

Does Environmental Degradation Affect Human Development and Sustainable Economic Development? Case of Pakistan

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1. Introduction

The concepts of human development and sustainable economic development seem to be intercorrelated and highly debatable issue in the recent literature. Human development can play an imperative role in economic development of a country. As Solow (1956) showed in the neoclassical growth model that human development is both the result of economic growth and is also an input to it. Thus, human capital acquires profound importance in determining the level of economic growth with respect to education, health and nutrition in the work of Lewis (1955) and then also in modern endogenous growth theories. Torras and Boyce (1998) as well as Klick (2002) include measures of human development as control variables in their respective setup.

Economic growth is associated with negative externalities, for example environmental degradation, while Economic Development is an increase in the real income per capita as well as improvements in a variety of indicators such as literacy rates, life expectancy, welfare of the nation, quality of life and quality of environment. Economic development is however concerned with sustainability which means meeting the present needs without compromising future needs. Sustainable development may be defined as continuous increase in the socio-economic standard of living of a country's population, normally accomplished by increasing its stocks of physical and human capital and improving its technology and environment. To ensure the sustainable development of the economy environmental degradation should not increase with time but be reduced or at least remain constant. If it increases, the economy will move further away from sustainability, while if it decreases, the economy will move closer towards it.

The rapidity of modernization, urbanization, and industrialization has led to serious environmental concerns in the developing countries like Pakistan. Over the past few decades, the natural resources have depleted remarkably resulting from accelerated pace of economic and social transformation. Economic and social changes such as large increase in population, shift of population from rural to urban areas, increase in mechanized and chemical agriculture, industrial production, capital accumulation, and innovative technologies have transformed the country's natural resource base, both as a source of

factor inputs and as a by product of pollution associated with economic activity. The continuously accelerated and unabated environmental degradation in the country is dangerous for sustainability of human development that is the foundation for long-term economic development. Economic development and human development efforts are increasingly constrained by environmental concerns, including degradation of forests and fisheries, lack of fresh water resources, and poor human health as a result of air and water pollution (Banister 1998; Chu and Yu 2002). Intensified crop and livestock production combined with misdirected incentives have contributed to increased production of chemical and organic wastes, natural resource and biodiversity loss, and soil erosion. Lack of an adequate supply of clean water, the explosive growth in population, and the artificial methods of cultivation are the most severe environmental problem in many developing countries.

The present study empirically investigates the long run rappings of environmental degradation and major socio-economic and demographic factors such as poverty, urbanization, trade liberalization, increasing population and economic growth on quality of human development in Pakistan. The study further estimates the effects of environmental degradation and other socio-economic and demographic factors as mentioned on sustainability of economic development in the country. Such analytical endeavor is necessary for disentangle an effective and efficient macroeconomic policy framework to prepare long term strategies for sustainability of economic development and high quality of human development in Pakistan particularly and generally in developing countries. The organization of the chapter is as: section II discusses the factor affecting human development as well as economic development, section III presents theoretical framework, section IV demonstrates the econometric techniques to be employed, section V discusses data sources and variables information and section VI explains the empirical analysis. Finally section VII presents conclusions and policy recommendations.

2. Human development and economic development with environmental concern

The eventual purpose of economic activities is improvement in quality of human recourse development and the principal aim of economic growth is the welfare of human beings. Most countries emphasize social well-being of people as the fundamental goal. Consequently, the problem faced by the policy makers is to increase social benefits. However, it is not clear whether the indicators of economic progress and measures of wealth such as growth in income per capita are the primary determinant of social and economic well being of the masses. Growth in income per capita may be insufficient for human development and increasing social benefits. Mazumdar (1996) estimated the causal relation between human development and economic growth and concluded that there is no uniform relation. The quality of human capital can be poor even with rapid economic growth. In fact, the transformation of economic growth to human development depends on several factors (Costantini, 2006).

