Indonesian Educational Administration and Leadership Journal
Volume 08 Number 01 (2026)
https://online-journal.unja.ac.id/index.php/IDEAL
DOI : https://doi.org/10.22437/ideal.v8i1.54132

e-ISSN 2686-3596

21-44

The Influence of Capital Expenditure and Employee Expenditure on the Education Index through Employment Absorption and Poverty in Regencies/Municipalities of Jambi Province

Muhammad Qodri[1], Hendri Tanjung[2], Nurul Huda[3], Immas Nurhayati[4] and Zainul Bahri[5]
[12345]Postgraduate, Ibn Khaldun University, Bogor, Indonesia
ORCIDs:
First AUTHOR: http://orcid.org/0000-0001-8710-5726

Article Info

Article history:

Received 30, 03, 2026
Revised 16, 04, 2026
Accepted 30, 04, 2026

Keywords:

capital expenditure; employee expenditure; education; employment; poverty

ABSTRACT

The purpose of this study is to examine how capital expenditure (X1) and employee expenditure (X2) influence the education index of regencies/municipalities (Y2) through employment absorption (Z1) and poverty (Z2) during the period 2002–2024. The method applied is multiple linear regression using the selected Random Effects Model (REM), with data analysis conducted through Eviews 8.0 Series to process panel data. The results of the t-test show that among the examined variables (capital expenditure (X1), employee expenditure (X2), employment (Z1), and poverty (Z2)), only capital expenditure (X1) does not have a significant effect on the education index of regencies/municipalities in Jambi Province (Y2) during 2002–2024, with a significance level of 5%. The other three variables—employee expenditure (X2), employment (Z1), and poverty (Z2)—were found to have a significant impact on the education index within the same period, at the 5% significance level. The Adjusted R-Squared value of 0.799658 (lower than the fixed effect model's 0.900323) indicates a high R-Squared value of 0.803492. The F-statistic probability of 0.000000 further confirms the model's overall significance, although the Durbin-Watson statistic of 0.242935, which falls below 2, suggests potential autocorrelation issues.

Corresponding Author: muhammad.9odri189@gmail.com

INTRODUCTION

Development priority funds allocated for regional expenditure are economic in nature and must be utilized efficiently and effectively. Due to decentralization, regional government finances are highly constrained, with the aim of reducing dependency on central government support. To manage regional expenditure smoothly and efficiently, financial performance measurement is required to assess the capability of local governments in utilizing public funds in an economical, efficient, and effective manner.

According to Mahmudi (2010), expenditure analysis is used to measure the extent to which local governments achieve budget efficiency and avoid spending that deviates from its intended purposes. A study by Novia Aminuddin & Srihadi Winarningsih (2024) in West Java identified several financial performance indicators, including independence ratio, financial dependency, fiscal decentralization, local revenue (PAD) effectiveness, and regional expenditure efficiency. The findings revealed that PAD effectiveness was nearly on target (≈ 99.64%), whereas regional expenditure efficiency was relatively low (average 90.90%).

To support autonomous governance, local governments need to identify and mobilize local resources. Locally managed funding constitutes one of the primary sources of financing for regional expenditure, while investment and human resource spending contribute to improving public service facilities and infrastructure. Consequently, regional expenditure tends to focus on investment and human resource development. Civil servants serve as one of the indicators used to assess government performance in carrying out national missions.

According to DJPK (2013), the Regional Budget (APBD) is planned annually with the approval of the Regional House of Representatives (DPRD). Essentially, it outlines regional revenue sources, expenditure allocations for program and activity implementation, as well as the funding balance in cases of surplus or deficit. In 2010, the APBD was largely dominated by equipment expenditure. At the provincial level, the majority of regional spending was allocated to salaries of regional employees and civil servants. Similarly, at the regency/municipality level, the proportion remained considerably high, reaching around 2%. The dominance of personnel expenditure in the structure of public spending indicates that the budget has not yet been fully optimized to benefit the public. Based on data from the Directorate General of Fiscal Balance, Ministry of Finance of the Republic of Indonesia (November 2021), the proportion of personnel expenditure in 2019 was projected to reach only 5% by 2020, yet it increased significantly to 58%. These figures suggest that annual personnel costs continue to rise and dominate the overall structure of the APBD.

Revenue from Jambi Province's 2024 Regional Budget (APBD) was adjusted to IDR 5,178,334,014,113, with expenditures amounting to IDR 4,784,426,341,772.58 and financing recorded at IDR 579,220,869,155.34. This was approved by the Jambi Regional House of Representatives (DPRD) during the ratification of the General Budget Policy (KUA) and the Provisional Budget Priorities and Ceiling (PPAS), following deliberations between the Jambi Budget Committee and the Provincial Budget Team. The difference between revenue and expenditure was allocated to cover the spending deficit through the financing account. This structure is consistent with the official report of the Jambi DPRD, which confirmed that the total APBD for 2024 amounts to approximately IDR 5.17 trillion, with regional revenue of around IDR 4.66 trillion and financing of approximately IDR 543 billion.

Personnel expenditure refers to compensation in the form of money or goods provided to civil servants, public officials, retirees, and honorary employees appointed as civil servants. This applies both domestically and abroad as remuneration for their contributions in supporting the mission and functions of government organizational units. Personnel expenditure covers payments such as salaries and allowances for civil servants and military/police personnel (TNI/POLRI), unpaid salaries for doctors, meal allowances for civil servants, and support costs for military/police personnel.

Capital expenditure refers to budget spending allocated for the acquisition of assets or the enhancement of fixed asset values that provide benefits across multiple accounting periods and exceed the minimum capitalization threshold for fixed assets, as regulated by the government. Capital expenditure includes investment in land, equipment and machinery, buildings and structures, roads, irrigation, and networks, as well as other types of capital investment and capital expenditure for Public Service Agencies (BLU). By

answering the following question: (1) How does capital expenditure (X1) affect the education index (Y2) through employment absorption (Z1) and poverty (Z2) in Jambi Province? (2) How does personnel expenditure (X2) affect the education index (Y2) through employment absorption (Z1) and poverty (Z2) in Jambi Province? (3) To what extent do capital expenditure (X1) and personnel expenditure (X2) influence the education index (Y2) through employment absorption (Z1) and poverty (Z2) in Jambi Province?

LITERATURE REVIEW

Capital Expenditure and Personnel Expenditure

Capital expenditure refers to budget spending allocated for the acquisition of fixed assets and other assets that provide benefits across multiple accounting periods. Capital expenditure includes, among others, spending for the purchase of land, buildings and structures, equipment, and intangible assets.

Personnel expenditure refers to compensation provided to civil servants, public officials, or contractual employees working within government institutions, either in the form of money or goods. Such expenditure includes salaries and allowances, meal allowances, waiting fees, employee health insurance contributions, honorarium payments, and other related costs. Personnel expenses are incorporated into the central government budget (APBN).

Table 1. Jambi Province Expenditure

Year	Regional Expenditure (Realization / APBD)	Remarks
2018	IDR 4,515,143,629,000	Realization (Source: Regional Financial Statistics)
2019	IDR 5,244,689,781,000	Realization (Source: Regional Financial Statistics)
2020	IDR 5,244,838,971,000	Realization (Source: Regional Financial Statistics)
2022	≈ IDR 5.4 trillion	Jambi Province APBD 2022
2023	≈ IDR 5.6 trillion	Jambi Province APBD 2023
2024	IDR 4,784,426,341,772.58	Revised APBD 2024 (Source: Jambi Governor Regulation No. 28/2024)

Source: Department of Finance, Regional Secretariat of Jambi Province.

Based on Jambi Provincial Government expenditure data from 2018 to 2024, fluctuations can be observed from year to year. In 2018, realized expenditure amounted to IDR 4.51 trillion, rising significantly in 2019 to IDR 5.24 trillion and remaining relatively stable in 2020 at IDR 5.24 trillion. In 2022, regional expenditure was recorded at approximately IDR 5.4 trillion and further increased in 2023 to around IDR 5.6 trillion. However, in 2024 a sharp decline occurred, with regional expenditure, after the revised APBD, falling to only IDR 4.78 trillion. This pattern indicates that although Jambi's regional expenditure showed an upward trend during 2018–2023, a significant adjustment in 2024 reduced total spending to below the levels of previous years.

Education Index

Education is the key to improving quality of life. It fosters critical thinking, encourages creativity, and enhances students' capacity for innovation. The higher the level of education, the greater the access to decent employment opportunities. With decent employment, both individual welfare and self-empowerment are improved. Therefore, education is recognized as one of the 17 Sustainable Development Goals (SDGs), specifically Goal 4: "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all."

