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The Effects of Environmental Degradation and Institutional Quality on Inclusive Human Development in Asia

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Abstract: Social justice, economic expansion, and environmental sustainability are all parts of the broad idea of inclusive human development. Encouraging inclusive human development in Asia is hampered by the problems caused by environmental degradation and poor institutional quality. This study examines the effect of environmental degradation and institutional quality on inclusive human development for 30 Asian countries over the period 2010-2023. The analysis of balanced panel of Asia is performed at aggregated and disaggregated level. The panel has been disaggregated on the basis of income level of countries i.e. high income, upper middle income, and lower middle income countries. The empirical evidences are based on Fixed Effect and Random Effect techniques. The Driscoll-Kraay Standard Errors technique is applied to take into account the autocorrelation and heteroskedasticity to present results more precisely. The empirical results of the study show that environmental degradation has negative and significant effect on inclusive human development, while governance has positive impact on inclusive human development in Asia. The impact of environmental degradation and institutional quality is negative on inclusive human development in high income countries. However, in upper and lower middle income countries institutional quality has positive effect on inclusive human development. In the end to ensure sensitivity of regression parameters with respect to sign, significance and magnitude, sensitivity analysis has been performed by taking into consideration different proxies of environmental degradation. Better environmental policies and strengthening financial institutions are especially needed to increase environmental sustainability and promoting financial inclusion therefore, policymakers should give the top priority to environment and institutions for inclusive human development.

Keyword: Inclusive Human Development, Environmental Degradation, Institutional Quality, Asia

1. Introduction

The sustained levels of human development and economic growth over a longer span of time are perquisite for sustainable development and inclusive growth of a country, and also making sure that everyone in a

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country can contribute and reap the benefits of development (Ndikumana, 2013). According to the Asian Development Bank (2014), inclusive human development is defined as the methods used to guarantee the equal allocation of resources, protection of citizens' rights, social security, and equal approach to both public and private services. Inclusive human development is important for progress of countries as without inclusive human development nations suffer long term delays in economic progress by hindering the best use of talent and reducing incentives for building human capital. Over the past twenty years, there has been an increase in global income and health inequalities. In several areas of the world concerns about the possible effects of growing inequality on social and economic stability as well as the sustainability of growth have increased in light of the global crisis and the recent unrest. Asia is not exempt from these worries, as decision-makers seek solutions to curb growing inequality and promote inclusive prosperity.

Though, Asia has had incredible progress in recent years, but there is rising worry that the rewards have not been distributed equally. An increasing number of Asian nations are establishing inclusive growth as the objective of development strategy in recognition of the potentially detrimental social, economic, and political effects of these developments. According to World Economic Forums Report (2023) Asian region frequently faces issues that are more severe than the rest of the world. In the Asia Pacific area, CO2 emissions account for about half of global emissions. Among the top 10 countries most impacted by climate change in the last 20 years are four South-East Asian countries: Thailand, Vietnam, the Philippines, and Myanmar. Furthermore, a 3.2 degree Celsius increase in temperature is expected to put 37% of the GDP of Association of South East Asian Nations (ASEAN) at risk.

As per United Nations Development Program (UNDP) Report, low levels of human development in developing countries are associated with weak social ties and slower economic growth, both of which make it more difficult to achieve sustainable development (UNDP, 2019). Therefore,

the notion of inclusive human development has gained significant attention in global development forums, particularly as a fundamental component of the Sustainable Development Goals (SDGs), which form the core of the United Nations' (UN) development agenda for the years 2016–2030. The focal point of it is the 17 Sustainable Development Goals (SDGs), which are an urgent call to action for all countries, developed and developing, in a global partnership. Among these 17 Goals of SDG's, the decrease of inequality is the focus of SDG-10, climate action is the responsibility of SDG-13, and strong institutions are the responsibility of SDG-16. The developed and developing world realize that, in addition to fostering economic progress, tackling climate change, safeguarding our oceans and forests, enhancing health and education, and reducing inequality are all necessary to eradicate poverty and other types of deprivation. Consequently, the enhancement of inclusive human development is given the highest priority in developing nations in both national and international development programs.

Among various other determinants that influence inclusive human development, environmental degradation and institutional quality are the two key determinants which play an important role. In literature there are various measures which are employed to measure environmental degradation. Some of these are CO2 emissions, bio capacity, and ecological footprint. Among these measures ecological footprint is the most suitable measure of environmental degradation as the primary indicator of environmental degradation employed in the past studies mainly concentrates on air pollution. To take into account environmental degradation, air quality is not the only indicator (Hunjra et al., 2020; Adebayo, 2023). This justifies the use of the ecological footprint as a more complete indicator of environmental quality.

Ecological Footprint is defined as the ecological resources required by a given population to produce goods and services they consume in their daily life and to take up its waste produced, particularly

carbon emissions (Global Footprint Network 2017). The social and economic fabric of a nation or region is seriously threatened by environmental degradation. Extreme environmental degradation can upset vital life-sustaining processes, resulting in problems including scarcity of food and water, public health emergencies, and working capacity of population. Aongu and Odhiambo (2018) concluded that increasing CO2 emissions have negative effect on inclusive human development. This indicates policy makers should focus on reduction of CO2 emissions which are potentially damaging to human development. The effects on industry, agriculture, and general economic stability can also be profound. The climate change and global warming have been more prevalent in recent decades as greenhouse gas emissions are commonly blamed for some of the world's problems. The natural environment of humans and other animals on earth is now seriously threatened by environmental degradation (Hunjra et al., 2020). The avalanche of carbon dioxide emissions (CO2) that are being released to the atmosphere as a result of humans consuming fossil fuels best explains the mounting concerns about the unparalleled environmental damage. The world has also seen an enormous decline in environmental quality, which is a direct outcome of people's growing desire for economic growth through the misuse of natural resources (Nathaniel & Bekun, 2020). According to the report of World Meteorological Organization (2024), there were 79 disasters throughout Asia in 2023 that were linked to hydro-meteorological hazard experiences. Eighty percent of these had something to do with storms and floods, resulting in nearly two thousand deaths and directly affecting nine million people. It shows that environmental degradation directly effects the components of IHDI.

Institutional quality, the second determinant influencing inclusive human development, which is examined in the past studies through governance. In a 1989 World Bank report on Africa, the concept of governance was given a contemporary definition: "the exercise of political power to manage a nation's affairs." In 1992, the World Bank changed its

definition of governance to include "the process through which authority is applied to the management of a nation's social and economic resources for development." Political stability, voice and accountability, government effectiveness, regulatory quality, control of corruption, and rule of law are the six indicators of good governance that are used in the past studies to gain a better understanding of institutional quality. Good governance has concentrated on increasing the efficacy and efficiency of institutions and rules in order to achieve equity, participation, openness, responsiveness, accountability, and the rule of law. These components are crucial to human development and the eradication of poverty since the weak and impoverished are usually the ones who bear the most from ineffective institutions.

Development organizations are realizing more and more that effective governance is not only a desirable end in itself but also a way to influence many other outcomes, most notably economic development and growth (Gisselquist, 2012). High levels of corruption cause tax evasion in nations with weak governments, taking money away from potentially beneficial public investments and impoverished peoples social programs. Government expenditures in health, education, and infrastructure are likely not being used efficiently to reduce poverty and achieve wider development goals due to the states low administrative capability and the service providers' inadequate transparency to the public (World Bank 2004). As stated by former UN Secretary-General Kofi Annan, "the single most important element in eliminating poverty and advancing development" is strong governance (UNDP 2002). Therefore, putting an emphasis on the quality of institutions is crucial for achieving other inclusive human development goals, such as reducing poverty, and achieving socio-economic prosperity (Olanrewaju et al., 2019).

