The Importance of Education for Economic Growth in ASEAN

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Abstract: Education is a crucial factor in ensuring economic growth, particularly in emerging and developing countries. However, according to the World Bank (2019), only 59% of potential productivity growth was attributed to human capital investment in ASEAN, suggesting that such investment does not significantly impact growth. This study, therefore, examined the role of education in economic development across the ASEAN region, including Malaysia, Indonesia, Singapore, Vietnam, Laos, Cambodia, Thailand, the Philippines, Myanmar, and Brunei. Utilizing panel data from 1985 to 2021 for these ten ASEAN countries, the study employed both random effect and fixed effect models. The study presents two main findings: Firstly, it shows that education and purchasing power parity have a positive relationship with economic growth. Secondly, it identifies inflation as having a negative effect on economic development. This research highlights the importance of education in driving economic growth within ASEAN countries. Policymakers can benefit from these findings in formulating strategies to enhance education and mitigate inflation, thereby fostering economic development in the region.

Keywords: ASEAN, economic growth, education, human capital development, Random Effect Model

Introduction

Education is a crucial driver of economic growth, social progress, and equitable income distribution (Grant, 2017; Ogundari & Awokuse, 2018; Bhalla & Meher, 2019). Intensive investments in education have been instrumental in accelerating the rapid growth of many countries (Gherghina & Duca, 2013). Moreover, education is a prerequisite for economic progress, as it facilitates the dissemination of knowledge that can improve human lives (Liao et al., 2019). Education influences economic growth in three key ways: first, by enhancing the collective ability of the workforce to perform tasks more efficiently; second, by enabling secondary and tertiary education to transfer knowledge about new information, products, and technologies developed by others; and third, by fostering creativity and increasing a country's capacity to develop new knowledge, products, and technologies (World Economic Forum, 2016).

Education directly impacts economic growth because it plays a critical role in improving the quality of human capital (Cheek et al., 2015). It can be defined as the enhancement of skills, competencies, and productivity (World Economic Forum, 2016). Additionally, education contributes to labor employability by equipping individuals with better skills (Amiruddin et al., 2020). Consequently, an increase in educational attainment enhances the efficiency of human capital by boosting worker productivity, as illustrated in Figure 1. This figure shows that the longer the total years

of education, the higher the worker's productivity, which positively contributes to the country's economic development.

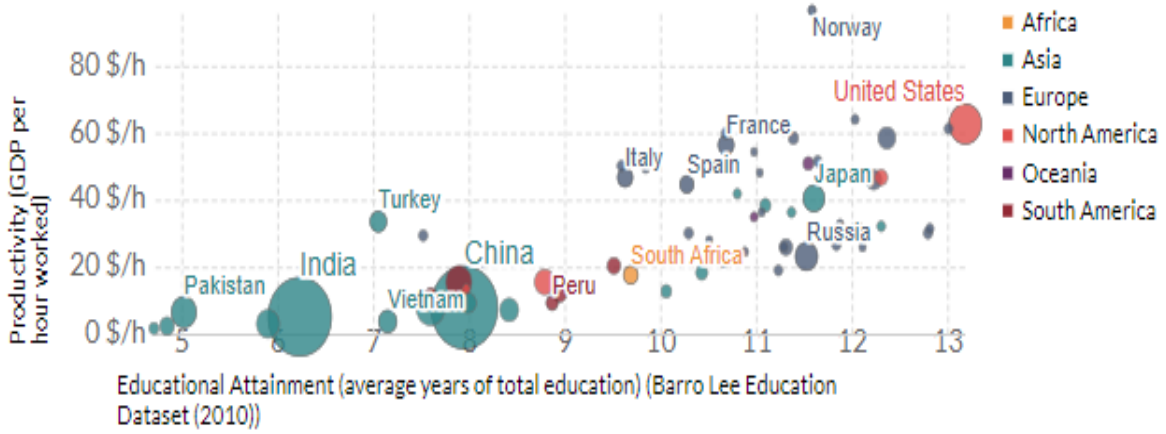

Fig. 1. Educational attainment (average years of total education) versus productivity (GDP per hour worked)
Source: Our World in Data, https://ourworldindata.org/grapher/productivity-vs-educational attainment

