

Effect of Democracy and Land Language on Human Development Index

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Abstract

The factors that affect Human Development Index have been investigated extensively in previous researches. These studies consider education as an important factor and focus on the quality of education such as teachers' skills, educational facilities and student conditions. Democracy has also been established as an important factor in HDI. In this study, we examined two variables, the democracy index and the land language index as fundamental variables of the Human Development Index (HDI). The land language index is a new variable created to signify the importance of the medium of instruction in higher education institutes, particularly in the Science, Technology, Engineering and Mathematics (STEM) fields. We performed a multiple-correlation analysis with the available data to find the correlation of these two indices on HDI. We found that together, the democracy index and land language index had a strong correlation to HDI. The results of this study can have a significant impact on social scientists and policymakers and should be considered for further research.

Keywords: land language index, medium of instruction, human development index, democracy index

1. Introduction

Finding factors that improve the quality of human life has always been important for social scientists and policymakers. Human Development Index (HDI) is a widely accepted index created by the United Nations Development Programme (UNDP) as a measurement for the quality of human life in each country. HDI is a summary measure of three indices: health, the standard of living and education. The health dimension is assessed by life expectancy at birth, the standard of living dimension is assessed by gross national income per capita and the education dimension is a combination of expected years of schooling for children entering school and mean years of schooling for adults 25 years and over (UNDP, 2018). It is often used to rank and compare the welfare of people in different countries.

There have been many efforts to find specific variables that affect HDI, such as quality of education and the level of democracy. A study by Demirbolat, analyzed the correlation of the sub-indices of the HDI with education and precursors of international student success (Demirbolat, 2018). One important factor in the quality of education is the Medium of Instruction (MOI). MOI is the language used in classrooms between teachers and students and is an important factor for language policy planning as it can affect areas of learning such as lessons, test-taking and classroom interactions. In Hong Kong, a study done on MOI showed that the relationship between MOI and classroom interactions were better when the medium of instruction was also the first language of the students (Lo & Macaro, 2012).

Another important variable that affects HDI is the level of democracy in a country. The democracy index was developed by the Economist Intelligence Unit (EIU) as a measure of the level of democracy in a country. Countries are categorized as full democracies, flawed democracies, hybrid regimes and authoritarian regimes. These categories are calculated based on five factors: electoral process and pluralism, civil liberties, the functioning of the government, political participation and political culture (EIU, 2018). Nygard explained the effect of democracy as a factor that affects the ranking of countries based on HDI. He argued that democracy is a fundamental component of long term sustainable human development and the HDI (Nygard, 2020).

Our study considers these two factors, namely, MOI at the tertiary level and democracy index as important variables that affect HDI. Democracy facilitates peoples' contribution to society's policymaking as peoples'

voices can be heard more efficiently by policymakers (Carson, 2019; Pogrewbinschi, 1914; Nygard 2020). The language factor is also a fundamental aspect of brain functionality that contribute to Education (Japhet, 2017; Okebukola; 2013; Puteh, 2013). Further, Higher education has an impact on the HDI (Ebrahimi & Chavooshi, 2019). To include the medium of education at the higher level we coined the new term Land Language Index (LLI) as an index to represent the role of (MOI) at tertiary-

In the next section, we describe the methods used to test our hypothesis that there is an effect of democracy and land language on HDI.

2. Methods

Data were collected for the Human Development Index (HDI) and democracy index of forty-one countries. Data for HDI was collected from the UNDP for 2018 and data for the democracy indices were collected from the EIU for 2018 (UNDP, 2018; EIU, 2018).

Land Language Index (LLI) represents the number of people whose first language is the MOI at the tertiary level or in HEI divided by the total population. Land language data were gathered online for countries that had data available on the number of people who speak the language used in education. The language in higher education was chosen if the language used in higher education was different than in primary and secondary levels for the LLI calculation. If no distinction was made for the language between the levels of education, then that language is assumed to be the language at the tertiary level. For some countries where STEM programs had a different MOI than other programs such as the Philippines, MOI for STEM program was selected over other academic programs. For example, STEM programs in the Philippines are in English, whereas social science and arts are in Filipino. Therefore, English was selected for the calculation of LLI for the Philippines (IQAS, 2009).

