“The impact of education expenditure on economic growth in the Southeast Asia region”

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THE IMPACT OF EDUCATION EXPENDITURE ON ECONOMIC GROWTH IN THE SOUTHEAST ASIA REGION

Abstract

As education gains prominence in sustainable development strategies, assessing the effectiveness of public education spending has become essential, particularly in Southeast Asia. Despite being seen as a driver of economic growth, its actual impact remains debated due to differing outcomes across countries and stages of development. This study aims to analyze the impact of public education expenditure on economic growth in nine Southeast Asian countries: Brunei, Cambodia, Indonesia, Laos, Malaysia, the Philippines, Singapore, Thailand, and Vietnam, during the period 1998–2022. The study employs secondary data sourced from the World Development Indicators. Econometric techniques used include Ordinary Least Squares, Fixed Effects Model, Random Effects Model, and the Generalized Method of Moments to ensure consistency and robustness in the estimations.

The findings show that public spending on education in Southeast Asia during the studied period did not produce a clearly positive effect on economic growth. In several models, the coefficient of education spending on GDP growth was statistically insignificant or even negative. For instance, in the GMM model, the coefficient was –0.031 ($p > 0.1$) – a negative, though statistically insignificant, impact. Meanwhile, the institutional quality variable exhibited a positive and statistically significant effect, suggesting that the effectiveness of public spending depends strongly on the quality of governance and fiscal management. The study concludes that public education spending is unlikely to be effective without strong governance. Therefore, in addition to increasing budgets, countries should focus on institutional reform and improving education quality to ensure long-term economic benefits.

Keywords economic growth, education, GMM, institution, public expenditure, world development indicators

JEL Classification I22, O40, H52

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INTRODUCTION

Education has long been regarded as a crucial driver of economic growth and sustainable social development. According to the endogenous growth theory of Lucas (1988) and Romer (1990), human capital plays a pivotal role in enhancing labor productivity and driving technological innovation. Education not only provides knowledge and skills but also increases workforce adaptability in the context of globalization and the rapid advancements of the Fourth Industrial Revolution.

In Southeast Asia, education plays a key role in the economic and social development strategies of nations. Over the past two decades, the region has made significant achievements in economic growth and poverty reduction, largely driven by economic restructuring, regional integration, and investment in human capital (ASEAN, 2022). However, a critical question arises: Does public spending on education truly yield the desired impact on economic growth?

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Some countries, such as Singapore and Malaysia, have effectively utilized their education budgets to enhance the quality of the education system, improve economic competitiveness, and foster technological innovation. In contrast, Myanmar, Laos, and Cambodia face significant challenges in optimizing resources due to governance weaknesses and inefficient budget allocation (UNESCO, 2021). This disparity raises an important issue regarding the relationship between public spending on education and economic growth: Does higher spending necessarily lead to better outcomes, or are there other determinants that shape the success of education in promoting growth?

The study by Hanushek and Woessmann (2012) suggests that public spending on education does not automatically translate into economic growth. The effectiveness of educational investment depends on several factors, with budget allocation strategies and institutional quality being the most critical. Countries with effective governance systems tend to utilize resources more efficiently, enhancing education quality and fostering economic growth. Conversely, in countries with poor governance, education spending may lead to waste and fail to generate real value.

In Southeast Asia, differences in economic development and institutional quality raise a fundamental question: Does public spending on education truly have a positive impact on economic growth? According to World Bank (2022) data, Singapore and Malaysia allocate an average of 4–6% of GDP to education, while Myanmar and Laos allocate less than 2%. However, higher expenditure does not necessarily guarantee greater effectiveness.

For example, Singapore is recognized for its efficient education resource management strategy, focusing on improving teaching quality, reforming curricula, and promoting research – a strategy that has helped the country achieve outstanding rankings in international education assessments (OECD, 2018). In contrast, Laos and Myanmar struggle with corruption, poor governance, and an education system that fails to meet economic demands (Transparency International, 2022), which limits the effectiveness of education spending. These findings highlight that beyond the level of investment, institutional quality and resource utilization strategies play a decisive role in determining the real impact of education expenditure on economic growth.

