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A Cross Analysis of HDI with IHDI and GDI in Selected Countries

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ABSTRACT: Development is a long term process of structural societal transformation short-to-medium term outcome of desirable targets. HDI is a tool used to measure a country's overall achievement in its social and economic dimensions. IHDI was introduced to measure income inequalities in countries.GDI aimed to measuregender-sensitive dimension to HDI.

Purpose: This research paper is an attempt on comparative analysis of HDI, IHDI and GDI data of selected countries in each group.

Design and methodology: The study is based on secondary data based on annual reports on Human Development Reports available in the United Nations Development Programme portal for the year 2021. The study takes into account thirty nine countries, 20% countries taken in each development group of 2021 HDI indices data. These countries are selected randomly in each category.The inferential analysis was done through ANOVA single factor.

Findings: The findings of the study are that there is a significant difference in HDI& IHDI and HDI & GDI of selected countries in very high, high, medium and low HDI group of countries.

KEYWORDS: Human Development Index, Inequality adjusted Human Development Index, Gender Development Index.

I. INTRODUCTION

Economic growth describes an increase in the quantity and quality of the economic goods and services that a society produces and consumes.Thus in nineties HDI was used to measure the country's development by the United Nations Development Program (UNDP).Development is a long term process of structural societal transformation short-to-medium term outcome of desirable targets. HDI is a tool used to measure a country's overall achievement in its social and economic dimensions. It is a measure for assessing long-term progress in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living.IHDI was introduced to measure income inequalities in countries.GDI was introduced in 1995 in Human Development Report by UNDP. The aim of GDI is to add a gender-sensitive dimension to HDI.

II. CONCEPTUAL FRAMEWORK

Human Development Index (HDI) is a statistical tool used to measure a country's overall achievement in its social and economic dimensions. The Human Development Index (HDI) is an index that measures key dimensions of human development. The three key dimensions are a long and healthy life measured by life expectancy, access to education measured by expected years of schooling of children at school-entry age and mean years of schooling of the adult population and a decent standard of living measured by Gross National Income per capita adjusted for the price level of the country.HDI overall score lies between 0 and 1.1 indicates a high level of economic development and 0 a very low level.[9]

Inequality adjusted Human Development Index(IHDI) combines a country's average achievements in health, education and income with how those achievements are distributed among country's population by "discounting" each dimension's average value according to its level of inequality. Thus, the IHDI is distribution-sensitive average level of human development. Under perfect equality the IHDI is equal to the HDI, but falls below the HDI when inequality rises.[10]

Gender Development Index (GDI) measures gender gaps in human development achievements by accounting for disparities between women and men in three basic dimensions of human development health, knowledge and living standards using the same component indicators as in the HDI.The GDI is the ratio of the HDIs calculated separately for females and males using the same methodology as in the HDI. It is a direct measure of gender gap showing the female HDI as a percentage of the male HDI.[11]

III. REVIEW OF LITERATURE

A study points out the understanding that has motivated the Human Development Reportssince their inception in 1990 is theelementary recognition that human beings are the primary ends as well as the principalmeans of development. These two aspects of the 'human'side of development are relatedbut quite distinct, and recognizing the special demands of each is important for analyticalclarity in the subject.[1]A paper evaluated how well the HDRs have lived up to their own mandate and to assess the ability of the HDI to accurately reflect the world.It also discusses the links between the dimensions of human development and environmental sustainability.[2]A paper examines whether the GDP ranking of countries aresignificantly different from the HDI ranks. It explores the gap between GDP and HDIby considering a sample of 140 economies and found that there is a positive relationshipbetween human development and per capita GDP. The paper focused on examining the difference in ranks between the two for different income group ofcountries, viz., high, middle and low income level of countries.[3]

A study highlighted the basic concept of HDI, its uses and explored the major causes which are responsible for India lagging of our country in HDI ranking.This article examines the contribution of the income component in the HDI index by recalculating the composite matrix. This article also qualitatively examines the ability of HDI index to measure the human development parameters.[5]An international study shows that HDI and investment have a negative effect and unemployment rate has a positiveand significant effect on the poverty levels. Economic growthmediates the effect of the HDI, investment, and the unemployment rate on thepoverty level of districts/cities in Bali Province.[6]A study provided useful policy insights for a strategy to promote human development by addressing inequalities across dimensions in different states in India. The study concluded that the policies promoting economic growth needs to be integrated with the distributional dimensions of education and health.[7]

A study attempted to critically analyse the status of women in India post reforms. The paper studied gender inequality at workplace as an indicator of development in true sense.[8]

Research Gap
The research studies indicate most of the studies are related to the HDI and its calculation framework. The studies are also on different countries attainment of HDI and its relationship with different economic parameters. No study was found towardsa comparison between different indices of HDI. This research paper is an attempt on comparative analysis of HDI, IHDI and GDI data of selected countries in each group.