In 2023, the education index in Jambi Province reached 65.84, slightly higher than the national average of 65.76. The highest achievements were recorded by Jambi City

(80.90) and Sungai Penuh City (75.73), indicating that the quality of education in urban areas is relatively better compared to other regions. At the regency level, Kerinci (67.27) posted the highest score, while most regencies such as Merangin, Sarolangun, Batang Hari, Muaro Jambi, Tanjung Jabung Barat, Tebo, and Bungo were in the range of 61–65. Meanwhile, Tanjung Jabung Timur (58.66) recorded the lowest achievement. This highlights a significant disparity between urban centers and coastal or inland regions, which still require more attention to improve the quality of education.

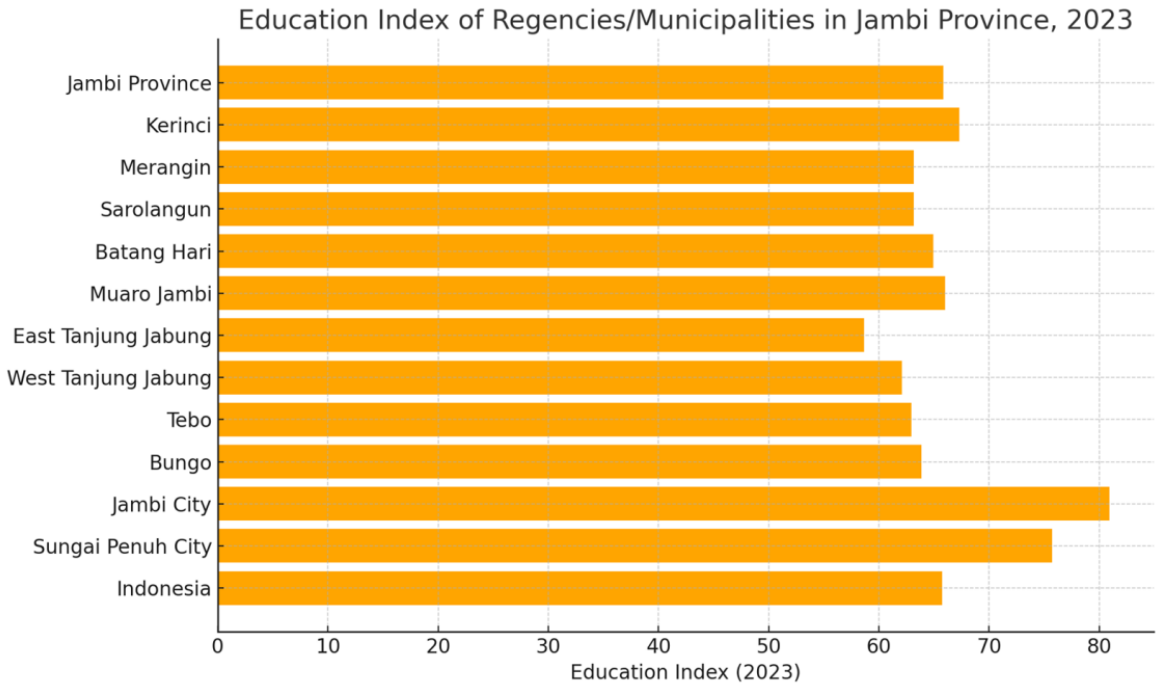


Figure 1. Education Index of Jambi Province (Source: Statistics Indonesia, Jambi Province, 2023)

Labor Force

In 2023, the labor market conditions in Jambi Province revealed considerable disparities across districts and municipalities. Jambi City recorded the largest labor force with 311,048 individuals, followed by Muaro Jambi with 233,135 and Bungo with 196,264. Conversely, Sungai Penuh had the smallest labor force at 52,117 individuals. In terms of employed population, Jambi City also registered the highest figure with 285,317 persons, while Sungai Penuh recorded the lowest at 50,136 persons.

In terms of the Open Unemployment Rate (OUR), Jambi City recorded the highest figure at 8.27%, followed by Muaro Jambi at 5.40% and Bungo at 5.23%. The lowest OUR was observed in Tanjab Timur at 1.67% and Tebo at 1.71%. Meanwhile, the Labor Force Participation Rate (LFPR) reached its peak in Muaro Jambi at 74.38%, whereas the lowest levels were found in Batang Hari (62.01%) and Jambi City (64.85%). These figures indicate that although Jambi City has the largest labor force and number of employed persons, it continues to face a serious challenge of relatively high unemployment, while several other districts demonstrate more optimal labor participation with comparatively low unemployment rates.

Table 2. Labor Force Participation Rate (LFPR) in Jambi Province

District/City	Employed Persons	Unemployed Persons	Labor Force	Non-Labor Force	Open Unemployment Rate (OUR) (%)	Labor Force Participation Rate (LFPR) (%)
Kerinci	137,302	3,485	140,787	55,062	2.48	71.89
Merangin	186,400	8,482	194,882	78,940	4.35	71.17
Sarolangun	136,619	7,334	143,953	72,446	5.09	66.52
Batang Hari	138,564	5,548	144,112	88,289	3.85	62.01
Muaro Jambi	220,545	12,590	233,135	80,282	5.40	74.38
Tanjab Timur	117,848	2,006	119,854	57,547	1.67	67.56
Tanjab Barat	166,336	5,064	171,400	72,861	2.95	70.17
Tebo	177,198	3,090	180,288	76,783	1.71	70.13
Bungo	185,999	10,265	196,264	82,905	5.23	70.30
Jambi City	285,317	25,731	311,048	168,620	8.27	64.85
Sungai Penuh	50,136	1,981	52,117	24,259	3.80	68.27

Source: Statistics Indonesia, Jambi Province, 2023

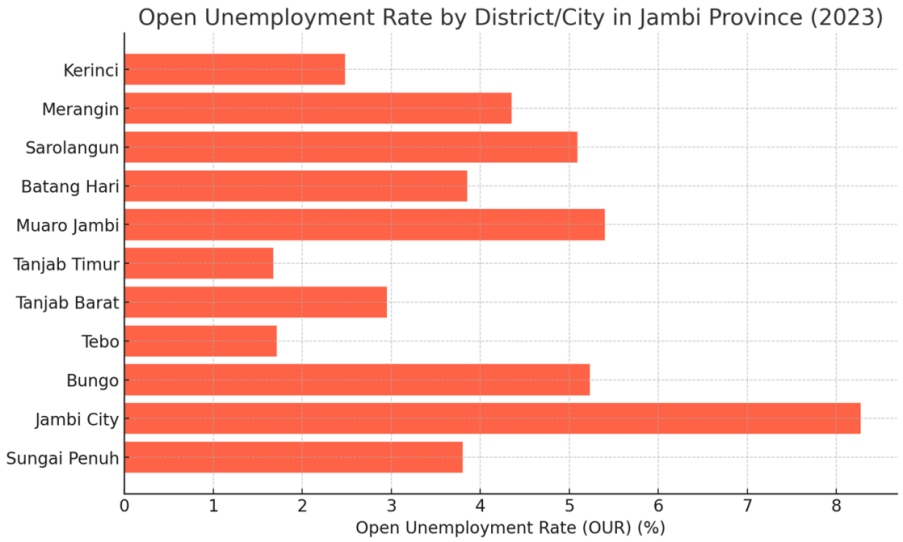


Figure 2. Open Unemployment Rate by District/City in Jambi Province

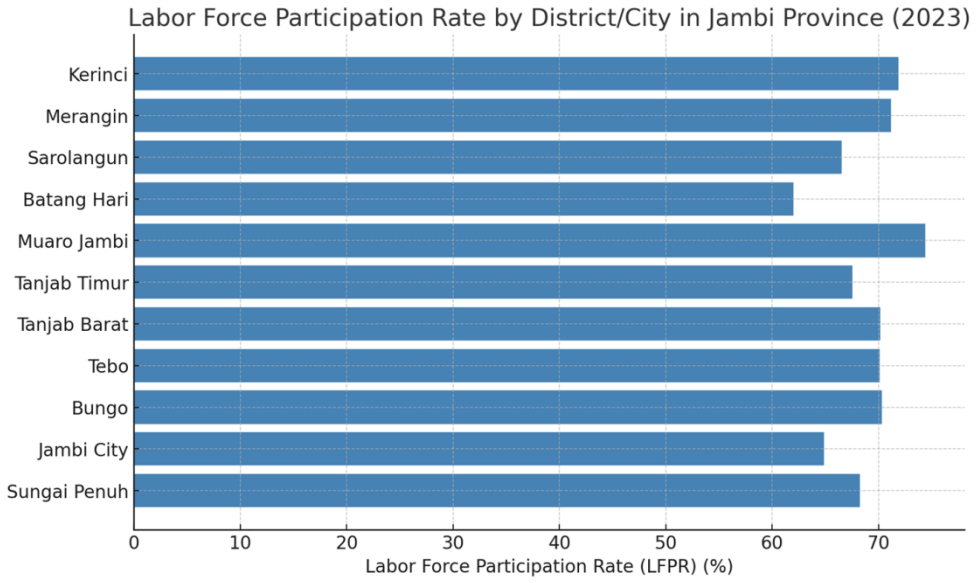


Figure 3. Labor Force Participation Rate by District/City in Jambi Province

Poverty

The Covid-19 pandemic has exacerbated poverty levels in Jambi Province. As of March 2021, the number of people living in poverty reached 293,860, equivalent to 8.09% of the total population. This figure represents an increase of 16,060 individuals compared to the same period in the previous year. In March 2020, the poor population of Jambi was recorded at 277,800 people, or 7.58%.