The forty-one countries used in the analysis were selected based on which countries had data available online on the medium of instruction and the number of people who speak the medium of instruction as a first language. Then data for the HDI and democracy index were collected for those forty-one countries. Since the availability of data was limited, the inferences, mainly for the forty-one countries included in the study. Data on the number of people who speak the medium of instruction ranged over the last twenty years. This is based on the observation that these 41 countries haven't changed their medium of instruction in the twenty-year duration. Countries were not included in the multiple regression analysis if there was no information about the MOI or the number of people who speak the MOI as their first language.

LLI was calculated from data for a country's population, the MOI in HEI and the number of people who speak it as their first language. Land Language Index was calculated for forty-one countries with the following formula (Table 1):

$$\text{Land Language Index (LLI)} = \frac{\text{\# People whose first language is MOI in Higher Education Institutes}}{\text{Total \# people in the population}} \quad (1)$$

Multiple regression analysis was performed and tested the correlation between LLI and democracy index on HDI. Statistical analysis was done using Excel (Data Analysis ToolPak in Excel 2010) HDI was considered as the dependent variable with LLI and Democracy Index as the independent variables. Assumptions were checked with a residual plot (Figure 1) which indicated that the assumption of the homoscedasticity is not violated and the correlation coefficient was calculated between the two independent variables with an r2 of 0.03 indicating no strong correlation between the democracy index and land language index.

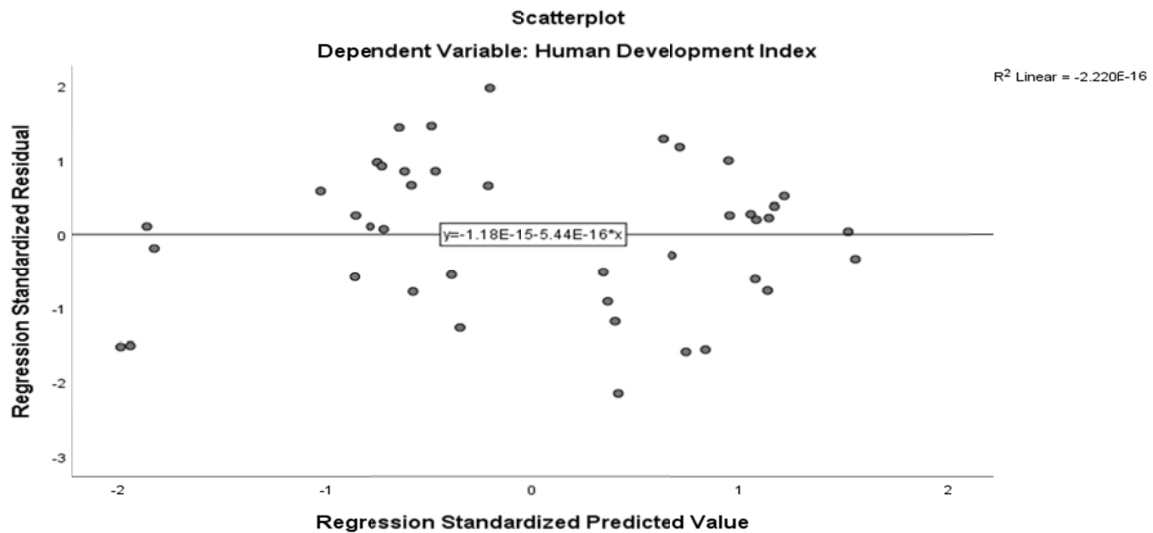


Figure 1. Scatter plot for the residual plot of the model

Table 1. Data used for the multiple correlation analysis with Human Development Index (HDI) as the dependent variable and Land Language Index (LLI) and Democracy Index as the independent variables. The countries are listed in descending order for HDI

Country	HDI (UNDP 2018)	LLI	Democracy Index (EIU 2018)
Australia	0.93	0.68	9.09
Ireland	0.94	0.99	9.15
Germany	0.94	0.90	8.68
Canada	0.93	0.54	9.15
U.S.	0.92	0.70	7.96
U.K.	0.92	0.90	8.53
New Zealand	0.92	0.99	9.26
Japan	0.91	0.98	7.99
South Korea	0.90	0.93	8
France	0.90	0.8	7.8
Spain	0.89	0.86	8.08
Italy	0.88	0.28	7.71
Portugal	0.85	0.97	7.84
Chile	0.84	0.98	7.97
Argentina	0.83	0.89	7.02
Russia	0.82	0.96	2.94
Iran	0.80	0.84	2.45
Turkey	0.79	0.86	4.37
Cuba	0.78	0.96	3
Mexico	0.77	0.85	6.19
Venezuela	0.76	0.91	3.16
Brazil	0.76	0.96	6.97
Thailand	0.75	0.52	4.63
Algeria	0.75	0.73	3.5
China	0.75	0.84	3.32
Peru	0.75	0.79	6.6
Colombia	0.76	0.94	6.96
Dominican Republic	0.74	0.82	6.54
Philippines	0.70	0	6.71
South Africa	0.70	0.08	7.24
Egypt	0.70	0.68	3.36
Viet Nam	0.69	0.77	3.08
Bolivia	0.69	0.52	5.7
El Salvador	0.67	0.93	5.96