The present study is very significant as it empirically observe the effect of environmental degradation and institutional quality on inclusive human development in Asian countries. There are several reasons why this

research is considered relevant in academic circles, including (i) the connection between inclusive human development and environmental sustainability have relevance with the post-2015 Sustainable Development Goals (SDGs); (ii) the problems associated with environmental degradation; and (iii) the contribution of improved institutional quality to environmental sustainability. Furthermore, this study is the most significant contribution to the existing literature due to two novel reasons. Firstly, it uses refined measures of inclusive human development (inequality-adjusted human development index) and environmental degradation (ecological footprint). Secondly, this study provides detailed empirical analysis of aggregated and disaggregated Asian panel. To the best of understanding and knowledge, the existing literature provides limited information about the empirical relationship of inclusive human development, ecological footprint and governance.

The organization of the study is as follow: After introduction, chapter two reports the literature of past studies pertaining to the effect of environmental degradation and institutional quality on inclusive human development. Chapter three comprised of the theoretical background of the study. In chapter four details of the data has been provided. Furthermore, it provides the specification of the model and the econometric techniques that are being employed to estimate the model. Chapter five discusses the empirical results of the study. Chapter six gives the details of conclusion, recommendations, and limitations.

2. Literature Review

Over the past two eras, various scholars have studied the impact of environmental degradation on economic growth, but there has been lesser research that has considered the environmental degradation and governance influence on the inclusive human development. The relevance of this research is based on a multitude of reasons in scholarly circles, namely (i) The relevance of Inclusive human development and

sustainability of environment with post 2015 Sustainable development goals (SDG's), (ii) issues surrounding the environmental degradation, (iii) the role of better institutional quality in enhancing sustainability of environment. These various factors are further extended in the same order as they are presented above.

First, the inclusive human development is the key theme in Sustainable development goals and its importance is even more crucial in Asia as severe poverty has been reducing in all the region of the world, while transitioning from the millennium development goals (MDGs) to sustainable development goals (SDGs) except for Asia. The dramatic decline in rate of poverty is well documented in some parts of the Asia while other countries have experienced less consistent growth. As the number of people living less than $1 a day decreased from 31% to 20% in 1990-2001 (Cook, 2006). Asia previously has witnessed the sound economic performance which was severely damaged by the financial collapse of 1997-1998. The highest growth has been experienced by the developing economies of Asia and Pacific with aggregate GDP expanding by 7.3% (Cook, 2006). Logically, this persistent course of economic growth has positive impact on emissions of greenhouse gases (GHG) which constitute a threat for the sustainability of environment which is a subject matter in the post 2015 development goals. Environmental degradation has an effect on the elements of Inequality adjusted human development index (IHDI). It mainly affects health, longevity, education, and standard of living. Firstly, In the presence of atmospheric pollution and absence of good transportation facilities, environmental deterioration directly affects the capability of parents to send their children to school. Curie et al. (2009) examined the impact of air pollution on school absence utilizing the data of 39 largest school districts in Texas for the academic year 1996-2001. The result of the study show significant and positive impact of CO2 emissions on school absences. Furthermore, such air pollution can affect the abilities of students to study efficiently in the classroom. Clark et al. (2012) studied the impact of air pollution

associated with traffic on the health of children and cognition by using sample of 719 children from 22 schools near London's Heathrow Airport. By multiple level modelling the conclusion of the study reveals that the impact of air pollution on children's health and cognition was moderate in school but the exposure to the noise of aircrafts was significantly affecting the conceptual recall memory of children in school. After adjustment for nitrogen dioxide the result show that the noise from aircraft pollution is also associated with poorer reading comprehension.

Secondly, there is a direct impact of environmental degradation or pollution on the health and life span of individuals. (Rich 2017 & Boogaard et al., 2017) Undertook an accountability study to observe the effect of air quality on the health of citizens. In this study the comprehensive review of the various studies show that improved air quality leads to beneficial health responses. As the results of most studies indicates that 1 micro gram per meter cubic decrease in annual country average SO2 associated with less infants and also increases infants weights and lengths. The increased emissions of SO2 in the atmosphere increases the prevalence of bronchitis, frequent colds, and febrile infections. Environmental degradation also affects the workers ability in a family to find work efficiently. This in turn can have an impact on a family's income. Zivin & Neidell (2012) studied the influence of pollution on the productivity of workers. The result of the study show that there is a 5.5 percent change in the productivity of worker due to 10ppb[1] change in average ozone exposure.

Second, environmental sustainability is the most important concern of sustainable development goal's agenda. This issue in Asia is based on two main factors, (i) the staggering indication of energy setback and (ii) Results of worldwide environmental degradation. According to Asian development bank's (ADB) report of 2013, more than 600 million population of Asia do not have access to sustainable and accessible

[1] PPB = Parts Per Billion is a unit of measurement for ozone exposure

modern electricity, which is important to attain the goals of sustainable development. There is abundant literature that shows the linkages between CO2 emissions, energy consumption and economics growth. There are two main aspects that make up the related literature. The first aspect of literature describes the relation between environmental degradation and economic growth, particularly focusing on Environmental Kuznets Curve (EKC) hypothesis. Akbostanci, Turut-Asi, & Tunc (2009) examined the two levels association between quality of environment and income for Turkey. First, using cointegration techniques, the linkage between per capita income and CO2 emissions was observed by using time series model. In the second step, by using PM10 and SO2 measurement, the association between income and air pollution was observed. The results of both panel data and time series do not favor the Environmental Kuznets Curve hypothesis. Similarly, Diao et al. (2009) studied the relationship between quality of environment and economic growth in China. Another research was conducted in Canada over a time span of 57 years to observe Environmental Kuznets Curve for CO2 (He & Richard, 2010). The results of the study show little evidence in favor of EKC hypothesis.

The second aspect of literature consists of further two sub aspects. On one hand there is literature which shows the nexus between economic growth and consumption of energy while on the other hand, the literature shows relationship between economic growth, pollution and consumption of energy. Akinlo (2008) observed the causal linkage between economic growth and energy consumption for time period 1980-2003 for eleven sub Saharan African countries. By employing Autoregressive distributed lag (ARDL) technique, the outcomes of the study indicates that in some countries consumption of energy has positive impact on economic growth in long run. While for two countries Ghana and Zimbabwe the relationship is negative. The remaining countries show bidirectional relationship.

Another similar study was conducted in Seven African countries to observe the causal linkage between growth and energy over the time period 1970-2007 (Esso, 2010). By using Cointegration technique the results of the study reveals that there is positive and significant long run impact of economic growth on energy consumption for 5 African countries before 1988, after that this effect becomes negative for two countries in Ghana and South Africa. While in other countries the results show unidirectional relationship for some countries and bidirectional relationship for the remaining countries. Olusegun (2008) observed the association between economic growth and consumption of energy in Nigeria for the time period 1970-2005. By employing ARDL techniques the results of the study show unidirectional causal linkage between economic growth and consumption of energy.

Ang (2007) using cointegration technique observed the causal association between consumption of energy, CO2 emissions and output in France for time period 1960-2000. The empirical outcomes of the study show that more CO2 emissions results due to more usage of energy, and in long run output and CO2 emissions have quadratic relationship. Furthermore, Apergis and Payne (2009) extended this research of Ang (2007) to observe causal relationship among energy usage, CO2 emissions and output for six Central American countries over the period of 1971-2004. The outcomes of the research support Ang (2007) energy usage has positive and significant effect on the CO2 emissions and output. These outcomes also validate the Environmental Kuznets Curve (EKC) hypothesis that emissions of CO2 growing with real output, stabilizing and then declining. Boluk and Mehmat (2015) examined the potential of renewable energy in decreasing the effects of Greenhouse Gas (GHG) emissions in both short and long run in Turkey for time period 1961-2010. The result of the study supports the previous literature as the EKC is U shaped both in long and short run. The overall results of the studies show that nonrenewable energy usage has positive relationship with emissions of CO2. So, in order to prevent environment, countries should focus on

utilizing the renewable energy as it shows negative relationship with CO2 emissions.

