Analysis of Human Development Index in ASEAN : A Panel Model

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Abstract. This study analyzes the determinants of HDI, the purpose of this study is to determine how much influence population, GDP, unemployment, and government expenditure have on HDI in 9 ASEAN member countries. The data used is secondary data obtained from Our World in Data, including HDI and population data, while other data on GDP, unemployment, and government spending are sourced from the World Bank. The data used is the period 2015-2022 including Brunei, Philippines, Indonesia, Cambodia, Malaysia, Myanmar, Singapore, Thailand, and Vietnam. The panel model analysis used selects the Commont Effect Model, Fixed Effect Model, or Random Effect Model using STATA software. The results in the analysis found that population and GDP have a positive and significant effect on HDI, besides that government spending turns out to have a negative and significant effect on HDI, and the unemployment variable does not have a significant effect on HDI in 9 ASEAN member countries.

Keywords: HDI; Population; GDP; Unemployment; Government Expenditure.

1 INTRODUCTION

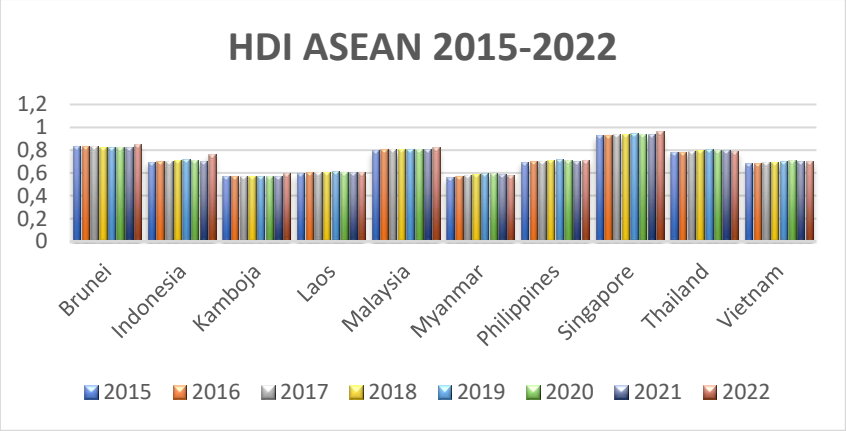
Increased per capita income is not the only outcome of development. The focus of development lies on people, with the ultimate goal of achieving resource acquisition, capacity building, education development, and health development, according to the conceptual framework of development. If HDI increases, the transition between developing and developed countries can be accelerated. Human development is an important component that determines the level of development of a country.(Sujahangir & Sarkar, 2012). In addition, development is a process that involves many aspects, including changing the structure and directing the entire economic and social system(Todaro & Smith, 2011). One of the indicators is the Human Development Index (HDI), which is used as a measure of the country's social welfare and progress, including income, life expectancy, and education. (Arisman, 2018) suggests that HDI is made to ensure

that a country's development is not only measured based on its economic conditions but based on the ability of its human resources.

Human development is an important benchmark in measuring the level of community welfare (UNDP, 1990). Discussions about development include many things besides increasing per capita income. However, rapid sector growth does not necessarily result in the same public welfare. On the other hand, rapid economic growth does not follow an improvement in the distribution of benefits for everyone.

In ASEAN, HDI varies among its member states. Singapore and Brunei Darussalam, for example, have high HDIs because they have high living standards, long life expectancy, and wide access to education, while Laos and Myanmar have lower HDIs because they have problems with basic education and health access. These variations show that each country has different development policies, access to resources, and development priorities. To improve the HDI in ASEAN, countries must work together to improve education, healthcare, and everyone's standard of living. The different HDIs among the ten member states are shown in Table 1. How the HDI evolved from 2015-2022 can be seen as the different HDI values among ASEAN countries show that there are still different levels of people's well-being in the region. This identifies that the goal of ASEAN formation has not been realized as there are still differences in welfare. In addition, the differences in HDI indicate that ASEAN countries have different policy priorities.

