

EVALUATING BOS IMPACT ON APS AND NEET DURING DEMOGRAPHIC BONUS ERA

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Abstract. The demographic bonus presents a strategic opportunity for Indonesia to boost economic growth by optimizing the participation of young people in education and the labor market. This study aims to analyze the effectiveness of the School Operational Assistance Fund (BOS FUND) at the senior high school level in increasing the School Participation Rate (APS) for individuals aged 16–18 years and reducing the proportion of NEET (Not in Education, Employment, or Training) youth aged 15–24 years. The research utilizes panel data from 38 provinces in Indonesia over the period 2021–2024 and is analyzed using the Fixed Effect Model (FEM). The results indicate that the BOS FUND has no significant impact on increasing the APS or reducing the NEET rate. Conversely, the Human Development Index (HDI) consistently has a positive impact on the APS and a negative impact on the NEET rate, while the Gross Regional Domestic Product (GRDP) per capita shows the opposite relationship. These findings suggest that the effectiveness of the BOS FUND has not been optimized without integration with human development and inclusive regional policies. Regionally based education policies and routine evaluations using panel data are recommended to support the equitable and sustainable utilization of the demographic dividend.

Keywords: BOS FUND; APS; NEET; Demographic Bonus; Panel data; Secondary Education

I. INTRODUCTION

Background of the Study

Indonesia is currently experiencing a strategic demographic transition marked by a large proportion of the productive-age population. This demographic bonus creates an important opportunity to accelerate economic growth, strengthen national competitiveness, and improve social welfare. However, the demographic dividend does not automatically generate development benefits. Its contribution depends heavily on the extent to which young people are equipped with adequate education, skills, health, and access to decent employment opportunities. In this context, education becomes a central instrument for transforming demographic potential into productive human capital. The Indonesian demographic structure, therefore, requires not only an increase in the number of young people entering the labor market but also an improvement in their educational attainment, employability, and social mobility (Badan Pusat Statistik [BPS], 2022; World Bank, 2020).

One crucial indicator for assessing the readiness of young people during the demographic bonus era is the School Participation Rate, particularly for the 16–18 age group. This age group corresponds to the senior secondary education level, which functions as a critical transition point between basic education, higher education, vocational training, and the labor market. A high School Participation Rate indicates that adolescents remain connected to formal education and have better opportunities to develop cognitive, technical, and socio-emotional competencies. Conversely, low participation at the senior secondary level may increase the risk of early school leaving, informal employment, unemployment, and long-term social exclusion. In developing countries, the transition from school to work is often shaped by family income, regional inequality, school quality, labor market conditions, and public education financing (ILO, 2022; OECD, 2024; World Bank, 2020).

Another important indicator is the proportion of youth categorized as Not in Education, Employment, or Training (NEET). NEET is increasingly used in international education and labor studies because it captures youth vulnerability more comprehensively than unemployment indicators alone. Young people classified as NEET are not only outside the labor market but also disconnected from formal education and training systems. This situation may reduce future productivity, increase dependency, and weaken the potential contribution of the demographic bonus. In Indonesia, NEET is particularly relevant because regional disparities, gender norms, social class, and unequal access to education and employment remain persistent challenges (BPS, 2024a; Pattinasarany, 2024; Rahmani & Groot, 2023).

To support educational access and reduce the cost burden of schooling, the Indonesian government has implemented the

School Operational Assistance Fund, known as Bantuan Operasional Sekolah (BOS). The BOS Fund is designed to support school operations, reduce direct educational costs, and improve access to basic and secondary education. At the senior secondary level, BOS is expected to help students remain in school, particularly those from low-income households and disadvantaged regions. However, the effectiveness of BOS in improving school participation and reducing youth disconnection remains an empirical question. Previous studies show mixed evidence: BOS may improve learning outcomes and support school operations, but its impact on household education expenditure, enrollment, and access is not always direct or uniform across regions (Kurniawan & Rakhmawati, 2022; Sitanggang & Jasmina, 2023; Wirandana & Khoirunurrofik, 2024).

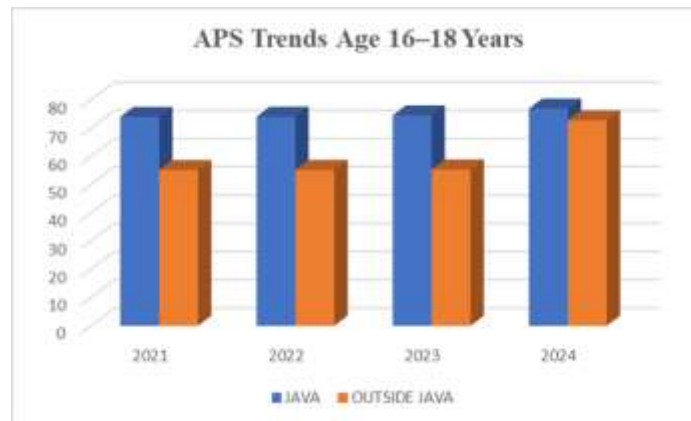


Figure 1 Comparison of APS Trends Age 16–18 Years Java Vs Outside Java
 Source: BPS data processed by researchers (2025)

Based on Figure 1, which shows the APS trend for ages 16–18 in Java and outside Java during the period 2021–2024. It can be seen that the APS in the Java region has consistently remained above 75%, while the non-Java region has remained stagnant at around 50–60%, despite a slight increase in 2024. This disparity indicates that most adolescents in the non-Java region have not yet gained full access or involvement in upper secondary education, which could ultimately affect human resource quality and widen development gaps.

