

## Analysis of Gross Domestic Product determinants in the association of Southeast Asian Nations Region

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**Abstract**

**Purpose** – This study aims to analyze gross domestic product (GDP) determinants in 7 ASEAN countries from 2010 – 2022.

**Methods** – This study uses panel data analysis that selects random effects as the best model for analysis.

**Findings** – This study concludes that investment, exports, and the Human Development Index (HDI) have a positive effect, and government expenditure positively affects gross domestic product (GDP). Meanwhile, imports have a negative effect on Gross Domestic Product (GDP).

**Implication** – This study implies that there must be policies on investment, exports, and HDI through investment in education and health as well as trade cooperation agreements so that they have implications for improving the quality of the country's economy.

**Originality** – This study contributes to analyze determinants of Gross Domestic Product (GDP), especially in ASEAN using a panel data approach.

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**Abstrak**

**Tujuan** – Penelitian ini bertujuan untuk menganalisis determinan produk domestik bruto (PDB) pada 7 Negara di ASEAN selama periode 2010 – 2022.

**Metode** – Penelitian ini menggunakan analisis data panel yang secara spesifik memilih random effect sebagai model terbaik untuk analisis.

**Temuan** – Penelitian ini menyimpulkan bahwa investasi, ekspor, Indeks Pembangunan Manusia (IPM) dan berpengaruh positif dan Pengeluaran Pemerintah berpengaruh positif terhadap Produk Domestik Bruto (PDB). Sementara itu, impor berpengaruh negatif terhadap Produk Domestik Bruto (PDB).

**Implikasi** – Implikasi dari penelitian ini adalah harus adanya kebijakan terhadap investasi, ekspor, dan IPM melalui investasi pendidikan dan Kesehatan serta perjanjian kerjasama perdagangan sehingga berimplikasi terhadap peningkatan kualitas perekonomian negara.

**Orisinalitas** – Penelitian ini berkontribusi terhadap analisis determinan Produk Domestik Bruto (PDB) khususnya di ASEAN menggunakan pendekatan data panel.

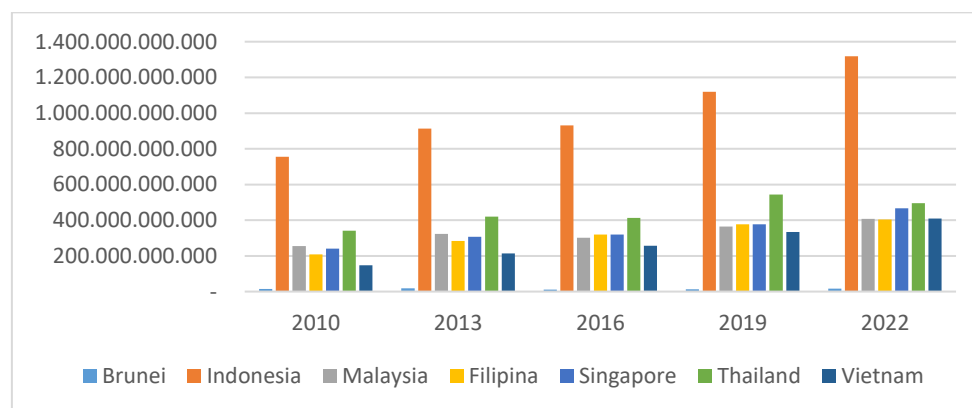
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### Introduction

The Association of Southeast Asian Nations (ASEAN) economy has attracted world attention for decades. It is also not free from the impact of the economic crisis in the international market. A country's government and central bank must formulate monetary policies wisely to ensure the