The other major reason that environmental sustainability is important concern for Asia is global environmental degradation. Asongu and Odhiambo (2018) examined the impact of degradation of environment on inclusive human development for 44 sub-Saharan African countries for the time period 2000-2012. The fixed effect, Tobit regression, and Generalized Method of Moments (GMM) methods were employed to get empirical results. The net outcomes reveal that increasing CO2 emissions have negative effect on inclusive human development. Furthermore, this paper suggest that the detrimental effects of CO2 could be reduced by relying on mechanisms like Information and communication technologies (ICT). As the transportation costs can be saved by utilizing ICT's and such savings can be ultimately used for education and health expenditure. Asongu, Roux and Biekpe (2017) investigated that how Information and communication technologies (ICT) accompany CO2 emissions to impact inclusive human development over the period 2000-2012 for 44 sub-Sahara Africa countries. By employing GMM techniques the results proves the Asongu and Odhiambo (2018) suggestions. As the results reveal that ICT can be used to decrease the negative impact of environmental pollution on inclusive human development.

Third, there is abundant literature that supports the view that political will is important in addressing the policy disorders of degrading environment, especially by taking into consideration sustainable development Goals. Tamazian & Rao (2010) observed that whether institutional and financial development matter for environmental degradation by using sample of 24 transition economies over a period of 1993-2004. By using GMM technique, they found that both financial development and institutional quality matters for environmental performance. Furthermore, the study suggests that government can assist in improving environment by establishing strong institutional structures that will have long term effect

in the reducing Greenhouse GHGs emissions. Aongu & Odhiambo (2020) used same econometric technique of GMM and examined the importance of governance in mediating environmental degradation effect on inclusive human development over the period 2000-2012 in 44 Sub Saharan African nations. By employing GMM, the outcomes of the study reveal that Institutional quality modulates CO2 emission in exerting negative impact on the inclusive human development but the net effects are positive which shows good governance is needed to be improved in order to attain net positive effect.

Good governance plays important role in achieving inclusive human development. Pradhan and Sanyal (2011) examined the effect of good governance on Human development in 15 Indian states. At first they examined the quality of governance and status of human development in Indian states and after that they examined the influence of good governance on human development. The empirical result of the study show that in the Indian economy, good governance is important element to achieve human development.

Stylianou, Nasir and Waqas (2023) investigated the nexus of Governance and inclusive human development for selected Asian countries over the period 2010-2017. In a regression model six indicators of governance have been employed as an independent variable. To develop overall governance index principal component analysis was used. The outcomes of the study show, variables have strong causal association among each other. Moreover, the important finding of the study is the bidirectional causality association between Inequality Adjusted Human Development Index (IHDI) and development expenditure. Similarly, Keser and Gokmen (2018) examined the relation of Human Development Level and indicators of governance for 33 member countries of European Union (EU) over the period 2002-2012. The results of the study indicates positive linkage between governance and human development. Which indicates that better quality of governance in any country can improve the human development.

Ouma and Nadzanja (2019) studied the effect of governance and fiscal policies on human development for 19 common Market for Eastern and Southern Africa (COSMEA) countries for the time period 1990-2016. By employing GMM techniques, the result of the work show, good governance and fiscal policy has positive and significant effect on human development. Scholl and Schermuly (2020) investigated the effect of corruption on human development and gross domestic product. The findings reveal, GDP has positive effect on human development and corruption has negative influence on human development. Similarly Brada et al. (2019) observed the linkage between corruption and human development over a period 1990-2018 in 45 developing countries. The findings are consistent with Scholl and Schermuly (2020) that corrupt nations get less Foreign Direct Investment (FDI) and GDP has a significant relationship with human development while on the other hand the relationship of human development and corruption is negative. The overall findings of the literature show that good governance is the potential factor to achieve inclusive human development.

The overall review of the literature shows that impact of environmental degradation on inclusive human development is negative as it impacts negatively the determinants of IHDI like health, education, and income. The effects of Governance observed in various countries are positive as political stability and institutional quality plays important part in the development of a country. To enhance inclusive human development Asian countries should improve their Governance and environment quality.

The study of the past literature show that researchers have mainly examined effect of environmental degradation and governance on Economic growth and Human. There are few studies in which effect of environmental degradation and governance has been observed on the inclusive human development but these studies have not actively observed the relationship of environmental degradation, institutional quality, and

inclusive human development for Asian countries. As the study of literature shows that most of studies are conducted in African nations. Furthermore, this study employs more refined measure of environmental degradation (ecological footprint) and inclusive human development (inequality adjusted human development index). This study is set out to fill the research gap and it will put up to the existing literature by observing the effect of environmental degradation and institutional quality on inclusive human development in Asia.

3. Data and Model Specification

In this research balanced panel data is employed to observe long run effect of environmental degradation and institutional quality on inclusive human development for selected Asian countries. The time period taken in this study is from 2010-2023. The effect of environmental degradation and institutional quality on inclusive human development is examined for thirty selected Asian countries. The countries which have been included in this study are Cyprus, Georgia, Israel, Japan, Kazakhstan, Russian Federation, Thailand, Turkey, Armenia, Azerbaijan, China, Egypt, Indonesia, Iran, Jordan, Maldives, Mongolia, Sri Lanka, Viet Nam, Kyrgyz Republic, Philippines, Bangladesh, Bhutan, Cambodia, India, Iraq, Nepal, Tajikistan, Pakistan, and Yemen. Some countries of Asian region have been excluded due to non-availability of data.

The secondary source of data is employed in this study. Inequality Adjusted Human Development Index (IHDI) is taken as dependent variable and data for this variable is taken from United Nations Development Program (UNDP) reports. The data for independent variable ecological footprint (bio capacity global hectares per person) as proxy of environmental degradation is taken from Global Footprint Network. Governance is taken as a proxy of institutional quality and its data is taken from World Governance Indicators (WGI). The data for control variables, Financial Development Index (FDIN) is taken from International

Monetary Fund (IMF), while Globalization and RGDP growth is taken from World Development Indicators (WDI).

Table 4.1: Description of the Variables

Variables	Symbols	Proxies	Unit of Measurements	Expected Signs	Data Sources
Dependent Variable					
Inclusive Human Development	$IHDI_{it}$	Inequality adjusted human development index	Index (0-1)		UNDP Reports
Independent Variables					
Environmental Degradation	ECF_{it}	Ecological Footprint	Global Hectares per person	-	Global Footprint Network
Institutional Quality	GOV_{it}	Governance	Index (0-100)	+	World Governance Indicators
Control Variables					
Financial Development	$FDIN_{it}$	Financial Development Index	Index (0-1)	+	IMF
Globalization	$ECGIN_{it}$	Economic Globalization	Index (0-100)	+	KOF
Economic Growth	$RGDP_{it}$	Real GDP Growth	Percentage	+, -	World Bank Indicators

The model employed in this study empirically estimates the long run effect of environmental degradation and institutional quality on inclusive human development. The econometric equation of the model is as follows:

$$IHDI_{it} = \alpha + \beta_1 ECF_{it} + \beta_2 GOV_{it} + \beta_3 ECGIN_{it} + \beta_4 FDIN_{it} + \beta_4 RGDP_{it} + \varepsilon_{it}$$

Where,

$IHDI_{it}$ = Inequality Adjusted Human Development Index

ECF_{it} = Ecological Footprint measured as global hectares per person

GOV_{it} = Governance Index

$ECGIN_{it}$ = Economic Globalization Index

$FDIN_{it}$ = Financial Development Index

$RGDP_{it}$ = Real GDP (Growth Rate)

ε_{it} = Residual

As the data is of panel nature so in the above equation “i” indicates the number of cross sections, and “t” shows time, “α” in equation represents intercept, while β represents the coefficients, and "ε" is residual.