2.1 Poverty

Poverty is a major cause of poor quality of human development as well as a big hurdle to achieving sustainable economic development. Whether defined by income, socioeconomic

status, living conditions or educational level, poverty is the single largest determinant of human development and poor economic growth (Borooah, 2005; Baulch and Hoddinott, 2000). Living in poverty is associated with poor sanitary conditions, unabated sewerage system, lack of clean water resources, and increased exposure to environmental risks. Urban poverty is a challenge in all developing countries, where not only the number of urban poor is increasing, but also the divisions among social groups within cities. There is also evidence that rural households use environmental resources quite extensively (Sale 1981).

The poor are traditionally taken as the agents for causing society's many problems. The most recent allegation directed against them is that they cause environmental degradation. For example, in one of the conclusions of the Brundtland commission report, which incidentally has been accepted as the proposal for environmental conservation, it is explicitly stated that poverty is a major cause of environmental problems and amelioration of poverty is a necessary and central condition of any effective program to deal with environmental concerns. Jalal (1993), argued that "It is generally accepted that environmental degradation, rapid population growth and stagnant production are closely linked with the fast spread of acute poverty in many countries of Asia". Both poverty and environmental degradation have been increasing in many developing countries. Ethnic minorities, migrants and refugees are the sources of environmental degradation. Their needs often receive far less attention, and they cannot always be reached through the usual hygienic and welfare channels. This problem is increasing in many developing countries, including Pakistan.

2.2 Population

Rapidly increasing population is one of the main obstacles in the way of sustainable economic development as well as human development. Specialists have raised concerns that the ever growing world population will be an obstacle to all people being able to benefit from human development, and therefore argue that further measures are needed to ease this "population explosion". "If we could slow our population growth rate, we would have an easier job in dealing with all the other things like education, health, employment, housing, food, the environment and so on"¹. Others have however criticized this approach, pointing to the need to rather focus on ways to improve the life quality of the world population as a whole.

Research relating to the theme of population and human development during the past one year has largely explored the shades of the experience of human development in the condition on the one hand, and issues of access and inequity in health and education, on the other. While health, nutrition and education have been the prime areas of concern within the human development perspective, there have also been attempts to explore the issue across diverse population groups, to examine private-public provisions, and to make a gender-sensitive evaluation. Regarding health, the contribution of research has been more towards understanding inequities in access, and in the utilization of health care under varying scenarios, and reflecting on their consequences.

¹ Professor Eric Tayag of the Department of Health in the Philippines
(<http://www.eurostep.org/wcm/archive-eurostep-weekly/1790-population-growth-raises-concerns-over-human-development.html>)

Professionals have exclusively highlighted the need to improve reproductive health conditions and female education, as a means to improve the life quality of women particularly and in general the overall population as a whole. Female education and reproductive health services are the two factors that will bring down unsustainable population growth².

2.3 Urbanization

Another major determinant of economic development as well as human resource development is urbanization, the share of urban population in total population. The rate of urbanization and its attendant impacts differ in regions across the globe. Asia contains almost half the world's mega cities and continues to urbanize rapidly. Given its current annual growth rate, Asia's urban population is expected to double in less than 20 years. Urbanizations reflect more than demographic change. It is both driven by and profoundly influences the context and processes of development. It exerts both direct and indirect advantages in the struggle towards global sustainability and human development. The origins of many global environmental problems related to air and water pollution are located in cities (Reddy, 2004). Cole and Neumayer (2004) argued that means of transports, like cars, buses, etc., are more intensively used in urban areas as compared to rural parts of the economy. Moreover food and other consumer goods have to be transported into cities, which again should lead to higher pollution that affect human health. The other sources of water pollution come from various other different situations which tend to occur in urban areas. For example, soil particles from construction and demolition sites, and also oil and toxic chemicals from car maintenance and runoff from road surfaces (Environmental Agency 2005) are also causes of water pollution. In addition, land in urban cities is covered with 'buildings, asphalt, and concrete', which brings a large amount of quick runoff, contributing to water pollution (Miller 1996; Stapleton et al 2004). Such an urban lifestyle and an urban design are also factors contributing to water pollution. However, much of the sewage in urban areas goes untreated and is dumped into rivers and lakes. As a result, surface water and ground water have been increasingly polluted (Banister 1998).