stability of the currency value and reduce the impact of economic pressures that may come from outside the ASEAN region (Pramana & Syafri, 2023). The ASEAN is a regional organization consisting of Southeast Asian countries, formed in Bangkok on August 8, 1967, based on the Bangkok Declaration by five countries, namely Indonesia, Malaysia, the Philippines, Singapore, and Thailand. One of the main goals of ASEAN is to accelerate the economic growth of its member countries through a spirit of togetherness, driven by geographical proximity and similar historical backgrounds (Khoirunisa, Sabaria, Munzir, & Alhazen, 2022). One of the main benchmarks in assessing the success of economic development is economic growth, which describes the influence of the development policies implemented where Gross Domestic Product (GDP) is the main indicator used to trigger a country's economic growth. Economic growth is also needed to encourage and spur development in various other fields and be a major force in increasing people's income and overcoming socio-economic inequality (Mongan & Saputra, 2012). Economic growth is a process of changing the national economic situation, characterized by increased output per capita and the welfare of citizens, which can be seen from the increased income that can be saved. GDP presents economic activity as a single monetary value for a certain period, covering two assumptions: the entire economy of all economic activities and the total expenditure spent on producing goods and services (Kurniawati & Islami, 2022). A country's economic growth is often considered the main indicator of the success of the government, institutions, and related agencies. Therefore, every country strives to increase its economic growth. The government plays three important roles to achieve this goal: allocation, distribution, and stabilization. The government encourages economic growth through various fiscal and monetary policies. (Himannudin, Ratih, & Mureiati, 2022).

As a primary measure of economic performance, GDP reflects the total value of goods and services produced in a country over a given period. A high GDP growth rate indicates strong economic health and can boost investor confidence, encouraging further investment. In addition, GDP provides valuable insights into a country's wealth and income distribution. Therefore, analyzing GDP is essential to understanding the interrelated factors that influence economic growth in ASEAN countries (Afifah, Djoemadi, & Ariani, 2019).



**Figure 1.** GDP Data in Seven ASEAN Countries for the Period 2010-2022

Based on Figure 1, it can be seen that there is a very large or small difference in GDP in seven ASEAN countries (Brunei, Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam) from 2010 to 2022, where Indonesia's GDP has the highest GDP among the seven ASEAN countries with significant and stable growth from 2010 to 2022, which in 2022 reached around 1,200 billion USD. Indonesia's high GDP can be attributed to several factors. Large population, abundant natural resources, and strong domestic market support Indonesia's high GDP. Meanwhile, Brunei showed a relatively low and flat GDP figure throughout the period. Its GDP figure is at the bottom of the scale, indicating limited growth or small fluctuations. Brunei's estimated GDP is around 20 to 40 billion USD. Despite its small population, Singapore has a high GDP per capita thanks to its advanced financial services sector. Vietnam is showing rapid growth. Malaysia shows an increasing trend, which in 2010 was only 200 billion USD to close to 400 billion

USD in 2022. The Philippines also shows a stable increase in GDP from 2010 to 2022. Thailand's GDP shows an increasing trend with some minor fluctuations.

One factor affecting GDP is investment, where investment (capital accumulation) is the first step in economic development activities. Each country strives to create a climate that supports investment to increase economic growth. The target of this effort includes not only the domestic community or private sector but also foreign investment (Mongan & Saputra, 2012). Thus, investment can affect the economic activity and growth of a country. In addition to investment, human development is another factor that influences the increase in Gross Domestic Product (GDP). One of the indicators used to assess the success of development and the level of welfare of a country is the Human Development Index (Pambudi, 2020). An increase in the Human Development Index can encourage industry to increase production efficiency, which has the potential to produce goods and services at lower prices. This can result in lower prices for goods and services, increasing public consumption and overall income (Himannudin, Ratih, & Mureiati, 2022). A high Human Development Index (HDI) is generally directly proportional to positive economic growth, because it reflects a good quality of life, high education, and adequate health (Yusuf, 2022). Another factor that affects GDP is government spending. Government spending plays a role in improving infrastructure and facilities essential for smooth economic activities, such as distribution infrastructure which is a key factor in supporting the economy (Haryanto, 2013).

Initial research by (Mongan & Saputra, 2012) analyzed the effect of government spending, investment, and inflation on Gross Domestic Product (GDP) in ASEAN 5 showed that government spending, investment, and inflation had a positive impact on the formation of Gross Domestic Product (GDP) in the countries studied. Further research by (Affandi, 2018) analyzed the effect of exports, imports and population on Indonesia's Gross Domestic Product from 1969-2016 using the Generalized Least Square (GLS) approach. The results of this study indicate that the export variable has a positive and significant effect on Indonesia's GDP. In contrast, the population negatively and significantly affects Indonesia's GDP. In contrast, imports positively and insignificantly affect Indonesia's GDP. Another study conducted by (Larasati & Sulasmiyati, 2018), analyzed the influence of inflation, exports, and labor on Gross Domestic Product (GDP) in Indonesia, Malaysia, Thailand, and Singapore in the period 2007 - 2016 concluded that inflation, exports, and labor have a direct and simultaneous influence on GDP, inflation has a negative and significant effect on GDP, exports have a positive and significant effect on GDP, and labor has a positive and significant effect on GDP.