Among districts, Tanjung Jabung Timur recorded the highest poverty rate in the province. According to data from the Central Statistics Agency (BPS), the poverty rate in the district stood at 11.39% in March 2021, higher than the 10.95% recorded in March 2020. Meanwhile, Tanjung Jabung Barat had the second-highest poverty rate at 10.75%, followed by Batang Hari at 10.05%.

METHODS

This study employs secondary data in the form of annual series covering the period 2002–2024. The data collected include: (1) government expenditure at the district/city level in Jambi Province (capital expenditure and personnel expenditure), (2) the education index, and (3) labor force and poverty data from the Jambi Provincial Statistics Agency (BPS). To address the research questions, the analysis applies classical assumption tests, followed by structural equation modeling using the equations and framework illustrated below.

Structural Model: $$Y_2 = \rho_{Y_2X_1}X_1 + \rho_{Y_2X_2}X_2 + \rho_{Y_2Z_1}Z_1 + \rho_{Y_2Z_2}Z_2 + \rho_{Y_2\varepsilon_3}\varepsilon_4$$

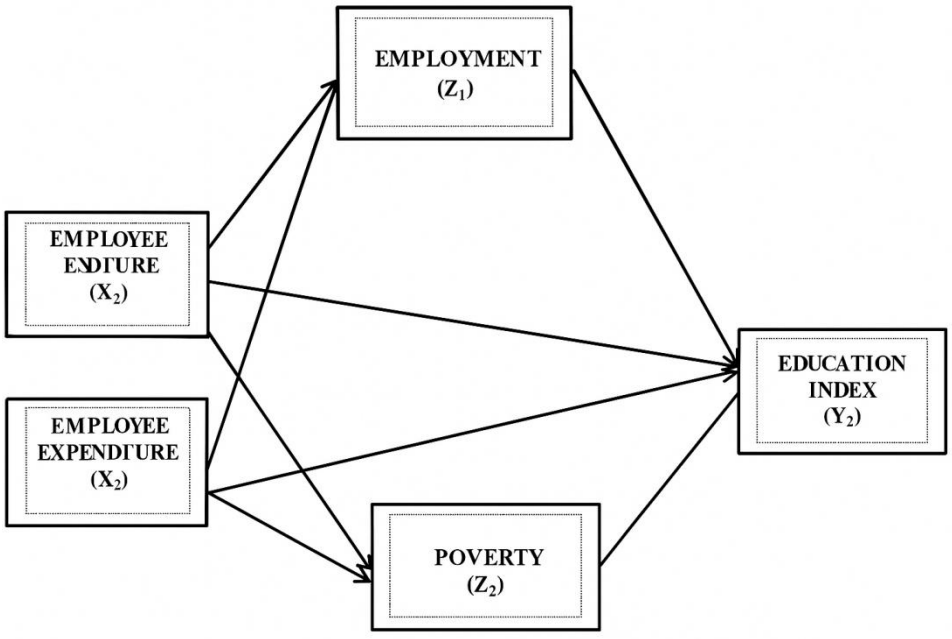


Figure 4. Structural Model

FINDINGS AND DISCUSSION

Analysis of the Effect of Capital Expenditure and Employee Expenditure on the Education Index through Employment Absorption and Poverty in Regencies/Municipalities of Jambi Province

F-Statistic Testing for Fixed Effect Model or Random Effect Model

The Hausman test was conducted to determine the most appropriate model between the Random Effects Model (REM) and the Fixed Effects Model (FEM). The hypotheses are formulated as follows:

- H0: Random Effects Model (REM) is appropriate
- H1: Fixed Effects Model (FEM) is appropriate

If the probability value is less than α (5%), then H0 is rejected and H1 is accepted. Conversely, if the probability value is greater than 5%, then H1 is rejected and H0 is accepted.

A summary of the estimation results for both models, namely the fixed-effect and random-effect models, is presented in the following table. The regression output is based on panel data using the fixed-effect modeling approach, covering regencies/municipalities in Jambi Province for the period 2002–2024.

Table 3. Estimation Results of the Panel Data Regression Model: Fixed Effect Model

Dependent Variable: LOG(Y2?)
Method: Pooled Least Squares
Date: 05/11/24 Time: 23:27
Sample: 1 21
Included observations: 21
Cross-sections included: 10
Total pool (balanced) observations: 210

Variable	Coefficient	Std, Error	t-Statistic	Prob,
C	-6,229708	0,746762	-8,342292	0,0000
LOG(X1?)	0,000910	0,018822	0,048370	0,9615
LOG(X2?)	0,230262	0,036881	6,243412	0,0000
LOG(Z1?)	0,433946	0,095830	4,528305	0,0000
LOG(Z2?)	-0,125180	0,047203	-2,651953	0,0087
Fixed Effects (Cross)				
BTHARI--C	0,222537			
BUNGO--C	0,066492			
KERINCI--C	0,159424			
KTJAMBI--C	0,393156			
MERANGIN--C	-0,295421			
MRJAMBI--C	0,033761			
SAROLANGUN--C	-0,055284			
TANJABBAR--C	0,003269			
TANJABTIM--C	-0,311032			
TEBO--C	-0,216903			

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0,906523	Mean dependent var	3,662600
Adjusted R-squared	0,900323	S,D, dependent var	0,420379
S,E, of regression	0,132721	Akaike info criterion	-1,136794
Sum squared resid	3,452516	Schwarz criterion	-0,913653

Log likelihood	133,3633	Hannan-Quinn criter,	-1,046586
F-statistic	146,2125	Durbin-Watson stat	0,251084
Prob(F-statistic)	0,000000		

Source: Processed using Eviews

From the table above, this study could not identify individual variables in the t-statistic test. The four independent variables include capital expenditure (X1), employee expenditure (X2), employment (Z1), and poverty (Z2). One independent variable was found to have no significant effect on the education index (Y2) of regencies/municipalities in Jambi Province for the period 2002–2024, namely capital expenditure (X1), with a significance level greater than 5%. In contrast, the other three independent variables—employee expenditure (X2), employment (Z1), and poverty (Z2)—were found to have a significant effect on the education index (Y2) of regencies/municipalities in Jambi Province for the period 2002–2024, with a significance level below 5%.

Furthermore, the Adjusted R-squared value of 0.900323 indicates a strong explanatory power, with the R-squared value recorded at 0.906523. The F-statistic probability of 0.000000 suggests that the model is statistically significant, while the Durbin–Watson statistic of 0.25108 falls below the benchmark value of 2. Therefore, an alternative specification, namely the Random Effects Model, is required, as presented in the following table.

Table 4. Estimation Results of the Panel Data Regression Model: Random Effects Model

Dependent Variable: LOG(Y2?)
Method: Pooled EGLS (Cross-section random effects)
Date: 05/11/24 Time: 23:29
Sample: 1 21
Included observations: 21
Cross-sections included: 10
Total pool (balanced) observations: 210
Swamy and Arora estimator of component variances

Variable	Coefficient	Std, Error	t-Statistic	Prob,
C	-6,376351	0,739435	-8,623275	0,0000
LOG(X1?)	-0,001168	0,018740	-0,062324	0,9504
LOG(X2?)	0,230804	0,036470	6,328623	0,0000
LOG(Z1?)	0,447990	0,093771	4,777514	0,0000
LOG(Z2?)	-0,123200	0,046711	-2,637497	0,0090
Random Effects (Cross)				
BTHARI--C	0,221459			
BUNGO--C	0,065500			
KERINCI--C	0,157144			
KTJAMBI--C	0,379531			
MERANGIN--C	-0,292316			
MRJAMBI--C	0,032626			
SAROLANGUN--C	-0,051904			
TANJABBAR--C	0,003654			
TANJABTIM--C	-0,301860			
TEBO—C	-0,213833			
	Weighted Statistics			

R-squared	0,803492	Mean dependent var	0,468001
Adjusted R-squared	0,799658	S,D, dependent var	0,296573
S,E, of regression	0,132745	Sum squared resid	3,612338
F-statistic	209,5542	Durbin-Watson stat	0,242935
Prob(F-statistic)	0,000000		
	Unweighted Statistics		
R-squared	0,643165	Mean dependent var	3,662600
Sum squared resid	13,17942	Durbin-Watson stat	0,066586

Note: *) Significant at α = 5%

From the table above, the t-statistic test shows that all independent variables—capital expenditure (X1), employee expenditure (X2), employment (Z1), and poverty (Z2)—were included in the analysis. Among them, one independent variable, namely capital expenditure (X1), was found to have no significant effect on the education index (Y2) of regencies/municipalities in Jambi Province for the period 2002–2024 at the 5% significance level. In contrast, the remaining three independent variables—employee expenditure (X2), employment (Z1), and poverty (Z2)—had a significant effect on the education index (Y2) of regencies/municipalities in Jambi Province for the same period, at the 5% significance level.