Like other regions, ASEAN is also focusing its education on enhancing people's skills and a better economic capacity to contribute to economic growth in the area (ASEAN Key Figures 2019, ASEAN State of Education 2013). Besides, education is critical in promoting the ASEAN community's development. Education is at the heart of the ASEAN development process, creating a knowledge-based society and contributing to the increased competitiveness of ASEAN. According to the World Bank (2019), ASEAN human capital investment can only produce 59% of potential productivity growth, which might undoubtedly affect ASEAN's efforts to improve its economic performance. Therefore, this paper examines the role of education in economic development in the ASEAN region.

Literature Review

The concept of human capital was first developed by Adam Smith in 1776 in his book "The Wealth of Nations" (Eide & Showalter, 2010). Smith argued that the skills and knowledge of a country's population should be considered as a share of its capital. However, this concept ceased in 1890 when Alfred Marshall claimed that human capital had no practical use due to the difficulty of measuring it. The concept was reintroduced by Schultz (1961), who developed quantitative and qualitative measures of human capital. Since then, numerous researchers have adopted the idea of human capital. Mincer (1984) identified human capital as a key factor of production, emphasizing that the nature of employees should be adequately addressed and that human capital should be coordinated with physical capital as a factor of production. He also stressed the need for sustained human capital growth to achieve sustainable economic development and balanced growth.

The theory of modern human capital introduced by Schultz (1961) and Becker (1975) can help researchers measure the impact of education on empirical economic growth. Human capital is one of the key factors in determining economic growth and plays a critical role in the technological advancement of the country (Teixeira & Queiro, 2016; Phoong et al., 2018).

Numerous studies have found a positive relationship between investment in education and economic growth. Chia-Hui Lu (2018) studied education policy in Taiwan by developing a three-year OG model with endogenous growth, investigating the impact of government education policies on economic growth and welfare. The results showed that the level of a country's development and its government's education policies, including compulsory education and investment in the education sector, can increase household welfare. The findings also indicated that the longer the government's compulsory education period, the greater the improvement in economic growth. Awad (2020) also

found that in the long run, education has a positive and significant effect on economic growth, while health has a negative influence on growth..

Using panel data from 118 countries, Marconi (2018) tested the hypothesis that the impact of education on economic growth depends on the age of the educated cohorts. The results showed that only adult education is associated with economic growth. Marconi concluded that investment in education benefits both society and the country, suggesting that expanding investment in education can lead to long-term economic growth. A study by Bane (2018) on low- and middle-income African countries found that investment in education had a significant impact on their economic growth. The study used dynamic GMM panel estimation covering the period from 1985 to 2015. Hassan and Cooray (2015) conducted a study on the impact of gender-based education on economic growth, using data from 18 Asian countries from 1970 to 2009. This study found that, irrespective of gender, primary, secondary, and higher education have a positive effect on economic growth.

However, some studies have reported mixed results regarding the impact of education on economic growth. For example, Su et al. (2020) studied the impact of education investment on economic growth in seven provinces in China, using the Dubin Model Panel on Fixed Effects and Dynamic Space to analyze the spatial impact of education investment in 31 province-level regions in China from 2008 to 2016. They found that the role of education investment in China's economic growth is limited and that the impact varies across different economic regions. Meanwhile, studies on the relationship between primary and tertiary education and economic growth in Malaysia have indicated a positive impact (Hussin et al., 2012; Sieng & Yussof, 2014). Maneejuk and Yamaka (2021) also concluded that secondary enrollment rates positively affect economic growth, examining the nonlinear impacts of higher education on economic growth in ASEAN-5 countries.

However, a study shows that secondary education has a negative relationship with economic growth in Malaysia (Phoong et al., 2018). Another recent study conducted in Saudi Arabia found no evidence of the relationship between education and economic development (Hamdan et al., 2020).