4. Estimation Technique and Results

There are several econometric methods that can be employed to estimate the model. The panel data often exhibits problem of Cross-Sectional Dependence (CD) which gives potentially distorting and incompetent results, therefore, at first CD test are applied on the model. Based on the results of CD, Unit root tests are applied to check for stationarity in model. To estimate panel data to check for the regression,

there are three approaches Pooled Ordinary Least Square (POLS), Fixed Effect (FE), and Random Effect (RE) among others. In this study, to control for the unobserved heterogeneity, fixed effect and random effect approaches are employed. Then, to select most appropriate model between Fixed and Random Effect, Hausman test is applied. Then, to check for the autocorrelation and heteroskedasticity problem, post estimation techniques are applied including Wooldridge and modified Wald test. Given the presence of serial autocorrelation and heteroskedasticity in the model, Generalized Least Square (GLS) test is applied to find results more precisely. In the end to check for the sensitivity of independent variables with respect to sign, significance, and magnitude sensitivity analysis has been performed by taking the different proxies of environmental degradation.

Firstly, CD test is applied, selection of the first generation unit root test and second generation unit root test is based on the p-value of CD test. To check for stationarity of panel data set, first generation panel unit root IPS (lm, Pesaran, & Shin) test and second generation unit root test CIPS (Cross-Sectionally Augmented IPS) test are employed.
The results of panel unit root tests are given in the table 4.1

Table 4.1: Panel Unit Root Results

Variables	CD Test (p-values)	CIPS (Level)	1st Difference CIPS	Decision
$\mathbf{IHDI_{it}}$	43.95 (0.000)	-2.443	……..	I(0)
$\mathbf{ECF_{it}}$	4.18 (0.000)	-2.638	……..	I(0)
$\mathbf{GOV_{it}}$	3.33 (0.001)	-2.037	-3.272	I(1)
$\mathbf{ECGIN_{it}}$	2.43 (0.015)	-1.686	-3.556	I(1)

$FDIN_{it}$	28.83 (0.000)	-2.744	……..	I(0)
$RGDP_{it}$	32.91 (0.000)	-2.820	……..	I(0)

The results of study show that all variables IHD_{it}, ECF_{it}, GOV_{it}, $ECGIN_{it}$, $FDIN_{it}$, and $RGDP_{it}$ are cross sectional dependent as the p value is significant for the variables. Then, second generation unit root test CIPS test is applied keeping in view results of CD test. The results of CIPS test show that variables, $IHDI_{it}$, ECF_{it}, $FDIN_{it}$, and $RGDP_{it}$ are stationary at integrated level [I (0)], whereas the variables GOV_{it}, and $ECGIN_{it}$ are stationary at integrated level [I (1)].

The econometrics techniques which are chosen to check effect of environmental degradation and institutional quality on inclusive human development are, REM and FEM. In order to choose most appropriate technique between FEM and REM, Hausman test is usually applied. The results of Hausman test are provided in table 4.2 which determine most appropriate model between FEM and REM for panel data estimation.

Table 4.2: Hausman Test Result

Region	Chi^2 **Test Statistics**	$Prob > Chi^2$	**Conclusion**
Asia	18.33	0.0026	Fixed effect model is appropriate
High Income Countries	23.60	0.0000	Fixed effect model is appropriate
Upper Middle Income Countries	2.53	0.7716	Random effect model is appropriate
Lower Middle Income Countries	10.36	0.0658	Random effect model is appropriate

Ho: Random Effect Model is suitable; **Ha**: Fixed Effect Model is suitable.

To check for the most suitable model between FEM and REM, if value of Chi-square probability value > 0.05, the REM is most suitable and if Chi-square probability < 0.05, the FEM is preferred for estimation. As the table 4.2 given above indicates that chi-square probability value for Hausman test in Asia is 0.0026, which is less than 0.05, it means the FEM is most preferred technique given the characteristics of data set. The chi-square probability value for high income countries is 0.0000 which is less than 0.05 which indicates that FEM is appropriate. The decision for upper middle income countries based on the chi-square probability value which is 0.7716 shows that REM is appropriate. Similarly for lower income countries REM is appropriate technique as the value of chi-square probability is greater than 0.05. Table 4.3 gives results of fixed effect model.

Table 4.3: Fixed Effect Model Results (Overall Asia)

Asia			
Variables	**Fixed effect Model**		
	Coefficients	**P-values**	**Std. Errs.**
ECF_{it}	-0.0103*	0.015	0.0042
GOV_{it}	0.0003	0.394	0.0004
$ECGIN_{it}$	0.0011*	0.025	0.0005
$FDIN_{it}$	0.4215*	0.000	0.0398
$RGDP_{it}$	-0.0002	0.146	0.0002
Constant	0.3979*	0.000	0.0304

Diagnostic Test Results	**Wald test**: prob>chi2= 0.0000		**Decision:** Presence of Heteroskedasticity
	Woolgridge test: prob > F= 0.0019		Presence of Autocorrelation

Note: * shows variable is significant.

The study further enhances the empirical analysis of FEM through serial autocorrelation and heteroskedasticity across the panel by applying Wooldridge test and Wald test. The results of Wooldridge test shows that there is presence of serial autocorrelation in the dataset, as the value of probability is 0.0019 which is < 0.05. If the prob. > 0.05, it indicates the absence of serial autocorrelation. When there is presence of autocorrelation and heteroskedasticity in the model then results cannot be interpreted with precision therefore, Driscoll-Kraay Standard Error is taken into consideration. As it is clear in the table 4.3 that present study has the presence of serial autocorrelation, therefore Driscoll-Kraay Standard Error test has been performed.

Table 4.4 gives results of regression with Driscoll-Kraay Standard Errors which is applied to solve the problem of autocorrelation and heteroskedasticity in the model.

Table 4.4: Results with Driscoll-Kraay Standard Errors

	Asia		
Variables	**Driscoll-Kraay Standard Errors**		
	Coefficients	**P-values**	**Drisc/Kraay Std. Errs.**
$\mathbf{ECF_{it}}$	-0.0103*	0.000	0.0019
$\mathbf{GOV_{it}}$	0.0003	0.487	0.0004

$ECGIN_{it}$	0.0011*	0.027	0.0004
$FDIN_{it}$	0.4215*	0.000	0.0679
$RGDP_{it}$	-0.0002	0.123	0.0002
Constant	0.3979*	0.000	0.0182

Notes: * shows variable is significant.

The results in the table 4.4 permits the formulation of equation by utilizing the list of coefficients of estimated parameters. The equation for the model can be represented as follow; $IHDI_{it} = 0.397 - 0.0103ECF_{it} + 0.0003GOV_{it} + 0.0011ECGIN_{it} + 0.4215FDIN_{it} - 0.0001RGDP_{it} \ldots$ (1)

The given results show that ecological footprint and governance have negative and positive effect on the inclusive human development respectively. The control variables, financial development index, and economic globalization, are also positive which indicates their positive relationship with inclusive human development. The sign for GDP growth is negative which shows the negative association with inclusive human development.

The coefficient of ECF_{it} has negative but significant relationship with inclusive human development. This means that, one unit increase in ECF_{it} on average has decreased inclusive human development by 0.0103 units. As degradation of the environment causes limitation on the access to natural resources like fertile land, clean air and water, which in turn increases inequality and poverty, it further decreases opportunities which are essential for economic participation, especially in agricultural nations (Asonghu, 2018). Environmental degradation also affects the workers ability in a family to find work effectively or work efficiently. This in turn can impact a family's income. This present results are in line with Zivin & Neidell (2012) who studied, impact of pollution on worker's productivity. The negative relationship of ECF_{it} with inclusive human development is

also in line with the Asongu et al. (2017) who found that inclusive human development is negatively affected by carbon dioxide degradation. It also align with results of Asongu and Odhiambo (2019) in which they studied the relationship of environmental degradation and inclusive human development for 44 Sub-Saharan African countries.