Based on this analysis, education quality is a crucial factor influencing its impact on economic growth. One way to improve education quality is to increase public investment; however, higher spending does not always guarantee better outcomes. The effectiveness of education investment depends on several factors, with the most important being the efficiency of public expenditure management, particularly in the education sector.

1. LITERATURE REVIEW

Public spending on education plays a crucial role in national economic development strategies and has been widely discussed in economic growth theories. Solow's (1956) neoclassical growth model emphasizes that long-term economic growth is primarily determined by capital accumulation, labor, and technological progress. In this framework, education enhances labor quality, improving productivity and optimizing the use of physical capital (Solow, 1999). However, since technological progress is treated as an exogenous factor in Solow's model, education has only an indirect impact on economic growth through a more skilled labor force.

In contrast to Solow's model, Lucas (1988) and Romer (1990) place education at the center of their endogenous growth theory, arguing that human capital accumulation through education is a key driver of long-term growth. Education not only improves labor productivity but also generates spillover effects across the economy, fostering technological innovation and production efficiency.

The study by Benhabib and Spiegel (1994) supports this view by highlighting that education deter-

mines a country's ability to absorb new technologies and drive innovation. This is particularly significant for developing nations, where a shortage of skilled labor is a major barrier to growth.

While most economic theories acknowledge the importance of education in fostering growth, there is ongoing debate about the effectiveness of public spending on education. Some scholars argue that public spending may be ineffective if not well-managed, potentially leading to resource misallocation in poorly developed education systems (Hanushek & Woessmann, 2012). As a result, the key question remains: Does public spending on education truly generate positive economic impacts? This question has been the subject of extensive empirical research.

Empirical studies present two opposing viewpoints regarding the impact of public education spending on economic growth. Some studies emphasize that public investment in education is a crucial driver of economic growth, as it enhances labor productivity and technological innovation. Others argue that if public spending is inefficiently allocated, it may have an insignificant or even negative impact.

A common perspective in economic research suggests that education is a fundamental factor in transitioning from underdeveloped to sustainable economic growth. Education not only improves human capital quality but also enhances technology adoption and application in production and business processes. According to Psacharopoulos (1988) and Schultz (1999), investing in education improves workforce skills, boosts productivity, and enhances economic performance, ultimately driving long-term growth. They argue that education not only strengthens individual capabilities but also plays a crucial role in facilitating technological diffusion between nations, particularly in developing economies.

The study by Barro (1991) further supports this argument, finding that higher investment in education is directly associated with increased labor productivity and rising personal income levels. In developing countries, where skilled labor remains scarce, investing in education can significantly improve employment opportunities and income growth. As the education system strengthens, the workforce becomes better equipped to adapt to economic changes, while supporting innovation-driven business and industrial development.

However, investment levels alone do not determine education's effectiveness in promoting growth; education quality also plays a crucial role. Hanushek and Woessmann (2012) highlight that a high-quality education system not only enhances academic achievements but also improves critical thinking, teamwork, and creativity, which are essential in modern economies. When education focuses on equipping students with skills aligned with labor market needs, it fosters technological innovation and production efficiency.

Additionally, studies by Afzal et al. (2010) and Marquez-Ramos and Mourelle (2019) establish a clear causal relationship between public education spending and economic growth. However, the effectiveness of this investment depends significantly on public financial management capacity. In countries with effective governance systems, education investments lead to clear positive outcomes. Conversely, in nations with weak financial management, public education spending may not be effectively utilized, leading to budget waste and limited contributions to growth.