Figure 1. ASEAN HDI comparison (percentage) 2015-2022



Source: Our World in Data

2 LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

After seeing the development of HDI in the ASEAN region, expert researchers conducted studies to identify what elements have an influence on HDI. Among the research studied (Arisman, 2018), the study was conducted to identify elements that affect HDI in ASEAN. Another study by (Winarti, 2014) in this study various elements affect Indonesia's HDI, with research results identifying poverty has a negative and significant impact on HDI, while GDP has a positive and significant impact but the cost of education has a negative and insignificant impact. (Setiawan & Hakim, 2008) in their research GDP and income tax in the short term as well as the long term affect the HDI. (Yuliani & Saragih, 2014) stated that the HDI of Central Java Province is influenced by economic growth, unemployment, and government spending. And according to (Lubis, 2022) in this case, spending that has nothing to do with improving the quality of human resources, for example the defense sector, is reduced and allocated to sectors that are directly related to improving the quality of human resources.

From some previous studies, it can be seen that there is a gap in research (research gap), thus HDI is not only affected by macroeconomic variables but also affected by the role that comes from the government (government spending). Therefore, this study aims to analyze the determinants of HDI especially on GDP in 9 ASEAN member countries with other independent variables namely population, unemployment, and government spending.

3 RESEARCH METHOD

The data used is secondary data obtained from Our World in Data including HDI and population data, while other data on GDP, unemployment, and government spending are sourced from the World Bank. In addition, the data used in the study is also panel data from 9 ASEAN members. The countries used as objects include Brunei, the Philippines, Indonesia, Cambodia, Malaysia, Myanmar, Singapore, Thailand, and Vietnam.

Table 1. Data Source

Variable	Description	Source	Quantity
HDI	Human Development Index	Our World in Data	Persent
pop	Population	Our World in Data	Million
gdp	Gross Domestic Product (GDP)	World Bank	Billion
Unemployment	Unemployment	World Bank	Persent
PP	Government Expenditures	World Bank	Persent

The use of this research data for the period 2015 to 2022 consisting of 9 ASEAN member countries. With the use of this year with the aim of seeing how the influence between HDI variables and other variables in 9 ASEAN member countries. The application of the analysis approach in this research selected econometric analysis method, namely panel data regression analysis and STATA software is the tool used.
The equation model used is:

$$y_{it} = \beta_{0it} + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \varepsilon_{it} \quad (2.1)$$

$$IPM_{it} = \beta_{0it} + \beta_1 Lnpop_{1it} + \beta_2 Lngdp_{2it} + \beta_3 \text{Unemployment}_{3it} + \beta_4 PP_{4it} + \varepsilon_{it} \quad (2.2)$$

Y here is the Human Development Index, $Lnpop_{it}$ symbolize Ln of the population, $Lngdp_{it}$ it's Gross Domestic Production, $Unemployment_{it}$ is Unemployment, PP_{it} is government spending, while i is 9 ASEAN member countries, t here is 2015-2022, and ε_{it} is an error term.
When estimating panel data used as model parameters, there are several models that are often used in estimating regression models with panel data between CEM, FEM, and REM. (A'yun & Khasanah, 2022; Nurul Azizah Az zakiyyah, Firsty Ramadhona Amalia Lubis, 2023; Ramadhona et al., 2022; Vianti & Zainal, 2022) explained the advantage of regression using panel data is that as a combination of two series and cross-section data, the large amount of data presented will have a high chance of regression.
In selecting the best model in panel data regression, testing includes the Chow, Hausman, and Lagrange Multiplier tests. From these tests will be able to determine the most appropriate model between CEM, FEM, and REM.

4 RESULT AND DISCUSSION

From the descriptive test with data calculation results with 9 ASEAN members from 2015-2020 are shown in Table 2. In table 2, the average HDI is 0.74 percent with a standard deviation of 0.11. On the other hand, the four independent variables that use the highest mean data are government expenditure, which reaches 66.15 with a standard deviation of 13.17, followed by population, which reaches 17.17 with a standard deviation of 1.84, GNP, which reaches an average of 5.14 with a standard deviation of 1.40, and unemployment, which reaches an average of 0.74 percent with a standard deviation of 0.11.