Methodology

This research employed panel data ranging from 1985 to 2021 for ten ASEAN countries namely Malaysia, Indonesia, Singapore, Vietnam, Laos, Cambodia, Thailand, Philippines, Myanmar, and Brunei. The dependent variable in this study is the gross domestic product (GDP), while the three independent variables are education, inflation, and purchasing power parity, the latter serving as a control variable. The modal for this study is as follows:

$$Y_{it} = \alpha + ED_{it} + PPP_{it} + \quad _{it} + \epsilon_{it}$$

Where:

Y_{it} = GDP
ED_{it}= Education
PPP_{it}= Purchasing Power Parity (PPP)
IN_{it}= Inflation
ϵ_{it}= Error Term

Panel data

Panel data analysis refers to data comprising time series for a cross-section or group of people regularly surveyed over a given period (Yaffee, 2003). Panel data observations have at least two dimensions: a cross-sectional dimension, indicated by subscript i, and a time-series dimension, indicated by subscript t. Panel data analysis has gained popularity in social sciences, particularly in economics, where it is used to study company behavior and wage trends over time. In marketing, panel data is often employed to review market share changes across different market structures (Hsiao, 2005; Yaffee, 2003).

Panel data analysis offers several advantages over analyses using time series or cross-sectional data alone. For instance, the increased sample size from combining cross-sectional and time-series data enhances the accuracy of model parameters. The increase in sample size also improves degrees of freedom and reduces multicollinearity compared to using only cross-sectional or time-series data. In cases of non-stationary time-series data, the independence among cross-sections invokes the central limit theorem, ensuring that estimators remain asymptotically normal. Since panel data contain information on both inter-temporal dynamics and individual entity characteristics, they control the effects of missing variables on estimation results. Additionally, panel data allow for the identification of previously unobserved model specifications (Hsiao, 2005).

There are several types of analytical data panel models in use: pool-effects models, fixed-effects models, and random-effects models. The most basic model is the pool-effects model, where shortcuts and slopes have fixed coefficients. In the absence of temporal or cross-sectional differences, data can be aggregated across cross-section and time series, and ordinary least squares regression (OLS) can be performed to analyse the data. The fixed coefficient method is given as follows:

$$Y_{it} = \pi r^2$$

$$Y_{it} = \alpha + \beta X_{it} + v_{it}, \text{ where } i = 1 \ldots N \text{ and } t = 1 \ldots T \quad (1)$$

where Y_{it} is the dependent variable, X_{it} is the independent variable, and v_{it} is the default word usually distributed ($v_{it} \sim$ NIID (0, πv2)). The underlying assumptions of this model are: 1) the explanatory variables (X_{it}) in each period are uncorrelated to the idiosyncratic error in each time period: $E(X_{it}' v_{it}) = 0$; and 2) the explanatory variables in each time period are uncorrelated to the non-observed effect: $E(X_{it}'\alpha_i) = 0$. The estimation of the OLS regression provides clear estimators so long as the underlying assumptions are met (Wooldridge, 2002).

The second form of model for the panel data is the Fixed Effects Model (henceforth, FEM), where the slopes are constant, but the intercepts differ. There are significant differences between the cross-sections in this type of model, and dummy variables are used to represent each cross-section. There may not be major variations across cross-sections at times, but there is an autoregressive time-series structure. Therefore, dummy variables are used to represent temporal dependence between periods. The model for fixed effects is represented as follows:

$$Y_{it} = \alpha_i + \beta X_{it} + v_{it}, \text{ where } i = 1 \ldots N \text{ and } t = 1 \ldots T \quad (2)$$

$$\varepsilon_{it} = \alpha_i + v_{it} \quad (3)$$

where $v_{it} \sim$ NIID (0, δv2); α_i denotes a cross-section-specific effect, and v_{it} is the idiosyncratic error term (Hsiao, 2002). In the fixed effects analysis, α_i is arbitrarily correlated with X_{it}, $E(X_{it}'\alpha_i) \neq 0$ (Wooldridge, 2002).