The Adjusted R-squared value of 0.799658 (lower than that of the Fixed Effects Model, 0.900323) still indicates a strong explanatory power, with the R-squared recorded at 0.80392. The probability value of the F-statistic is 0.000000, confirming that the model is statistically significant. However, the Durbin–Watson statistic of 0.22935 falls below the threshold value of 2, suggesting potential autocorrelation issues.

Classical Assumption Tests for Panel Data

Multicollinearity Test

One approach to detect multicollinearity in the model is by examining the R-squared value. The estimation produced a relatively moderate R-squared of 0.80392, while individually, some independent variables—such as capital expenditure (X1)—were found to be insignificant, whereas the other three variables (employee expenditure (X2), employment (Z1), and poverty (Z2)) were significant in explaining the dependent variable, the education index (Y2). This suggests that multicollinearity may not be present in the model.

Another method to test for multicollinearity is by examining the correlation coefficient matrix. If any pair of independent variables shows a correlation value close to 1, then perfect multicollinearity is indicated. Conversely, if no correlation approaches 1, the model can be considered free from perfect multicollinearity and therefore valid for estimation.

The results of the multicollinearity test show that the overall correlation coefficients are close to zero, indicating that the model does not deviate from the classical assumptions and is confirmed to have passed the multicollinearity test.

Table 5. Matrix Correlation

Correlation	BTHARI	BUNGO	KERINCI	KTJAMBI	MERANGIN	MRJAMBI	SAROLANGUN	TANJABBAR	TANJABTIM	TEBO
BTHARI	1,000	0,836	0,639	0,952	-0,815	0,561	-0,216	0,393	-0,684	-0,800
BUNGO	0,836	1,000	0,181	0,740	-0,650	0,781	-0,195	0,559	-0,449	-0,784
KERINCI	0,639	0,181	1,000	0,657	-0,427	-0,036	0,135	0,098	-0,476	-0,212
KTJAMBI	0,952	0,740	0,657	1,000	-0,912	0,371	-0,381	0,150	-0,805	-0,854
MERANGIN	-0,815	-0,650	-0,427	-0,912	1,000	-0,207	0,661	0,129	0,935	0,926
MRJAMBI	0,561	0,781	-0,036	0,371	-0,207	1,000	0,015	0,828	0,030	-0,485
SAROLANGUN	-0,216	-0,195	0,135	-0,381	0,661	0,015	1,000	0,515	0,689	0,694
TANJABBAR	0,393	0,559	0,098	0,150	0,129	0,828	0,515	1,000	0,316	-0,066
TANJABTIM	-0,684	-0,449	-0,476	-0,805	0,935	0,030	0,689	0,316	1,000	0,788
TEBO	-0,800	-0,784	-0,212	-0,854	0,926	-0,485	0,694	-0,066	0,788	1,000

Another method used to detect the presence of multicollinearity in the model is the F-test for overall significance. The probability value of the F-statistic was 0.00000, which is less than the 5% alpha level (0.05). If any variable correlation approaches 1, the model can be defined as having perfect multicollinearity. Conversely, if no such correlation exists, the model can be considered free from perfect multicollinearity and thus appropriate for estimation.

The results of this multicollinearity test indicate that there are no deviations from the classical assumptions, and the model is confirmed to have passed the multicollinearity test.

Heteroskedasticity Test

Based on the Park test, a model is considered free from heteroskedasticity if the probability value of the t-statistic is greater than α = 5%. Therefore, it can be concluded that this regression equation does not exhibit signs of variance heterogeneity. When tested simultaneously, the F-statistic is greater than the F-probability, as shown in the table below.

Table 6. Heteroskedasticity Test Result

R-squared	0.803492
Adjusted R-squared	0.799658
S,E, of regression	0.132745
F-statistic	209.5542
Prob(F-statistic)	0.000000

Figure 5. Residual Plot for Heteroskedasticity Test

The F-statistic value of 209.5542 is greater than the F-probability of 0.000000, which is smaller than the 5% alpha level. Furthermore, the R-squared value is 80.3492%, indicating that the model demonstrates a strong explanatory power.

Based on these results, it can be inferred that there is no variance in the estimation outcomes, as the residuals do not form a distinct pattern. In other words, the residuals tend to remain constant. Similarly, Robert (1998) concluded that investment expenditure (X1) does not have a significant effect on the education index (Y2) of regencies/municipalities in Jambi Province for the 2002–2024 period. In contrast, employee expenditure (X2), employment (Z1), and poverty (Z2) significantly influence the education index (Y2) of regencies/municipalities in Jambi Province during the same period.

Normality Assessment

A good regression model should have data that are normally or approximately normally distributed. One of the most commonly used methods to test normality is the Jarque-Bera test. The Jarque-Bera test is based on the chi-square distribution. If the Jarque-Bera statistic is greater than the chi-square value at the 5% significance level, then the null hypothesis is accepted, indicating that the data are normally distributed. Conversely, if the Jarque-Bera statistic is smaller than the chi-square value at the 5% significance level, the null hypothesis is rejected, implying that the data are not normally distributed.

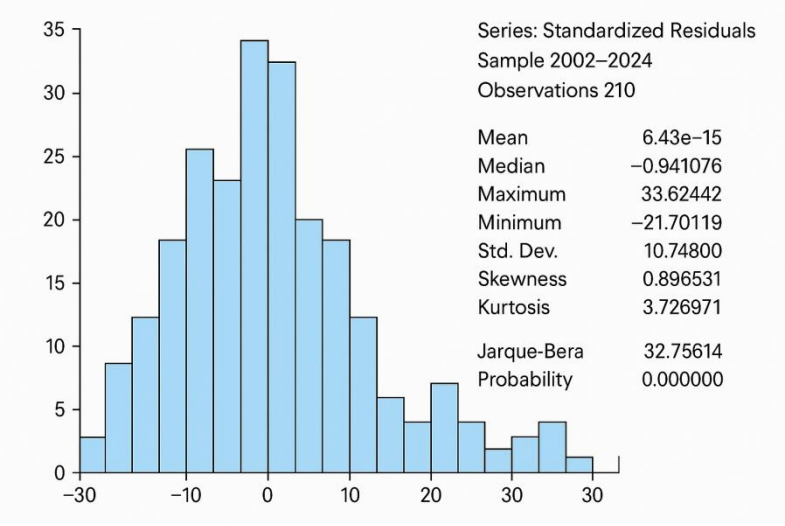


Figure 6. Normality Graph with Jarque-Bera Test

The result of the normality test above shows that the Jarque-Bera statistic is 32.75614 with a probability of 0.000000, which is less than the chi-square value (7.60100). Based on these results, the null hypothesis is rejected, indicating that the residuals are not normally distributed.

However, considering the overall classical assumption tests, the model is still considered valid and suitable for further analysis of both direct and indirect effects, as specified in the structural equation and diagram below.

Structural Model 4: $Y_2 = \rho_{Y_2X_1}X_1 + \rho_{Y_2X_2}X_2 + \rho_{Y_2Z_1}Z_1 + \rho_{Y_2Z_2}Z_2 + \rho_{Y_2\varepsilon_3}\varepsilon_4$