Research conducted by (Silitonga, 2021), analyzed the impact of inflation on Indonesia's Gross Domestic Product (GDP) in the 2010-2020 period. A country's economic growth can be seen through an increase in GDP. In addition to income factors such as consumption, investment, government spending, and net exports, other factors affect GDP. Through quantitative research and simple regression analysis, it was found that inflation simultaneously affects GDP. Partially, inflation has a negative impact on Indonesia's GDP, so that inflation is one of the factors that can partially explain changes in GDP. The next study (Himannudin, Ratih, & Mureiati, 2022) aims to analyze the effect of economic factors and human development on gross domestic product in Southeast Asia during the 2017-2019 period using panel data analysis with a descriptive and quantitative approach. The results of the study show that partially, the variables of government spending, labor force, and Human Development Index (HDI) have a positive and significant effect on GDP in Southeast Asia. In addition, simultaneously, the variables of government spending, foreign investment, labor force, and HDI also have a positive and significant effect on GDP in the region. Research conducted by (Naila, 2023), analyzed the effect of exports, investment, and the Human Development Index (HDI) on Gross Domestic Product (GDP) in Indonesia using the Autoregressive Distributed Lag (ARDL) analysis method. This study concludes that in the short term, export and investment variables have a positive and significant effect, while HDI has a negative and significant effect. In the long term, investment has a positive and significant effect, but HDI has a negative and significant effect. The ASEAN region is one of the fastest-growing economic centers in the world. Given the importance of the economic contribution of ASEAN countries to the global economy, understanding the factors that influence GDP in this region is

very important. Gross Domestic Product (GDP) is the main indicator of a country's economic performance. By analyzing GDP, we can understand the level of economic welfare and the effectiveness of policies implemented in each ASEAN country.

## Research Methods

This study analyzes the determining factors of Gross Domestic Product in 7 ASEAN countries for 2010 – 2022. The data used in this study and its data sources are explained in full in Table 1.

**Table 1.** Definition of Variable

Variable Dependent				
Variable	Symbol	Unit	Definition	Sources
Gross Domestic Product	GDP	U.S. dollars	GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.	WDI World Bank
Variable Independent				
Variable	Symbol	Unit	Definition	Sources
Foreign Direct Investment	FDI	U.S. dollars	The net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows total net FDI. In BPM6, financial account balances are calculated as the change in assets minus the change in liabilities. Net FDI outflows are assets and net FDI inflows are liabilities.	
Export	EXP	U.S. dollars	The value of all goods and other market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.	WDI World Bank
Import	IMP		The value of all goods and other market services received from the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.	WDI World Bank
Human Development Index	HDI	Percent	Summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions.	UNDP
Government Expenditure	GE	U.S. dollars	General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security but excludes government military expenditures that are part of government capital formation. Data are in constant 2015 prices, expressed in U.S. dollars.	WDI World Bank

The basic model used in this study is shown in equation 1 which shows the main factors determining GDP in ASEAN countries.

$$GDP = f(FDI, EXP, IMP, HDI, GE) \tag{1}$$

The implementation of the basic model in equation 1 into an equation for the panel data model is shown in equation 2, which shows the equation in analyzing the relationship between factors forming GDP.

$$GDP_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 EXP_{it} + \beta_3 IMP_{it} + \beta_4 HDI_{it} + \beta_5 GE_{it} + \varepsilon_{it} \tag{2}$$

Based on the econometric model in equation 2, the process carried out in this study is to estimate panel data to carry out the estimation process carried out by estimating the model that has been formed with three approaches, namely Common Effect (CE), Random Effect (RE) and Fixed Effect (FE). The model selection process is carried out to obtain the best model to be a reference for interpreting the regression results. This process is carried out through 3 main tests: the Chow Test, the Lagrange Multiplier (LM) Test, and the Hausman Test.