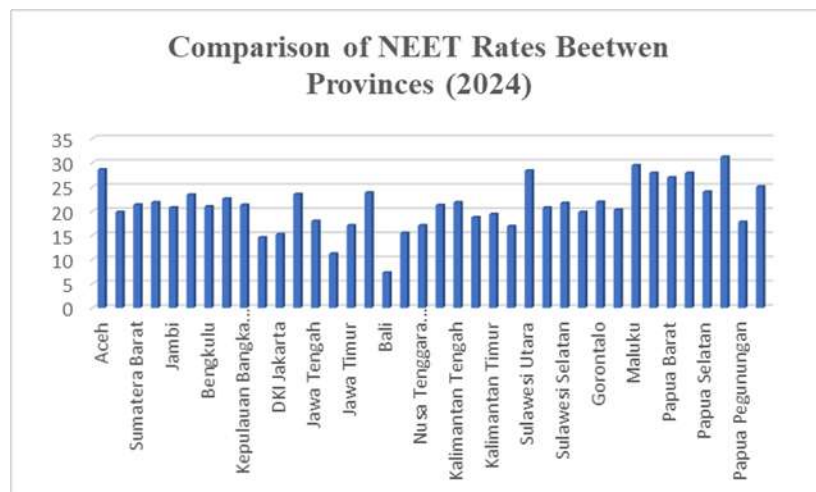


Figure 2 Comparison of NEET Rates Between Provinces (2024)
 Source: BPS data processed by researchers (2025)

Educational financing policies must also be understood within the broader framework of human development and regional inequality. Provinces with higher Human Development Index scores generally have better educational infrastructure, stronger institutional capacity, and wider access to health and employment services. In contrast, provinces with lower human development indicators may face structural barriers that limit the effectiveness of fiscal transfers. Likewise, regional economic capacity, as reflected in Gross Regional Domestic Product per capita, does not always guarantee inclusive educational participation. Economic growth may increase employment opportunities, but it may also attract adolescents into early work if educational pathways are weak or if the labor market offers short-term income opportunities without requiring formal qualifications. Therefore, evaluating BOS effectiveness requires a multidimensional approach that considers education finance, human development, unemployment, and regional economic conditions (BPS, 2024b; World Bank, 2020; Wirandana & Khoirunurrofik, 2024).

From the perspective of educational management, the effectiveness of public education financing is strongly related to

school-level governance, teacher capacity, and the quality of learning processes. Suchyadi and Suharyati (2021) emphasized that the use of multimedia and teacher learning innovation is important for strengthening teachers' creative thinking in the era of Merdeka Belajar. Similarly, Setyaningsih and Suchyadi (2021) highlighted that classroom management, learning interaction, and supportive educational environments contribute to improving the learning process. These findings imply that financial assistance such as BOS may not be sufficient when it is not accompanied by effective school management, teacher development, and learning quality improvement. Thus, the impact of BOS should not only be evaluated from the perspective of budget realization but also from its relationship with broader educational outcomes, including participation and youth transition.

Problem of the Study

Although BOS has become one of Indonesia's most important education financing instruments, its contribution to senior secondary school participation and youth NEET reduction remains insufficiently understood. The policy is expected to lower educational cost barriers and support school operational needs; however, empirical evidence suggests that the availability of education funds does not automatically translate into higher participation or lower youth vulnerability. In many provinces, adolescents aged 16–18 still face barriers related to household economic pressure, regional infrastructure gaps, school accessibility, and limited relevance of schooling to labor market needs (Kurniawan & Rakhmawati, 2022; Sitanggang & Jasmina, 2023).

The problem becomes more complex when NEET is included as an outcome. BOS primarily targets formal school operations, whereas NEET includes young people who may already be outside formal education, unemployed, inactive, or disengaged from training systems. Consequently, the effect of BOS on NEET may be indirect, mediated by school participation, human development, regional economic opportunity, and labor market absorption. This raises an important policy question: can an education financing instrument designed for schools contribute meaningfully to reducing youth disconnection during the demographic bonus era?

At the provincial level, Indonesia also faces strong spatial disparities. Provinces differ in terms of HDI, GRDP per capita, unemployment rate, school distribution, fiscal capacity, and education governance. Such differences may influence how BOS is implemented and how effectively it contributes to educational participation. Therefore, a national-level aggregate analysis may be insufficient to capture the heterogeneity of BOS effectiveness across regions. A panel-data approach covering all Indonesian provinces is needed to assess whether BOS realization has a significant relationship with APS and NEET after controlling for regional human development and economic conditions.