In urban areas, education facilities are better than rural areas, in this case urbanization affect human development positively. Qiang (2009) estimated that urbanization in China plays the roles not only for improving human capital but also for controlling over population growth. Cao and Lutz (2004) proved that urbanization and education are linked directly to one another. Currently, in the developing countries like Pakistan there are many contrasts occur in the urban areas. They contribute to human development - as well as constrain it. They are centers of affluence - as well as concentrations of poverty. They bring out the best in human enterprise - as well as the worst in human greed. They contain some of the best social services available in the country. But they are also host to many social ills - overcrowding, unsanitary living conditions, drug addiction, alienation, social unrest and environmental pollution.

There is a strong, positive link between urbanization and levels of human development. Urban population, in both highly industrialized countries (HIC) and those countries with a

² Professor Wolfgang Lutz who convened a panel on population, development and environment in September 2011.

high Human Development Index (HDI), is above 70 percent. Urbanization falls to less than 30 percent in countries that are classified as Least Developed Countries (LDC) or have a low HDI. All HICs score high in their provision of urban services and infrastructure to all citizens and low in incidence of absolute poverty. Development and urbanization, thus, proceed hand in glove. Without substantial investment in the infrastructure and services that support both, neither can occur (UNDP, Human Development Report 2000). The growing concentration of people in cities is by now almost exclusively a developing country phenomenon. The urban population of the developing countries, now 1.3 billion, is expected to grow by nearly another billion in the next 15 years. According to recent UN projections, the developing world's rural population will reach an upper limit by 2015 and beyond this point all future population growth will be concentrated in urban areas. By 2015 half the developing world's people will live in urban areas (UNDP, Human Development Report 2009).

2.4 Globalization

In general, globalization can affect the environment through trade liberalization by several channels, such as trade affects the overall *scale* of the economy; the *techniques* of production, and *composition* of industries (Copeland and Taylor, 2003). The most direct effect of trade liberalization on the environment would be through the composition of industries and hence much of the focus of the literature has been on dissecting the composition effects of trade. Trade liberalization leads to specialization, and countries that specialize in less (more) pollution-intensive goods will have cleaner (dirtier) environments. This discussion suggests that developing countries may be able to achieve high levels of economic growth and high levels of environmental performance long before they reach the income levels of the industrialized countries. This is not to say that there are no trade off between growth and the environment. Even with good environmental policies and clean technologies, continued increases in output may tend to increase the total volumes of various kinds of pollutants in many cases. Every society has to decide for itself on the relative value it places on economic output and the environment. The point about international openness, though, is that in general it appears to make this tradeoff less painful for developing countries, allowing more environmental protection for the same amount of growth, or more growth for the same amount of environmental protection.

In any case while trade does offer opportunities to improve the standard of living of people greater participation in trade does not necessary translates in accelerated human development. It is interesting to know how globalization has influenced our day to day life - if I will be more specific - the quality of life. There are contradictory views though on this issue. While the cohorts of globalization theory view globalization as improving economic growth and quality of life indicators, the critics view globalization as accentuating inequalities, promoting poverty, and degrading the over all quality of human life. Running through this contentious debate, the present research examines how economic and cultural globalizations have influenced the overall quality of life, or in the language of developmental economists, how globalization has influenced the indicators that constitute human development. Globalization has a major impact on the human resource development in developing countries (Qian, 2009). It has led to homogenization and convergence in organization strategies, structures and processes as well as in consumer choice. With accelerating globalization, organizations have had to change and new trends have set in even in the development of human resources. Globalization has led to

changes in organization design and organization structures are leaner thus improving efficiency but having a negative impact on staff numbers which have had to be reduced. This means employees have been economized in many sectors in order for those organizations to gain competitive advantage. Although the homogeneity that results from globalization has had a major effect in developing countries because of brain drain. Globalization can therefore be said to have had an exceptional impact on a developing economy (Hallak and Levinsohn, 2004).