### Results and Discussion

The initial process in this study was carried out by estimating 3 main models: Common Effect Models, Fixed Effect Models, and Random Effect Models. The output results of the estimation for the entire model are shown in Table 2. Based on the initial conditions of the three panel data models, it is shown that the influence of Investment indicated by FDI has a positive and significant influence on the common effect model. In contrast, it shows negative and significant conditions on the fixed and random effect models. The Export variable shows positive and insignificant results on the common effect model and positive and significant results on the fixed and random effect models. The results for the Import variable show a positive and insignificant influence on the common effect model. In contrast, it shows negative and significant conditions on the fixed and random effect models. The human capital or HDI variable results show negative and significant conditions on the common effect model. In contrast, they show positive and significant conditions on the fixed and random effect models. The same thing is shown in the Government Expenditure (GE) variable, which shows negative and significant conditions on the common effect model. In contrast, it shows positive and significant conditions on the fixed and random effect models. These results are a general representation of the entire model that cannot yet be used as a Conclusion in this study. Panel data testing is required to obtain complete results, including the Chow, Hausman, and Lagrange Multiplier (LM) tests.

**Table 2.** Overall Estimation Results of Panel Data Model

Variable	Common Effect Models		Fixed Effect Models		Random Effect Models	
	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob
C	278276.4	0.0259	-1108263.	0.0000	-936066.8	0.0000
FDI	2.688107	0.0000	2.374443	0.0000	2.463752	0.0000
EXP	0.264943	0.5380	0.397034	0.0467	0.424666	0.0293
IMP	0.038976	0.9369	-0.933789	0.0004	-0.959422	0.0001
HDI	-285169.6	0.0750	1601609.	0.0000	1358378.	0.0000
GE	-1.420669	0.0053	1.619032	0.0060	1.745907	0.0018
F-statistic	237.2454		779.3353		110.7245	
Prob (F-statistic)	0.000000		0.000000		0.000000	
R-Squared	0.933135		0.990869		0.866901	
Observations	91		91		91	

The next step to select the best model is done by conducting the Chow test, Hausman test, and Lagrange multiplier (LM) test to be able to select one of three models, namely the Common Effect model, the Fixed Effect model, and the Random Effect model. The first test evaluates the selection of models between common and fixed effects, using the Chow test. Based on the results of the Chow test, the Cross-section Chi-square probability value is  $0.0000 < 0.05$  or 5%, thus it can be concluded that  $H_0$  is rejected, indicating that the selected model is a fixed effect model.

**Table 3.** Chow Test Result

Effects Test	Statistic	d.f	Prob.
Cross-section F	83.248508	(6,79)	0.0000
Cross-section Chi square	181.178745	6	0.0000

The second model test was conducted using the Lagrange Multiplier (LM) test, which was used to determine the choice between the common effect and fixed effect models so that the model that will be determined for the model selection process will be selected. The results of the Lagrange multiplier (LM) test used to determine between the Random Effect Model (REM) and the Cross Effect model (CEM) showed that the Breusch-Pagan probability value was  $0.0000 < 0.05$  so that  $H_0$  was rejected. Based on the results of this test, the selected model is the Random effect model.

**Table 4.** Lagrange Multiplier (LM) Test Result

	Cross-Section	Test Hypothesis Time	Both
Breusch-Pagan	115.8413 (0.0000)	0.286352 (0.5926)	116.177 (0.0000)

The third model selection test is conducted using the Hausman Test, which can be applied to choose between fixed effect or random effect models, accompanied by the test results. Based on the output results of the Hausman Test, it is known that the random cross-section probability value is  $0.2184 > 0.05$  therefore it fails to reject  $H_0$  which indicates that the right and best model in this study is the Random effect model.