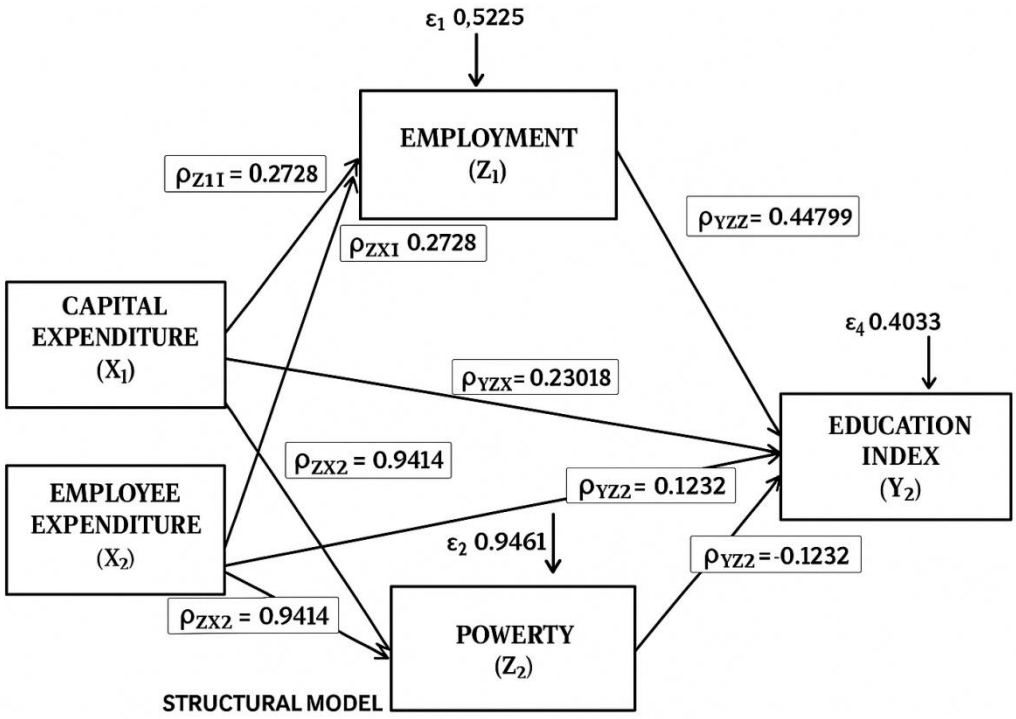


Figure 7. Structural Model 4

Thus, the structural equation derived from the above path diagram is as follows:

$$Y_2 = \rho_{Y_2X_1}X_1 + \rho_{Y_2X_2}X_2 + \rho_{Y_2Z_1}Z_1 + \rho_{Y_2Z_2}Z_2 + \rho_{Y_2\varepsilon_4}\varepsilon_4$$

$$Y_2 = -0,0012X_1 + 0,2308X_2 - 0,4479Z_1 - 0,1232Z_2 + \varepsilon_4$$

$$\boldsymbol{\varepsilon_3} : (\sqrt{(1 - 0{,}803492)} = 0{,}4433$$

$$Y_2 = -0,0012X_1 + 0,2308X_2 - 0,4479Z_1 - 0,1232Z_2 + \mathbf{0{,}4433}$$

Before conducting the analysis, it is necessary to perform an intermediary test using the Sobel Test. The Sobel Test examines whether the relationship through a mediating variable has a statistically significant role in mediating the effect. In this case, the relationship tested is between capital expenditure (X_1) and the education index (Y_2) through labor (Z_1), where labor serves as the mediating variable between capital expenditure and the education index.
To test the significance of the mediating role of labor in the relationship between capital expenditure and the education index, the Sobel Test is employed. The Sobel Test applies a Z-test with the following formula:

$$\mathbf{Z_{hit}} = \frac{\boldsymbol{ab}}{\sqrt{(b^2SEa^2) + (a^2SEb^2)}}$$

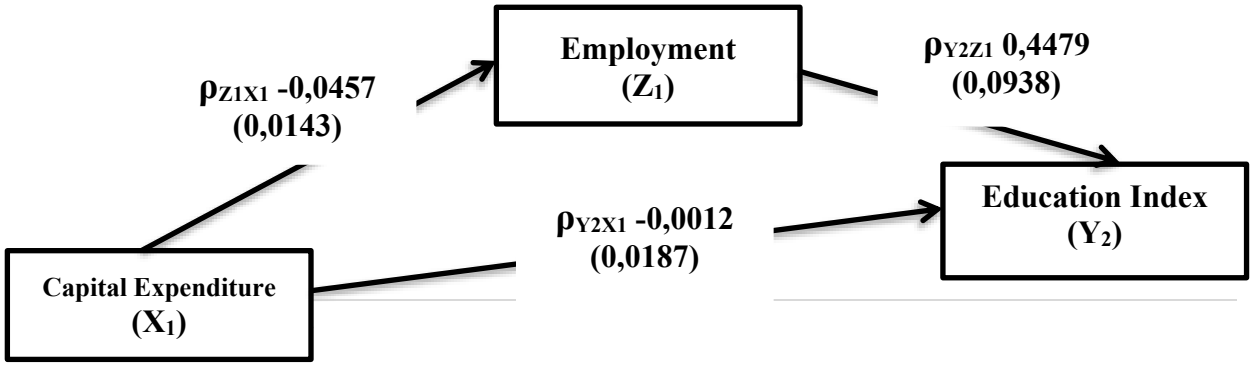
Where:

- **a** = Regression coefficient of the independent variable on the mediating variable
- **b** = Regression coefficient of the mediating variable on the dependent variable
- **SEa** = Standard error of the estimation for the effect of the independent variable on the mediating variable
- **SEb** = Standard error of the estimation for the effect of the mediating variable on the dependent variable

Decision Criteria

If $Z_{hit} < Z_{tabel}$, Then H_0 is accepted.
If Jika $Z_{hit} \geq Z_{tabel}$, Then H_0 is rejected and H1 is accepted.

a. **Path Analysis of Capital Expenditure (X1) on the Education Index (Y2) through Employment (Z1) in Regencies/Municipalities of Jambi Province**.



Path Analysis Diagram of Structural Relationship 4.1: The Effect of X1 on Y2 Through Z1

$$Z_{hit} = \frac{ab}{\sqrt{(b^2SEa^2) + (a^2SEb^2)}}$$

$$Z_{hit} = \frac{\textbf{(-0,0457) x (0,4479)}}{\sqrt{((0,4479^2 x\ (0,0143)^2) + ((-0,0457)^2 x\ (0,0938)^2)}}$$

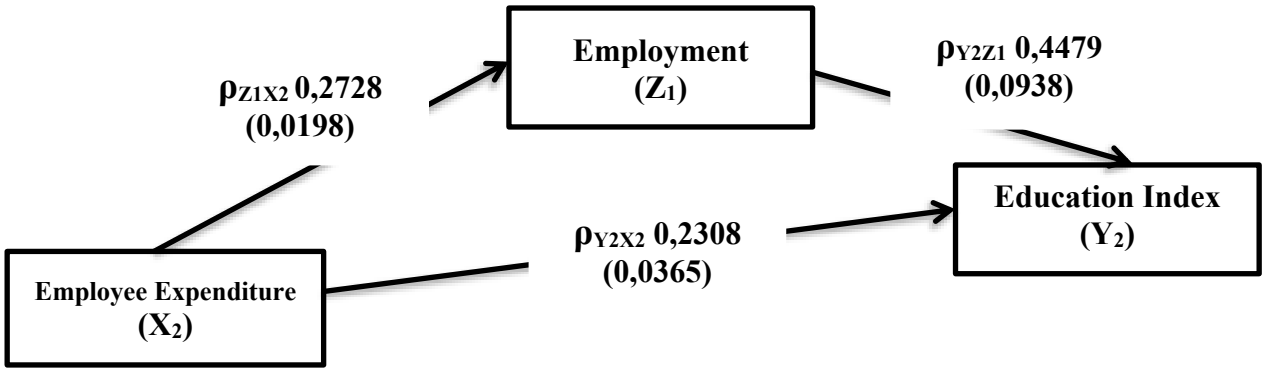
$$Z_{hit} = \frac{\textbf{-0,0205}}{\sqrt{(0,2006\ x\ 0,0002) + (0,0021\ x\ 0,0088)}}$$

$$Z_{hit} = \frac{\textbf{-0,0205}}{\textbf{0,00771}}$$

$$Z_{hit} = \textbf{-2,6559}$$

At a 5% significance level for a two-tailed Z-test, the Z-table value is 1.960. From the Sobel test calculation above, the obtained Z-value (Zhit) is -2.6559. Since the absolute value of Zhit (2.6559) is greater than 1.960 at the 5% significance level, this result demonstrates that labor (Z1) serves as a significant mediating variable in the relationship between capital expenditure (X1) and the education index (Y2) in the regencies/municipalities of Jambi Province.

b. **Path Analysis of Employee Expenditure (X2) on the Education Index (Y2) through Labor (Z1) in the Regencies/Municipalities of Jambi Province.**



Path Analysis Diagram of the Structural Relationship of Personnel Expenditure (X2) on the Education Index (Y2) Through Employment (Z1)

$$Z_{hit} = \frac{ab}{\sqrt{(b^2SEa^2) + (a^2SEb^2)}}$$

$$Z_{hit} = \frac{(0,2728) \text{ x } (0,4479)}{\sqrt{((0,4479^2 x\ (0,0198)^2) + ((0,2728)^2 x\ (0,0938)^2)}}$$