Research State of the Art

Recent studies on education financing and youth transition have emphasized three major research directions. First, studies on public education expenditure show that the quality, allocation, and execution of education spending are as important as the size of the budget itself. The World Bank (2020) reported that effective and efficient subnational education expenditure is essential for Indonesia's human capital development, particularly because local governments play a major role in planning and implementing education budgets. This perspective suggests that fiscal transfers must be evaluated not only from a financial compliance perspective but also from their capacity to produce educational outcomes.

Second, studies on BOS have examined its impact on learning outcomes, school access, and educational inequality. Kurniawan and Rakhmawati (2022) found that BOS had a positive effect on student scores but did not provide strong evidence of reducing household education expenditure. Sitanggang and Jasmina (2023) examined the effect of BOS on access to secondary education in Indonesia and showed that BOS does not always produce uniform improvements in educational access. Meanwhile, Wirandana and Khoirunurrofik (2024) demonstrated that intergovernmental fiscal transfers may help reduce educational inequality, but their effectiveness depends on regional implementation capacity and local conditions. These studies indicate that BOS is important but not automatically effective across all regions.

Third, studies on NEET highlight that youth disconnection is shaped by multidimensional social and economic factors. Rahmani and Groot (2023), through a scoping review, identified that NEET status is associated with individual characteristics, family background, education, health, labor market structure, and institutional factors. Pattinasarany (2024) provided specific evidence from Indonesia, showing that social class plays an important role in shaping the transition to adulthood and the risk of becoming NEET. These findings suggest that reducing NEET requires integrated policies connecting education, training, employment, and social protection. Therefore, examining BOS in relation to NEET offers a wider perspective on whether school-based fiscal intervention contributes to youth development beyond formal schooling.

In addition, studies in educational management stress that improving education outcomes requires more than financial support. Suchyadi and Suharyati (2021) argued that teachers' capacity to use multimedia and develop creative thinking is essential in the Merdeka Belajar era. Setyaningsih and Suchyadi (2021) also showed that classroom management and learning-process quality are key factors in improving educational implementation. These studies strengthen the argument that BOS effectiveness must be linked with school governance, teacher competence, and learning quality. Without these supporting factors, education financing may have limited effects on student participation and youth transition.

Gap Study & Objective

Despite the growing literature on BOS, educational inequality, and youth NEET, several research gaps remain. First, most studies on BOS focus on educational access, school expenditure, or learning achievement, while fewer studies connect BOS directly with both school participation and NEET as simultaneous indicators of human capital development. Second, previous analyses often

examine education outcomes separately from labor-market vulnerability, even though APS and NEET are closely related in the school-to-work transition. Third, limited empirical studies use recent provincial panel data covering the post-pandemic period and the current demographic bonus phase. Fourth, the role of regional development indicators, such as HDI, open unemployment, and GRDP per capita, has not been sufficiently integrated into BOS impact evaluation.

This study addresses these gaps by evaluating the impact of senior high school BOS Fund realization on two strategic outcomes: the School Participation Rate of adolescents aged 16–18 and the NEET rate of youth aged 15–24. Using panel data from 38 provinces in Indonesia during the 2021–2024 period, this study applies a Fixed Effect Model to control for unobserved provincial heterogeneity. The inclusion of HDI, Open Unemployment Rate, and GRDP per capita as control variables enables the analysis to capture the broader social and economic context influencing education participation and youth transition.

Accordingly, the objectives of this study are: first, to examine whether the realization of BOS Fund at the senior high school level significantly increases the School Participation Rate of 16–18-year-olds in Indonesia; second, to analyze whether BOS Fund realization significantly reduces the NEET rate among youth aged 15–24; and third, to assess how regional human development, unemployment, and economic capacity influence the relationship between education financing and youth development outcomes. The findings are expected to contribute to education policy, public finance evaluation, and demographic dividend studies by providing empirical evidence on whether school operational assistance is sufficient to strengthen youth participation during Indonesia's demographic bonus era.

II. METHOD

Type and Design

This study employed a quantitative research approach using a panel data design to examine the effect of the School Operational Assistance Fund (BOS Fund) on two strategic youth development indicators: the School Participation Rate (APS) of individuals aged 16–18 years and the proportion of youth aged 15–24 years categorized as Not in Education, Employment, or Training (NEET). A quantitative approach was considered appropriate because the study aimed to test empirical relationships among measurable variables using statistical estimation. The panel data design was selected because it combines cross-sectional and time-series dimensions, allowing the study to observe variations across provinces as well as changes over time. This design is particularly relevant for policy evaluation because it enables researchers to control for unobserved heterogeneity among provinces that may influence educational participation and youth transition outcomes. As emphasized by Baltagi (2021), panel data analysis provides more informative data, greater variability, less collinearity among variables, and more efficient estimation compared with purely cross-sectional or time-series data.