**Table 5.** Hausman Test Result

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob
Cross-section random	7.029976	5	0.2184

Based on the results of the previous model specification tests, it can be concluded that the most appropriate model to be analyzed is the Random Effect Models regression model. The output estimation results for the best model, namely random effect, are shown in table 6 where the next process or step is to evaluate the model to determine the effect of independent variables, such as Investment, Export, Import, Human Development Index (HDI) and Government Expenditure, on the dependent variable Gross Domestic Product (GDP). Based on table 6, the R-Squared value of 0.866901 is obtained, indicating that in this study, independent variables such as Investment, Export, Import, HDI, and Government Expenditure can explain around 86.69% of the variation in the dependent variable Gross Domestic Product (GDP). In comparison, the remaining 14.31% is explained by other factors not included in this study. The f-statistic test assessed whether the regression coefficient had a simultaneous effect. Based on table 4.6 of the regression results, the P-value is  $0.000000 < \alpha$  (5%), indicating a significance to reject  $H_0$ . Thus, it can be concluded that independent variables such as investment, export, import, HDI, and government spending significantly or simultaneously influence the dependent variable gross domestic product (GDP).

**Table 6.** Estimation Result Random Effect Models

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-936066.8	193054.6	-4.848716	0.0000
Foreign Direct Investment (FDI)	2.463752	0.235537	10.46013	0.0000
Export (EXP)	0.424666	0.191580	2.216654	0.0293
Import (IMP)	-0.959422	0.241131	-3.978847	0.0001
Human Development Index (HDI)	1358378.	260898.6	5.206537	0.0000
Government Expenditure (GE)	1.745907	0.543111	3.214639	0.0018
R-squared	0.866901	F-statistic		110.7245
Adjusted R-squared	0.859072	Prob(F-statistic)		0.000000

Based on the estimation results on the Investment variable, a coefficient value of 2.463752 was obtained with a probability value of 0.0000, which positively and significantly affects the Gross Domestic Product (GDP) variable. Based on this, if investment increases by 1%, it will have an impact on increasing Gross Domestic Product by 2.463752% and vice versa. The results of this study are supported by (Mongan & Saputra, 2012) the statement that the investment variable has a positive and significant effect on gross domestic product. Investment is one of the main factors contributing to the formation of Gross Domestic Product (GDP) and is important in driving a country's economic growth. Public and private sector investments include spending on capital goods, infrastructure development, technology development, and innovation that can increase production capacity and economic efficiency. The contribution of investment to GDP occurs through capital expenditures for purchasing capital goods such as machinery, equipment, and technology, which ultimately increases the production capacity of companies and the industrial sector, increasing national output and driving GDP growth. Overall, investment is important in driving economic growth and increasing GDP. Countries can increase productivity, production capacity, and global competitiveness by investing in capital goods, infrastructure, human resources, and technology. Investment also provides long-term benefits, such as increased economic efficiency and job creation, contributing to GDP growth. The higher a country's investment, the more it can increase its economic growth (Maulida, Indrawati, & Prastyanto, 2020).

Based on the estimation results on the Export variable, a coefficient value of 0.424666 and a probability value of 0.0293 are obtained so that it has a positive and significant effect on the Gross Domestic Product variable, so when exports increase by 1%, it will have an impact on increasing Gross Domestic Product by 0.424666% and vice versa. The results of this study are supported by (Larasati & Sulasmiyati, 2018), which states that the export variable has a positive and significant effect on Gross Domestic Product (GDP) (Study in Indonesia, Malaysia, Singapore, and Thailand). Export is one of the crucial elements in the formation of Gross Domestic Product (GDP) and has an important role in driving a country's economic growth. The higher the export value a country generates, the greater its contribution to GDP. Foreign exchange from export activities will also affect national income, so the higher the export volume, the greater the national income generated (Saputra & Kesumajaya, 2016). This shows that increasing exports will directly increase total national output and GDP.

Based on the results for the import variable, a coefficient value of -0.959422 and a probability value of 0.0001 were obtained, so it has a negative effect on the Domestic Product variable, so if imports increase by 1%, it will have an impact on reducing Gross Domestic Product in seven ASEAN by -0.959422% and vice versa. The results of this study are supported by (Hodijah & Angelina, 2021), which states that the import variable has a negative effect on economic growth in Indonesia. Imports are an important element in the economy that significantly influences Gross Domestic Product (GDP). This is because imports reflect the purchase of goods and services from abroad that do not directly contribute to national output. Therefore, the greater the volume of imports, the smaller the contribution to overall GDP. Imports will also reduce domestic demand. Imports will reduce national income in equilibrium and cause economic problems that the country will face (Hodijah & Angelina, 2021). When a country imports more than it exports, it can cause a trade deficit. The deficit shows the country's dependence on foreign goods and services, which can reduce foreign exchange reserves. Imports will also reduce domestic demand.