The third type of panel data model is the random effects model, where both the slopes and the intercepts vary. In this model, the αi is included in the error term, and the model takes the following specification:

$$Y_{it} = \beta X_{it} + u_{it}, \text{ where } i = 1 \ldots N \text{ and } t = 1 \ldots T \quad (4)$$

$$u_{it} = \alpha_i + v_{it} \quad (5)$$

where $\alpha_i \sim$NIID (0, $\delta\alpha$2); $v_{it} \sim$ NIID (0, δv2). In the random effects approach, αi is in the composite error term that is orthogonal to the explanatory variables, (X_{it}), $E(X_{it}'\alpha_i) = 0$. Furthermore, the method accounts for the implied serial correlation in the composite error, $u_{it} = \alpha_i + v_{it}$, the same way as the generalised least squares (GLS) estimation technique (Wooldridge, 2002). To assess

whether a model of fixed or random effects is suitable for data processing, the Hausman test is usually conducted.

Findings and Discussion

As shown in Table 1, the likelihood ratio test was employed to determine the preferable model. The test results indicated that the cross-sectional chi-square from the FEM was significant, leading to the rejection of the null hypothesis. When compared with Pooled Ordinary Least Squares (POLS), FEM is preferred due to its significant p-value. The POLS model indicated that EDU and INF have significant coefficients, but PPP was not significant. If POLS were the preferred model, this would imply that the coefficients do not exhibit individual effects and that the parameters are consistent.

The Breusch-Pagan LM test was used to evaluate the pooled OLS model. The LM test indicated that the one-way random effect is significant for both the cross-sectional and test hypotheses, with a p-value of 0.0000. Based on the Random Effects Model (REM), all coefficients were significant, showing a positive relationship between EDU and PPP, except for INF, which was negatively related to economic growth and statistically insignificant.

The Hausman test was employed to choose between FEM and REM. As shown in Table 1, the small p-value from the Hausman test suggests that the coefficients estimated by FEM and REM differ significantly. The significant p-value indicates that FEM is preferable. Following this, a likelihood ratio test was conducted to choose between POLS and FEM, confirming that FEM is the best choice after conducting the specification test.

Table 1. Pooled OLS, Fixed Effect and Random Effects on education and economic in Asian countries 1985 to 2021

Variables	**POOLS**	**FEM**	**REM**
C	-8.989627	-8.989627	-8.989627
LNEDU	4.115249 18.22255 (0.0000)*	1.088561 4.916428 (0.0000)*	4.115249 19.35747 (0.0000)*
LNPPP	0.381057 1.636996 (0.1058)	1.722508 7.484653 (0.0000)*	0.381057 1.738949 (0.0861)
LNINF	-0.111159 -6.999973 (0.0000)*	-0.008358 -1.181547 (0.2420)	-0.111159 -7.435937 (0.0000)*
F-test (Pooled OLS VS FEM)		(0.0000) H0 = 0 H1 ≠ 0 Null hypothesis is rejected. There are fixed effects.	
LM test (Pooled OLS VS REM)	(0.0000) H0 = 0 H1 ≠ 0 Null hypothesis is rejected. There are fixed effects.		
Hausman test (REM VS FEM)			0.0006 H0 = 0 H1 = 1 Null hypothesis is rejected. The fixed effect model is correct.

Note: *significant at a 5% level of significance.

The FEM was found to be the most appropriate model compared to POLS and REM. The specification test results confirm that FEM is more applicable, implying the presence of an individual-specific effect. This effect is time-variant and is considered part of the intercept, potentially correlated with other regressors. The results of the FEM are discussed below, as shown in Table 1.

The coefficient for EDU is statistically significant and consistent across the three alternative methods, indicating that EDU positively impacts economic growth. The p-value (0.0000) is significant at the 5% level. Previous researchers (e.g., Breton, 2012) have also supported the view that education has a direct and indirect impact on national productivity. The coefficient suggests that a 1.09 per cent increase in EDU contributes to GDP growth.

The FEM estimation results indicate that Purchasing Power Parity (PPP) has a significant p-value of 0.000 and a positive relationship with GDP growth. As shown in Table 1, a 1% increase in GDP leads to a 1.722 per cent increase in PPP. This relationship between PPP and economic growth aligns with previous studies (Alba & Papell, 2007), which found that PPP is positively related to economic growth, particularly in countries open to trade and with low inflation rates. PPP is expected to increase as the growth rate rises, especially in developing countries.