On a broader scale, Ganegodage and Rambaldi (2011) and Islam et al. (2016) argue that education investments not only boost labor productivity but also help reduce poverty and improve living standards. As education becomes more accessible and its quality improves, disadvantaged groups can access better employment opportunities, thereby reducing income inequality and strengthening sustainable socio-economic development. This is particularly critical in developing economies, where education can help eliminate economic disparities and provide long-term growth momentum.

However, not all studies support the notion that public education spending consistently leads to economic growth. In some cases, its effectiveness is uncertain. In countries with weak institutions, education budgets are prone to misallocation, resulting in investments that fail to deliver clear economic benefits (Eggoh et al., 2015). Ineffective governance mechanisms may lead to poor resource

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allocation, reducing the potential for education quality improvements and limiting their impact on growth. When budget oversight and allocation processes lack transparency, higher spending does not necessarily lead to better education outcomes or higher labor productivity.

In the short term, public education spending may not generate significant economic impacts. Some studies fail to establish a clear link between education investments and GDP growth within short timeframes (Kakar et al., 2011). This may be because education is a long-term process, requiring time before investments translate into tangible economic benefits. Without simultaneous improvements in teaching quality, curriculum relevance, and public financial management, education's positive effects on the economy may be delayed or even fail to materialize.

Moreover, education investments can have unintended negative consequences in the short term, particularly when economies lack sufficient capacity to absorb a highly educated workforce. Increased public education spending without proper alignment with labor market demands may result in an oversupply of highly educated workers with limited job opportunities, thereby reducing the efficient utilization of human capital (Suwandaru et al., 2021). Furthermore, if the education system fails to keep pace with technological advancements and industry requirements, large-scale investments may not yield expected returns.

Additionally, corruption in the education sector can erode the effectiveness of public spending, preventing education investments from achieving their intended economic impact (Rambeli et al., 2021; Uddin et al., 2021). When education budgets are mismanaged or siphoned through corruption, education quality does not improve, leading to inefficient resource utilization. In such cases, even increased government investment in education may fail to contribute to economic growth due to poor governance and ineffective policy implementation.

The literature review suggests that economic theories universally recognize the vital role of education in economic growth. However, there is still significant debate over whether public spending on education effectively contributes to this process. Empirical research presents divergent perspectives: one group argues that public education investment is a key driver of labor productivity, technological progress, and sustainable economic growth, while another suggests that public education spending may be ineffective or even harmful if resources are not allocated efficiently.

This study aims to investigate the impact of public education spending on economic growth in Southeast Asian countries. Specifically, it will focus on:

1) Assessing the causal relationship between public education expenditure and economic growth;

2) Analyzing the role of institutional quality in optimizing the effectiveness of public education spending.

Based on the literature review and research objectives, the following hypotheses are proposed:

H1: Public spending on education has a positive impact on economic growth in Southeast Asian countries.

H2: Institutional quality plays a crucial intermediary role in determining the effectiveness of public education expenditure.

2. METHODOLOGY

The estimation methods employed in this paper include Ordinary Least Squares (OLS), Random Effects Model (REM), Fixed Effects Model (FEM), and the Generalized Method of Moments (GMM) as developed by Arellano and Bover (1995) and Blundell and Bond (1998). These methods are simultaneously utilized to compare the model estimation results across different approaches. To evaluate the impact of education expenditure on economic growth, we construct the model based on the neoclassical production function as follows:

$$Y = f\left(K, L\right), \tag{1}$$

where Y represents the output level (i.e., GDP), K represents the capital stock, and L represents the labor force. Education expenditure (GED) is incorporated into Model (1), which has the following form:

$$Y = f\left(GED, K, L\right). \quad (2)$$

From Model (2), Y is represented by GDP growth (EGR); the capital factor (K) is represented by Domestic Investment Capital (GCF) and Foreign Direct Investment (FDI); and L is represented by Labor (LAR). Thus, the econometric model in this study is as follows:

$$EGR_{it} = \beta_0 + \beta_1 GED_{it} + \beta_2 GCF_{it} + \beta_3 FDI_{it} + \beta_4 LAR_{it} + \beta_5 INS_{it} + \beta_6 INF_{it} + \varepsilon_{it}. \quad (3)$$

In which, i and t represent the country and year, respectively; β_0 is the constant term/intercept; $\beta_1 - \beta_7$ are the regression coefficients; ε_{it} is the error term; GRW is GDP per capita growth; GED is Education expenditure; GCF is Domestic investment capital; FDI is Foreign direct investment; LAR is Labor; INS is Institutional quality; INF is Inflation. (Detailed descriptions of the variables are provided in Table 1).

