This share in agri-production can be increased by 20 to 30 percent by providing access to more resources used in agriculture and it will decrease extreme poverty by 12 to 17 percent in Asia. Hence, female participation in the production process of the economy can build the capacity of developing countries.

Simon Kuznets presented the relationship between the emission of CO<sub>2</sub> and economic development in form of a curve, and this curve is called the Environmental Kuznets Curve (EKC). According to this curve, the growth of the economy and degradation of environmental change in the same direction but only to some point. After that point, the relationship starts to change in opposite direction i.e. more growth of economy with low degradation of the environment. And economies also experience structural changes during the achievement of human development, for instance, developing countries move from the agriculture sector to the production sector and from the production sector to sophisticated service base structure. During this transformation of economic structure, developing countries experience hypothesis of EKC. Hence, the effect of emission of CO<sub>2</sub> is important in analyzing the capabilities of the economy and environment. The vicious circle of poverty can be break by injecting capital flows in the economy, however, there is a requirement of domestic capabilities for sustainable human development. In order to build domestic capabilities, domestic saving and educated

labor force are important. It will increase the speed of economic activities in the form of investment and production.

### The Objectives of the Study

There are two main objectives of the study:

- i. The objective is to find out Significant determinants to enhance the capacity building (CB) of countries for sustainable human development. The selected countries are from two regions i.e. East Asia and South Asia.
- ii. Increase awareness about strong sustainability.

### The Significance of the Study

- i. There has been an improvement in human development since the last couple of decades, however, this improvement is not yet in each region of the world. The major portion of the world's population live in East Asia and South Asia as we can see in the following table, so these regions are selected for analysis.

**Table 2: Population**

Region	Population (2017, in million)	Share in Total Population
World	7536	-----
Asia	4494	59.64% of World Population
South Asia	1845	77.21% of Asia &
East Asia	1625	46.04% of World Population

Source: [www.worldpopdata.org](http://www.worldpopdata.org)

- ii. The concept of the Capacity building is widely acknowledged by UNO and policymakers ((Fukuyama, 2013; Hyden & Mease, 2004; Rothstein, 2011) and human development cannot be sustained without a domestic capacity building. Hence this study will be helpful to illustrate the determinants which will build domestic capabilities of selected countries. )
- iii. The idea of this study is developed from 2030 Agenda and selected counties are members of UNO. Hence, this study will promote further research on 2030 Agenda and contribute to relevant policy-making in selected countries.

Section II presents a literature review and hypothesis of the study. Model specification, methodology, & data are described in section III, and result in interpretation in section IV. Finally, conclusion and policy recommendations are given in the last section.

## LITERATURE REVIEW

In the last decade, the concept of sustainability has gained the main attention of researchers, policy makers, and government. It is the reason for growing literature on the sustainability of the economy, society, and environment. This study develops an empirically link between economy, society, environment, and sustainability of human development on the bases of relevant literature, some of this literature is given below.

Kim et al. (2017) examined the effects of institutions on individual preferences. They made analysis by using data on NK refugees and SK students and found NK refugees showed more references for marked based economy and democracy than those of SK students. They also found a difference in

distributional preferences between NK and SK subjects is not only significant but also large.

Joshi et al. (2015) constructed three indices of governance for 183 countries and found positive prospects of governance in all selected countries. These found that governance contributed to progress in human development i.ee health, education, and income and concluded that governance is a necessary source for sustainable development.

Carbonnier et al. (2012) made a comparison of governance outcome in developed and developing countries. They found that some countries (Australia etc.) fully utilized their natural resources and included in the high-income group, some countries (South Africa etc.) utilized their natural resources and included in upper-middle income group, and finally some countries (Niger etc.) under-utilized natural resources and included in a poor income group. The basic difference in these groups of countries was the quality of governance.

Rizk (2012) gave empirical evidence of a decrease in poverty by increasing the quality of governance. He used data of 71 countries from 1996 to 2008 and showed in estimated results that a one percent increase in quality of governance will decrease 1.75 percent in poverty.

Baliamoune (2011) empirically analyzed the contribution of institutions in the growth of the economy. They collected data from 30 countries and used methods of fixed effects and Arellano-Bond GMM to estimate results. They found strong evidence that social capital increases the contribution of political institutions and weak evidence in case of civil liberties. Furthermore, institutions and social capital have a positive effect on economic growth and human capital.