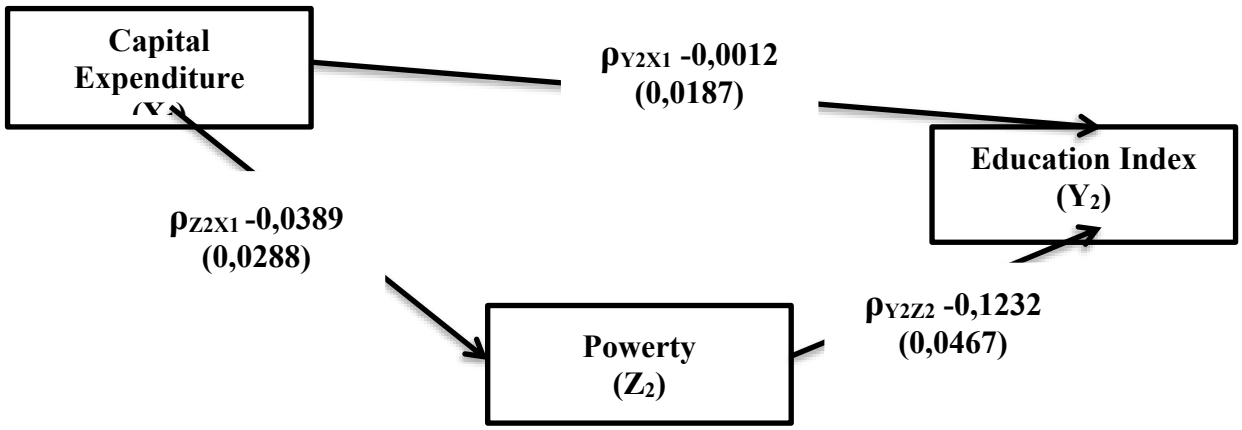
$$Z_{hit} = \frac{0,1222}{\sqrt{(0,2006\ x\ 0,0004) + (0,0744\ x\ 0,0088)}}$$

$$Z_{hit} = \frac{0,1222}{0,02708}$$

$$Z_{hit} = 4,5118$$

At a 5% significance level for a two-tailed Z test, the critical value (Z_table) is 1.960. The Sobel test yields a Z_calculated (Z_hit) of **4.5118**. Since Z_hit = 4.5118 > 1.960, the result is statistically significant at α = 0.05. This indicates that employment (Z1) significantly mediates the relationship between personnel expenditure (X2) and the education index (Y2) in the regencies/municipalities of Jambi Province.

c. Path Analysis of Capital Expenditure (X1) on the Education Index (Y2) Through Poverty (Z2) in the Regencies/Municipalities of Jambi Province.



Path Analysis of Structural Relationship 4.3: X1 to Y2 Through Z2

$$Z_{hit} = \frac{ab}{\sqrt{(b^2SEa^2) + (a^2SEb^2)}}$$

$$Z_{hit} = \frac{\textbf{(-0,0389) x (-0,1232)}}{\sqrt{((-0,1232^2 x\ (0,0288)^2) + ((-0,0389)^2 x\ (0,0467)^2)}}$$

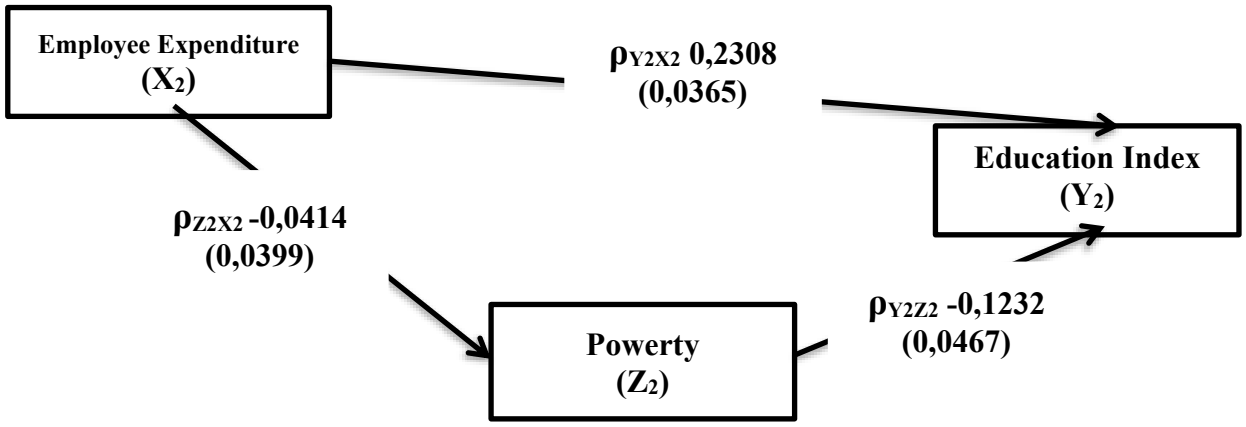
$$Z_{hit} = \frac{\textbf{0,0048}}{\sqrt{(0,0015\ x\ 0,0008) + (0,0152\ x\ 0,0022)}}$$

$$Z_{hit} = \frac{\textbf{0,0048}}{\textbf{0,00399}}$$

$$Z_{hit} = 1,2023$$

With a 5% alpha level for the two-tailed Z-test, the critical Z-value (Ztable) is 1.960. From the Sobel test calculation above, the obtained Zhit value is 1.2023. Since the Zhit value of 1.2023 is less than 1.960 at the 5% significance level, this indicates that Poverty (Z2) does not have the capacity to mediate the relationship between Capital Expenditure (X1) and the Education Index (Y2) in the regencies/municipalities of Jambi Province.

d. Path Analysis of Employee Expenditure (X2) on the Education Index (Y2) Through Poverty (Z2) in the Regencies/Municipalities of Jambi Province.



Path Analysis of the Structural Relationship of X2 to Y2 Through Z2

$$Z_{hit} = \frac{ab}{\sqrt{(b^2SEa^2) + (a^2SEb^2)}}$$

$$Z_{hit} = \frac{\textbf{(-0,0414) x (-0,1232)}}{\sqrt{((-0,1232^2 x\ (0,0399)^2) + ((-0,0414)^2 x\ (0,0467)^2)}}$$

$$Z_{hit} = \frac{0,0051}{\sqrt{(0,0152\ x\ 0,0016) + (0,0017\ x\ 0,0022)}}$$

$$Z_{hit} = \frac{0,0051}{0,00528}$$

$$Z_{hit} = 0,9656$$

At a 5% significance level, the Z-table value for a two-tailed Z-test is 1.960. Based on the Sobel test calculation, the obtained Z-statistic (Zhit) is 0.9656. Since Zhit = 0.9656 < 1.960 at the 5% significance level, this indicates that poverty (Z2) does not mediate the relationship between government employee expenditure (X2) and the education index (Y2) in the regencies/municipalities of Jambi Province.

To further assess the direct effect of capital expenditure (X1) and government employee expenditure (X2) on the labor force (Z1) in the regencies/municipalities of Jambi Province during the period 2002–2024, the results are presented in the following table**.**

Table 7. The Magnitude of Direct and Indirect Effects of Independent Variables on the Education Index (Y2) in Jambi Province

Variabel	Direct Effect (%)	Indirect Effect through Employment (%)	Indirect Effect through Poverty (%)	Total Effect (%)
Capital Expenditure (X_1)	0,000144	-2,046903*	0,479248	-1,567511
Employee Expenditure (X_2)	5,326864*	12,218712*	0,510048	18,055624*
Employment (Z_1)	20,06144*	-	-	20,06144*
Powerty (Z_2)	1,517824	-	-	1,517824*

Note: * Indicates non-significance at the 5% level (α = 0.05)

From the table above, the following conclusions can be drawn:

1. **The effect of capital expenditure (X1) on employment (Z1).**

The results indicate that capital expenditure (X1) has a significant effect on employment (Z1). This finding is supported by the probability value of 0.0015, which is smaller than the 5% significance level (α = 0.05). This demonstrates that capital expenditure has a direct influence on employment at the district/city level in Jambi Province during the 2002–2024 period.

2. **The effect of capital expenditure (X1) on the education index (Y2) through employment (Z1) as a mediating variable.**

   The findings indicate that employment significantly mediates the relationship between capital expenditure and the education index in 10 districts/cities of Jambi Province during the 2002–2024 period. This is confirmed by the Sobel test, which produced an intermediate Z-value (Zhit) of 2.6559, exceeding the Z-table value of 1.960 at the 5% significance level (α = 0.05). The direct effect of capital expenditure on the education index is 0.0001%, while the indirect effect of capital expenditure on the education index through employment is –2.06903%.

3. **The effect of capital expenditure (X1) on poverty (Z2).**

   The results show that capital expenditure (X1) has no significant effect on poverty (Z2). As presented in Table 15, the probability value is 0.1789, which is greater than the significance level of α = 5%. This indicates that capital expenditure does not have a direct effect on poverty levels in the districts/cities of Jambi Province during the 2002–2024 period.

4. **The effect of capital expenditure on the education index through poverty as a mediating variable.**

   The analysis indicates that capital expenditure does not significantly affect the education index through poverty in the 10 districts/cities of Jambi Province during the 2002–2024 period. This finding is supported by the Sobel test, which produced an intermediate effect Z-value of 1.2023, lower than the Z-table value of 1.960 at a 5% significance level. The direct effect of capital expenditure on the education index is 0.0001%, while the indirect effect through poverty is -0.7928%. Since the calculated Z-value of 1.2023 < 1.960 at α = 5%, this confirms that poverty (Z2) does not serve as a mediating variable in the relationship between capital expenditure (X1) and the education index (Y2) in the districts/cities of Jambi Province.