Nicaragua	0.66	0.79	3.63
Guatemala	0.65	0.57	5.6
India	0.64	0	7.23
Myanmar	0.58	0.04	3.83
Pakistan	0.56	0	4.17
Tanzania	0.54	0.77	5.41
Ethiopia	0.46	0.08	3.35
DR Congo	0.46	0.38	1.49

Note. HDI=Human Development Index; LLI=Land Language Index.

3. Results

In this section, we present the result by Descriptive statistics for Human Development Index, Land Language Index and Democracy Index charts, Model Summary of the linear regression analysis for Human Development Index, Land Language Index table and Democracy Index, and ANOVA for Human Development Index, Land Language Index and Democracy Index table. And the equation of the model.

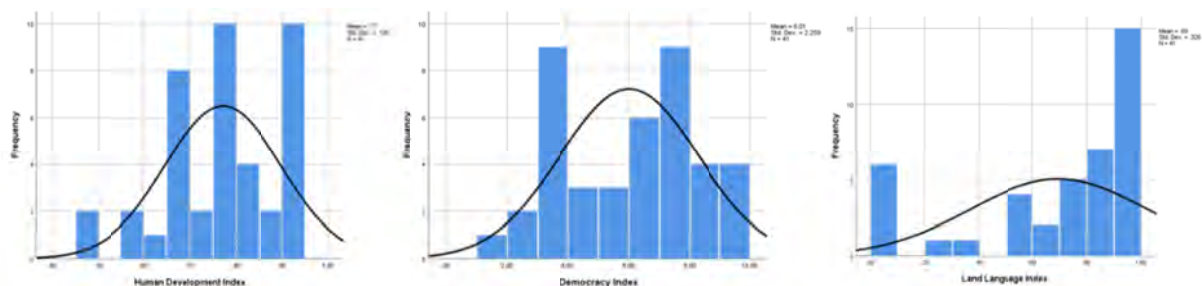


Figure 2. Descriptive statistics for Human Development Index, Land Language Index and Democracy Index

Table 2. Model summary of the linear regression analysis for Human Development Index, Land Language Index and Democracy Index

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.859 ^a	.738	.724	.06602	.738	53.434	2	38	.000

Note. a. Predictors: (Constant), Democracy Index, Land Language Index.

b. Dependent Variable: Human Development Index

From the above table, the adjusted R Squared value (AR2=0.724), implying that 72.4% variation in the Human Development index was explained by Land Language Index and Democracy Index.

Table 3. ANOVA for Human Development Index, Land Language Index and Democracy Index

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.466	2	.233	53.434	.000b
	Residual	.166	38	.004		
	Total	.631	40			

Note. a. Dependent Variable: Human Development Index; b. Predictors: (Constant), Democracy Index, Land Language Index.

The table above shows the ANOVA result for the Human Development Index, Land Language Index and Democracy Index. From the table, the Significant value (P-value=0.000) indicate the existence of a statistically significant relationship between Human Development index, Land Language Index and Democracy Index.

Table 4. Coefficients of the linear regression analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.433	.034		12.598	.000	.363	.503
	Land Language Index.	.194	.033	.503	5.953	.000	.128	.260
	Democracy Index	.034	.005	.610	7.221	.000	.024	.043

Note. a. Dependent Variable: Human Development Index.

The equation can be given below as:

$$\text{Human Development Index} = 0.433 + 0.194 * \text{LLI} + 0.034 * \text{Democracy Index} \quad (2)$$

4. Discussion

There are many views on developing countries and why these countries face challenges to be classified as developed. UNDP developed the HDI to classify countries based on specific variables, but it isn't clear how other factors such as language in education and level of democracy impact HDI. It was investigated that the language in education in a country improves education practices and the HDI (Ebrahimi, 2019; Jepesen, 2011).