3. Theoretical framework

The study intends to analyze the factors influencing the human development and economic development as well as environment through vector autoregressive framework. For this purpose the study used human development index collected from United Nations database. Based on the preceding discussion, the theoretical framework for this empirical study is set as follows:

If *HD* is human development, *EG* is the economic growth measured as per capita GDP, *PV* represents poverty, *URB* is the rate of urbanization, *GL* represents globalization measured as export plus import to GDP ratio and *PD* is population density. *ED* is environmental degradation in term of water pollution, According to European Environmental Agency “biochemical oxygen demand (BOD) is a measure of how much dissolved oxygen is being consumed as microbes break down organic matter. A high demand therefore can indicate that levels of dissolved oxygen are falling with potentially dangerous implications for the river’s biodiversity”. According to United Nations Environment Programme, “Emissions of organic water pollutants are measured by biochemical oxygen demand, refers to the amount of oxygen that bacteria in water will consume in breaking down waste”. The following relationship can reasonably be expected for human development:

$$HD = f(EG, ED, PV, URB, PD, GL) \quad (1)$$

Expressing the variables in natural logarithms, the base regressions are:

$$\ln HD_t = \beta_0 + \beta_1 \ln EG_t + \beta_2 \ln ED_t + \beta_3 \ln PV_t + \beta_4 \ln URB_t + \beta_5 \ln PD_t + \beta_6 \ln GL_t + \xi_1 \quad (2)$$

Where, β_1 to β_6 are the elasticities and ξ_1 is the stochastic error term with standard properties.

The expected sign of the coefficient of economic growth β_1 should be positive because economic growth ultimately improves the human welfare (Saxena, 1989). Environmental hazard to the poorest populations vary by human development level. The poor and developing countries tend to face household environmental deficiency such as indoor air pollution and inadequate sanitation and drinking water. These environmental factors lead to wide-ranging risks to human health and education (Human Development Report, 2011). Therefore the coefficient β_2 will be negative. The poverty coefficient β_3 is also negative, because poverty is a major hurdle of human resource development. Population growth and resulting higher population density is often argued to lead to increased stress on water and natural resources, decreased food security, slower human development. So β_5 will be negative. On the basis of above discussion β_4 and β_6 would be either positive or negative.

Furthermore, the study extended its empirical analysis to explore the effect of environmental degradation, human development, poverty, globalization, urbanization and

population density on economic growth. To measure economic growth study takes gross domestic product (GDP) per capita at current market price.

$$EG = f(HD, ED, PV, URB, PD, GL) \tag{3}$$

Expressing the variables in natural logarithms, the base regressions are:

$$\ln EG = \delta_0 + \delta_1 \ln HD_t + \delta_2 \ln ED_t + \delta_3 \ln PV_t + \delta_4 \ln URB_t + \delta_5 \ln PD_t + \delta_6 \ln GL_t + \xi_2 \tag{4}$$

Where δ_1 to δ_6 are the elasticities and ξ_2 is the stochastic error term with standard properties.

The study expects δ_1 to be positive because human development can play vital role to achieve economic growth. However, the relationship between environmental degradation and economic development is complex, because the process of economic development is closely related to growth in industrialization and human activities while this growth in industrialization and human activities is clearly the main cause of increase in pollution. Thus limiting this pollution would affect the process of economic growth. Thus one can reasonably expect positive relation δ_2 between the two. The expected sign of δ_3 should be negative because poverty is a major hurdle to continuing economic growth. However, the δ_4 could be positive or negative. The rapid urbanization induced difficulties for the cities in terms of infrastructure shortage, congestion and pollution control. On the other hand, urbanization might be environmental-friendly. The expected sign of δ_5 may be negative because increased population density can slow the economic growth. The expected sign of δ_6 should be positive because globalization is directly associated with higher economic growth.

Moreover, the study extended its empirical analysis to investigate the effect of economic growth, human development, poverty, urbanization, population density and globalization on environmental degradation.

$$ED = f(EG, HD, PV, URB, PD, GL) \tag{5}$$

Expressing the variables in natural logarithms, the base regressions are:

$$\ln ED = a_0 + a_1 \ln EG_t + a_2 \ln HD_t + a_3 \ln PV_t + a_4 \ln URB_t + a_5 \ln PD_t + a_6 \ln GL_t + \xi_3 \tag{6}$$

Where, a_1 to a_6 are the elasticities and ξ_3 is the stochastic error terms with standard properties.

