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Analysis of Factors Influencing Not in Employment, Education, or Training (NEET) Among Youth in Indonesia from 2019 to 2023 Using Panel Data Regression

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***Abstract*— The phenomenon of youth categorized as 'Not in Employment, Education, or Training (NEET)' poses a significant challenge for Indonesia's economic and social development, particularly during the demographic bonus era. This study aims to analyze the factors influencing the percentage of NEET youth aged 15-24 in Indonesia during the 2021-2023 period. Using panel data regression analysis, the study examines data from 34 provinces, with independent variables including the 'Open Unemployment Rate (TPT), Labor Force Participation Rate (TPAK), Net Enrollment Rate (APM)', proportion of informal employment, proportion of young women married at an early age, the 'Human Development Index (HDI), and GRDP'. The best model for panel data regression in this study is the fixed effects model. The results show that the independent variables TPT, TPAK, APM, HDI, and the proportion of informal employment significantly influence the NEET percentage, with an R-squared value of 97.7% and an adjusted R-squared value of 96.2%. This indicates that the significant independent variables in the model explain 96.2% of the NEET percentage, while the remaining 3.8% is explained by other variables outside the independent variables in this study. In conclusion, this study underscores the importance of addressing the identified factors to reduce NEET prevalence. The findings provide valuable insights for policymakers and stakeholders to design targeted strategies for sustainable human resource development, improve access to education, and create better employment opportunities for Indonesian youth.**

Keywords— ***NEET; Data Panel Regression; Economic***

I. INTRODUCTION

Indonesia, one of the most populous countries in the world, faces significant challenges in maximizing the opportunities presented by its demographic bonus. This demographic shift is characterized by a majority of the population being of productive age, which should ideally drive economic growth. However, data reveals that more than 20% of young people aged 15-24 are classified as 'Not in Employment, Education, or Training (NEET)', reflecting a lack of engagement in productive activities such as education, training, or work. The NEET phenomenon in Indonesia is driven by various factors, including a mismatch between the skills of young workers and industry needs, as well as social challenges like early marriage and limited access to quality education. The COVID-19 pandemic has further exacerbated this issue, with many young people losing jobs and education opportunities. This situation not only reduces the productivity of the younger generation but also increases the risk of poverty, social exclusion, and economic burdens on the nation. This study aims to analyze the factors influencing NEET percentages in Indonesia from 2021 to 2023. By utilizing panel data regression, it focuses on the impact of variables such as the 'Open Unemployment Rate (TPT), Labor Force Participation Rate (TPAK), Net Enrollment Rate (APM), proportion of informal employment, Human Development Index (HDI), and Gross Regional Domestic Product (GRDP)'. The findings are expected to provide valuable insights for policymakers and stakeholders in designing strategies to reduce NEET rates.

II. METHOD

This research uses secondary data sourced from BPS and the One Data Employment website. The data comprises 34 provinces in Indonesia over the period 2021-2023. The research was analyzed using 'EViews 12 software'. The research steps included the following:

1. 'Collecting data for independent variables (TPT, TPAK, APM, proportion of informal employment, young women married early, HDI, and GRDP) and the dependent variable (NEET percentage)'.
2. Performing descriptive analysis to understand the general characteristics of the data.
3. Estimating the panel data regression model using three approaches: 'Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM)'.
4. Selecting the best model through 'Chow, Hausman, and Lagrange Multiplier tests'.
5. Conducting classical assumption tests (normality, multicollinearity, and heteroskedasticity).
6. Testing the significance of parameters using F-tests and t-tests.
7. Evaluating the model using the coefficient of determination (R-squared).
8. Making Interpretations and Conclusions from the Analysis Results.

III. RESULTS AND DISCUSSION

A. Descriptive Statistical Analysis

The summary of descriptive statistics for other variables is as follows:

TABLE I. DESCRIPTIVE STATISTICAL ANALYSIS

Variable	Descriptive Statistic		
	Mean	***Minimum***	***Maximum***
NEET Percentage	22.378	9.890	35.380
Open Unemployment Rate (TPT)	5.024	2.270	9.910
Labor Force Participation Rate (TPAK)	68.703	62.150	78.290
Net Enrollment Rate (APM)	63.201	44.410	76.370
Proportion of Informal Employment	59.84	33.67	84.43
Proportion of Women Married at a Young Age	8.597	0.880	17.710
Human Development Index (HDI)	71.984	60.620	82.460
Gross Regional Domestic Product (GRDP)	2.930	0.250	17.180

Descriptive statistics show that the average NEET percentage (Y) in Indonesia is 22.38%, with a minimum value of 9.89% and a maximum of 35.38%. Descriptive statistics also The Open Unemployment Rate (TPT) has an average of 5.02%, ranging from a minimum of 2.27% to a maximum of 9.91%. The Labor Force Participation Rate (TPAK) has a mean value of 68.70%, with a minimum of 62.15% and a maximum of 78.29%. The Net Enrollment Rate (APM) averages at 63.20%, with values ranging from 44.41% to 76.37%. The Proportion of Informal Employment shows an average of 59.84%, with a minimum of 33.67% and a maximum of 84.43%. The Proportion of Women Married at a Young Age has an average of 8.60%, with values ranging from 0.85% to 17.71%. The Human Development Index (HDI) has an average value of 71.98%, with a minimum of 60.62% and a maximum of 82.46%. Lastly, the Gross Regional Domestic Product (GRDP) averages at 2.93%, with a minimum value of 0.25% and a maximum of 17.18%.