Based on the research results for the HDI variable, a coefficient value of 1358378 was obtained with a probability value of 0.0000 so that the HDI variable has a positive and significant effect on the Gross Domestic Product variable, so if HDI increases by 1% it will have an impact on increasing Gross Domestic Product by 1358378% and vice versa. The results of this study are supported by (Himannudin, Ratih, & Mureiati, 2022) the statement that the HDI variable has a positive and significant effect on gross domestic product (GDP) in Southeast Asia. HDI evaluates non-economic aspects of human development, such as health, education, and standard of living, while Gross Domestic Product (GDP) measures the total value of a country's output of goods and services over a certain period. A higher HDI can potentially increase GDP through increased productivity, education, and standard of living. On the other hand, higher GDP allows the

government to invest more in sectors that increase HDI, such as health, education, and social protection. This means that increasing HDI means that the quality of human resources will increase productivity, increasing total output (Yuniana, 2019). High HDI creates stable social and economic conditions, attracts foreign and domestic investment, encourages innovation, and produces a more dynamic market.

Based on the results for the government expenditure variable, a coefficient value of 1.745907 and a probability value of 0.0018 were obtained, so it has a positive and significant effect on the Domestic Product variable, where if government spending increases by 1%, it will have an impact on increasing Gross Domestic Product in seven ASEAN countries by 1.745907% and vice versa. The results of this study are supported by (Himannudin, Ratih, & Mureiati, 2022) the statement that the government expenditure variable has a positive and significant effect on gross domestic product (GDP) in Southeast Asia. Government spending is a major component of aggregate demand in the economy. When the government increases public spending, for example, through infrastructure development or subsidies, this directly drives an increase in demand for goods and services. This growth in demand stimulates production activities in various related sectors, which ultimately contributes to an increase in GDP. Government spending can also increase economic growth if the available budget is used for productive infrastructure development, education and human resources (Nasir, Wibowo, & Yansyah, 2021). Government spending is important in influencing GDP in the short and long term. The effect of government spending on GDP depends on the type of spending, the efficiency of budget allocation, and the government's ability to manage long-term impacts such as budget deficits and public debt. In ASEAN, government spending directed at productive sectors can drive economic growth and increase GDP.

## Conclusion and Implications

Based on the data estimation process based on the model that has been established in the analysis of GDP determinants in seven ASEAN countries during the period 2010 - 2022, it can be concluded that Investment has a positive and significant effect on Gross Domestic Product (GDP); Exports have a positive and significant effect on Gross Domestic Product (GDP); Imports have a negative effect on Gross Domestic Product (GDP); Human Development Index (HDI) has a positive and significant effect on Gross Domestic Product (GDP); and Government Expenditure has a positive and significant effect on Gross Domestic Product (GDP).

The implications of this study that can be the basis for policymaking by the government are that to maximise the positive impact of investment, governments in seven ASEAN countries can implement various policies such as allocating sufficient budgets for infrastructure development and increasing investment in education and training to develop a skilled workforce ready to compete in high value-added sectors. Meanwhile, to maximize the positive impact of exports, governments in seven ASEAN countries can implement several strategic policies such as signing free trade agreements with other countries to reduce or eliminate tariffs and non-tariff barriers so that export products become more competitive in the international market. Second, develop and support industries with high export potential, such as electronics, automotive, textiles, and agricultural products.

The next implication to overcome the negative impact of imports is that the government can implement various policies to protect domestic industries and reduce dependence on imports. Furthermore, to maximize the positive impact of the Human Development Index (HDI), governments in the seven ASEAN countries can implement several strategic policies such as increasing the budget for education from elementary to tertiary levels to improve workforce skills and productivity and providing affordable and quality health services to improve public health and productivity. Also, to maximize the positive impact of government spending on Gross Domestic Product (GDP), governments in the seven ASEAN countries can implement several strategic policies such as increasing the allocation of funds for social welfare programs, such as health, education, and social assistance, to improve the quality of life and increase community productivity



and make large investments in transportation, energy, and telecommunications infrastructure to drive economic growth.

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