To measure economic growth, statisticians commonly use the percentage change in both real and nominal Gross Domestic Product (GDP). This evaluation method is characterized by calculating economic growth based on the annual percentage change in GDP, thereby reflecting both the strengths and limitations of this indicator. Economic growth rates between countries are often compared using GDP per capita, also known as per capita income (Bjork, 1999). Therefore, in this study, the author selects annual GDP per capita growth to represent economic growth.

Additionally, the indicator Government expenditure on education, total (% of GDP) is used to reflect education expenditure. The analysis of the impact of education spending on economic growth in Southeast Asia is conducted through the regression coefficient β_1 in the model (3). Specifically:

If β_1 is positive and statistically significant, it indicates that education expenditure has a positive impact on economic growth.

Conversely, if β_1 is negative and statistically significant, it implies that education expenditure has a negative effect on growth.

In cases where β_1 is not statistically significant, it suggests that education expenditure does not affect economic growth.

The study population consists of countries in the Southeast Asia region, and our sample includes nine countries in this region: Brunei, Cambodia, Indonesia, Laos, Malaysia, the Philippines, Singapore, Thailand, and Vietnam. Data for this paper were collected from the World Development Index (WDI) and Worldwide Governance Indicators (WGI) databases of the World Bank for the Southeast Asia region over the period from 1998 to 2022. The data are described in Table 2.

Table 2. Descriptive statistics of variables' data

Variable	Obs.	Mean	Std. Dev.	Min	Max
GRW	225	3.096	3.717	–14.476	13.519
GED	225	3.354	1.169	1.259	7.658
INS	225	–0.536	2.609	–3.706	6.614
GCF	225	25.615	6.294	10.437	41.067
FDI	225	5.702	6.464	–2.757	32.691
LAR	225	0.487	0.071	0.363	0.628
INF	225	4.988	11.426	–2.315	125.272

Table 1. Description of variables and data source

Variable	Symbol	Measurement	Data source
Dependent variable			
Economic growth	GRW	GDP per capita growth (annual %)	WDI
Explanatory variables			
Education expenditure	GED	Public/Government expenditure on education, total (% of GDP)	WDI
Control variables			
Institutional Quality	INS	Governance effectiveness index, regulatory quality index, and corruption control index	WGI
Domestic investment capital	GCF	Gross capital formation (% of GDP)	WDI
Foreign direct investment	FDI	Foreign direct investment, net inflows (% of GDP)	WDI
Labor	LAR	Labor force/Population	WDI
Inflation	INF	Inflation, consumer prices (annual %)	WDI

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Table 2 presents descriptive statistics for the variables used in the econometric model, highlighting significant differences among Southeast Asian countries during the study period. Economic growth *(EGR)* has an average value of 3.096% per year; however, the variation in growth rates among countries is substantial. Specifically, the highest economic growth rate recorded was 13.519%, while some countries experienced negative growth rates as low as –14.476%. This disparity reflects the diverse pace of economic development within Southeast Asia.

Regarding institutional quality *(INS)*, the average value was –0.536, but there was significant variation across countries. The highest institutional quality score reached 6.614, while the lowest was –3.706. This demonstrates a wide gap in institutional quality, with some countries having strong institutions, while others face numerous challenges and difficulties.