In the light of prior discussion, the expected signs of a_1, a_3 and a_5 should be positive. The coefficient of human development a_2 will be positive because increased human development can aware the people to save their environment. While a_4 will be either negative or positive because for urbanization there exist two alternate views. First view argues that increase in urbanization is the main contributor to environmental pollution. For instance, Panayotou (1993) points out environmental degradation tend to firstly increase as the structure of the economy changes from rural to urban, from agricultural to industrial. But second views suggest that urbanization impact environment positively as urbanization involves more efficient use of infrastructure, more efficient use of transportation and more efficient energy use. Whereas a_6 may be positive or negative, because some critics argue that since increased globalization stimulate higher growth in developing countries; this must lead to more industrial pollution and environmental degradation. Moreover, globalization can provide developing countries with both the incentive to adopt, and the access to, advance

technologies, which may provide a cleaner or greener way of producing the good concerned. A World Bank study of steel production in 50 countries found that open economies led closed economies in the adoption of cleaner technologies by wide margins, resulting in the open economies being 17 percent less pollution-intensive in this sector than closed economies (Huq and Wheeler, 1993).

4. Econometric methodology

4.1 Unit root test

The distinction between whether the levels or differences of a series is stationary leads to substantially different conclusions and hence test of non-stationarity that is unit roots are the usual practice today. Engle and Granger (1987), define a non-stationary time series to be integrated of order d if it achieves stationarity after being differentiated d . times. This notion is usually denoted by $X_t \sim I(d)$. Hence all the series are tested for the probable order of difference stationarity by using the augmented Dickey-Fuller (ADF) tests. ADF test is a standard unit root test, it analyze order of integration of the data series. These statistics are calculated with a constant and a constant plus a time trend; respectively these tests have a null hypothesis of non-stationarity against an alternative of stationarity. ADF test to check the stationarity of the series is based on the equation of the form:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^m \Delta Y_{t-i} + \varepsilon_t \quad (7)$$

where ε_t is a pure white noise error term and $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$, $\Delta Y_{t-2} = (Y_{t-2} - Y_{t-3})$ etc. ADF test determines whether the estimates of δ are equal to Zero. Fuller (1976) provided the cumulative distribution of the ADF statistics, if the calculated t -ratio of the coefficient δ is less than the critical value from Fuller table, then Y_t is said to be stationary. (Note that t ratio of coefficient δ is always with a negative sign). Now, consider for example two series X_t and Y_t both integrated of order (d). Engle and Granger have shown that their linear combination will in general also be $I(d)$. It is an empirical fact that many important macroeconomic variables appear to be integrated of order (d) or $I(d)$ in the terminology of Engle and Granger (1987) so that their changes are stationary. Hence, if the variables are each $I(d)$ than it may be true that any linear combination of these variables will also be $I(d)$. Having established that all the series are integrated of order (d) that is $I(d)$ the study then proceeds to determine the long run behavioral relationships among the variables for the purpose to examine the long run relationship among the variables.

4.2 Testing co-integration using Vector Autoregressive (VAR) approach

The VAR model used is denoted as follows:

$$X_t = \rho_1 X_{t-1} + \rho_2 X_{t-2} + \dots + \rho_k X_{t-k} + t + \eta + \mu_t \quad 1 \leq t \leq T \quad (8)$$

Where X_t is a vector containing *HD*, *EG*, *ED*, *PV*, *URB*, *PD* and *GL* in the model. Starting from the highest possible lag order, and sequentially testing down to the lowest, the optimal lag order is chosen based on AIC and SBC. After running the VAR model and obtaining the most efficient lag order by observing the AIC and SBC values, long run relationship among

the variables have been tested using the Johansen and Juselius (J-J) co-integration technique. Two or more variables are said to be co-integrated if their linear combination is integrated to any order less than 'd'. Co-integration test provides the basis for tracing the long-term relationship. The theory of co-integration put forward by Johansen and Juselius (1990) indicate that the maximum likelihood method is more appropriate in a multivariate system. Therefore this study used this method to identify the number of co-integrated vectors in the model. The selection of "r" co-integrating vector is based on the two statistics defined by Johansen as the maximal eigenvalue and the trace statistic. There is "r" or more co-integrating vectors. The Johansen model is given by:

$$\Delta X_t = \alpha_0 + \Pi X_{t-1} + \sum_{i=1}^k \theta_i \Delta X_{t-i} + \omega_t \quad 1 \leq t \leq T \quad (9)$$