The research design was explanatory in nature because it sought to explain whether differences in BOS Fund realization were associated with variations in APS and NEET after controlling for regional socio-economic conditions. The study did not merely describe provincial education indicators but attempted to identify the statistical influence of education financing on youth development outcomes. In this framework, BOS Fund realization was positioned as the main independent variable, while APS and NEET were treated as dependent variables in two separate empirical models. Human Development Index (HDI), Open Unemployment Rate (OUR), and Gross Regional Domestic Product (GRDP) per capita were included as control variables to account for broader regional development conditions. This design is aligned with recent education finance studies showing that the effectiveness of intergovernmental fiscal transfers in education must be analyzed together with local development capacity and regional disparities (Wirandana & Khoirunurrofik, 2024).

Data and Data Sources

The data used in this study consisted of secondary panel data covering 38 provinces in Indonesia during the 2021–2024 period. The selection of this period was based on the relevance of post-pandemic educational recovery, regional development dynamics, and Indonesia's ongoing demographic bonus phase. The unit of analysis was the province-year observation, which allowed the study to capture differences in BOS Fund realization, school participation, youth NEET rates, and socio-economic indicators across provinces and across time. The use of provincial-level data was considered appropriate because BOS implementation, educational participation, and youth labor-market transition vary substantially across regions due to differences in infrastructure, fiscal capacity, school distribution, household welfare, and human development conditions.

The main data sources were official government institutions, particularly the Central Bureau of Statistics of Indonesia (Badan Pusat Statistik/BPS) and the Ministry of Education-related financial and administrative databases. Data on APS aged 16–18 years, NEET aged 15–24 years, HDI, OUR, and GRDP per capita were obtained from BPS publications and statistical tables. Meanwhile, data on senior high school BOS Fund realization were obtained from official education finance records. The dependent variables consisted of APS_{16_18} and NEET_{15_24}. The independent variable was the realization of BOS Fund at the senior high school level, which was transformed into logarithmic form to reduce scale differences and improve the stability of estimation. The control variables included HDI, OUR, and logarithmic GRDP per capita. These variables were selected because previous studies have shown that school participation and youth vulnerability are shaped not only by education financing but also by human development, labor-market conditions, and regional economic capacity.

Data Collection Technique

The data collection technique used in this study was documentation. This technique was conducted by collecting, identifying, and organizing numerical data from official statistical reports, government databases, and publicly accessible institutional publications. Documentation was appropriate because the study relied entirely on secondary data rather than survey or experimental data. Each variable was traced based on its official definition, measurement unit, and annual provincial availability. The data were then compiled into a balanced or near-balanced panel structure according to province and year. Before analysis, the dataset was checked to ensure consistency in variable names, measurement scales, province codes, and time periods.

Several data preparation procedures were conducted to improve the quality of analysis. First, all provincial observations were arranged according to the same administrative classification to ensure comparability across years. Second, monetary variables, particularly BOS Fund realization and GRDP per capita, were transformed into logarithmic form to address large numerical differences among provinces and to reduce potential heteroscedasticity. Third, the completeness of each variable was examined to identify missing observations or inconsistent entries. Fourth, the final dataset was structured into two empirical models: one model using APS_{16_18} as the dependent variable and another model using NEET_{15_24} as the dependent variable. This preparation process was essential to ensure that the empirical estimation could produce valid and interpretable results.

Data Analysis

The data were analyzed using panel data regression. The analysis began with descriptive statistics to provide an overview of the distribution, mean, minimum, maximum, and standard deviation of each variable. Descriptive analysis was used to identify the general characteristics of APS, NEET, BOS Fund realization, HDI, OUR, and GRDP per capita across Indonesian provinces during the 2021–2024 period. This stage was important because it provided preliminary evidence regarding regional disparities in education participation, youth vulnerability, fiscal support, and socio-economic development.

After descriptive analysis, model selection tests were conducted to determine the most appropriate panel regression model. The Chow test was used to compare the Common Effect Model or pooled least squares with the Fixed Effect Model. If the Chow test indicated significant differences among provinces, the Fixed Effect Model was preferred because it could control for time-invariant provincial characteristics. The Hausman test was then used to compare the Fixed Effect Model with the Random Effect Model. A significant Hausman test result indicated that the Fixed Effect Model was more appropriate because the individual provincial effects were correlated with the explanatory variables. This procedure follows standard panel data econometric principles, in which model selection must consider whether unobserved heterogeneity is correlated with independent variables (Baltagi, 2021).