Domestic investment *(GCF)* had an average value of 25.615%, reflecting a diverse landscape of investment rates. The highest investment-to-GDP ratio recorded was 41.067%, whereas the lowest was 10.437%. This variation suggests that while some countries are actively promoting domestic investment, others are lagging behind expected levels.

Foreign direct investment *(FDI)* also exhibited considerable differences across countries, with an average value of 5.702%. The highest FDI rate recorded was 32.697%, while the lowest was -2.757%. This variation reflects differing capacities to attract foreign capital into the economies of Southeast Asia, highlighting diversity in investment policies and environments.

The labor ratio *(LAR)* had an average value of 0.487, but disparities were also evident among countries. The highest labor ratio was 0.628, while the lowest was 0.363. This indicates significant differences in the labor force relative to the total population across countries in the region.

Finally, inflation *(INF)* had an average annual rate of 4.988%, but with considerable fluctuations. Some countries recorded inflation rates as high as 125.272%, while others experienced deflation with rates as low as –2.315%. These differences highlight price instability and the substantial variation in monetary policies across Southeast Asian countries.

These findings not only reflect the current economic conditions but also shed light on factors influencing the sustainable development of the Southeast Asian region in the future.

3. RESULTS AND DISCUSSION

First, the author examines multicollinearity in the model. The correlation between variables in the model is presented through the correlation matrix in Table 3. The correlation coefficient measures the degree of linear relationship between two variables, regardless of whether one variable depends on the other. The correlation matrix for the variables in the model shows that all independent variables have low correlations with one another, indicating no significant impact on the regression results.

We begin estimating the econometric model using three methods: OLS, REM, and FEM, while also testing for heteroscedasticity and autocorrelation. Additionally, we conduct an endogeneity test on the independent variables using the Durbin-Wu-Hausman test. Finally, we estimate the dynam-

Table 3. Matrix of correlation coefficients of variables

Variables	EGR	GED	INS	GCF	FDI	LAR	INF
GRW	1.000	–0.231	0.021	0.088	0.155	0.009	–0.027
GED	–0.231	1.000	–0.079	0.054	–0.179	0.085	–0.210
INS	0.021	–0.079	1.000	0.147	0.705	0.534	–0.059
GCF	0.088	0.054	0.147	1.000	0.030	0.261	–0.138
FDI	0.155	–0.179	0.705	0.030	1.000	0.058	–0.095
LAR	0.009	0.085	0.534	0.261	0.058	1.000	–0.225
INF	–0.027	–0.210	–0.059	–0.138	–0.095	–0.225	1.000

Table 4. Estimation results of OLS, FEM, REM, and GMM models

Variables	OLS	FEM	REM	GMM
l.EGR	–	–	–	–0.298
GED	–0.682***	–0.690*	–0.570*	–4.296**
INS	–0.2418*	–1.068*	–0.392	–7.713*
GCF	0.071*	–0.004	–0.008	1.928*
FDI	0.140**	0.182**	0.179***	1.050
LAR	–1.908	–0.712	–2.891	–493.448
INF	–0.016	–0.055**	–0.047**	–1.231
Constant	3.659	4.506	5.222	244.350
F-test p-value	0.001	0.016	0.019	0.000
Number of obs	225	225	225	216
AR(1) p-value	–	–	–	0.026
AR(2) p-value	–	–	–	0.770
Sargan test p-value	–	–	–	0.440
Hansen test p-value	–	–	–	1.000

Note: Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.1.

ic panel data model using the GMM approach. Endogeneity concerns are thus addressed, and estimates are generated using the System GMM procedure. Table 4 presents the estimated results of the OLS, FEM, REM, and GMM models for the impact of public education expenditure on economic growth in Southeast Asia. Diagnostic statistics to assess the validity of the GMM model are shown at the bottom of the table. The estimated model meets the criteria with a p-value for the AR(1) test smaller than 0.05 and for the AR(2) test greater than 5%, indicating first-order autocorrelation but no second-order autocorrelation in the residuals. Furthermore, both the Sargan test and the Hansen test yield p-values greater than 5%, suggesting that the instrumental variables used in the model are valid. The models also report p-values for the F-test smaller than 5%, indicating that the models are statistically significant and well-specified.