Where X_t is a column vector of m endogenous variables, Π and θ are $m \times m$ matrices of unknown parameters and ω is a Gaussian error term. Π can be dichotomized into two $m \times r$ matrices Ω and σ . The reduced rank $r < m$ of Π is hypothesized as $H(r): \Pi = -\Omega \sigma^T$. The vectors of σ representing the r linear combinations of $\sigma^T X_t$ are stationary. The matrix Ω represents the error-correction parameters. To investigate the relationship, two main likelihood ratio tests, also known as the trace test to evaluate the null hypothesis of at most r co-integrating vectors and the maximum eigenvalue test, used to evaluate the null hypothesis of r co-integrating vectors against the alternative of $(r+1)$ co-integrating vectors, are used.

5. Data and variables information

The study is based on annual data covering a time period from 1970 to 2010 for Pakistan. All the time series data of Water Pollution (Organic water pollutant emissions are measured in terms of biochemical oxygen demand -BOD in kilogram per day), gross domestic product (GDP) per capita, population density, urbanization (percentage of urban population from total population) and globalization are compiled from World Development Indicators (WDI 2011). The series of Gini Coefficient, the indicator of poverty is taken from Haroon (2006). The series of human development index is taken from United Nation database (UNDP 2011). All these variables are expressed in natural logarithm.

6. Empirical analysis

6.1 Testing of the unit root hypothesis

A prerequisite in applying the co integration procedure is to test the unit root properties of the data; Table 1 presents statistics describing these properties of the data. For this purpose the present study tested for the existence of a unit root in the level and the first difference of each of the variable under consideration using the well-known Augmented Dickey- Fuller test (ADF test). The summary table of ADF reveals that all variables are non-stationary until being differentiated with the first order.

6.2 Multi-variate co-integration tests

After establishment of order of integration for all individual series under consideration, VAR model is used to estimate the co-integrating vectors among the variables. First, the

present study estimates model (1) to investigate the long run relationship among human development, sustainable economic development, environmental degradation and other socio-economic factors. For the determination of lag length two VAR versions are initially run: 1 1 and 1 2 lag version. Then Akaike information criterion (AIC) and Schwarz Bayesian criterion (SBC) are used to specify the lags. Results suggest that VAR at lag 1 1 is more appropriate. To establish whether there is a long run relationship among the variables Johansen maximum likelihood approach is conducted. The results from the test are summarized in Table 2, where both the maximal-eigenvalue and trace statistics are used to examine the null hypothesis of no co-integration against the alternative of co-integration. Both trace and max statistics clearly reject the null hypothesis of no co-integration at 5% level of significance in favor of the general alternatives of seven co-integrating relationships for each test. Therefore, based on the two tests, our annual data from 1970 to 2010 appears to support the proposition that in Pakistan there exist a long run relationship among *human resource development (HD)*, *economic development (EG)*, *environmental degradation (ED)*, *poverty (PV)*, *urbanization (URB)*, *population density (PD)* and *globalization (GL)*.

Variables	Level		First Difference	
	Constant	Const. &Trend	Constant	Const.
LEG	-1.84	-1.27	-3.17**	-3.20**
LHD	-0.65	-1.79	-4.85*	-4.82*
LED	-2.45	-2.59	-8.55*	-9.17*
LGL	-0.97	-2.52	-6.05*	-6.97*
LPV	-2.47	-2.80	-3.43**	-4.84*
LURB	- 1.28	- 1.35	-3.75*	- 3.83*
LPD	-2.57	-1.70	-2.78***	-3.28*

Note: Critical values are: -3.6155, -2.9411 and 2.6090 (significant at 1%, 5% and 10% respectively when 1st difference is constant). *, ** and *** represent significant at 1%, 5% and 10% respectively.