The empirical estimation was conducted using two Fixed Effect Models. The first model examined the effect of BOS Fund realization on the School Participation Rate of adolescents aged 16–18 years. The second model examined the effect of BOS Fund realization on the NEET rate of youth aged 15–24 years. Both models included HDI, OUR, and GRDP per capita as control variables. The general regression equations are specified as follows:

Model 1:

$$\text{APS}_{16_18it} = \alpha_i + \beta_1 \text{LOG_BOS}_{it} + \beta_2 \text{HDI}_{it} + \beta_3 \text{OUR}_{it} + \beta_4 \text{LOG_GRDP}_{it} + \epsilon_{it}$$

Model 2:

$$\text{NEET}_{15_24it} = \alpha_i + \beta_1 \text{LOG_BOS}_{it} + \beta_2 \text{HDI}_{it} + \beta_3 \text{OUR}_{it} + \beta_4 \text{LOG_GRDP}_{it} + \epsilon_{it}$$

In these equations, i represents province, t represents year, α_i denotes province-specific fixed effects, β represents the estimated regression coefficient, and ϵ_{it} represents the error term. The coefficient of LOG_BOS indicates whether BOS Fund realization has a significant relationship with APS and NEET after controlling for provincial human development, unemployment, and economic capacity. The HDI variable was expected to have a positive effect on APS and a negative effect on NEET because better human development generally strengthens education access and youth opportunities. The OUR variable was included to capture labor-market pressure, while LOG_GRDP was used to represent regional economic capacity.

The interpretation of the regression results was based on the direction, magnitude, and statistical significance of the estimated coefficients. The coefficient of determination was used to assess the explanatory power of the model, while the F-statistic was used to evaluate the overall significance of the regression model. The significance level was assessed using conventional thresholds of 1%, 5%, and 10%. Through this analytical procedure, the study aimed to provide empirical evidence on whether BOS Fund realization contributes to improving school participation and reducing NEET during Indonesia's demographic bonus era. The use of regional panel data also allowed the study to offer more nuanced policy implications by recognizing that education financing outcomes may differ across provinces due to variations in human development, economic structure, and institutional capacity.

III. RESULTS

The data in the table were obtained from processing using the Eviews 13 program to determine descriptive data. The data in the table show information about the number of samples (N), range, minimum, maximum, mean, and standard deviation. The results of the descriptive statistical test can be seen in the following table:

Table 1. Statistik Deskriptiv

	APS 16 18	NEET 15 24	LOG BOS FUND	LOG GRDP	HDI	OUR
Mean	75.68459	22.03120	26.43252	10.57769	72.62519	4.928195
Median	75.32000	21.89000	26.35785	10.53216	72.50000	4.630000
Maximum	91.17000	35.38000	28.76989	12.21263	83.08000	9.910000
Minimum	66.32000	7.260000	24.61130	9.478662	65.26000	1.790000
Std. Dev.	5.631578	4.790243	0.957664	0.555815	3.489160	1.573376
Skewness	0.583818	-0.312588	0.530428	0.880736	0.635634	0.681401
Kurtosis	2.651835	3.850149	3.054149	3.888061	4.043831	3.467245
Jarque-Bera	8.227104	6.171189	6.252915	21.56503	14.99410	11.50200
Probability	0.016350	0.045703	0.043873	0.000021	0.000555	0.003180
Sum	10066.05	2930.150	3515.525	1406.833	9659.150	655.4500
Sum Sq.Dev.	4186.336	3028.928	121.0599	40.77886	1606.999	326.7678
Observations	133	133	133	133	133	133

Source: Data processed by researchers through Eviews 13 (2025)

The national average School Participation Rate (APS) for ages 16–18 reached 75.68%, ranging from 66.32% to 91.17%, indicating disparities between provinces. Meanwhile, the average percentage of young people aged 15–24 classified as NEET (Not in Education, Employment, or Training) reached 22.03%, with the highest rate at 35.38% and the lowest at 7.26%, indicating that one in five young people are at risk of not being involved in formal education or employment, which poses a challenge in the demographic dividend. The BOS FUND (log) has an average of 26.43, with relatively narrow variation across regions (24.61–28.77). Development disparities are reflected in the HDI (65.26–83.08), log GRDP (9.48–12.21), and OUR (1.79–9.91), highlighting the contrast between western and eastern regions. Data distribution tends to be normal but still contains relevant extreme values for econometric analysis.

Chow Test and Hausman Test Results

Table 2 Chow Test and Hausman Test Results

Model	Uji Chow (Prob.)	Uji Hausman Prob.)
Model 1	0.0000	0.0419
Model 2	0.0000	0.0036

Source: Data processed by researchers through Eviews 13 (2025)

Based on Model 1, which examines the effect of BOS FUND on APS for 16–18-year-olds, the Chow test results show a significant F-statistic value at the 1% level, namely 0.0000 (< 0.05). This indicates that the Fixed Effect model is more appropriate than the Pooled Least Square model, as there are differences in characteristics between provinces that need to be taken into account. Additionally, the Hausman test results are also significant at 0.0419 (< 0.05), making the Fixed Effect model more appropriate than the Random Effect model. Thus, this model is better able to capture the province-specific heterogeneity that influences school participation.

For Model 2, which analyzes the effect of BOS FUND on the NEET rate among 15–24-year-olds, the Chow test results again show significance at the 1% level, namely 0.0000 (< 0.05), confirming that the Fixed Effect approach is superior to Pooled Least Square. The Hausman test also produced a significant value of 0.0036 (< 0.05), reinforcing the decision to use the Fixed Effect model. These results confirm that the unique characteristics of each province play an important role in explaining variations in NEET rates, and therefore must be included in the estimation model to avoid bias.

