

Topic: **THE HUMAN DEVELOPMENT INDEX AND ITS RELATIONSHIP WITH
OTHER SELECTED DEVELOPMENT INDICATORS**

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Introduction

In strictly economic terms, **development** has traditionally meant the capacity of a national economy, whose initial economic condition has been more or less static for a long time, to generate and sustain an annual increase in its gross national product (GNP) at rates of perhaps 5% to 7% or more. The **GNP** is the measure of the total domestic and foreign output claimed by residents of a country. It comprises the gross domestic product plus factor incomes accruing to residents from abroad, less the income earned in the domestic economy accruing to persons abroad. A common alternative economic index of development has been the use of rates of growth of income **per capita** or **per capita GNP**, to take into account the ability of a nation to expand its output faster than the growth rate of its population.

The levels and rates of growth of “real” per capita GNP (monetary growth of GNP per capita minus the rate of inflation) were and are still normally used to measure the overall economic well-being of a population (how much of real goods and services are available to the average citizen for consumption and investment). **Development**, prior to the 1970’s according to Todaro (1994, p14), was nearly always seen as an **economic phenomenon** in which rapid gains in overall and per capita GNP growth would either “trickle down” to the masses in the form of jobs and other economic opportunities or create the necessary conditions for the wider distribution of the economic and social benefits of growth.

Over time it was realized that these conventional economic measures of GNP and per capita GNP were **insufficient** in assessing the overall well being of a society and as tools of comparing different societies. Problems of income distribution amongst people; poverty; evaluating the quality life and that of goods and services produced in a society; estimating leisure time; unemployment; and accounting for the costs indirectly paid in increasing GNP (e.g., pollution) were often ignored and were of secondary importance to “get the growth job done”. These income measures were also unable to reflect price changes and changes in production of goods and services in real terms. In light of the above deficiencies the construction of the Human Development Index helped to integrate social and economic factors when assessing the well being of societies.

In 1990 the United Nations Development Program (UNDP) constructed and refined the **Human Development Index (HDI)**, in their annual series of *Human Development Reports*. According to Michael. P. Todaro (1994), “the HDI was seen as the most ambitious attempt to analyze the comparative status of socioeconomic development in both developing and developed nations systematically and comprehensively by the UNDP”. The HDI attempts to rank all countries on a scale of 0 (lowest human development) to 1 (highest human development) based on three goals or end products of development:

1. **Longevity** is measured by life expectancy at birth;
2. **Knowledge** as measured by a weighted average of adult literacy (two thirds) and mean years of schooling (one-third weight); and
3. **Income** as measured by adjusted real per capita income (i.e., adjusted for the differing purchasing power of each country’s currency and for the assumption of rapidly diminishing marginal utility of income).

Using these three measures of development to 1990 data for 160 countries, the HDI ranks all countries into three groups: low human development (0.0 to 0.50), medium human development (0.51 to 0.79), and high human development (0.80 to 1.0). The *advantages* of HDI are that it measures **relative**, and not absolute, levels of human

development and its focus is on the **ends of development** (longevity, knowledge, and material choice) rather than the means (as with per capita GNP alone). Therefore it can be said that HDI measures development in all its dimensions.

Objectives of the Study

The study presented is of an exploratory nature and the conclusions are presented by way of probable scenarios. The discussion revolves around the variability of HDI (as the dependent variable) across countries and its relationship with other development indicators (which are the independent variables). These indicators are indirectly related to and can be seen to (positively and negatively) influence the development indicators used to construct the HDI.

The spectrum of these development indicators is:

1. Composition of GDP (e.g., percentage share of agriculture);
2. Gender issues (e.g., work participation of women in work force);
3. Demographic factors (e.g., population growth and crude birth rate); and
4. Environmental concerns (e.g., carbon-dioxide emissions and deforestation).

The study provides a summary relationship of HDI with the other indicators for all the countries chosen for the study. For separate analysis of all the countries one would need time-series data which was not available. Annexure 1 one lists the countries and their scores on the HDI and the six variables chosen.