Table 1. ADF Unit Root Test

Hypothesized No. of CE(s)	Trace Statistic	Max-Eigen Statistic
None	290.5859*	78.9075*
At most 1	211.6783*	60.0052*
At most 2	151.6731*	50.1254*
At most 3	101.5477*	46.9160*
At most 4	54.6316*	27.3980*
At most 5	27.2336*	16.7314*
At most 6	10.5021*	10.5021*

Trace and Max-eigenvalue tests indicate 7 co-integrating equation(s) each at the 0.05 level.

* denotes rejection of the hypothesis at the 0.05 level.

Table 2. Johansen Maximum Likelihood Co-Integration Test

Next, study move towards the results of co-integrating coefficients normalized on *human development*. The co-integrating coefficient of *economic growth* normalized on *human*

development [see Table 3 panel (a)] show that 1% increase in *economic growth* leads to 0.24% increase in development level of human resource. The elasticities of environmental degradation and poverty are found to be negative and significant. These results suggest that if the level of water pollution increases 1%, condition of human development deteriorates by 0.08%. If the level of poverty increases by 1%, the quality of human development worsen by 0.18%. This indicates that in Pakistan environmental degradation and poverty growth adversely affect quality of human development. The globalization coefficient illustrates that globalization has positive and significant impact on degree of human development. If globalization increases 1% the quality of human resource development will improve by almost 0.09% in Pakistan. The result further demonstrates that increase in population density and rapid urbanization growth do not affect quality of human resource development significantly but the negative sign of population density implies that growing population density may cause to deteriorates the quality of human resource development.

(a) Normalized on Human Development						
LHD	LEG	LED	LPV	LPD	LURB	LGL
1.00	0.2489*	- 0.0786**	- 0.1842**	- 0.0948	0.2243***	0.0936*
Std. error	0.0725	0.0355	0.0938	0.0864	0.1308	0.0298
t-statistics	3.4331	- 2.2141	-1.9637	- 1.0972	1.7148	3.1409
(b) Normalized on Economic Development						
LEG	LHD	LED	LPV	LPD	LURB	LGL
1.00	2.3861*	0.7364	- 2.1008	- 0.2263	- 0.5353	0.2397*
Std. error	0.2882	0.5268	1.3537	0.2049	0.8111	0.0601
t-statistics	8.2793	1.3978	- 1.5519	-1.1044	- 0.6075	3.9883
(c) Normalized on Environmental Degradation						
LED	LEG	LHD	LPV	LPD	LURB	LGL
1.00	1.3579*	- 1.0523*	2.8527	0.3072***	0.7269	- 0.3255*
Std. error	0.1907	0.4059	1.8391	0.1673	1.1482	0.0847
t-statistics	7.1393	- 2.5925	1.5511	1.8362	0.6331	- 3.6792

*, ** and *** denotes rejection of the hypothesis at the 1%, 5% and 10% level of significance.

Table 3. Normalized co-integrating Equations

As far as co-integrating coefficients normalized on economic development concern, the results displayed in table 3, panel (b). The human development coefficient normalized on economic development indicates that 1% increase in the quality of human resource development will boost economic development by 2.38% in Pakistan. The normalized coefficient for environmental degradation is positive but insignificant, suggesting that environmental degradation does not effect the economic development. However, increase in water pollution may harmful, but in the consequence of increase in economic output, water pollution may indirectly cause to speed up economic development. The coefficient of poverty and population density are negative and insignificant, implies to suggest that increase in poverty and population density may slower the process of economic development in Pakistan. The globalization co-integrating coefficient points out that if economy would be globalized 1 percent more then economic development will grow about 0.24 percent more rapidly.

Moreover, the study move towards the results of co-integrating coefficients normalized on environmental degradation [see Table 3, panel (c)]. The cointegrating coefficient of economic growth normalized on environmental degradation explains that one percent increase in economic growth leads to 1.35 percent increase in environmental degradation in the long run in Pakistan.