As for inflation, the empirical result obtained from the estimate, as shown in Table 1, shows that the inflation rate has a negative impact on economic growth. The inflation coefficient, with a p-value of 0.2420, is not statistically significant. The coefficient suggests that a 1% increase in GDP would reduce inflation by 0.2420 per cent. This finding is consistent with previous research by Munir et al. (2009), which found that when inflation exceeds a threshold, it negatively affects economic growth.

Overall, the results of this study suggest that education has a positive relationship with economic growth and is statistically significant. The results were found to be parallel in all three alternative methods. PPP was also found to be statistically significant and has a positive relationship with economic growth. However, inflation shows that it has a different significant and negative impact on economic growth. Inflation can be harmful to the economy when the level of inflation is too high, as it can hinder economic growth.

Conclusion

This paper provides evidence that both education (human capital) and physical capital are critical to economic growth. The macroeconomic variables examined in this research significantly and positively impact productivity, aligning with the research objectives. Education plays a crucial role in economic growth by increasing labor efficiency in production. Providing secondary and tertiary education enhances innovation dissemination and accelerates research and technology development. In the POLS model, education is shown to have a positive relationship with economic growth, a finding consistent with the results from FEM and REM, which both show that education is statistically significant for GDP growth. Investing in education can thus drive regional economic development. Countries that heavily invest in human capital have proven their capability to grow their economies. The education sector serves as a primary platform for science and technological innovations, as well as fostering intellectual and critical thinking. Governments should enhance their education policies and introduce initiatives to maximize students' potential. Additionally, the focus should be on developing students' communication and soft skills. Increased investment in education is essential, particularly in less developed Asian countries, as it has been shown to boost the marginal productivity of workers.

Moreover, PPP has been found to have a favourable relationship with GDP, with tests showing statistical significance across all three methods at the 1% level, indicating a positive relationship between PPP and economic development. Higher purchasing power stimulates economic activity, which is crucial for sustainable development.

The empirical results clearly indicate that inflation has a negative effect on economic development. Although inflation is statistically significant, the relationship is negative across all three methods. This suggests a nonlinear relationship between inflation and economic growth, where high inflation rates are particularly harmful as they erode purchasing power and increase the cost of goods and services. Inflation is a risk when it exceeds 4% per annum, but even at low levels, inflation must be monitored by central banks to prevent adverse effects on economic growth.

Suggestions for Future Research

It is suggested that future studies should delve into the differential effects of public and private education systems on economic growth.

Co-Author Contribution

Hanani Ahmad Fuad, the corresponding author, contributed to the writing of the abstract and literature review and provided editing assistance throughout the manuscript preparation process. Hapiza Omar conducted thorough review and editing input. Samsiah Bidin reviewed the manuscript extensively, focusing on grammar and English language refinement to ensure clarity and coherence.

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References

Alba, J. D., & Papell, D. H. (2007). Purchasing power parity and country characteristics: Evidence from panel data tests. *Journal of Development Economics*, *83*(1), 240-251.

Amiruddin, M. H., Sumarwati, S., Suib, S. N., Ibrahim, A. C., & Jalil, S. A. A. (2020). Determining the factors influencing indigenous youth become a successful entrepreneurs. *Gading Journal for Social Sciences (e-ISSN 2600-7568)*, *23*(01), 6-12.

Awad, A. (2021). Which contributes more to economic growth in the MENA region: Health or education? An empirical investigation. *Journal of the Knowledge Economy*, *12*(3), 1119-1133.

Bane J. (2018) Dynamics and Determinants of Inflation in Ethiopia. In: Heshmati A., Yoon H. (eds) *Economic Growth and Development in Ethiopia. Perspectives on Development in the Middle East and North Africa (MENA) Region*. Singapore. https://doi.org/10.1007/978-981-10-8126-2_4

Becker, G. S. (1975). Investment in human capital: effects on earnings. In *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education, Second Edition* (pp. 13-44). NBER.