Objectives of the Study
1. To study the various indices of HDI among different development groups.
2. To analyse the variations in HDI and IHDI among different development groups.
3. To examine the variations in HDI and GDI among different development groups.

Hypotheses of the Study
1. There is no significant difference in HDI and IHDI of the selected countries in various development groups.
2. There is no significant difference in HDI and GDI of the selected countries in various development groups.

Research Methodology
The study is based on secondary data based on annual reports on Human Development Reports available in the United Nations Development Programme portal for the year 2021. The inferential analysis was done through ANOVA single factor.

Limitation
The study takes into account thirty nine countries,20%countries taken in each development group of 2021 HDI indices data. These countries are selected randomly in each category.

Descriptive analysis & Interpretation

The countries of the world are divided into four groups by the ranking of various indices of HDI, very high, high, medium and low human development. For the purpose of analysis the indices selected are IHDI and GDI. 191 countries data has been available for 2021. 20% countries are selected for analysis in each group. In very high HDI out of 66 countries 13 are taken, in high HDI category 10 are taken out of 49 countries, in medium HDI 9 countries are taken out of 44 and in low HDI 7 countries out of 32 are selected. The comparative analysis is done on the basis of value.

		Human Development Index (HDI)	Inequality-adjusted HDI (IHDI)	Gender Development Index (GDI)
		Value	Value	Value
HDI rank	Country	2021	2021	2021
Very high human development				
1	Switzerland	0.962	0.894	0.967
2	Norway	0.961	0.908	0.983
3	Iceland	0.959	0.915	0.976
4	Hong Kong, China (SAR)	0.952	0.828	0.976
5	Australia	0.951	0.876	0.968
6	Denmark	0.948	0.898	0.980
7	Sweden	0.947	0.885	0.988
8	Ireland	0.945	0.886	0.987
9	Germany	0.942	0.883	0.978
10	Netherlands	0.941	0.878	0.968
11	Finland	0.94	0.890	0.989
12	Singapore	0.939	0.817	0.992
13	Belgium	0.937	0.874	0.978
High human development				
67	Albania	0.796	0.710	1.007
73	Sri Lanka	0.782	0.676	0.949
76	Iran (Islamic Republic of)	0.774	0.686	0.880
77	Ukraine	0.773	0.726	1.012
79	China	0.768	0.651	0.984
86	Mexico	0.758	0.621	0.989
87	Brazil	0.754	0.576	0.994
90	Maldives	0.747	0.594	0.925
109	South Africa	0.713	0.471	0.944
114	Indonesia	0.705	0.585	0.941
Medium human development				
116	Philippines	0.699	0.574	0.990
120	Venezuela (Bolivarian Republic of)	0.691	0.592	0.983
121	Iraq	0.686	0.554	0.803
127	Bhutan	0.666	0.471	0.937
129	Bangladesh	0.661	0.503	0.898

Table 1: Human Development Indices

132	India	0.633	0.475	0.849
143	Nepal	0.602	0.449	0.942
146	Cambodia	0.593	0.479	0.926
146	Zimbabwe	0.593	0.458	0.961
Low human development				
161	Pakistan	0.544	0.380	0.810
163	Nigeria	0.535	0.341	0.863
175	Ethiopia	0.498	0.363	0.921
185	Mozambique	0.446	0.300	0.922
189	Niger	0.400	0.292	0.835
190	Chad	0.394	0.251	0.770
191	South Sudan	0.385	0.245	0.843

Source: https://hdr.undp.org/data-center/human-development-index#/indicies/HDI,https://hdr.undp.org/gender-development-index#/indicies/GDI

The analysis shows that the countries in very high HDI are also very high in IDHI and GDI. The countries with high HDI vary in IDHI and GDI. Countries show less IDHI but some countries are better in GDI even from very high HDI countries. The countries in medium HDI are low in IHDI but better in GDI. Low HDI countries are further poor in IDHI but some countries are good in GDI. To understand and interpret these variations inferential analysis is done.

Inferential analysis & Interpretation
For hypothesis testing ANOVA single factor is applied. This helped in analysing variations of various indices of HDI in very high, high, medium and low human development countries with respect to IHDI and GDI.