The long run co-integrating coefficient of globalization demonstrates that 1 percent increase in globalization leads to decrease in water pollution by 0.32 percent. The result suggests that if the economy would be more globalized the economy will move towards more cleaner and more environmental friendly technologies. The long run co-integrating coefficients of human development reveals that 1 percent increase in the quality of human resource development tends to decrease 1.05 percent in water pollution. This result suggests that development of human resource generates the awareness to prevent environmental damages. The co-integrating coefficient of population density normalized on environmental degradation illustrates that if population density increases 1 percent the environmental degradation will worsen by 0.31 percent in Pakistan in the long run. The long run co-integrating coefficients of urbanization and poverty are found to be statistically insignificant and positive, reveal that rapid growing urbanization and poverty may cause to further environmental deterioration in the long run in case of Pakistan.

7. Concluding remarks

The present study explored the long run relationship between human resource development, economic development and environmental degradation along with other socio-economic and demographic factors, such that poverty, urbanization, globalization and population density in case of Pakistan. The study demonstrated that expansion in economic activities, globalization through trade liberalization and urbanization affect human resource development favorably, while increased poverty and environmental degradation has caused to deteriorate the quality of human resource development. The evidence found, suggests that economic development and the globalization are the major factors contributing in the development of human resource. The urbanization also plays a crucial role in the development of human resource, by providing better health and education facilities to people live in urban areas.

The study further found that human resource development and globalization have favourable impact on economic development suggests that development of human capital and growing globalization through trade liberalization are the keys to obtain sustainable economic development. The environmental degradation has not significantly affected the economic development. However, increase in water pollution may harmful, but in the consequence of increase in economic output, water pollution may indirectly cause to speed up economic development.

The results further suggest that the effect of human development is significant to reduce the environmental degradation; while it can play a positive role to attain sustainable development in Pakistan. The human development generates the awareness in people to protect environment and it further improves the economic development of a country. The population density is also adversely affects the environment because due to congestion the planning is more difficult and more populated areas could be more polluted. If we want to sustain our

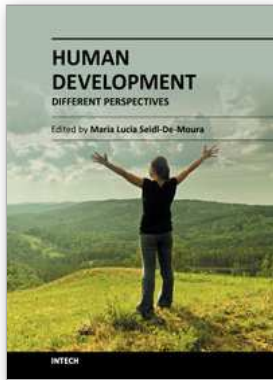
development, then we have to control water pollution and protect our environment. If we want to attain sustainable development in Pakistan, we have to globalize our resources, increase the serious efforts of poverty reduction, own green and clean technologies to increase industrial and agriculture output, control the growing population and urbanization rate.

According to Jalal (1993), “two leaks of sustainable development, i.e., poverty and environmental degradation”, the present study found that two leaks are not significantly affecting sustainable development in Pakistan but their signs represent an alarming situation that poverty and environmental degradation may adversely affect sustainable development unless poverty alleviation and control of environmental degradation are dealt with simultaneously in case of Pakistan. As far as human development and globalization is concerned they can play constructive and significant role to attaining sustainable development by protecting environment through adaptation of green technologies. Last but not least, there is need to enhance the quality of human resource development in Pakistan that can help to alleviate poverty, increase the awareness of environmental protection and generate the understanding to globalize resources.

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Human development has different meanings depending on the area we focus on. To the psychologists it is the ontogenetic process of individual development. It considers systematic psychological changes that occur in human beings over the course of their life span. To sociologists and economists, among others, the main consideration is the macro-level of countries or regions and their development conditions related to human needs. Our book has two parts. The first one is entitled "Development in the ontogenesis" and it consists of three chapters whilst the second is "Human development: contextual factors", also including 3 chapters. Together, the two parts give the readers a panoramic view of very complex subjects and complement each other. Researchers of ontogenetic development cannot ignore that contextual factors are the basis of this process. On the other hand, social scientists worried about the macro variables need to remember that they are dealing with people, who are affected one way or another by those variables and whose development is the product of biology and culture.

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