Coefficient of GOV_{it} shows positive and insignificant relationship of institutional quality with inclusive human development. The aforementioned outcome indicates that these nations' well-being is evenly enhanced by the advantages of institutional quality. Consequently, less developed economies such as those in Asia benefit from institutional quality, which creates an environment that is favorable to their needs and offers advantages like equitable resource distribution, high levels of education, good health, and jobs with greater growth potential (Nginyu et al; 2023). The positive results of the governance show that the Asian countries have the capacity to boost inclusive human development through excellent governance. This finding align with outcomes of Yinusa et al. (2020), and Olanrewaju et al. (2019) who observed that institutional quality plays positive role in driving inclusive growth in Nigeria. It is also in accordance with the results of Stylianou et al., (2023) who confirmed the positive relationship of institutional quality and inclusive human development in Africa.

Financial development has positive and significant relationship with inclusive human development in Asia during 2010-2023. One unit increase in financial development has caused the increase in inclusive human development by 0.4215 units. Financial development plays important role in social and human development, as it promotes inclusive growth (Kebede et al., 2021). As financial system of a country improves like improvement in banking and access to credit it ultimately leads to increased growth opportunities, innovation and enhanced investment opportunities which in turn improves inclusive human development. Positive and significant relationship of financial development indicates that it causes improvement in inclusive human development by enhancing

infrastructure, creating employment opportunities, improving economic resources, and increasing financial inclusion (Masoud, and Hardaker, 2012). The results of the study are consistent with Dutta and Singh (2019) who concluded that financial development significantly and positively impacts inclusive human development in case of Asian countries.

Economic globalization has positive and significant effect on inclusive human development, which indicates that one unit improvement in economic globalization has caused 0.0011 unit increase in inclusive human development. The results of the study proves that globalization enhances inclusive human development, which clearly suggests that Asian countries should increase engagement in liberalization to improve inclusiveness in human development. As the integration of countries increases, they experience improvement in transfer of technology, flow of capital, trade and innovation which in turn leads to enhanced economic growth and ultimately to improved inclusive human development. Globalization have the potential to enhance the access to better goods, innovation and services which benefits health care, distribution of income and education, which directly improves inclusive human development (Ali et al; 2021). This result is in accordance with previous studies Asongu & Nwachukwu (2016), and Ullah & Azim (2015).

The results of the GDP growth show that it has negative and statistically insignificant impact on inclusive human development. The negative relationship of economic growth is due to the fact that economic growth often concerned about aggregate output, which does not always turn into the equitable distribution of resources which ultimately leads to the improvement in the living conditions of the small segments of a society (Masoud and Hardaker; 2012). The negative impact of RGDP can be attributed to uneven distribution of benefits gained through growth. In most of the cases economic growth enhances wealth without necessarily increasing access to healthcare, education, and inequality which causes negative relationship of RGDP with inclusive human development. These

negative results of RGDP are consistent with the study of stewart et al. (2018).

Table 4.5: Fixed Effect and Random Effect Model Results of Disaggregated Asian Panel

Variables	High Income Countries	Upper-Middle Income Countries	Lower-Middle Income Countries
	Fixed Effect Model	Random Effect Model	Random Effect Model
	Coefficients P-values Std. Errs.	Coefficients P-values Std. Errs.	Coefficients P-values Std. Errs.
ECF_{it}	-0.5491* 0.020 0.0054	-0.0007 0.706 0.0064	0.0048* 0.665 0.112
GOV_{it}	-0.0022* 0.008 0.0008	0.0012 0.165 0.0090	0.0015* 0.018 0.006
$ECGIN_{it}$	0.0049* 0.000 0.0009	0.0031* 0.003 0.019	-0.0008 0.180 0.0006
$FDIN_{it}$	0.1743* 0.019 0.072	0.0017* 0.004 0.125	0.2485* 0.001 0.7310
$RGDP_{it}$	-0.005 0.486 0.009	-0.0067* 0.012 0.0004	-0.0002 0.282 0.0001
Constant	0.549* 0.000 0.005	0.4310* 0.000 0.0521	0.4331 0.665 0.112
Diagnostic Test Results			
High Income Countries	Wald test: prob>chi2= 0.7792		**Decision** Absence of Heteroskedasticity
	Woolgridge test: prob > F= 0.0021		Presence of Autocorrelation

Upper Middle Income	Wald test: prob>chi2= 0.0000	Presence of Heteroskedasticity
	Woolgridge test: prob > F= 0.0536	Presence of Autocorrelation
Lower Middle Income	Wald test: prob>chi2= 0.0000	Presence of Heteroskedasticity
	Woolgridge test: prob > F= 0.1569	Absence of Autocorrelation

Notes: * shows variable is significant.

The table 4.5 gives the results of FEM and REM for disaggregated Asian panel. As firstly Hausman test is applied to select most suitable model between FEM and REM. The results of the Hausman test suggested FEM for high income countries and REM for upper middle and lower middle income countries. The study further enhances empirical analysis of FEM and REM through serial autocorrelation and heteroskedasticity across the panel by applying Wooldridge test and Wald test. The results of Wooldridge test shows that there is presence of serial autocorrelation in dataset, as value for probability is 0.0021 in high income countries which is < 0.05. If the prob. > 0.05, it indicates the absence of serial autocorrelation. The same issue of autocorrelation and heteroskedacity is present in upper middle income and lower middle countries. When there is presence of autocorrelation and heteroskedasticity in the model then results cannot be interpreted with precision therefore, Driscoll-Kraay Standard Error is taken into consideration. As it is clear in the table 4.5 that present study has the presence of serial autocorrelation, therefore Driscoll-Kraay Standard Error has been performed.

Table 4.6: Results with Driscoll-Kraay Standard Errors and REM Generalized Least Square (GLS)

Variables	High Income Countries	Upper-Middle Income Countries	Lower-Middle Income Countries
	Driscoll-Kraay Standard Errors	REM Generalized Least Square (GLS) Results	REM Generalized Least Square (GLS) Results
	Coefficients P-values Drisc/Kraay Std. Errs.	Coefficients P-values Std. Errs.	Coefficients P-values Std. Errs.
ECF_{it}	-0.0132* 0.006 0.004	-0.0001 0.917 0.0016	-0.0101 0.215 0.0081
GOV_{it}	-0.0022* 0.003 0.0006	0.0015* 0.001 0.0004	0.0018* 0.000 0.0005
$ECGIN_{it}$	0.0049* 0.000 0.0049	0.0014* 0.004 0.0005	0.0024* 0.000 0.0003
$FDIN_{it}$	0.1743* 0.049 0.0679	0.0009 0.796 0.0003	-0.0011 0.982 0.0509
$RGDP_{it}$	-0.0005 0.658 0.0011	0.00005 0.724 0.0004	0.0001 0.345 0.0001
Constant	0.5491* 0.000 0.0605	0.4702* 0.000 0.0280	0.3219* 0.000 0.0236

Note: * shows variable is significant.

The table 4.6 shows that in high income countries, ecological footprint has negative and significant effect on Inclusive Human development. However, the impact of ecological footprint in upper and lower middle income countries is negative and insignificant. One unit increase in ECF has caused 0.0132 unit decreases in inclusive human

development in high income countries. The negative effect of ecological footprint indicates that as ECF increases it causes more degradation of the environment which in turn decreases inclusive human development by effecting its determinants like education, income and health. Global environmental degradation and ecological damage have resulted from the industrialization process' overuse and depletion of resources that are renewable, jeopardizing people's advancement and existence (Mahmoud et al., 2020). The negative results of ECF are aligned with the study of Asongu and Odhiambo (2019) who found that ECF negatively effects IHDI by taking into consideration 44 sub-Saharan African countries.