Table 2. Descriptive Data

Variable	Observation	Mean	St.Dev	Min	Max
HDI	72	0.74	0.11	0.56	0.96
pop	72	17.17	1.84	12.95	19.43
gdp	72	5.14	1.40	2.43	6.90
Unemployment	72	2.88	2.22	0.1	9.3
PP	71	66.15	13.17	39.9	90.9

Source: Data processed by Stata.17

The results of the panel data model calculation in Table 3 are Comman Effects, Fixed Effects, and Random Effect.

Table 3. Selection of the Best Model

Variabel	(1) Comman Effect	(2) Fixed Effect	(3) Random Effect
Pop	-0.091 (-30.99)***	0.131 (1.78)*	- 0.079 (-11.92)***
pdb	0.108 (40.26)***	0.027 (1.72)*	0.094 (14.20)***
Pengangguran	-0.0005 (-0.48)	-0.002 (-0.82)	0.0007 (0.34)

PP	0.0007 (2.71)***	-0.0008 (-1.66)*	0.0000 (0.06)
Cons	1.705 (53.91)***	-1.598 (-1.34)	1.611 (20.35)***

p<0,1*, p<0,05**, p<0,01***

Source: Data processed by Stata.17

Furthermore, the Chow test is conducted for the selection between CEM, FEM, REM. The Chow test results shown in table 4 prove that with H0 rejected, the probability of the F value <0.05, the FEM or REM model is chosen.

Table 4. Chow Test

Test	**F Test**	**Prob**
Chow Test	F(8, 58) = 15.30	Prob > F = 0.00

Source: Data processed by Stata.17

Then, the results of the Hausman test in Table 5, H0 is rejected because it proves (Prob > Chi2) < 0.05, so the selected model is FEM. Because in the chow test and Hausman test the selected model is FEM, the Lagrangian Multiplier Test is not carried out.

Table 5. Hausman Test

Variable	**FEM**	**REM**	**S.E**
Pop	0.13146	-0.0792596	0.0734013
gdp	0.0278978	0.0942471	0.0148499
Unemployment	-0.0021984	0.0007729	0.001371
PP	-0.008266	0.0000252	0.0001993
Prob > Chi2		**0.000**	

Source: Data processed by Stata.17

Table 6 is the test result, where Multicollinearity exists when the VIF value is > 10 or the tolerance value < 0.10. Multicollinearity identifies that the independent variables have a strong relationship between variables. If H0 is rejected, then the independent variables do not show symptoms of multicollinearity.

Table 6. Multicollinearity Test

Variabel	**VIF**	**1/VIF**
Pop	8.47	0.12
gdp	4.11	0.24
PP	3.49	0.29
Unemployment	2.02	0.49
Mean VIF		**4.52**

Source: Data processed by Stata.17

The heteroscedasticity test is conducted to know how the regression model shows a variance that is not constant. If prob > Chi > 0.05, it means that H0 is accepted. In the sense that the independent variables do not show problems or heteroscedasticity in the regression model, then the results of the heteroscedasticity test are shown in table 7.

Table 7. Heteroscedasticity Test

Chi2	**Prob > Chi2**

0.29	0.5900

Source: Data processed by Stata.17

Furthermore, the F test is conducted to identify whether the independent variables have an influence on the dependent variable. The F probability value of 0.00 in table 8 means that the variables of population, population, unemployment, and government expenditure have a simultaneous influence on the formation of HDI at a significance level of $\alpha = 1\%$.

Table 8. F Test

Test	**F test**	**Prob**
F Test	F(4, 66) = 902.90	Prob > F = 0.00

Source: Data processed by Stata.17

The following panel data regression equation with the FEM method in this study can be interpreted:

1. The constant value of -1.598 means that the estimated HDI value is not affected by population, GDP, unemployment, government spending.
2. Population has a significant positive effect on the HDI variable. So if the population variable increases by 1%, it increases the HDI variable by 0.131%.
3. GDP has a significant positive effect on the HDI variable. So if the GDP variable increases by 1%, it will increase the HDI variable by 0.027%.
4. Unemployment is not significant and does not affect the HDI variable. So if the unemployment variable increases by 1%, it will not increase the HDI variable.
5. The government expenditure variable has a significant negative effect on the HDI variable. So if the government expenditure variable increases by 1%, it will reduce the HDI variable by 0.0008%.