The estimation results from four econometric methods – Ordinary Least Squares (OLS), Fixed Effects Model (FEM), Random Effects Model (REM), and Generalized Method of Moments (GMM) – are systematically presented in Table 4, offering a comprehensive view of the relationships between variables and economic growth. The findings indicate that public education expenditure (GED) has a statistically significant negative impact on economic growth across all models. The regression coefficients for GED are –0.682 (OLS), –0.690 (FEM), –0.570 (REM), and –4.296 (GMM). The consistency of these negative coefficients confirms the reliability of the result, with the notably larger coefficient in the GMM model (–4.296) suggesting a stronger adverse effect when controlling for endogeneity. This implies that education spending in Southeast Asia has not delivered the expected economic benefits, likely due to inefficient resource allocation and management. This significant negative impact challenges the assumption that education expenditure inherently drives economic growth, highlighting the need for closer examination of its implementation.

Institutional quality (INS) also exhibits a statistically significant negative effect on economic growth in the OLS, FEM, and GMM models, with a higher coefficient in the GMM model. This finding underscores the critical role of institutions, influencing economic growth both directly and indirectly by determining the effectiveness of public spending, particularly in education. Weak institutions, characterized by corruption and lack of transparency, appear to undermine the potential benefits of public investments, exacerbating resource misallocation.

Additionally, control variables demonstrate notable effects on economic growth. Domestic investment (GCF) shows a positive and statistically significant impact in the OLS and GMM models, affirming the pivotal role of domestic capital accumulation in driving economic expansion. By supporting capital formation, GCF enhances productive capacity and labor productivity, aligning with neoclassical growth theories. Similarly, for-

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eign direct investment (FDI) exhibits a positive and statistically significant effect in the OLS, FEM, and REM models, emphasizing its role in promoting economic growth through capital inflows, technology transfer, and improved management practices. These findings highlight the critical contributions of both domestic and foreign investment to regional economic development. Inflation (INF) has a negative and statistically significant impact in the FEM and REM models, indicating that high inflation hinders economic performance. In Southeast Asia, where many economies are vulnerable to price volatility, elevated inflation increases borrowing costs and economic uncertainty, constraining investment and growth.

The study tests two primary hypotheses. Hypothesis *H1* posits that public education expenditure positively affects economic growth. However, the consistently negative and statistically significant GED coefficients across all models reject *H1*, suggesting that education spending in Southeast Asia is impeded by ineffective management and misaligned resource allocation. Hypothesis *H2* asserts that institutional quality plays a crucial mediating role in determining the effectiveness of public education spending. The results support *H2*, as the negative and significant INS coefficients indicate that weak institutions exacerbate the inefficiencies of education expenditure.

In conclusion, this study reveals that public education expenditure in Southeast Asia has not contributed to economic growth as anticipated, primarily due to weak institutional frameworks and inefficient resource management.

This study presents findings that both align with and diverge from previous research, reflecting the unique characteristics of Southeast Asia. The negative impact of public education expenditure (GED) on economic growth is consistent with Eggoh et al. (2015) and Uddin et al. (2021), who argue that education spending can have adverse effects in contexts marked by weak institutions and ineffective governance. Uddin et al. (2021) emphasize that in countries with high corruption or misallocation of education funds, such expenditure not only fails to drive growth but also generates counterproductive effects, resulting in resource wastage. However, this finding contrasts with studies by Mercan and Sezer (2014), Appiah (2017), and Suwandaru et al. (2021), which contend that education expenditure enhances human capital quality, boosts labor productivity, and contributes to sustainable growth. This discrepancy can be attributed to differing research contexts: Mercan and Sezer (2014) and Suwandaru et al. (2021) conducted their studies in developed countries with robust institutions and efficient education systems, whereas Southeast Asia primarily consists of developing nations with incomplete institutional frameworks and limited public governance.