Ozcan and Bjonskoy (2011) have tested the relationship between social trust and development. They collected primary data on social trust from 86 countries and used HDI as a proxy for development. The estimated results showed significant social trust and the speed of development in selected countries.

Portney (2013) tested empirically the Environmental Kuznets Curve (EKC), The author used data of 55 largest cities of USA, time period from 1990 to 2009 and estimated results showed that citizen of these cities expects from public policymakers to follow sustainability.

Dempsey et al (2011) presented a detailed survey of social sustainability within the urban context. He classified two dimensions of social sustainability, one is equitable access and other is the sustainability of the community. Equitable access means target to meet the needs of not only the present generation but also the future generation. The sustainability of community means the ability of society to survive as well as to reproduce itself

Custancet and Hillier (1998) examined the contribution of statisticians in describing indicators of sustainable development. Statisticians presented criteria to select an indicator. According to these criteria, the indicator must be sound, easy to understand, capable of being updated, able to indicate the whole scenario. Rennungs and Wiggering (1997) found that instead of a strong positive correlation between sustainable environment and economy, the slogan of

sustainability is looked a concern only for ecological economics and neoclassical economics focused on only materialistic development. They presented criteria to merge both environment and economy, this criterion is based on social cost and benefit analysis of environmental degradation.

Nayar (1994) highlighted sustainable development is only a fashionable buzz, and since it is against the developed countries. The north region is responsible for environmental pollution by industrialization, they not only degraded their own environment but also of the south region. He also linked theoretically environmental degradation with poverty.

Bravo (2015) updated his previous version of human sustainable development index and used emission of CO2 as a proxy for the sustainability of the environment. The advantage of an updated version of the index is the emission of CO2 is a major concern and has effects on many economic and social indicators.

Bravo (2014) developed the new form of human development index by including the role of the environment and named it Human Sustainable Development Index (HSDI). He used data taken from the UN, however, this index remained insufficient in its representation of sustainability of the environment.

### The Hypothesis of the Study

Above literature emphasized the role of institutions, environment, and society in sustainability. Hence, the following variables are chosen to build the capacity of selected countries for sustainable human development.

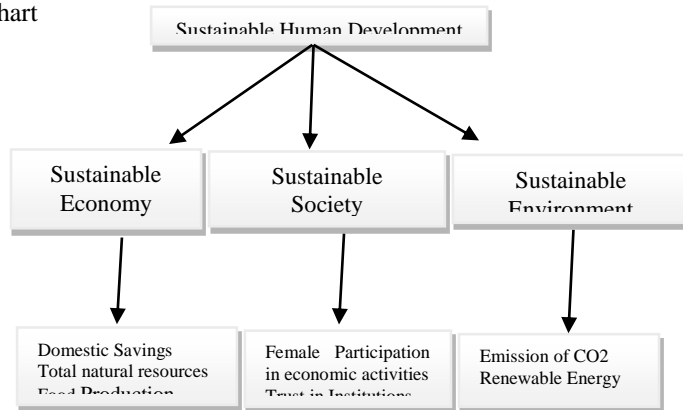
**H1:** Domestic Saving, total natural resources, female participation in the production process of the economy, renewable energy, food production, and institutions have a significant relationship with sustainable human development.

### METHODOLOGY AND MODEL SPECIFICATION

The following function describes the model of study  
 Sustainable Human Development = f (Capacity Building)  
 Where capacity building depends on economically sustainable development, social Sustainable development, and environmental development.