Data Used and their Source

Variable 1: **HDI** (year 1997) – *source*: Human Development Report 1999

Variable 2: **Population Growth Rate** (taken for 1980 to 1997) – *source*: World Development Indicators 1999

Variable 3: **Percentage of Agriculture Income in GDP** (year 1997) – *source*: World Development Indicators 1999

Variable 4: **Carbon-dioxide Emissions** per capita metric ton (year 1996) – *source*:
World Development Indicators 1999

Variable 5: **Percentage of Women Participation in Workforce** (year 1997) – *source*:
World Development Indicators 1999

Variable 6: **Crude Birth Rate** (year 1997) – *source*: World Development Indicators 1999

Variable 7: **Percentage Change in Deforestation** – *source*: World Development
Indicators 1999

Methodology:

(a) Sampling Method

To achieve the objective of the exploratory study on Human Development Index (HDI) the published data or the secondary data are used for the analysis. The economic indices of 174 countries were published. Hence the sample frame in the study is taken as 174. Since the minimum size of the sample for a statistical analysis is recommended as at least thirty and due to time constraint and simplification the sample size was limited to thirty.

The selection of countries for the study was done in two approaches. Out of the total sample, twenty-one (21) countries were selected on stratified random sample technique. The balance (9) countries were selected based on the purposive or judgment sampling.

The sample frame is divide into seven strata each having twenty-five countries accept last stratum which contains only twenty-four. Three countries were selected randomly from each stratum by a lottery system.

The next step is to examine the stratified random sample and include the nine countries based on the Judgement. The true representation of entire spectrum of the

countries was completed with judgment sampling. In the judgment sampling the following countries were included selected due to specific reasons.

India	- Included as the country of interest.
Sri Lanka	-S.A.A. R.C Country and a small Island.
Nepal	- S.A.A. R.C Country
Bangladesh	- S.A.A. R.C Country
Pakistan	- S.A.A. R.C Country
Australia	-No country is selected from Australian Sub Continent.
China	-The highest population and a large country.
U.S.A.	-World leader
Russia	-World Leader

The selection of other indices was focused on various aspects, which are not directly related to the HDI. The aspects include demographic data, Gender Issues, Urbanization, Environmental issues etc as mentioned above paragraph.

(b) Statistical Analysis

The seven variables are considered in the statistical analysis. The Human Development Index is taken as the dependent variable and other six independent variables are studied in the analysis. Statistical Package for Social Sciences (SPSS) is used in the analysis. The variables analyzed in the study are listed below and all the six independent variables are not directly related to the components of the HDI.

Variable 1:	Human Development Index	Dependent Variable
Variable 2:	Population Growth rate (per cent)	Independent Variable
Variable 3:	Percentage share of Agriculture in G.D.P.	Independent Variable
Variable 4:	CO ₂ Emission Mton per capita	Independent Variable

Variable 5:	Percentage of Women in work force	Independent Variable
Variable 6:	Crude Birth Rate	Independent Variable
Variable 7:	Average Annual Deforestation % change	Independent Variable

The first step was to find the Correlation Matrix among seven variables. The Correlation Matrix is given in the Table 1.

Then the significant levels of correlation coefficients were found. The figures are shown in the Table 2. In these exercises any independent variable which is not related to HDI and also any independent variable which is having a higher correlation coefficient among other independent variables is omitted from multi-variate analysis.

The next step is to perform the multi-variate analysis, which takes into account of the various relationships among variables. Initially partial correlation analysis is performed among the final curtailed variables such as .Population Growth as a percentage, Percentage of Agriculture on G.D.P. and CO₂ Emission Mton per capita.

Partial Correlation analysis describe the relationship of HDI and the partial contribution of the each independent variable. The table 3 of the report shows the partial contribution of each independent variable together with the significant level.

In the final stage, enter method of multi-variate analysis is performed. The results are shown in the Table 4 of the report.

After finding the correlation matrix variable 5, 6 and 7 has been dropped out either because correlation coefficients are not significant or levels of significance are very high. Partial correlation analysis shows an insignificant correlation between Variable 1 and 4 at below 5 per cent level. So variable 4 has been dropped at this stage. Finally 'enter' method of multiple regression is applied to explain variation in HDI by variations in Population Growth and Per cent Share of Agriculture in GDP. More than 72 per cent variation in HDI is explained by the above mentioned independent variables. It is significant at 0 level. B- coefficients are also significant at nearly 0 level.