Countries that have the local language as the MOI in education have had success such as shown in a study by Puteh in Malaysia. The study examined the development and implementation of the Malay medium of instruction policy in the Malaysian educational system. These results showed high performance in Malay-medium of instruction universities (National University of Malaysia, UTM and UPM) at the higher education level (Puteh, 2013). Another study investigated the local implementation of the National Policy of Education (NPE) on the use of mother tongues or the languages of the immediate community (Japhet, 2017). The result of this study showed the advantages of Yoruba medium of instruction over English using a case study approach of Yoruba as the MOI for Ikire in the south-western part of Nigeria.

In addition to the education and language policies, it is important to consider the level of democracy for a country to increase the HDI. Previous literature has shown that living under democratic governance leads to higher growth (Acemoglu et al., 2019). A high democracy index value can lead to long-term sustainable development with factors such as economic growth and reduced infant mortality and should be considered as a fundamental component of human development (Nygard, 2020; Gerring et al., 2020). A study by Demirbolat also showed significant associations between educational attainment and civil liberties, political participation, GDP per capita, average years of schooling, expected years of schooling and happiness (Demirbolat, 2018).

Population and language data was not available for all countries, however, the limited data from this study suggests that HDI can be improved with a high level of democracy and the education policy in HEI particularly in STEM fields of study and should be further examined. Further, the data suggest that the democracy index has a lower effect on HDI when compared with LLI. This can be seen by the observation that, for example in India where the democracy index is reasonably good but India is still low in HDI.

In addition, more studies can determine the effect of LLI and democracy index on the individual factors of HDI such as mean years of schooling or Gross National Income (GNI) per capita (UNDP, 2018). This will determine the specific areas of HDI that are most impacted by language in education and level of democracy and will allow for more informed policy practices.

The importance of language in education and the level of democracy in improving HDI, in general, has been studied widely. The result of this paper shows that there is a strong correlation between these factors and HDI and should be taken into consideration when examining HDI. Therefore, further studies on these factors or relevant factors will provide more insight for countries to achieve a high HDI. These results may be relevant for educators and policymakers in developing countries.

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Appendix A

Calculation of Land Language Index (LLI)

Country	MOI at the tertiary level	Population size	# of people whose MOI at tertiary level is first language	Land Language Index (LLI)	Reference
China	Chinese	1,420,062,022	120000000	0.84	<i>The Chinese Central Government's Official Web Portal.</i>
India	English	1,368,737,513	226500	0	<i>Office of the Registrar General & Census Commissioner, India Ministry of Home Affairs.</i>
U.S.	English	329,093,110	231000000	0.70	<i>Ryan, Camille (2013). "Language Use in the United States: 2011" (PDF). American Community Survey Reports.</i>
Brazil	Portuguese	212,392,717	211000000	0.99	<i>How Many People Speak Portuguese, And Where Is It Spoken? (2021). Babel.</i>
Pakistan	English	204,596,442	50000	0	<i>Which Countries Have the Most English Speakers? (2021). K-International.</i>
Russia	Russian	143,895,551	138312000	0.96	<i>Russian Population Census (2010). Demoscope.</i>
Mexico	Spanish	132,328,035	113000000	0.85	<i>Cambridge assessment English, Spanish Speaking Countries List Lingoda Online Spanish Language</i>
Japan	Japanese	126,854,745	124951000	0.98	<i>2021 World Population Review.</i>
Ethiopia	English	110,135,635	8920000	0.08	<i>WorldAtlas: Ethiopia.</i>
Philippines	English	108,106,310	37000	0	<i>Which Countries Have the Most English Speakers?. (2021), K-International.</i>
Egypt	Arabic	101,168,745	68795000	0.68	<i>Bateson, Mary Catherine (2003), Arabic Language Handbook, Georgetown University Press, ISBN 0-87840-386-8</i>