Governance has negative and significant impact on IHDI in high income countries, while the impact of governance in upper and lower middle income countries is positive and significant. One unit increases in governance has caused 0.0022 units decline in IHDI in high income countries. While in upper and lower middle income countries one unit rise in governance has caused to 0.0015 and 0.0018 unit improvement in IHDI respectively. The foundation of any nation's successful development is its governance, especially its quality of government. As the presence of excellent governance is essential in every economy, particularly to achieve better economic growth and human development. The aforementioned sectors are all necessary for a thriving nation (Brautigam, 1991). The negative effect of governance in high income countries represents high political instability, corruption, state capture, and rent seeking behavior in region. Positive results of governance are in accordance with study of Stylianou et al., (2023) who confirmed that governance plays positive role in enhancing IHDI for African countries.

Economic globalization have positive and significant impact on IHDI in all the regions of Asia based on income classification. One unit increase in economic globalization has resulted in 0.0049, 0.0014, 0.0024 unit improvement in IHDI in high, upper and lower middle income countries respectively. Access to better products, innovations, and services might be

improved by globalization, which would boost health care, distribution of income, and education, all of which would directly contribute to more inclusive human development (Ali et al; 2021). Positive and significant results of globalization are aligned with Asongu & Nwachukwu (2016).

Financial development has positive and significant effect in case of high income countries. However, in case of upper middle income countries this effect is positive but insignificant and in lower middle income countries financial development has negative and insignificant effect on IHDI. One unit rise in financial development has caused 0.1743 unit increase in IHDI in high income countries. By strengthening economic resources, generating jobs, expanding financial inclusion, and upgrading infrastructure, financial development has a positive association with inclusive human development (Masoud and Hardaker, 2012). Therefore, countries having improved financial system has better IHDI. The results are in accordance with previous studies like Dutta and Singh (2019).

Economic growth has negative and insignificant effect on IHDI for high income countries, however, this effect is positive in upper and lower middle income countries but insignificant. One reason for the negative effect of RGDP is the unequal distribution of growth-related benefits. Economic expansion typically increases income without necessarily expanding access to healthcare, education, and inequality, which results in a negative correlation between RGDP and inclusive human development. The positive impact of economic growth indicates that benefits of growth have positive impact on income, health, and education of people. The results of the study align with stewart et al. (2018). Low income countries are excluded from the analysis as there is only one country in low income classification so the formation of panel is not possible.

To ensure sensitivity of regression parameters with respect to sign, significance and magnitude, sensitivity analysis has been performed by taking into consideration different proxies of environmental degradation. The table 4.7 presents the results of the panel regression.

Table 4.7: Robustness Results

Dependent Variable: $IHDI_{it}$				
Variables		(1)	(2)	(3)
		Coefficients (p-values) [Std Errs.]	Coefficients (p-values) [Std Errs.]	Coefficients (p-values) [Std Errs.]
ED	ECF_{it}	-0.0132 (0.006) [0.004]	…….	…….
	$BIOC_{it}$	…….	0.002 (0.553) [0.0037]	…….
	CO_{2it}	……	……	-0.0015 (0.484) [.0020]
GOV_{it}		0.0003 (0.487) [0.0004]	0.0017 (0.000) [0.0001]	0.0002 (0.565) [0.0004]
$ECGIN_{it}$		0.0011 (0.027) [0.0005]	0.0026 (0.000) [0.0002]	0.0011 (0.019) [0.0004]
$FDIN_{it}$		0.247 (0.049) [0.0168]	0.4215 (0.000) [0.0679]	0.4109 (0.000) [0.0673]
$RGDP_{it}$		-0.0002 (0.123) [0.0001]	0.0001 (0.301) [0.0001]	-0.0002 (0.148) [.0001]
Constant		0.3979 (0.000) [0.0182]	0.281 (0.000) [0.0115]	0.3802 (0.000) [0.0195]

In the table 4.7, column 1 represents the baseline results while column 2 and 3 represents the results of Bio capacity (BIOC) and Carbon dioxide emissions (CO2) respectively. The results of environmental

degradation become negative in the column 3 and are positive in column 1. These signs of the variables are different than the baseline model. As bio capacity increases it reduces the environmental degradation and which in turn increases the inclusive human development. In the similar way the results of ECF and CO2 have negative sign which shows that increase in these variables cause increase in environmental degradation which in turn reduces inclusive human development. The sign and magnitude of ECF variables suggest that these are moderately robust. The Governance variables have same signs and magnitude which shows that these are moderately robust, while the results for economic globalization indicate the same sign, magnitude, and significance, which shows that it is strongly robust. The financial development index is moderately robust as its signs and significance remains same with different proxies of environmental degradation. The results of economic growth also shows the moderately robust results. From table 5.7 it is concluded that countries should improve their environment quality by increasing bio capacity and reducing CO2 emissions and ECF to enhance inclusive human development.

The table 4.8 provides robustness results for disaggregated Asian panel. To observe the sensitivity of variables with respect to sign, significance and magnitude different proxies of environmental degradation are employed.

Table 4.8: Robustness results for disaggregated Asian panel

Dependent Variable: $IHDI_{it}$				
High Income Countries				
Variables		**(1)**	**(2)**	**(3)**
		Coefficients (p-values) [Std Errs.]	**Coefficients (p-values) [Std Errs.]**	**Coefficients (p-values) [Std Errs.]**
ED	ECF_{it}	-0.0103 (0.000) [.00197]	…….	…….
	$BIOC_{it}$	……	0.0567 (0.002) [0.0141]	…….
	CO_{2it}	……	……	-0.0118 (0.000) [0.0020]
GOV_{it}		-0.0022 (0.487) [0.0006]	-0.0025 (0.000) [0.0004]	-0.0023 (0.006) [0.0007]
$ECGIN_{it}$		0.0049 (0.000) [0.0009]	0.0005 (0.000) [0.0008]	0.0049 (0.000) [0.0010]
$FDIN_{it}$		0.1743 (0.049) [0.0801]	0.1047 (0.268) [0.0905]	0.1358 (0.088) [0.0735]
$RGDP_{it}$		-0.0005 (0.658) [0.0011]	-0.0008 (0.434) [0.0010]	-0.0003 (0.737) [0.0008]
Constant		0.5491 (0.000) [0.0605]	0.3708 (0.000) [0.0501]	0.6157 (0.000) [0.0731]
Upper Middle Income Countries				

Variables		(1)	(2)	(3)
		Coefficients (p-values) [Std Errs.]	**Coefficients (p-values) [Std Errs.]**	**Coefficients (p-values) [Std Errs.]**
ED	**ECF_{it}**	-0.001 (0.917) [0.0016]	…….	…….
	$BIOC_{it}$	……...	-0.0009 (0.314) [0.0009]	…….
	CO_{2it}	……	……	0.0120 (0.000) [0.0017]
GOV_{it}		0.0017 (0.001) [0.0004]	0.0015 (0.000) [0.0004]	0.0017 (0.000) [0.0017]
$ECGIN_{it}$		0.0014 (0.004) [0.0005]	0.0014 (0.005) [0.0005]	0.0023 (0.000) [0.0004]
$FDIN_{it}$		0.00009 (0.796) [0.0003]	0.00006 (0.862) [0.0003]	-0.0103 (0.000) [0.0015]
$RGDP_{it}$		0.00005 (0.724) [0.0001]	0.0001 (0.475) [0.0001]	-0.00001 (0.943) [0.0001]
Constant		0.4702 (0.000) [0.0280]	0.4782 (0.000) [0.0263]	0.3689 (0.000) [0.0205]

Lower Middle Income Countries

Variables	(1)	(2)	(3)
	Coefficients (p-values) [Std Errs.]	**Coefficients (p-values) [Std Errs.]**	**Coefficients (p-values) [Std Errs.]**