Table 3: Very high development group HDI & IHDI						
Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
HDI	13	12.324	0.948	7.26667E-05		
IHDI	13	11.432	0.879384615	0.000785256		
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.0306025	1	0.030602462	71.34080516	1.19127E-08	4.259677273
Within Groups	0.0102951	24	0.000428962			
Total	0.0408975	25				

The calculated value of F is 71.34 is greater than F critical value 4.25, null hypothesis is rejected. This means that there is a significant difference in HDI and IHDI of selected countries in very high development group.

Table 4: High development group HDI & IHDI						
Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
HDI	11	8.36	0.76	0.0008552		
IHDI	11	6.953	0.632090909	0.005358891		
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.089984	1	0.089984045	28.96129032	2.87748E-05	4.351243503
Within Groups	0.0621409	20	0.003107045			
Total	0.152125	21				

The calculated value of F is 28.96 is greater than F critical value 4.35, null hypothesis is rejected. This means that there is a significant difference in HDI and IHDI of selected countries in high development group.

Table 5: Medium development group HDI & IHDI						
Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
HDI	9	5.824	0.647111111	0.001846361		
IHDI	9	4.555	0.506111111	0.002850111		
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.0894645	1	0.0894645	38.09859646	1.33984E-05	4.493998478
Within Groups	0.0375718	16	0.002348236			
Total	0.1270363	17				

The calculated value of F is 38.09 is greater than F critical value 4.49, null hypothesis is rejected. This means that there is a significant difference in HDI and IHDI of selected countries in medium development group.

Table 6: Low development group HDI & IHDI						
Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
HDI	7	3.202	0.457428571	0.004642619		
IHDI	7	2.172	0.310285714	0.002799905		
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.0757786	1	0.075778571	20.36367592	0.000710877	4.747225347
Within Groups	0.0446551	12	0.003721262			
Total	0.1204337	13				

The calculated value of F is 20.36 is greater than F critical value 4.74, null hypothesis is rejected. This means that there is a significant difference in HDI and IHDI of selected countries in low development group.

Table 8: Very high development group HDI & GDI						
Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
HDI	13	12.324	0.948	7.2667E-05		
GDI	13	12.73	0.979230769	6.9692E-05		
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.00633985	1	0.006339846	89.0684438	1.5037E-09	4.2596773
Within Groups	0.00170831	24	7.11795E-05			
Total	0.00804815	25				

The calculated value of F is 89.06 is greater than F critical value 4.25, null hypothesis is rejected. This means that there is a significant difference in HDI and GDI of selected countries in very high development group.

Table 9: High development group HDI & GDI

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
HDI	11	8.36	0.76	0.0008552		
GDI	11	10.659	0.969	0.0020434		
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.2402455	1	0.2402455	165.766577	3.88155E-11	4.3512435
Within Groups	0.028986	20	0.0014493			
Total	0.2692315	21				

The calculated value of F is 165.76 is greater than F critical value 4.35, null hypothesis is rejected. This means that there is a significant difference in HDI and GDI of selected countries in high development group.

Table 10: Medium development group HDI & GDI

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
HDI	9	5.824	0.647111111	0.00184636		
GDI	9	8.289	0.921	0.0038205		
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.33756806	1	0.337568056	119.137579	8.01723E-09	4.4939985
Within Groups	0.04533489	16	0.002833431			
Total	0.38290294	17				

The calculated value of F is 119.13 is greater than F critical value 4.49, null hypothesis is rejected. This means that there is a significant difference in HDI and GDI of selected countries in medium development group.

Table 11: Low development group HDI & GDI

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
HDI	7	3.202	0.457428571	0.00464262		
GDI	7	5.964	0.852	0.00310667		
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.54490314	1	0.544903143	140.633127	5.51663E-08	4.7472253
Within Groups	0.04649571	12	0.003874643			
Total	0.59139886	13				

The calculated value of F is 140.63 is greater than F critical value 4.74, null hypothesis is rejected. This means that there is a significant difference in HDI and GDI of selected countries in low development group.

IV. CONCLUSION

There is a variation in HDI& IHDI and HDI & GDI of selected countries in very high, high, medium and low HDI group of countries.HDI scores can be substantially enhanced the government floats inclusive policies that strengthen public health, education and nutrition, and end gender discrimination. The high growth accompanied by more effective income distribution can help enhance human development. Universalisation of education and health care can improve deprivations and IHDI. Government should invest in gender equality as it is integral to human development.

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