Viet Nam	Vietnamese	97,429,061	75000000	0.77	<i>The Origin of Vietnamese: Language and Influences - Asian Absolute Ltd, UK</i>
DR Congo	French	86,727,573	33000000	0.38	<i>WorldAtlas: The Democratic Republic Of The Congo.</i>
Turkey	Turkish	82,961,805	71100000	0.86	<i>BBC: Languages Across Europe: Turkey.</i>
Iran	Farsi	82,820,766	70000000	0.84	<i>UNC: Department of Asian and Middle Eastern Studies.</i>
Germany	German	82,438,639	74385000	0.90	<i>Marten, Thomas; Sauer, Fritz Joachim, eds. (2005), Länderkunde – Deutschland, Österreich, Schweiz und Liechtenstein im Querschnitt [Regional Geography – An Overview of Germany, Austria, Switzerland and Liechtenstein].</i>
Thailand	Thai	69,306,160	36000000	0.52	<i>Thai at Ethnologue (18th ed., 2015)</i>
U.K.	English	66,959,016	60000000	0.90	<i>"2011 Census: Quick Statistics for England and Wales, March 2011". Office for National Statistics.</i>
France	French	65,480,710	52384000	0.8	<i>BBC: Languages Across Europe: France</i>
Italy	Italian	59,216,525	55000000	0.93	<i>How Many People Speak Italian, And Where Is It Spoken? (2021). Babel.</i>
South Africa	English	58,065,097	4892000	0.08	<i>Census 2011: Census in brief (PDF). Pretoria: Statistics South Africa. 2012. p. 30. ISBN 9780621413885.</i>
Myanmar	English	54,336,138	2400000	0.04	<i>Bolton, Kingsley (2008). "English in Asia, Asian Englishes, and the issue of proficiency". Cambridge University Press.</i>
South Korea	Korean	51,339,238	48000000	0.93	<i>Korean language History, Characteristics, & Facts. (2021). Britannica.</i>
Colombia	Spanish	49,849,818	47000000	0.94	<i>Cambridge assessment English, Spanish Speaking Countries List Lingoda Online Spanish Language</i>
Spain	Spanish	46,441,049	40000000	0.86	<i>Cambridge assessment English, Spanish Speaking Countries List Lingoda Online Spanish Language</i>
Argentina	Spanish	45,101,781	40000000	0.89	<i>Cambridge assessment English, Spanish Speaking Countries List Lingoda Online Spanish Language</i>
Algeria	Arabic	42,679,018	31155000	0.73	<i>WorldAtlas: What Languages Are Spoken In Algeria?</i>
Canada	English	37,279,811	20000000	0.54	<i>Population by mother tongue and age groups (total), 2011 counts, for Canada, provinces and territories. Statistics Canada.</i>
Peru	Spanish	32,933,835	26000000	0.79	<i>Cambridge assessment English, Spanish Speaking Countries List Lingoda Online Spanish Language</i>
Venezuela	Spanish	32,779,868	30000000	0.91	<i>Cambridge assessment English, Spanish Speaking Countries List Lingoda Online Spanish Language</i>
Australia	English	25,088,636	17000000	0.68	<i>Australian Bureau of Statistic 2011 Census Quick Stats: Australia</i>
Chile	Spanish	18,336,653	18000000	0.98	<i>Cambridge assessment English, Spanish Speaking Countries List Lingoda Online Spanish Language</i>
Guatemala	Spanish	17,577,842	10000000	0.57	<i>Cambridge assessment English, Spanish Speaking Countries List Lingoda Online Spanish Language</i>
Cuba	Spanish	11,492,046	11000000	0.96	<i>Cambridge assessment English, Spanish Speaking Countries List Lingoda Online Spanish Language</i>
Bolivia	Spanish	11,379,861	6000000	0.53	<i>Cambridge assessment English, Spanish Speaking Countries List Lingoda Online Spanish Language</i>
Dominican Republic	Spanish	10,996,774	9000000	0.82	<i>Cambridge assessment English, Spanish Speaking Countries List Lingoda Online Spanish Language</i>
Portugal	Portuguese	10,254,666	10000000	0.97	<i>How Many People Speak Portuguese, And Where Is It Spoken? (2021). Babel.</i>
El Salvador	Spanish	6,445,405	6000000	0.93	<i>Cambridge assessment English, Spanish Speaking Countries List Lingoda Online Spanish Language</i>
Nicaragua	Spanish	6,351,157	5000000	0.79	<i>Cambridge assessment English, Spanish Speaking Countries List Lingoda Online Spanish Language</i>
Ireland	English	4,847,139	4800000	0.99	<i>Northern Ireland Statistics and Research Agency 2012, Table KS207NI: Main Language</i>
New Zealand	English	4,792,409	4790000	0.99	<i>Statistics New Zealand (April 2014). "2013 QuickStats About Culture and Identity".</i>

Note. Data collected for a country's population recorded in 2019, Medium of Instruction (MOI) and the number of people who speak the MOI as a first language. The countries are listed in descending order for population size.

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