Effect of population variables on HDI

This study shows that the population of 9 ASEAN member countries in the last 8 years 2015-2022 has an effect on HDI. From the calculation of population, it shows that the 9 ASEAN member countries have a significant and positive influence of 0.131 on the increase in HDI.

Although this study has a positive effect, considering previous research the importance of population control programs. As in research (Handalani, 2018) the significance value of the constant shows that if all independent variables do not exist, the value of the human development index will be negative. This result is entirely rational, because if all independent variables do not exist, then this indicates the absence of economic development in the country. Population has an adverse impact, meaning that the higher the population, the lower the quality of human development in the selected countries. This result explains why Singapore and Brunei Darussalam are in the top category as both countries have lower populations than other ASEAN countries.

Effect of GDP variable on HDI

This study shows that the GDP of 9 ASEAN member countries in the last 8 years 2015-2022 has an effect on HDI. From the calculation of GDP, it shows that the 9 ASEAN member countries have a positive and significant effect of 0.027 on the increase in HDI.

These results mean that the higher the economic growth of a country, the higher the quality or quality of its human development and the increase in per capita income shows how economic growth. As in research (Kurniawan & A'yun, 2022), strong economic growth can act as an export capacity in Indonesia, but policies that rely on economic growth have vulnerabilities to global dynamics that can affect export activity and the investment climate in Indonesia. Countries with higher per capita income growth rates will have a higher quality human

development index. (Hasan, 2013) found a positive correlation between HDI and GDP and showed that this correlation tends to decrease with higher income levels.

Effect of Unemployment variable on HDI

This study shows that unemployment of 9 ASEAN member countries in the last 8 years 2015-2022 has no effect on HDI. This result shows that the unemployment rate has no direct relationship to HDI. Similar to previous research, according to (Arisman, 2018) the unemployment rate has no effect on HDI in ASEAN countries. Although the unemployment rate has no impact on the human development index, the government must also have a priority to reduce the unemployment rate. According to (Yuniarti & Sukarniati, 2021) the age group 25-59 years, primary education, secondary education and wages affect the addition of labor, therefore the government needs to pay attention to education again so that the unemployment rate can be lower even though it does not have a direct influence on HDI.

Effect of Government Expenditure variable on HDI

This study shows that Government Expenditure of 9 ASEAN member countries in the last 8 years 2015-2022 has an effect on HDI. From the calculation of Government Expenditure -0.0008 shows that the 9 ASEAN member countries have a significant but negative effect of -0.0008 on increasing HDI, which means that it can reduce the HDI of the 9 ASEAN member countries.

Based on research (Riana & Khafid, 2022) government spending on education, poverty, population, growth rate, and minimum wage turns out to have a significant influence on the HDI variable. One way the government does this is by establishing policies that control government spending (Noviansyah et al., 2019). Therefore, it is necessary to re-examine which government spending should be prioritized in building HDI in ASEAN.

5 CONCLUSION AND RECOMMENDATION

This study analyzes the determinants of HDI in 9 ASEAN member countries during the period 2015-2022 by using panel data for analysis. Based on the description above, it can be concluded that population, GDP, unemployment, and government spending results in the analysis found that population and GDP have a significant and positive effect on increasing HDI with a significance level of 1%, although in this study the population has a positive effect, given previous research the importance of population control programs or population. The results of GDP can be interpreted that the higher the economic growth of a country, the higher the quality or quality of human development and the increase in per capita income shows how economic growth. In addition, this study for government spending turned out to have a significant but negative effect on HDI where the significance level was 1% which could also reduce HDI. That way it needs to be reviewed which government spending should be prioritized in building HDI in ASEAN. And the unemployment variable does not have a direct influence on HDI in 9 ASEAN member countries.

This research is expected to be a source of reference or reference to the development and implementation of appropriate policies by the governments of ASEAN member countries on improving the quality of life of the community, which in turn will have an impact on improving the HDI.

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