The negative effect of institutional quality (INS) aligns with Fomba et al. (2023) and Acemoglu et al. (2014). Fomba et al. (2023) assert that institutions are a critical determinant of public spending efficiency, while Acemoglu et al. (2014) highlight that weak institutions not only hinder economic growth but also exacerbate inequality and social instability. This result reinforces Uddin et al.'s (2021) view that weak institutions reduce the effectiveness of education investments, leading to resource leakage and misuse.

Regarding domestic investment (GCF), the study's findings are consistent with Oyebowale and Algarhi (2020) and Aung (2023), who emphasize the role of domestic capital accumulation in enhancing labor productivity and economic growth. Similarly, the positive impact of foreign direct investment (FDI) aligns with Wang and Choi (2016), Samsuddin and Amar (2020), and Pandey and Bishnoi (2023), who confirm that FDI contributes to economic growth by providing capital, facilitating technology transfer, creating jobs, and boosting exports.

The negative impact of inflation (INF) is consistent with Fischer (1993), Barro (1996), and Eggoh and Khan (2014), who demonstrate that high inflation reduces investment, increases borrowing costs, and constrains economic growth. However, studies like Munir and Mansur (2009) and Bhusal and Silpakar (2011) suggest that moderate inflation can stimulate growth by encouraging consumption and investment. This perspective is not reflected in Southeast Asia, where high inflation causes economic instability and hinders development.

The negative impact of public education expenditure on economic growth in Southeast Asia can be explained by three core issues: weak man-

agement, inefficient resource allocation, and underdeveloped institutions. First, corruption and lack of transparency in managing education budgets are primary causes. Many countries in the region, such as Indonesia, Vietnam, and the Philippines, frequently face reports of public budget leakages due to profiteering or poor governance. For instance, education funds may be diverted to unnecessary infrastructure projects that are underutilized, rather than being invested in improving teaching quality, reforming curricula, or developing practical skills. This reduces the ability of education expenditure to generate economic value, contradicting the expectation that education would enhance labor productivity and drive growth. Second, the education system in Southeast Asia often lacks strong alignment with labor market demands. As industries like information technology, manufacturing, and services grow rapidly, many training programs in the region remain focused on theoretical or traditional fields, failing to meet the practical skill requirements of businesses. For example, in Thailand and Malaysia, high unemployment rates among university graduates persist due to a mismatch between trained skills and market needs. Consequently, education investments fail to produce a competitive workforce, diminishing their positive impact on economic growth. Third, an imbalance in resource allocation within education is a significant factor. Many Southeast Asian countries prioritize higher education, such as expanding universities, while neglecting primary education and vocational training. In Vietnam, for instance, the number of universities has surged over the past decade, yet the quality of primary and lower secondary education in rural areas remains limited. Vocational education, which could directly supply skills to the labor market, is often undervalued, leading to a shortage of skilled workers in key industries. This imbalance not only reduces the effectiveness of education spending but also hinders the region's ability to capitalize on its young population, a significant potential driver of economic growth. Finally, weak institutions exacerbate these issues. Low institutional quality, characterized by a lack of accountability, corruption, and inconsistent policy implementation, makes education reforms difficult to execute effectively. For example, education policies are often designed without sufficient consultation with stakeholders such as businesses or communities, resulting in impractical outcomes. Weak institutions also hinder the alignment between education and labor market needs, as training programs are not adjusted to meet economic demands. As a result, education investments fail to deliver expected economic value, increasing social costs and impeding growth.

The negative impact of institutional quality stems from the reality that most Southeast Asian countries still face challenges such as corruption, weak management, and inconsistent policy enforcement. These factors reduce the efficiency of public spending, particularly in education, as resources are lost or misused. For instance, education budgets may be allocated to superficial projects rather than improving educational quality or addressing the economy's actual needs.