5. **The effect of employee expenditure (X2) on labor (Z1).**

   The findings indicate that employee expenditure (X2) has a significant effect on labor (Z1). This result is evident from the probability value of 0.0000 < α = 5% as shown in the table above. This demonstrates that employee expenditure exerts a direct influence on human resources at the district/city level in Jambi Province during the period 2002–2024.

6. **The effect of employee expenditure on the education index through labor mediation.**

   The results indicate that employee expenditure influences the education index

through labor as a mediating variable across 10 districts/cities in Jambi Province during the period 2002–2024. This is supported by the Sobel test, which produced a Z-value of 4.5118, greater than the Z-table value of 1.960 at the 5% significance level. The direct effect of employee expenditure on the education index is 5.32686%, while the indirect effect of employee expenditure on the education index through labor amounts to 12.218712%.

7. **The effect of employee expenditure on the education index through poverty mediation.** The effect of employee expenditure on the education index through poverty as a mediating variable was examined across 10 districts/cities in Jambi Province during the period 2002–2024. The Sobel test yielded a Z-value of 0.9656, which is lower than the Z-table value of 1.960 at the 5% significance level. The direct effect of employee expenditure on the education index is 5.32686%, while the indirect effect through poverty amounts to only 0.51008%. Since the obtained Z-value (0.9656) is less than 1.960, it can be concluded that poverty (Z2) does not serve as a mediator in the relationship between employee expenditure (X2) and the education index (Y2) in the districts/cities of Jambi Province.
8. **The Effect of Capital Expenditure (X1) on the Education Index (Y2)**
   The findings indicate that capital expenditure (X1) does not have a significant effect on the education index (Y2). As shown in Table 37, the probability value is 0.950 ≥ 0.05, which means the effect is statistically insignificant. This demonstrates that investment expenditure does not directly influence the education index in districts/cities of Jambi Province during the 2002–2024 period. The direct effect of capital expenditure on the education index is only 0.0001%.
9. **The Effect of Employee Expenditure (X2) on the Education Index (Y2)**
   The results show that employee expenditure (X2) has a significant effect on the education index (Y2). As presented in Table 37, the probability value is 0.0000 ≤ 0.05, confirming statistical significance. This indicates that employee expenditure directly influences the education index in districts/cities of Jambi Province during the 2002–2024 period. The direct effect of employee expenditure on the education index is 5.32686%.
10. **The Effect of Labor (Z1) on the Education Index (Y2)**
    The findings indicate that labor (Z1) has a significant effect on the education index (Y2). As shown in Table 36, the probability value is 0.0000 < 0.05, confirming statistical significance. This suggests that labor directly influences the education index in districts/cities of Jambi Province during the 2002–2024 period. The direct effect of labor on the education index is 20.06144%.
11. **The Effect of Poverty (Z2) on the Education Index (Y2)**
    The results show that poverty (Z2) significantly affects the education index (Y2). As presented in Table 36, the probability value is 0.0090 < 0.05, which indicates statistical significance. This demonstrates that poverty directly influences the education index in districts/cities of Jambi Province over the 2002–2024 period. The direct effect of poverty on the education index is 1.51782%.

Based on the results of the path analysis, the value of ε4 was obtained at 0.4433, indicating that the contribution of capital expenditure (X1) and personnel expenditure (X2) to the education index (Y2) through labor (Z1) and poverty (Z2) in the districts/municipalities of Jambi Province during the period 2002–2024 amounted to 44.33%. This finding demonstrates that the variables of capital expenditure (X1), personnel expenditure (X2), labor (Z1), and poverty (Z2) collectively provide a direct contribution of 44.33% to the education index (Y2), while the remaining 55.67% is influenced indirectly by other factors outside the independent variables examined in this study.

The results further reveal that capital expenditure (X1) does not have a significant effect on the education index (Y2), as indicated by a probability value greater than α = 5%. In contrast, personnel expenditure (X2), labor (Z1), and poverty (Z2) were found to have significant effects on the education index (Y2) in the districts/municipalities of Jambi Province during the 2002–2024 period. Moreover, as presented in Table 42, the direct effect of labor (Z1) on the education index is greater than the direct effect of personnel expenditure (X2). Specifically, the direct effect of labor on the education index was 20.06144%, while the direct effect of personnel expenditure on the education index was only 1.517824%.

Based on the data analysis in this study, the researcher proposed hypothesis H1, which states that there is a significant relationship between personnel expenditure (X2), labor (Z1), and poverty (Z2) with the education index (Y2), while capital expenditure (X1) shows no significant relationship with the education index (Y2) in the districts/municipalities of Jambi Province during the period 2002–2024. The hypothesis testing employed in this study was conducted using path analysis. The research framework consisted of five variables: capital expenditure (X1), personnel expenditure (X2), labor (Z1), poverty (Z2), and the education index (Y2).

Coefficient of Determination (R^2)

Based on the calculation results, the R-squared (R^2) value obtained from the model equation is 0.803492. This indicates that approximately 80.35% of the variation in the Education Index (Y2) of districts/municipalities in Jambi Province during the period 2002–2024 is explained by changes in capital expenditure (X1) and personnel expenditure (X2), mediated through labor (Z1) and poverty (Z2). Meanwhile, the remaining 19.65% is attributed to other factors not included in the regression model.

The data analysis results further confirm that the exogenous variables exert a significant simultaneous influence on the endogenous variable. In other words, capital expenditure (X1) and personnel expenditure (X2) affect the Education Index (Y2) through labor (Z1) and poverty (Z2) across districts/municipalities in Jambi Province.

The combined effect of the exogenous variables (capital expenditure, personnel expenditure, labor, and poverty) on the endogenous variable (education index) is evident in the R-squared output shown in Table 33. The R^2 value of 0.803492 signifies that these exogenous variables collectively explain 80.35% of the variation in the education index. The remaining 19.65%, calculated using the coefficient of determination (KD) formula, represents the proportion influenced by other factors outside the model.

In other words, the Education Index can be explained by the exogenous variables of capital expenditure and personnel expenditure through labor and poverty at a rate of **80.35%**, while the remaining **19.65%** is influenced by other variables outside this study. This implies that the Education Index is affected by capital and personnel expenditure through labor and poverty, including aspects such as physical needs, security and compensation, working conditions, administrative systems and government policies, as well as opportunities. However, these variables are able to contribute only **80.35%** through path analysis, since a considerable portion of the Education Index variation is influenced by other factors beyond the scope of this study. These external factors likely have a broader influence than capital and personnel expenditures mediated by labor and poverty.

To calculate the intercept (β0) coefficient for each district/municipality in Jambi Province, the following formula can be applied:

Table 8. Intersep Individual Province i = Overall intercept ($\beta_{0)}$ + Intercept for the i-th unit (β0i)

β_0 untuk Batanghari	= -6,376351 + 0,221459	=	-6,154892
β_0 untuk Bungo	= -6,376351 + 0,065500	=	-6,310851
β_0 untuk Kerinci	= -6,376351 **+** 0,157144	=	-6,219207
β_0 untuk Kota Jambi	**=** -6,376351 **+ 0,379531**	**=**	**-5,996820**
β_0 untuk Merangin	= -6,376351 – 0,292316	=	-6,668667
β_0 untuk Muaro Jambi	= -6,376351 + 0,032626	=	-6,343725
β_0 untuk Sarolangun	= -6,376351 – 0,051904	=	-6,428255
β_0 untuk Tanjabbar	= -6,376351 **+ 0,003654**	=	-6,372697
β_0 untuk Tanjabtim	**= -**6,376351 – **0,301860**	**=**	**-6,678211**
β_0 untuk Tebo	= -6,376351 – 0,213833	=	-6,590184

From the regression equation using the Random Effect Model (REM), the variables can be interpreted as follows:

1. The coefficient value of β_0 for districts/municipalities in Jambi Province is -6.376351. This implies that if, during the 2002–2024 period, there are no changes in the variables (Capital Expenditure (X1), Personnel Expenditure (X2) through Labor (Z1), and Poverty (Z2)), or under the assumption of constancy, the education index for all districts/municipalities in Jambi Province would decline by -6.38%.
2. Using the random effect model estimation technique with panel data also allows for the observation of differences across the 10 districts/municipalities in Jambi Province in improving the education index. These differences can be seen from the variations in the β_0 (intercept) coefficients among districts/municipalities in Jambi Province. In this case, Jambi City has the highest intercept value of -5.996820, meaning that when changes occur in the variables (Capital Expenditure (X1) and Personnel Expenditure (X2)) through Labor (Z1) and Poverty (Z2), both across districts/municipalities in Jambi Province and over time, Jambi City experiences the highest individual effect on the decline in the education index, namely -5.99%, compared to other districts/municipalities in Jambi Province during the 2002–2024 period. The relatively high intercept value can be attributed to Jambi City being the economic center, serving as a magnet for surrounding regions by providing better and more complete educational facilities at various levels compared to other areas in Jambi Province. Moreover, as the capital city of Jambi Province, Jambi City benefits from better educational access, contributing to a higher education index relative to other districts/municipalities.
3. Tanjung Jabung Timur Regency has the lowest intercept value of -6.678211. This indicates that when changes occur in the variables (Capital Expenditure (X1) and Personnel Expenditure (X2)) through Labor (Z1) and Poverty (Z2), both across districts/municipalities in Jambi Province and over time, Tanjung Jabung Timur Regency experiences the lowest individual effect on the education index, namely -6.68%, compared to other districts/municipalities in Jambi Province during the 2002–2024 period. The low intercept value suggests that significant development challenges remain, particularly in terms of limited educational access. Contributing factors include relatively strict licensing procedures, inadequate infrastructure, limited transportation networks, and low levels of investment in the education sector. These are compounded by insufficient working capital and educational facilities, as well as a lack of supporting infrastructure. Consequently, improving the education index in Tanjung Jabung Timur Regency is relatively difficult. Additionally, unfavorable geographic conditions and limited

attractiveness to investors contribute to the regency's low education index compared to other districts/municipalities in Jambi Province. Other contributing factors include limited accessibility, insufficient public facilities, low-quality human resources, and underutilized regional economic potential, which collectively position Tanjung Jabung Timur Regency at the lowest level of educational development in the province.

CONCLUSION

This study analyzed the effects of capital expenditure, personnel expenditure, labor, and poverty on the education index in the districts/municipalities of Jambi Province during the 2002–2024 period using a path analysis approach with the Random Effect Model (REM). The results revealed that personnel expenditure, labor, and poverty had significant effects on the education index, while capital expenditure did not show a statistically significant influence. The Sobel test further confirmed that labor served as a significant mediator in the relationship between both capital and personnel expenditure and the education index, whereas poverty did not function as an effective mediating variable.

The coefficient of determination (R^2) indicated that 80.35% of the variation in the education index could be explained by capital expenditure, personnel expenditure, labor, and poverty, while the remaining 19.65% was influenced by factors beyond the scope of this study. These findings suggest that strengthening human resources and reducing poverty are essential strategies for improving educational outcomes in Jambi Province. Furthermore, the study highlights disparities among districts, where Jambi City demonstrated the strongest positive conditions for educational development, while Tanjung Jabung Timur Regency experienced the greatest challenges due to limited access, infrastructure, and socio-economic constraints. Overall, the study emphasizes the importance of aligning fiscal policies, labor development, and poverty reduction programs to enhance the education index across the region.

ACKNOWLEDGMENTS

The authors would like to express their sincere gratitude to all parties who contributed to the completion of this study. Special appreciation is extended to the Statistics of Indonesia (BPS) of Jambi Province for providing comprehensive data, and to academic colleagues who offered valuable insights and constructive feedback. The authors also acknowledge the support of their respective institutions in facilitating this research.

AUTHOR CONTRIBUTIONS

All authors contributed significantly to this study.

- **MQ**: Conceptualization, data analysis, writing – original draft.
- **HT**: Methodology, supervision, validation.
- **NH**: Literature review, theoretical framework.
- **IN**: Data collection, data curation.
- **ZB**: Review and editing, final approval of the manuscript.

All authors have read and agreed to the published version of the manuscript.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this paper.

REFERENCES

Aminuddin, N., & Winarningsih, S. (2024). Analisis pengukuran kinerja keuangan dan tingkat kemampuan keuangan daerah dalam era otonomi daerah. *Journal of Economics & Business, 13*(1). https://doi.org/10.52644/joeb.v13i1.1416

Arsyad, L. (2010). Ekonomi Pembangunan (Edisi 5). Yogyakarta: UPP STIM YKPN.

Barro, R. J. (1991). Economic growth in a cross section of countries. *The Quarterly Journal of Economics*, 106(2), 407–443. https://doi.org/10.2307/2937943

Becker, G. S. (1964). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. New York: Columbia University Press.

Badan Pusat Statistik Provinsi Jambi. (2023). *Indeks Pendidikan Kabupaten/Kota se-Provinsi Jambi (Metode Baru)*. Badan Pusat Statistik Provinsi Jambi. Diakses pada 11 September 2025, dari https://jambi.bps.go.id/id/statistics-table/2/MjE0NiMy/-/metode-baru-indeks-pendidikan-kabupaten-kota-se-provinsi-jambi.html

Badan Pusat Statistik Provinsi Jambi. (2023). *Ketenagakerjaan kabupaten/kota tahun 2023*. Jambi: BPS Provinsi Jambi. Diakses dari https://jambi.bps.go.id/id/statistics-table/2/ODQ0IzI=/ketenaga-kerjaan-kab-kota.html

Badan Pusat Statistik Provinsi Jambi. (n.d.). Realisasi belanja pemerintah provinsi (ribu rupiah). *BPS Provinsi Jambi*. https://jambi.bps.go.id/indicator/13/1243/1/realisasi-belanja-pemerintah-provinsi-ribu-rupiah-.html

Badan Pusat Statistik Provinsi Jambi. (n.d.). Pengeluaran pemerintah seluruh kabupaten/kota. *BPS Provinsi Jambi*. https://jambi.bps.go.id/indicator/13/1745/1/pengeluaran-pemerintah-seluruh-kabupaten-kota-.html

Devarajan, S., Swaroop, V., & Zou, H. (1996). The composition of public expenditure and economic growth. *Journal of Monetary Economics*, 37(2), 313–344. https://doi.org/10.1016/S0304-3932(96)90039-2

DPRD Provinsi Jambi. (2023, November 30). DPRD Provinsi Jambi sahkan APBD Provinsi Jambi 2024 sebesar Rp 5,1 triliun. *DPRD Provinsi Jambi*. https://dprd-jambiprov.go.id/berita/detail/1256/dprd-provinsi-jambi-sahkan-apbd-provinsi-jambi-2024-sebesar-rp-51-triliun

Fathiyah, A., Sukmana, A., & Majid, H. (2021). Analisis Belanja Daerah Pemerintah Provinsi Jambi. *Jurnal Manajemen dan Sains, 6*(1), 117–122. https://doi.org/10.33087/jmas.v6i1.236

Foteinis, S., & Tsoutsos, T. (2017). Strategies to improve sustainability and offset the initial high capital expenditure of wave energy converters (WECs). *Renewable and Sustainable Energy Reviews, 70*, 775–785. https://doi.org/10.1016/j.rser.2016.11.262

Gujarati, D. N., & Porter, D. C. (2009). *Basic Econometrics* (5th ed.). New York: McGraw-Hill.

Keynes, J. M. (1936). *The General Theory of Employment, Interest and Money*. London: Macmillan.

Kompas.com. (2020, Desember 2). Jenis-jenis belanja negara. *Kompas*. https://www.kompas.com/skola/read/2020/12/02/145101669/jenis-jenis-belanja-negara?page=all

Mahmudi. (2010). *Analisis Laporan Keuangan Pemerintah Daerah*. Yogyakarta: UPP AMP YPKN.

Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A contribution to the empirics of economic growth. *The Quarterly Journal of Economics*, 107(2), 407–437. https://doi.org/10.2307/2118477

Musgrave, R. A., & Musgrave, P. B. (1989). *Public Finance in Theory and Practice*. New York: McGraw-Hill.

Ranis, G., Stewart, F., & Ramirez, A. (2000). Economic growth and human development. *World Development*, 28(2), 197–219. https://doi.org/10.1016/S0305-750X(99)00131-X

Santi, N. (2013). Analisis pengaruh belanja modal pemerintah daerah, tenaga kerja terserap dan indeks pembangunan manusia terhadap pertumbuhan ekonomi dan kemiskinan (Studi kasus 35 kabupaten/kota di Provinsi Jawa Tengah). *Jurnal Bisnis dan Ekonomi (JBE), 20*(2), 131–141. ISSN: 1412-3126.

Todaro, M. P., & Smith, S. C. (2011). *Economic Development* (11th ed.). Boston: Addison-Wesley.

Vitora, L., & Erina, J. (2015). R&D expenditures by higher education sector and analysis of performance indicators of Baltic States. *Procedia - Social and Behavioral Sciences, 213*, 223–228. https://doi.org/10.1016/j.sbspro.2015.11.422

Wagner, A. (1893). *Grundlegung der politischen Ökonomie*. Leipzig: C.F. Winter.

World Bank. (2020). *World Development Indicators*. Washington, DC: World Bank.