FEM Regression Analysis Results

Table 3 FEM Regression Analysis Results

Variabel Independen	Model 1: APS_16_18	Model 2: NEET_15_24
LOG BOS FUND	0,694 (0,4037)	-0,417 (0,6215)
HDI	0,963** (0,0119)	-1,331*** (0,0007)
OUR	-0,299 (0,4165)	0,462 (0,2184)
LOG GRDP	-9,008** (0,0117)	9,520*** (0,0089)
Intercept (C)	84,074* (0,0397)	26,474 (0,5201)
R-squared	0,955	0,921
Adjusted R-squared	0,936	0,887
F-statistic	49,648***	26,980***
Prob (F-statistic)	0,000	0,000
Observasi	137	137

Information: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Source: Data processed by researchers through Eviews 13 (2025)

Model 1: The Effect of BOS FUND Funds on APS for 16–18 Year Olds

The results of the Fixed Effect Model regression for the APS variable aged 16–18 years show that the model has a high level of feasibility, with an R^2 value of 0.955, meaning that 95.5% of the variation in APS can be explained by the variables in the model. The F-statistic is also significant at the 1% level ($p = 0.000$), indicating that the model as a whole is feasible for use.

However, individually, the main variable LOG_BOS FUND did not show a significant effect on APS (coefficient = 0.694; $p = 0.4037$). These results reinforce previous findings indicating that BOS FUND allocation does not necessarily directly increase high school participation, especially when linked to governance quality, targeting accuracy, and interprovincial implementation variation. A study by (Wirandana & Khoirunurrofik, 2024) also noted that the success of the BOS FUND in equalizing education depends heavily on the effectiveness of implementation and regional fiscal conditions. In this context, the insignificant impact of the BOS FUND on APS could be due to inaccurate budget realization (Nurman, 2025), delayed disbursement (Putra, 2020), or school fees that are still borne by students outside the components financed by the BOS FUND (Dewi & Indrayani, 2021).

Conversely, the HDI variable has a significant positive influence (coefficient = 0.963; $p = 0.0119$), indicating that provinces with higher human development tend to have better school participation rates. This is in line with human capital theory, which emphasizes the importance of basic social investment in supporting educational participation (Becker, 1993). Interestingly, LOG_GRDP actually had a significant negative effect on APS (coefficient = -9.008; $p = 0.0117$), indicating that an increase in regional income is not always followed by an increase in school participation. This phenomenon can be explained by the labor substitution hypothesis in regions with high economic activity, where adolescents prefer to work rather than continue their education. The OUR variable (coefficient = -0.299; $p = 0.4165$) is not significant, indicating that labor market conditions are not yet strong enough to influence decisions regarding upper secondary education participation.

Model 2: The Effect of BOS FUND Funds on NEET Aged 15–24 Years

The regression model for the NEET variable produced an R^2 value of 0.921, indicating that 92.1% of the variation in NEET rates can be explained by the variables in the model. The very small F-statistic probability ($p = 0.000$) indicates that the model is significant overall and suitable for use.

However, the main variable LOG_BOS FUND was again insignificant (coefficient = -0.417; $p = 0.6215$), indicating that BOS FUND funds had no direct effect on the decline in NEET rates. This result can be understood because the BOS FUND program generally focuses on providing operational costs for formal education and does not target out-of-school youth or those uninterested in returning to education. NEET groups are often influenced by more complex socio-economic and psychological factors, such as work motivation, non-formal skills, or access to vocational training (Baah-Boateng, 2016).

The HDI variable in this model shows a negative and significant influence (coefficient = -1.331; $p = 0.0007$), meaning that the higher the quality of human development in a province, the lower the proportion of youth who become NEET. This is in line with the literature stating that good human resource development can reduce youth dependence on assistance systems or passive economic conditions. Conversely, LOG_GRDP has a significant positive effect (coefficient = 9.520; $p = 0.0089$) on NEET, indicating a growth paradox: regions with high economic growth do not always have the capacity to absorb the young labor force. Economic growth without improvements in access to inclusive education or training can widen social disparities (Azmi Azizah & Ima Amailah, 2023). The variable OUR is insignificant (coefficient = 0.462; $p = 0.2184$), indicating that fluctuations in open unemployment do not sufficiently explain the differences in NEET between provinces.

These results confirm that BOS FUND, although important, is not the only factor determining the success of education and the reduction of NEET. The insignificant influence of BOS FUND in both models shows that structural and implementation problems such as delays in distribution, school capacity, and misallocation remain major obstacles to the effectiveness of this program. Conversely, HDI has proven to be a key factor in increasing APS and reducing NEET, highlighting the need for an integrated approach between education and basic social development. Meanwhile, the negative impact of GRDP on APS and its positive impact on NEET underscore the importance of inclusive and youth-friendly development strategies. Without strengthening vocational education, expanding access to affordable higher education, and supporting the transition to the workforce, economic growth may fail to lift the younger generation sustainably.