#### Model Specification

The specification of the model is illustrated in the following chart



**Figure:** Conceptual Framework, Source: Author's own work

In order to find an elasticity of independent variables the lin-log model is used in this study and given below

$$HDI_{it} = \beta_0 + \beta_1 \log(ANS_{it}) + \beta_2 \log(LEF_{it}) + \beta_3 \log(CO_2)_{it} + \beta_4 \log(TNR_{it}) + \beta_5 \log(RL_{it}) + \beta_6 \log(FPI_{it}) + \beta_7 \log(REO_{it}) + \mu_{it} \dots \dots \dots 1.1$$

Where  
*i* = 1,2,3.....10  
 and  
*t* = 1996,1997,1998.....2016

HDI = Human Development Index  
 ANS = National Savings  
 LFF = Female Labor Force Participation in Economic Activities  
 CO<sub>2</sub> = Emission of CO<sub>2</sub> (kt)  
 TNR = Total Natural Resources include Rent on Oil, Gas, Coal, Mineral, and Forest  
 RL = Rule of Law  
 FPI = Food Production Index  
 REO = Renewable Electricity Production as a percentage of Total Production of Electricity

**Data**

The panel data is used for 10 countries from East Asia and South Asia. In order to represent approximately the whole population of East Asia and South Asia, countries are selected on population size. Countries include Pakistan, India, Bangladesh, Sri Lanka, Indonesia, Malaysia, Republic of Korea, China, Thailand, and the Philippines. The data of Institution is collected from WGI by WB, data of HDI from UNDP, and data of remaining variables from WDI by WB. The time period is from 1996 to 2016.

**Econometric Methodology**

**Unit Root Test.** Since data of 20+ years for each country is used, so the unit root of each series of data is tested. And there are also differences among selected countries in their population size so following panel unit root test is applied in this study.

**The Im, Pesaran, and Shin (IPS) Test.** IPS unit root test allows heterogeneity on the coefficient of the  $Z_{i,t-1}$  variable.

The test procedure is based on the average of the individual statistic of each cross section. The Equation of the IPS test is given below

$$\Delta Z_{i,t} = \alpha_i + \rho_i Z_{i,t-1} + \sum_{k=1}^n \Phi_{ik} \Delta Z_{i,t-k} + \delta_i t + \mu_{it} \dots \dots \dots 1.2$$

While

$$H_0 : \rho_i = 0$$

$$H_1 : \rho < 0$$

Alternative hypothesis describes that coefficient of at least one cross section is less than zero. After checking the unit root test of data, the appropriate methodology is chosen for estimation. Since the value of HDI is effected by the previous value of HDI, hence dynamic model is used in the study. To estimate the dynamic model of this study, the pooled mean group estimator is chosen.

**The Pooled Mean Group (PMG) Estimator**

In PMG estimation, only the long run coefficients are constrained to be the same across countries, while short-run coefficients are allowed to vary. By using the equation of PMG estimator developed by Pesaran and Smith (1995), the unrestricted specification for the ARDL equation of the model of this study is

$$HDI_{it} = \sum_{j=1}^q \lambda_{ij} HDI_{i,t-j} + \sum_{j=1}^q \delta'_{ij} X_{i,t-j} + \mu_i + \varepsilon_{it} \dots \dots \dots 1.3$$

Where  $X_{it}$  is vector [7\*1 in this study] of explanatory variables. Here error term of the model is assumed independently distributed with zero mean and variance >0, and distributed independently of the regressors.  $\mu_i$  represents the fixed effects and  $p$  and  $q$  may vary across the countries. The error correction model for this study is given below

$$\Delta HDI_{it} = \theta_i (HDI_{i,t-1} - \beta_i X_{i,t-1}) + \sum_{j=1}^{p-1} \gamma_{ij} \Delta HDI_{i,t-j} + \sum_{j=1}^{q-1} \gamma'_{ij} \Delta X_{i,t-j} + \mu_i + \varepsilon_{it} \dots \dots \dots 1.4$$

Where the  $\beta_i$  is the long run parameters are the error-correction parameters. The error correction parameter indicates the speed of adjustment. If = 0, then there is no evidence that variables have long run the association. It is expected, that is negative and statistically significant under the prior supposition that variables indicate a convergence to long-run equilibrium in case of any disturbance. Since, the restriction in PMG estimator is that  $\beta$  is common across the countries, which is shown in the following model

$$\Delta HDI_{it} = \theta_i (HDI_{i,t-1} - \beta X_{i,t-1}) + \sum_{j=1}^{p-1} \gamma_{ij} \Delta HDI_{i,t-j} + \sum_{j=1}^{q-1} \gamma'_{ij} \Delta X_{i,t-j} + \mu_i + \varepsilon_{it} \dots \dots \dots 1.5$$