B. Panel Data Regression

Panel data regression analysis is used to form an estimated regression equation that provides an overview of the influence of independent variables on the dependent variable regarding Not in Employment, Education, or Training (NEET) in Indonesia from 2021 to 2023.

a. Common Effect Model (CEM)

The panel data regression model was obtained using the Common Effect Model (CEM) approach as follows:

$$\hat{Y}_{it} = 104{,}6685 + 0{,}3760X_{1.it} - 0{,}9472X_{2.it} - 0{,}0731X_{3.it} + 0{,}1656X_{4.it} + 0{,}0560X_{5.it} - 0{,}3445X_{6.it} - 0{,}0752X_{7.it}$$

The Common Effect Model implies that a one percent increase in variable X1, with other variables held constant, will cause the NEET percentage to increase by 0.37 percent, meaning the NEET percentage is directly proportional to the TPT variable. A one percent increase in variable X2, with other variables held constant, will result in a 0.94 percent decrease in the NEET percentage, meaning the NEET percentage is inversely proportional to the TPAK variable. A one percent increase in variable X3, with other variables held constant, will lead to a 0.07 percent decrease in the NEET percentage, meaning the NEET percentage is inversely proportional to the APM variable. A one percent increase in variable X4, with other variables held constant, will cause the NEET percentage to increase by 0.16 percent, meaning the NEET percentage is directly proportional to the APM variable. For every one percent increase in variable X5, with other variables held constant, the NEET percentage will increase by 0.06 percent, indicating that the NEET percentage is directly proportional to the proportion of informal employment. A one percent increase in variable X6, with other variables held constant, will result in a 0.34 percent decrease in the NEET percentage, meaning the NEET percentage is inversely proportional to the proportion of young women who are married. Finally, a one percent increase in variable X7, with other variables held constant, will decrease the NEET percentage by 0.08 percent, meaning the NEET

percentage is inversely proportional to the GDP per capita (PDRB) variable.

b. *Fixed Effect Model (FEM)*

The panel data regression model was obtained using the Fixed Effect Model (CEM) approach as follows:

$$\hat{Y}_{it} = -138{,}9907 + 0{,}9047X_{1,it} - 1{,}2025X_{2,it} - 0{,}4858X_{3,it} + 0{,}5320X_{4,it} + 0{,}1661X_{5,it} + 3{,}2868X_{6,it} + 0{,}0984X_{7,it}$$

The Fixed Effect Model indicates that an increase of one percent in variable X1, with other variables held constant, will result in a 0.9 percent increase in the NEET percentage, meaning the NEET percentage is directly proportional to the TPT variable. If variable X2 increases by one percent, with other variables held constant, the NEET percentage will decrease by 1.2 percent, meaning the NEET percentage is inversely proportional to the TPAK variable. A one percent increase in variable X3, with other variables constant, will lead to a 0.48 percent decrease in the NEET percentage, meaning the NEET percentage is inversely proportional to the APM variable. A one percent increase in variable X4, with other variables constant, will result in a 0.53 percent increase in the NEET percentage, meaning the NEET percentage is directly proportional to the APM variable. For every one percent increase in variable X5, with other variables constant, the NEET percentage will rise by 0.16 percent, indicating that the NEET percentage is directly proportional to the proportion of informal employment. If variable X6 increases by one percent, with other variables constant, the NEET percentage will increase by 3.28 percent, meaning the NEET percentage is directly proportional to the proportion of women with a marital status at a young age. A one percent increase in variable X7, with other variables constant, will lead to a 0.09 percent increase in the NEET percentage, indicating that the NEET percentage is directly proportional to the Gross Regional Domestic Product (PDRB).

c. *Random Effect Model (REM)*

The panel data regression model was obtained using the Random Effect Model (CEM) approach as follows:

$$\hat{Y}_{it} = 102{,}1119 + 0{,}1774X_{1,it} - 1{,}0198X_{2,it} - 0{,}1155X_{3,it} + 0{,}2051X_{4,it} - 0{,}0765X_{5,it} - 0{,}2017X_{6,it} - 0{,}1197X_{7,it}$$