Bhalla, R., & Meher, S. (2019). Education, Employment and Economic Growth with Special Reference to Females in Kerala. *Indian Journal of Labour Economics*, *62*(4), 639–658. https://doi.org/10.1007/s41027-019-00197-2

Cheek, D. W., Santos, J., & Vaillant, N. (2015). Education and Economic Growth. *International Encyclopedia of the Social & Behavioral Sciences: Second Edition*, *32*, 121–126. https://doi.org/10.1016/B978-0-08-097086-8.92058-0

Eide, E. and Showalter, M. (2010). Human capital. In D. Brewer and P. McEwan (Eds), *Economics of Education* (pp. 27–33). Elsevier.

Gherghina, R., & Duca, I. (2013). The Contribution of Education to Economic Development. *Journal of Knowledge Management, Economics and Information Technology*, *19*(1), 173–210.

Grant, C. (2017). *The Contribution of Education to Economic Growth*. K4D Helpdesk Report. Brighton, UK: Institute of Development Studies.

Hamdan, A., Sarea, A., Khamis, R., & Anasweh, M. (2020). A causality analysis of the link between higher education and economic development: Empirical evidence. *Heliyon*, *6*, 108- 119

Hassan, G., & Cooray, A. (2015). Effects of male and female education on economic growth: Some evidence from Asia. *Journal of Asian Economics*, *36*, 97-109.

Hsiao, C. (2005). Why panel data?. *The Singapore Economic Review*, *50*(2), 143-154.

Hussin, M. Y. M., Muhammad, F., Hussin, M. F. A., & Razak, A. A. (2012). Education expenditure and economic growth: a causal analysis for Malaysia. Journal of Economics and Sustainable Development, 3(7), 71-81.

Liao, L., Du, M., Wang, B., & Yu, Y. (2019). The impact of educational investment on sustainable economic growth in Guangdong, China: A cointegration and causality analysis. *Sustainability 11*(3). 1-16. https://doi.org/10.3390/su11030766

Lu, C. H. (2018) Social status, compulsory education, and growth, *Economic Modelling*, *68* (2018) 425–434.

Maneejuk, P., & Yamaka, W. (2021). The impact of higher education on economic growth in ASEAN-5 countries. *Sustainability*, *13*(2), 520.

Marconi G (2018), Education as a long-term investment: The decisive role of age in the education-growth relationship, *Kyklos 71* (1), 132-161

Mincer, J. (1984). Human capital and economic growth. *Economics of education review*, *3*(3), 195-205.

Munir, Q., Mansur, K., & Furuoka, F. (2009). Inflation and economic growth in Malaysia: A threshold regression approach. *ASEAN Economic Bulletin*, 26(2). 180-193.

Ogundari, K., & Awokuse, T. (2018). Human Capital Contribution To Economic Growth In Sub-Saharan Africa: Does Health Status Matter More Than Education? *Economic Analysis and Policy*, *58*, 131–140. https://doi.org/10.1016/j.eap.2018.02.001

Phoong, S. Y., Phoong, S. W. & Tan, X. J. (2018). A Mediation Analysis on Level Of Education And Economic Growth. *The Journal of Social Sciences Research*, *6*, 417-422.

Teixeira, A. A. C., and Queiro´s, A. S. S. (2016) Economic Growth, Human Capital And Structural Change: A Dynamic Panel Data Analysis. *Research Policy 45* (8), 1636 – 1648.

Schultz, T. W. (1961). Investment in human capital. *The American Economic Review*, 1-17.

Sieng, L. W., & Yussof, I. (2014). Human capital accumulation and economic growth in Malaysia-Investigating the long run nexus. Jurnal Ekonomi Malaysia, 48(1), 155-165.

Su, H., Yu, J., & Shi, Y. (2021). The economic effect of China's educational input, based on the research of dynamic spatial Dubin model. *Computer Applications in Engineering Education*, *29*(2), 433-444.

Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*. MIT press.

World Bank (2019) The world bank invest in ASEAN human capital development https://www.worldbank.org/en/news/infographic/2019/09/06/invest-in-asean-human-capital-development 24/9/2020 10.59pm

World Economic Forum (2016) Global Competitiveness Report 2015-2016 http://reports.weforum.org/global-competitiveness-report-2015-2016/education/#view/fn-53

Yaffee, R. (2003). *Primer for panel data analysis*. Connect: Information Technology at NYU.