**ESTIMATED RESULT AND INTERPRETATION**

**Results of Unit Root Test**

IPS unit root test is applied to check the stationarity of data used in this study, and results are shown in the following table

**Table 3: Results of Unit Root Test**

Variable	At Level		At First Difference	
	With Intercept	With Intercept and Trend	With Intercept	With Intercept and trend
HDI	-0.59125	2.99539	-4.91523**	-4.56296**
L_ANS	-3.66857**	-1.08662	-10.3709**	-7.93104**
L_CO2	1.86410	0.66950	-10.8370**	-9.66887**
L_LFF	-1.29376*	-2.20879**	-----	-----
L_TNR	0.01552	2.74601	-9.95475**	-9.77634**
L_RL	-2.11956**	-0.48968	-8.63761**	-6.93321**
L_FPI	-1.39092*	2.05225	-10.3907**	-7.85843**
L_REO	-1.17300	-4.17596**	-10.6653**	-8.83812*

\*, and \*\* represent significant at 10% and 5% respectively, Source: Authors own calculation.

Variable of female labor force participation (LFF) is stationary on the level while remaining all variables are stationary at first difference. Since variables are stationary at mixed order i.e. either at  $I(0)$  or  $I(1)$ , hence PMG estimator is appropriate to estimate a model of study. PMG estimator requires selection of appropriate lag length for equations of an individual country. In this study, the Schwarz Bayesian

Criterion is used for appropriate lag length and results are given in the following table

**Table 4: Schwarz Criterion for Selection of Lag Length**

Lag Length	SIC
0	-6.125931
1	-33.84735*
2	-32.73141
3	-31.32002
4	-29.37451
5	-27.64441
6	-26.10883
7	-24.59703

\* represent minimum value of SIC. Source: Authors own calculation

When we applied Schwarz Bayesian Criterion on different lags length, the minimum value is calculated at lag length 1, hence we chose lag length 1 to estimate our model, and short-run results are given in the following table

**Table 5: Individual Short Run Estimates**

Variable	PAK	IND	BGD	LKA	IDN	MYS	KOR	CH N	THA	PHL
ECM	-	-	-	-	-	-	-	-	-	-
	0.64 **	0.03 **	0.78**	0.09 **	0.23 **	0.12 **	0.12 **	0.03 **	0.06 **	0.28 **
D(L <sub>AN</sub> S)	-	-	-	-	0.01 **	0.02 **	0.02 **	0.04 **	-	0.03 **
	0.02 **	0.01 **	0.02**	0.02 **	-	-	-	-	0.01 **	-
D(L <sub>C</sub> O <sub>2</sub> )	-	0.01 **	0.0068 59	0.01 **	0.02 **	0.08 **	-	0.04 **	0.02 **	0.02 **
	0.03 **	-	-	-	-	-	*8	-	-	-
D(L <sub>FP</sub> I)	-	0.07 **	0.03**	-	0.03 **	0.14 **	0.05 **	0.08 **	0.13 **	0.09 **
	0.02 **	-	-	-	-	-	-	-	-	-
D(L <sub>LF</sub> F)	0.01 **	-	0.92**	-	0.48 **	0.03 **	0.69 **	0.34 **	0.25 **	-
	-	0.04 **	-	0.04 **	-	-	-	-	-	0.08 **
D(L <sub>RE</sub> O)	0.01 **	0.02 **	0.02**	0.01 **	-	0.02 **	0.02 **	0.02 **	-	-
	-	-	-	-	0.02 **	-	-	-	0.02 **	0.01 **
D(L <sub>RL</sub> )	-	0.08 **	0.01**	-	0.01 **	-	0.02 **	-	0.01 **	0.02 **
	0.01 **	-	-	0.01 **	-	0.04 **	0.01 **	0.01 **	-	-
D(LTN R)	-	-	-	-	-	-	-	0.01 **	-	-
	0.02 **	0.01 **	0.02**	0.01 **	0.01 **	0.03 **	0.06 **	-	0.01 **	0.05 **
C	-	-	-	-	-	-	-	-	-	-
	0.22 **	0.01 **	0.35**	0.01 **	0.08 **	0.03 **	0.02 **	0.01 **	0.02 **	0.08 **