Discussions

The results of this study show that the BOS Fund has not had a statistically significant effect on increasing APS or reducing NEET at the provincial level. This finding is important because BOS has long been positioned as one of the main instruments of education financing in Indonesia. The absence of a significant direct effect indicates that the relationship between school operational assistance and youth development outcomes is more complex than expected. BOS may reduce certain school-level operational constraints, but it may not be sufficient to overcome household poverty, regional inequality, school quality gaps, transportation costs, opportunity costs, and weak youth employment systems.

This finding is consistent with previous research showing that education fiscal transfers are not automatically effective unless they are supported by strong implementation capacity and contextual policy alignment. Wirandana and Khoirunurrofik (2024) argued that intergovernmental fiscal transfers can contribute to reducing educational inequality, but their effectiveness depends on local conditions and how funds are translated into education services. Similarly, Kurniawan and Rakhmawati (2022) found that BOS may affect student academic outcomes but does not necessarily reduce household education expenditure. These findings suggest that BOS should be seen as an enabling policy rather than a standalone solution.

The insignificant relationship between BOS and APS may also indicate that the cost of schooling is not limited to formal school operational fees. Students and families may still face indirect costs such as transportation, uniforms, digital access, learning materials, private tutoring, and opportunity costs from not working. For low-income households, these indirect costs may remain substantial even when schools receive operational support. Therefore, increasing APS at the senior secondary level requires a broader financing model that combines BOS with targeted scholarships, transportation assistance, conditional cash transfers, and school quality improvement.

The insignificant effect of BOS on NEET is also theoretically understandable. NEET includes young people outside education, employment, and training, while BOS is mainly directed toward students and schools within the formal education system. Once young people have exited school, BOS may no longer reach them directly. This means that NEET reduction requires policy instruments beyond school operational funding. These may include second-chance education, vocational training, apprenticeship programs, youth employment services, career counseling, and local industry partnerships. International literature also emphasizes that NEET is caused by multiple risk factors and should be addressed through integrated education, labor, and social protection policies (ILO, 2022; OECD, 2024; Rahmani & Groot, 2023).

The significant role of HDI in both models is one of the most important findings of this study. HDI was positively associated with APS and negatively associated with NEET. This confirms that human development is a core determinant of youth outcomes. Provinces with better health, education, and living standards are more likely to keep adolescents in school and reduce youth inactivity. This result supports the argument that improving school participation and reducing NEET cannot be separated from broader human development policies. Investments in education must be synchronized with health services, poverty reduction, nutrition, family welfare, and social protection.

The significant but opposite effect of GRDP per capita also deserves careful interpretation. In the APS model, GRDP had a negative effect, while in the NEET model it had a positive effect. These results suggest that regional economic growth may not be inclusive enough to support youth educational participation and employment transition. In some provinces, economic growth may generate low-skilled work opportunities that attract adolescents away from school. In others, growth may be concentrated in sectors that do not create sufficient youth employment. This finding reinforces the importance of inclusive growth, skills development, and stronger alignment between secondary education, vocational education, and regional labor market demand.

From an educational management perspective, these findings indicate that the effectiveness of BOS depends not only on budget availability but also on how schools use resources to improve learning quality, student retention, and transition support. Financial support must be connected to school leadership, teacher competence, classroom management, and innovation in learning. Suchyadi and Suharyati (2021) emphasized that teachers' creative thinking and multimedia-based learning are important in the Merdeka Belajar era, while Setyaningsih and Suchyadi (2021) highlighted that classroom management and learning process quality contribute to school effectiveness. Therefore, BOS will be more impactful when used not only for routine operations but also for improving instructional quality and student support systems.

Novelty and Contribution

The novelty of this study lies in its simultaneous examination of APS and NEET as two interconnected indicators of youth development during Indonesia's demographic bonus era. Previous studies on BOS have generally focused on school access, education expenditure, or learning outcomes. This study extends the analysis by connecting education financing with both school participation and youth disconnection. By doing so, it provides a broader understanding of whether school-based fiscal intervention contributes not only to formal education participation but also to reducing the risk of youth exclusion from education, employment, and training.

Another contribution of this study is the use of recent provincial panel data from 38 provinces during the 2021–2024 period. This period is important because it reflects the post-pandemic recovery phase, the current demographic bonus window, and recent developments in education financing and regional inequality. The use of a Fixed Effect Model enables the study to control for unobserved provincial characteristics, making the analysis more robust in explaining regional variation. This methodological contribution is important for education policy evaluation because Indonesia's provinces have different levels of infrastructure, fiscal capacity, human development, and labor market conditions.

This study also contributes to the literature by demonstrating that BOS Fund realization alone does not significantly improve APS or reduce NEET when regional human development and economic conditions are considered. This finding challenges the assumption that increasing school operational funding will automatically lead to better youth outcomes. Instead, the study shows that human development plays a more consistent role in improving school participation and reducing NEET. Therefore, the study contributes to the policy discourse by emphasizing the need to move from a narrow education-financing approach toward an integrated human development strategy.