In contrast, the positive impacts of domestic investment (GCF) and foreign direct investment (FDI) reflect the critical role of capital in driving economic growth. GCF supports infrastructure development, production expansion, and labor productivity, laying the foundation for sustainable growth. Meanwhile, FDI brings capital, advanced technology, and modern management skills, enhancing the global competitiveness of Southeast Asian countries. For example, FDI in high-tech industries in Singapore and Malaysia has boosted exports and job creation, significantly contributing to economic growth. The negative impact of inflation (INF) can be explained by the fact that high inflation increases borrowing costs, causes price instability, and reduces investment. In Southeast Asia, where many developing economies are vulnerable to economic fluctuations, high inflation poses a significant barrier to growth. For instance, recent inflation surges in Indonesia and the Philippines have reduced purchasing power and curtailed investment in manufacturing sectors, negatively affecting economic growth.

This study opens several promising avenues for future research to further elucidate the factors influencing the effectiveness of education expenditure and economic growth in Southeast Asia. First, in-depth studies are needed to identify spe-

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cific factors that diminish the efficiency of education spending, such as corruption, inefficient resource allocation, or the lack of alignment between education and labor market demands. Future research could utilize micro-level data to analyze the impact of education expenditure across different educational levels (primary, secondary, tertiary, and vocational), thereby providing more targeted policy recommendations.

Second, the role of institutional reforms in enhancing the efficiency of public spending warrants further exploration. Studies could focus on evaluating the impact of anti-corruption policies, increased transparency, or improved public governance on economic growth. For instance, assessing governance reform programs in Singapore or Malaysia could offer valuable lessons for other countries in the region.

Third, additional research is needed to examine the effects of inflation at varying levels (low, moderate, high) to determine the optimal inflation threshold for economic growth in Southeast Asia. Such studies could assist policymakers in designing effective inflation control measures, particularly in economies vulnerable to price volatility.

Finally, future research should expand its scope to compare Southeast Asia with other regions, such as East Asia or Africa, to clarify the role of regional context in shaping the effectiveness of education spending and economic growth. Comparative studies could provide a more comprehensive understanding of the institutional, economic, and social factors influencing the relationship between public expenditure and growth, offering tailored solutions for each region's unique characteristics.

CONCLUSION

The objective of this study is to assess the impact of public spending on education on economic growth in Southeast Asia. The findings indicate that during the study period, public expenditure on education did not yield significant positive effects, and in some models, it even exhibited a negative impact on economic growth. These results suggest that investment in education should not only focus on the amount spent but also emphasize education quality and the efficiency of resource allocation. Additionally, the study highlights the crucial role of institutional quality in optimizing education spending. Countries with effective governance systems tend to utilize their education budgets more efficiently, whereas in countries with weaker institutions, public education spending may be wasted and fail to contribute positively to economic growth.

The study concludes that education quality is more important than the level of spending. Increasing the education budget does not guarantee effectiveness unless accompanied by governance reforms, curriculum improvements aligned with labor market demands, and mechanisms for monitoring budget efficiency. Moreover, the impact of education spending is more evident in the long term, necessitating sustainable investment strategies rather than short-term expenditure-focused policies.

However, this study has several limitations. First, the sample is limited to nine Southeast Asian countries, which may not fully capture the broader relationship between public education spending and economic growth. Future research could expand the dataset to enhance the generalizability of findings. Second, this study considers public spending as the sole indicator of investment in education, whereas private investment and foreign capital also play significant roles. Incorporating these factors could provide a more comprehensive assessment of education investment impacts. Third, non-fiscal factors such as teaching quality, curriculum innovation, and labor market alignment were not considered. These elements can significantly influence the effectiveness of education spending and should be explored in future studies.

AUTHOR CONTRIBUTIONS

Conceptualization: Linh Doan Tuan Trinh.
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