The Random Effect Model indicates that a one percent increase in variable X1, with other variables held constant, will result in a 0.17 percent increase in the NEET percentage, meaning the NEET percentage is directly proportional to the TPT variable. A one percent increase in variable X2, with other variables held constant, will cause the NEET percentage to decrease by 1 percent, meaning the NEET percentage is inversely proportional to the TPAK variable. A one percent increase in variable X3, with other variables held constant, will lead to a 0.11 percent decrease in the NEET percentage, meaning the NEET percentage is inversely proportional to the APM variable. A one percent increase in variable X4, with other variables held constant, will result in a 0.2 percent increase in the NEET percentage, meaning the NEET percentage is directly proportional to the APM variable. For every one percent increase in variable X5, with other variables held constant, the NEET percentage will decrease by 0.08 percent, meaning the NEET percentage is inversely proportional to the proportion of informal employment. A one percent increase in variable X6, with other variables held constant, will cause the NEET percentage to decrease by 0.2 percent, meaning the NEET percentage is inversely proportional to the proportion of women with marital status at a young age. Every one percent increase in variable X7, with other variables held constant, will lead to a 0.11 percent decrease in the NEET percentage, meaning the NEET percentage is inversely proportional to the GRDP variable.

C. *Model Estimation Selection*

Based on the Chow test results, the p-value = 0.0000, which is smaller than the significance level α = 0.05, with an $F_{calculated}$ value of 6.17 > F_{table} value of 1.65. Therefore, H0 is rejected, indicating that there is a difference in individual effects, and the fixed effect model is better than the common effect model. Based on the Hausman test, the p-value obtained is 0.0000 < α = 0.05 with a W value of 87.397491 > χ^2_{tabel} = 14.0671, so H0 is rejected, meaning there is a correlation between the individual errors and the independent variables, or the fixed effect model is better than the random effect model. The estimation results indicate that the Fixed Effect Model (FEM) is the best model based on the Chow test and the Hausman test.

D. *Classical Assumption Test*

After obtaining the best model estimation, assumption tests were conducted, including normality test, heteroscedasticity test, and multicollinearity test. Based on the normality test, it can be observed that the Jarque-Bera test statistic has a p-value of 0.875431, which is greater than α = 0.05, meaning that H0 fails to be rejected, indicating that the residuals are normally distributed. Based on the heteroscedasticity test, it can be seen that all independent variables have $|t_{calculated}|$ < 2.348 and a p-value > 0.05, meaning that H0 fails to be rejected, indicating that there are no issues with heteroscedasticity or that the residual variation is homoscedastic. Based on the multicollinearity test, it can be observed that all independent variables have a VIF < 10, meaning that H0 fails to be rejected, indicating that there is no correlation among the independent variables.

E. *Parameter Significance Test*

Based on the model selection conducted, the best model for use in panel data regression is the Fixed Effect Model (FEM). Subsequently, the obtained FEM undergoes parameter significance and model accuracy tests, including the F-test, t-test, and coefficient of determination analysis. Based on the simultaneous test (F-test) results, the value $F_{calculated}$ = 64,9688 > F_{table} = 1,6265 atau $p - value$ = 0,0000 < α, meaning is rejected. This indicates that all independent variables simultaneously influence the dependent variable. Based on the partial test (t-test), it is shown that the variables TPT, TPAK, APM, the proportion of informal employment, and IPM have a partial effect on the dependent variable. Meanwhile, the independent variables for the proportion of

women marrying at a young age and GRDP do not have a partial effect on the dependent variable.

F. *Coefficient of Determination*

The coefficient of determination is used to indicate how well the selected model explains the dependent variable by utilizing R^2 (R-Square). In the selected fixed effect model with five significant variables, the R^2 value is 97.7%. The adjusted R^2 value is 96.2%, meaning that the significant independent variables in the model can explain 96.2% of the variation in the NEET percentage, while the remaining 3.8% is explained by other variables outside the independent variables included in the study.

IV. CONCLUSIONS

Based on the analysis and discussion, the best panel data regression model for analyzing the NEET percentage in Indonesia from 2021 to 2023 is the fixed effect model (FEM). The FEM equation is as follows:

$$\hat{Y}_{it} = -138{,}99 + 0{,}9X_{1,it} - 1{,}2X_{2,it} - 0{,}48X_{3,it} + 0{,}53X_{4,it} + 3{,}28X_{6,it}$$

The variables Open Unemployment Rate (TPT as X1), Proportion of Informal Employment (X4), and Human Development Index (HDI as X6) have a positive impact on the NEET percentage. A 1% increase in TPT will result in a 0.9% increase in the NEET percentage. Similarly, a 1% increase in the proportion of informal employment will raise the NEET percentage by 0.53%, and a 1% increase in HDI will lead to a 3.28% rise in the NEET percentage. On the other hand, Labor Force Participation Rate (TPAK as X2) and Net Enrollment Rate (APM as X3) have a negative impact on the NEET percentage. A 1% increase in TPAK will reduce the NEET percentage by 1.2%, while a 1% increase in APM will decrease the NEET percentage by 0.48%.

The selected fixed effect model has an R-squared value of 97.7% and an adjusted R-squared value of 96.2%. This indicates that the significant independent variables in the model explain 96.2% of the variation in the NEET percentage, while the remaining 3.8% is explained by other factors outside the independent variables in this study.

The researcher's suggestion for future studies is to add other independent variables that are suspected to influence the NEET percentage in Indonesia, such as population density, and to extend the time period analyzed.

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