ED	$\mathbf{ECF_{it}}$	-0.0101 (0.215) [0.0081]	…….	…….
	$\boldsymbol{BIOC_{it}}$		-0.0079 (0.091) [0.0047]	…….
	$\boldsymbol{CO_{2it}}$	……	……	0.0255 (0.000) [0.0058]
$\mathbf{GOV_{it}}$		0.0018 (0.000) [0.0005]	0.0010 (0.025) [0.0004]	0.0011 (0.023) [0.0005]
$\mathbf{ECGIN_{it}}$		0.0024 (0.000) [0.0003]	0.0016 (0.000) [0.0004]	0.0017 (0.000) [0.0003]
$\mathbf{FDIN_{it}}$		-0.0011 (0.982) [0.0509]	-0.0113 (0.843) [0.0569]	0.0119 (0.832) [0.0564]
$\mathbf{RGDP_{it}}$		0.0001 (0.345) [0.0001]	0.00001 (0.878) [0.0001]	0.00007 (0.644) [0.0001]
Constant		0.3219 (0.000) [0.0236]	0.3759 (0.000) [0.0276]	0.3350 (0.000) [0.0205]

In table 4.8, column 1 provides baseline results while column 2 and 3 presents results of bio capacity (BIOC) and carbon dioxide emissions (CO2). Robustness results of ECF in case of high income countries show that ECF is moderately robust as sign and significance of variables remains same. However, in case of upper and lower middle income countries ECF is not robust with respect to sign, significance and magnitude. Governance is moderately robust in case of high income countries as the sign and magnitude is same. In upper and lower middle income countries governance is strongly robust with respect to sign, significance and magnitude. Economic globalization is highly robust in all

three regions. Financial development is not robust in case of high, upper and lower middle income countries as the sign and significance is different with different proxies of environmental degradation. In case of high and lower income countries RGDP is weakly robust with respect to sign, while in case of upper middle income countries RGDP is not robust.

5. Conclusion and Recommendations

Social justice, economic expansion, and environmental sustainability are all parts of the broad idea of inclusive human development. Encouraging inclusive human development in Asia is hampered by the problems caused by environmental degradation and poor institutional quality. This study has examined how environmental degradation and institutional quality impacts inclusive human development in long run in case of Asian countries. The time period of study is from 2010 to 2023. The study uses balanced panel data of 30 Asian for aggregated and disaggregated analysis of Asian countries has been performed. The disaggregation of Asian countries is based on the level of income i.e. high income, upper middle income, lower middle income, and low income countries. Inclusive human development is used as dependent variable and the explanatory variables are environmental degradation, institutional quality, economic globalization, financial development, and economic growth. Inclusive human development is measured through inequality adjusted human development index. Environmental degradation is measured through ecological footprint global hectares per person. Whereas institutional quality is measured through governance index. The six different dimensions of governance is used and by taking the average of these dimensions governance index is generated. Financial development is measured through financial development index, and economic growth is measured through Real GDP growth. The cross sectional dependence test is applied for the selection of first and second panel unit root tests. The empirical evidence of study are based on FEM and REM techniques. Hausman test is applied after fixed effect and random effect technique to select most appropriate technique. To check the presence of serial

autocorrelation and heteroskedasticity, Wooldridge and Wald test has been applied. Then to present results more precisely Driscoll-Kraay Standard Errors has been performed. In the end to ensure sensitivity of regression parameters with respect to sign, significance and magnitude, sensitivity analysis has been performed by taking into consideration different proxies of environmental degradation

The empirical results show that relationship between institutional quality and inclusive human development is positive. It shows that improvement in institutional quality in Asian countries increases inclusive human development. The proxy variable of environmental degradation also has negative but significant impact on inclusive human development. The negative results of environmental degradation indicates that degraded environment due to deforestation, resource depletion and pollution causes reduction in access to clean air and water which are necessary for healthy living and well-being of individuals. Globalization and financial development also have positive impact on inclusive human development. The impact of economic growth is negative on inclusive human development. Conclusively, it is observed that improvement in the quality of environment and institutions can lead to equitable distribution of resources, better health, poverty reduction, and enhanced education facilities which are crucial for the inclusive development of a country.

The empirical results of disaggregated Asian panel shows that ecological footprint has negative and significant effect on Inclusive Human development. However, the impact of ecological footprint in upper and lower middle income countries is negative and insignificant. Governance has negative and significant impact on IHDI in high income countries, while the impact of governance in upper and lower middle income countries is positive and significant. Economic globalization have positive and significant impact on IHDI in all the regions of Asia based on income classification. Financial development has positive and significant effect in case of high income countries. However, in case of upper middle income

countries this effect is positive but insignificant and in lower middle income countries financial development has negative and insignificant effect on IHDI. Economic growth has negative and insignificant effect on IHDI for high income countries, however, this effect is positive in upper and lower middle income countries but insignificant.

The findings have broadly proved that improved environment and institutional quality can be employed to increase inclusive human development. Accordingly it has been established that (i) institutional quality complements inclusive human development; (ii) Degraded environment has negative impact on inclusive human development. It is concluded, adoption of better environment and improved institutional quality could enhance the standard of living of people by increasing inclusive human development.

The results of the study suggest some strong policy recommendations for Asian countries. These recommendations highlights the importance of institutional quality and environment for inclusive human development.

1. Better environmental policies are especially needed to increase environmental sustainability, therefore, policymakers should give the top priority to environment for inclusive human development especially in high, upper and lower middle income countries. As the clean air and water provides better health and education top the individuals which in turn leads to enhanced development.
2. In order to accomplish much-desired broad-based inclusive human development and productive employment growth, governments of Asian countries should use their state roles to mobilize both natural and human resources for equal socio-economic possibilities. Policy makers should give top priority to the institutions in high income, lower and upper middle income countries for better inclusive human development.

3. Policy makers should focus on strengthening financial institutions, promoting financial inclusion, and encouraging long term investment to increase inclusive human development, particularly focusing on high, upper and lower middle income countries.
4. The policies of globalization like export diversification and investment in infrastructure can give boost to local industries and improve global competitiveness which ultimately leads to increased inclusive human development in Asian regions.

References

Adebayo, T. S., Kartal, M. T., & Ullah, S. (2023). Role of hydroelectricity and natural gas consumption on environmental sustainability in the United States: Evidence from novel time-frequency approaches. *Journal of environmental management*, 328, 116987.

Akbostancı, E., Türüt-Aşık, S., & Tunç, G. İ. (2009). The relationship between income and environment in Turkey: Is there an environmental Kuznets curve?. Energy policy, 37(3), 861-867.

Akinlo, A. E. (2008). Energy consumption and economic growth: Evidence from 11 Sub-Sahara African countries. *Energy Economics*, 30(5), 2391-2400.

Ali, M., Raza, S.A.A., Puah, C.-H. and Samdani, S. (2021). How financial development and economic growth influence human capital in low-income countries. *International Journal of Social Economics*, Vol. 48 No. 10, pp. 1393-1407. https://doi.org/10.1108/IJSE-05-2020-0323

Ang, J. B. (2007). CO_2 emissions, energy consumption, and output in France. *Energy Policy, 35*(10), 4772–4778. https://doi.org/10.1016/j.enpol.2007.03.032

Aongu, S., & Odhiambo, N. M. (2020). Governance and inclusive human development in Sub-Saharan Africa: The role of environmental degradation. *Environmental Science and Pollution Research, 27*(34), 42938–42951. https://doi.org/10.1007/s11356-020-10188-9

Apergis, N., & Payne, J. E. (2009). *CO_2 emissions, energy usage, and output in Central America*. Energy Policy, 37(8), 3282–3286. https://doi.org/10.1016/j.enpol.2009.03.048

Asian Development Bank (2014). Asian development bank annual report. Improving lives throughout Asia and Pacific.