Implication and suggestions

The findings have several important policy implications. First, the government needs to strengthen BOS governance at the senior secondary level. BOS should not only be evaluated based on budget absorption and administrative compliance, but also on its contribution to student retention, learning quality, participation, and transition outcomes. Monitoring and evaluation systems should include indicators related to dropout prevention, student support, and regional equity. Schools in disadvantaged provinces should receive stronger technical assistance to ensure that BOS is used effectively according to local needs.

Second, BOS should be integrated with broader social protection and human development programs. Since HDI was found to have a significant effect on both APS and NEET, education financing should be synchronized with health, nutrition, poverty reduction, and family welfare policies. Students from low-income households may require more than school operational support. They may need transportation subsidies, learning equipment, digital access, scholarships, and family-based assistance. Such integration is essential to ensure that adolescents remain in school and are not forced into early work or inactivity.

Third, NEET reduction requires policies beyond formal schooling. Since BOS does not directly target youth who are already outside education, employment, or training, the government should develop stronger school-to-work transition programs. These may include vocational training, career guidance, entrepreneurship support, apprenticeship schemes, recognition of prior learning, and re-entry pathways for out-of-school youth. Collaboration among schools, vocational institutions, local governments, industry, and community organizations is necessary to reconnect NEET youth with productive pathways.

Fourth, regional economic growth must be made more inclusive for young people. The finding that GRDP per capita had a negative effect on APS and a positive effect on NEET indicates that economic growth does not automatically improve youth outcomes. Local governments should ensure that regional development creates decent employment opportunities, relevant training systems, and incentives for adolescents to complete senior secondary education. Provinces with high economic growth but high NEET rates require specific interventions to address skills mismatch and youth labor market exclusion.

Fifth, school management capacity should be strengthened. BOS effectiveness depends on the ability of school leaders and teachers to translate funding into meaningful educational services. Therefore, BOS policy should be accompanied by capacity-building programs in school planning, financial management, student support, data-based decision making, learning innovation, and collaboration with parents and communities. In this regard, improving teacher competence and classroom management is essential to ensure that students not only enroll but also remain engaged in meaningful learning processes.

Directions for Future Research

Future research should expand the scope of analysis by including longer time periods and more detailed district-level data. Provincial-level data are useful for identifying broad regional patterns, but district-level analysis may reveal more specific local variations in BOS implementation, school access, poverty, transportation, and youth employment conditions. A more disaggregated approach would help policymakers identify areas where BOS is effective and areas where additional interventions are needed.

Future studies should also examine mediating and moderating variables that may influence the relationship between BOS and youth outcomes. For example, school quality, teacher availability, poverty rate, urban-rural status, internet access, vocational school distribution, and local labor market structure may mediate or moderate the effect of BOS on APS and NEET. Including these variables would provide a more comprehensive explanation of why BOS is effective in some regions but not in others.

In addition, future research should combine quantitative panel analysis with qualitative fieldwork. Interviews with school principals, teachers, students, parents, and local education officials could provide deeper insights into how BOS is used at the school level and why it may fail to influence participation or NEET outcomes. A mixed-methods approach would be useful for identifying implementation bottlenecks, governance problems, and contextual factors that cannot be captured through secondary data alone.

Further research may also compare the effectiveness of BOS with other education and youth policies, such as scholarships, vocational education programs, employment training, conditional cash transfers, and digital learning support. Such comparative analysis would help determine which policy combinations are most effective in increasing school participation and reducing youth disconnection. Since NEET is a multidimensional issue, future studies should examine integrated policy packages rather than single interventions.

Finally, future research should explore the long-term impact of education financing on labor market outcomes. APS and NEET are important intermediate indicators, but the ultimate goal of the demographic bonus is to create a productive, skilled, and competitive workforce. Therefore, future studies may examine whether education financing contributes to higher educational attainment, better employment quality, income mobility, and reduced intergenerational inequality. This would provide stronger evidence on the role of education financing in transforming Indonesia's demographic bonus into sustainable development.

IV. CONCLUSION

This study aims to examine the effectiveness of the School Operational Assistance Fund (BOS FUND) in addressing two key indicators of human resource development in the demographic bonus era: School Participation Rate (APS) for ages 16–18 and the percentage of NEET (Not in Education, Employment, or Training) youth aged 15–24. Based on panel data from 38 provinces during the years 2021–2024, the results indicate that the BOS FUND has not had a statistically significant impact on increasing APS or reducing NEET at the provincial level. This finding highlights one important point: fiscal spending alone is not enough to optimize the demographic bonus potential. Although the BOS FUND program is designed to expand access to education, empirical results show that there are still gaps in targeting, implementation quality, and regional capacity. Conversely, the Human Development Index (HDI) has proven to consistently have a significant impact on increasing APS and reducing NEET, indicating that comprehensive human development is far more decisive. Another interesting finding is that provinces with high GRDP per capita tend to have lower APS and higher NEET, indicating that economic growth does not automatically create educational inclusion or employment for young people. Therefore, addressing the demographic dividend challenge requires not only larger education budgets but also smarter, more inclusive, and locally tailored policies.

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