\*and \*\* represent significant at 10% and 5% respectively. Source: Authors own calculation

In the above table, for all selected countries the value of ECM is significant and also negative which means convergence towards equilibrium in the next period. However, the speed of adjustment from the current period to the next period is different in each country. The high speed of adjustment in Bangladesh and Pakistan, low speed of adjustment in China, India, and Sri Lanka, and average speed of adjustment in remaining selected countries. Here ECM = -0.64 in case of Pakistan which describes that speed of adjustment towards equilibrium is 64% from current period to next period in Pakistan, and value of ECM for each selected country has the same explanation

All variables in the case of each selected country (except variable LFF in the case of China) are significant. However, the magnitude and sign of each variable for a specific country of study are different. But we will rely on long-run behavior of our variables for interpretation.

Importantly, ECM also represents the existence of a long-run relationship among variables if it has a significant and negative value (Baek, 2016). As ECM value in this model is also significant and negative, hence there exist long-run relationship among variables of the model. So, the long run results are estimated and given in the following table

**Table 6: Long Run Estimates**

Variable	Coefficient	Standard Error	t-Statistic	Probability
L_ANS	0.044927**	0.008170	5.498815	0.0000
L_CO2_KT	0.084297**	0.019657	4.288367	0.0000
L_FPI	0.092502**	0.033808	2.736094	0.0073
L_LFF	0.218021**	0.018460	11.81044	0.0000
L_REO	-0.07210**	0.009035	-7.98000	0.0000
L_RL	-0.02658**	0.004432	-5.99839	0.0000
L_TNR	0.027588**	0.003334	8.274026	0.0000
ECM	-0.23989**	0.083544	-2.87067	0.0050
C	-0.08280**	0.037304	-2.21972	0.0286

\*\* represent significant at 5%. Source: Authors own calculation.

Following all interpretations belong to table 3. Since probabilities given in table 3 are less than 5%, so we reject our null hypothesis of study which means all variables are significant in long run. Since the lin-log model is used this study, hence long-run results are showing the percentage change in explanatory variables but an absolute average unit change independent variable.

The coefficient of variable CO2 is confirming the hypothesis of Environment Kuznets Curve (EKC) in the case of East Asia and South Asia. That is, as the economy and human development improve the emission of CO2 will also increase. But when the goal of sustainable human development achieves, emission of CO2 will start to decrease in these regions. Positive coefficients of both ANS and TNR are confirming the importance of domestic savings and natural resources for sustainable economic development. The role of the female in sustainable human development is also proved important as the coefficient of LFF is significant and positive.

Food production has been increased during the last few decades due to the adoption of green revolution by developing countries. It helped to improve human development, the positive coefficient of FPI in this study confirming this positive trend between food production and human development.

There are traditional societies in most of the selected countries, especially in South Asia. In traditional society, the staff of institutions, as well as people of societies, are reluctant to follow the rules and regulation. So, institutions are negatively contributing to capacity building. However, after some period when traditional societies convert into modern society, the institution will start to contribute positively to capacity building. And developing countries are lacked technical and financial resources to build Dams for the production of cheap and renewable energy. These countries have to obtain these types of assistance from developed countries. And in return, developed countries make influence to domestic policies of these countries in their own interests. Hence contribution of renewable energy in the improvement of human development.

## CONCLUSIONS

The main purpose of this research work is to identify indicators of the economy, society, and environment which are helpful to build the capacity of selected countries for sustainable human development. After empirical analysis in this study, the following indicators are found for this purpose. These are, domestic savings, utilization of natural resources,

renewable energy, control on emissions of CO<sub>2</sub>, female participation in all economic activities are min indicators for capacity building. However, in order to make an effective & positive role of the institution, there is a need to convert traditional societies of these regions especially of South Asia into modern societies. In order to enhance the capacities of countries for sustainable human development, the following policy recommendations are given on the bases of long-run estimates of this study

- First of all, to increase the participation rate of public and institutes in achieving both sustainable human development and SDGs, there should be more conferences, research seminars and lectures in educational institutes and policy-making institutes.
- Instead of focusing only on economic development, policymakers should include social as well as environmental preference, by allocating more fiscal resources on human capital and environment.

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