Asongu SA, Odhiambo NM (2018) Environmental degradation and inclusive human development in sub-Saharan Africa. *Sustainable Development* 27(1): 25–34.

Asongu, S. A., & Odhiambo, N. M. (2019). Environmental degradation and inclusive human development in sub-Saharan Africa. *Sustainable Development, 27*(1), 25–34. https://doi.org/10.1002/sd.1858

Asongu, S. A., Roux, S. L., & Biekpe, N. (2017). Environmental degradation, ICT and inclusive development in sub-Saharan Africa. *Energy Policy, 111*, 353–361. https://doi.org/10.1016/j.enpol.2017.09.007

Asongu, S.A (2018). CO_2 emission thresholds for inclusive human development in sub-Saharan Africa. *Environ Sci Pollut Res* **25**, 26005–26019. https://doi.org/10.1007/s11356-018-2626-6

Asongu, Simplice and Nwachukwu, Jacinta (2016): *Globalization and Inclusive Human Development in Africa.* Forthcoming in: Man and the Economy

Bolük, G., & Mert, M. (2015). The renewable energy, growth and environmental Kuznets curve in Turkey: An ARDL approach. *Renewable and Sustainable Energy Reviews, 52*, 587–595. https://doi.org/10.1016/j.rser.2015.07.068

Boogaard, H., van Erp, A. M., Walker, K. D., & Shaikh, R. (2017). Accountability studies on air pollution and health: The HEI experience. *Current Environmental Health Reports, 4*(4), 514–522. https://doi.org/10.1007/s40572-017-0161-0

Brada, J. C., Drabek, Z., Mendez, J. A., & Perez, M. F. (2019). National levels of corruption and foreign direct investment. *Journal of Comparative Economics*, 47(1), 31-49.

Brautigam, D. (1991) Governance and Economy: A Review, World Bank Policy Research Working Paper, No. 815, Washington D. C.: The World Bank.

Clark C, Crombie R, Head J. (2012). Does traffic-related air pollution explain associations of aircraft and road traffic noise exposure on children's health and cognition? A secondary analysis of the United Kingdom sample from the RANCH project. *American Journal of Epidemiology* 176(4): 327–337.

Currie J, Hanushek EA, Khan EM, (2009). Does pollution increase school absences? *The Review of Economics and Statistics* 91(4): 682–694.

Diao, X., Zeng, S., Tam, C. M., & Tam, V. W. (2009). EKC analysis for studying economic growth and environmental quality: A case study in China. *Journal of Cleaner Production*, 17(5), 541-548.

Dutta, SK & Singh, K, (2019). Variation and determinants of financial inclusion and association with human development: A cross country analysis. *IIMB Management Review*. https://www.sciencedirect.com/science/article/pii/S0970389616301574.

Esso, L. J. (2010). Threshold cointegration and causality relationship between energy use and growth in seven African countries. *Energy Economics*, 32(6), 1383-1391.

Gisselquist, R. (2012). Good governance as a concept, and why this matters for development Policy. UNU-WIDER Working Paper 2012/30.

He, J., & Richard, P. (2010). Environmental Kuznets curve for CO_2 in Canada. *Ecological Economics, 69*(5), 1083–1093. https://doi.org/10.1016/j.ecolecon.2009.11.030

Hunjra, A. I., Tayachi, T., Chani, M. I., Verhoeven, P., & Mehmood, A. (2020). The moderating effect of institutional quality on the financial development and environmental quality nexus. Sustainability, 12(9), 3805.

Kebede, J., Selvanathan, S., and Naranpanawa, A. (2021). Foreign bank presence, institutional quality, and financial inclusion: Evidence from Africa. *Economic Modelling*. https://doi.org/10.1016/j.econmod.2021.105572

Keser, A., & Gökmen, Y. (2005). Governance and human development: The impacts of governance indicators on human development. *Economic Issues.*

Mahmood, A., Jiang, P., Abdul M., Muhammad, U., Zeeshan, K., Sulaman, M., (2020). The dynamic 766 impact of natural resources, technological innovations and economic growth on ecological 767 footprint: An advanced panel data estimation. *Resources Policy*, 69. 768 https.//doi.org/10.16/j.resourpol.2020.101817.

Masoud, N. and Hardaker, G. (2012). The impact of financial development on economic growth: Empirical analysis of emerging market countries, *Studies in*

Economics and Finance, Vol. 29 (3), pp. 148-173. https://doi.org/10.1108/10867371211246830

Nathaniel, S. P., & Bekun, F. V. (2020). Electricity consumption, urbanization, and economic growth in Nigeria: New insights from combined cointegration amidst structural breaks. *Journal of Public Affairs*. https://doi.org/10.1002/pa.2102

Ndikumana, L. (2013). *The private sector as culprit and victim of corruption in Africa.* Amherst, MA: PERI.

Olanrewaju, O. A., Jimoh, S. O., & Adebayo, S. B. (2019). *Institutional quality and inclusive human development in developing countries*. *Journal of Economics and Sustainable Development, 10*(9), 50–60. http://www.examplejournal.com/articles/vol10no9/olanrewaju2019

Omisakin, O. A. (2008). Energy consumption and economic growth in Nigeria: A bounds testing cointegration approach. *Journal of Economic Theory, 2*(4), 118–123. https://ssrn.com/abstract=2156905

Ouma, D. O., & Nadzanja, T. (2019). Fiscal policy, governance and human development in the common market for eastern and southern Africa. *African Journal of Governance and Development,* 8(1), 71-89.

Pradhan, R.P. and Sanyal, G.S. (2011). Good Governance and Human Development: Evidence from Indian States. *Journal of Social and Development Science*, 1(2), 1-8.

Rich, D. Q. (2017). Accountability studies of air pollution and health effects: Lessons learned and recommendations for future natural experiment opportunities. *Environment International, 100*, 62–78. https://doi.org/10.1016/j.envint.2016.12.019

Scholl, W., & Schermuly, C. C. (2020). The impact of culture on corruption, gross domestic product, and human development. Journal of Business Ethics, 162(1), 171-189.

Stewart, Frances, Gustav Ranis, and Emma Samman (2018), 'The Relationship between Human Development and Economic Growth, *Advancing Human Development: Theory and Practice* https://doi.org/10.1093/oso/9780198794455.003.0003,

Stylianou, Tasos, Rakia Nasir, and Muhammad Waqas (2023). Inclusive Human Development and Governance Nexus: Causality Analysis of Selected Asian Countries. *Economies* 11: 97. https://doi.org/ 10.3390/economies11030097

Tamazian, A., & Rao, B. B. (2010). Do economic, financial and institutional developments matter for environmental degradation? Evidence from transitional economies. *Energy economics*, 32(1), 137-145.

Ullah, S., & AZIM, P. (2015). Human Development in the Era of Globalization: An Asian perspective. Proceedings of the XIV International Business and Economy Conference.

UNDP (United Nations Development Programme). (2002). *Human Development Report 2002*. New York.

UNDP. (2019). Human Development Report 2019: Beyond income, beyond averages, beyond today. http://hdr.undp. org/sites/default/files/hdr2019.pdf.

World Bank (2004). World Development Report 2004. Making Services Work for Poor People. Washington, DC.

World Economic Forum (2023). World Economic Forum Annual Report 2023. Key Developments in 2023-2024.

Yinusa, O. G., Aworinde, O. B., & Odusanya, I. A. (2020). Institutional quality, financial development and inclusive growth: Asymmetric cointegration approach. *International Journal of Management, Economics and Social Sciences*, 182–205.

Zivin, J. S. G., & Neidell, M. J. (2012). The impact of pollution on worker productivity. *American Economic Review, 102*(7), 3652–3673. https://doi.org/10.1257/aer.102.7.3652