CONCLUSION:

- i) As the study is exploratory no strong conclusion can be drawn.
- ii) We came to a position where we need further study to explore the relationships among the components of HDI and pop growth and share of agriculture in GDP.
- iii) Pop growth has a negative relationship with HDI i.e. quantity and quality of life are negatively related (cross-sectional).
- iv) Per cent women in work force has no significant relationship with HDI. However, empowerment of women has always significant contribution to development. For our case we need sector-wise data.
- v) Study shows that higher level of development is associated with higher level of environmental degradation.

MULTIVARIATE ANALYSIS:**TABLE 1. CORRELATION MATRIX:**

	V1	V2	V3	V4	V5	V6	V7
V1	1.00						
V2	-0.75	1.00					
V3	-0.73	0.51	1.00				
V4	0.65	-0.47	-0.54	1.00			
V5	0.03	-0.34	0.16	0.09	1.00		
V6	-0.78	0.84	0.78	-0.51	-0.30	1.00	
V7	-0.11	0.30	0.08	-0.22	-0.44	0.19	1.00

TABLE 2. SIGNIFICANCE OF CORRELATION MATRIX:

	V1	V2	V3	V4	V5	V6	V7
V1	*						
V2	0.00	*					
V3	0.00	0.00	*				
V4	0.00	0.00	0.00	*			
V5	0.43	0.04	0.20	0.32	*		
V6	0.00	0.00	0.00	0.00	0.06	*	
V7	0.29	0.06	0.33	0.13	0.01	0.16	*

DROP VAR: V5, V6, AND V7.

TABLE 3. PARTIAL CORRELATION:

<u>BETWEEN</u>	<u>CONTROL</u>	<u>COR.</u>	<u>SIG.</u>
V1 & V2	V3 & V4	-0.62	0.001
V1 & V3	V2 & V4	-0.53	0.006
V1 & V4	V2 & V3	+0.36	0.078

DROP VAR: V4

TABLE 4. SPSS OUTPUT OF REGRESSION ANALYSIS

DEP VAR: V1; INDEP VAR: V2 & V3

MULTIPLE R	:	0.86432
R SQUARE	:	0.74706
ADJUSTED R SQUARE	:	0.72598
STANDARD ERROR	:	0.09520
SIGNIF F	:	0.0000
<u>VARIABLE</u>	<u>B</u>	<u>SIG T</u>
V2	-0.093398	0.0003
V3	-0.005393	0.0007
CONST	-0.941910	0.0000

CONCLUSION:

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- viii) Pop growth has a negative relationship with HDI i.e. quantity and quality of life are negatively related (cross-sectional).
- ix) Per cent women in work force has no significant relationship with HDI. However, empowerment of women has always significant contribution to development. For our case we need sector-wise data.

- x) Study shows that higher level of development is associated with higher level of environmental degradation.

HUMAN DEVELOPMENT INDEX (in descending order)

Rank	Country	HDI (1997)
3	<i>Unites States</i>	0.298
4	Japan	0.924
7	Australia	0.922
8	Netherlands	0.921
12	Switzerland	0.914
30	Korea, Republic of.	0.852
35	Kuwait	0.833
40	Uruguay	0.826
57	Colombia	0.768
63	Bulgaria	0.758
69	Lebanon	0.749
76	Kazakhstan	0.740
86	Turkey	0.728
90	Sri Lanka	0.721
98	<i>China</i>	0.701
101	South Africa	
110	Vietnam	0.664
114	Honduras	0.641
121	Nicaragua	0.616
126	Morocco	0.582
132	India	0.545
135	Congo	0.533
138	Pakistan	0.508
144	Nepal	0.463
148	Yemen	0.449
150	Bangladesh	0.440
156	Tanzania	0.421
160	Angola	0.398
172	Ethiopia	0.298
71	<i>Russia</i>	0.747