

The Influence of Capital Expenditure, Farmer Exchange Rate, and Economic Growth on The Human Development Index in Jambi Province Districts/Cities

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ABSTRACT

This research aims to analyse the effects of capital expenditure, farmers' exchange rates, and economic growth on the Human Development Index in the districts/cities of Jambi Province during the period 2020–2024. The research method used is panel data regression, consisting of CEM, FEM, and REM models, with the Chow test, Hausman test, and Lagrange multiplier test. The selected fixed effects model (FEM) indicates that farmers' exchange rates and economic growth are statistically significantly associated with the human development index at the 10% level. In contrast, the capital expenditure variable is not statistically significantly associated with the human development index of the districts/cities of Jambi Province at the 10% level during 2020-2024. These results suggest that improvements in farmers' purchasing power and inclusive economic growth are associated with higher human development outcomes, whereas the association with aggregate capital spending is not statistically significant. The study highlights the importance of strengthening agricultural welfare policies and promoting inclusive regional growth to improve human development performance, particularly in agrarian-based regions.

Keywords: *capital expenditure, farmers' exchange rate, economic growth, human development index*

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1. INTRODUCTION

The government, as the executor of development, certainly needs quality human capital as the basic capital for development. To produce quality individuals, efforts are needed to improve human resource quality. The quality of individuals can be measured through the Human Development Index. Purnamawati (2021) states that enhancing human quality can be fulfilled through various policies, namely that education development will take into account the direction of economic development in the future, health development will receive attention by instilling a healthy lifestyle culture and expanding the scope and quality of health services, for the poor, quality improvement is achieved by providing practical skills, fostering a productive attitude, and encouraging the spirit of self-reliance and independence to jointly free themselves from poverty while suppressing population growth by improving the implementation of family planning movements, and enhancing the balance of population density and distribution.

The Human Development Index (HDI) summarizes achievements in three dimensions: a long and healthy life, knowledge, and a decent standard of living. In Indonesia, these dimensions are represented by life expectancy at birth, expected and mean years of schooling, and adjusted per capita expenditure, respectively (Badan Pusat Statistik [BPS], 2019).

The Human Development Index (HDI) serves as a tool to measure the success of human development, which is assessed based on the fundamental components of quality of life, namely Life Expectancy Index, Education Index, and Decent Standard of Living Index. With improvements in human development, countries will experience progress and growth (Hasyim, 2017). The government policy is to allocate funds in the form of capital expenditure in the Regional Budget (APBD) in the hope of enhancing community welfare. According to Halim and Kusufi (2013), capital expenditure is the regional government's spending that will add assets or regional wealth; capital expenditure is one of the ways to realize the goals of regional autonomy, which are to improve welfare and enhance services to the community by providing facilities directly related to public services.

Rostow and Musgrave (as cited in Setiawan & Budiana, 2015) connect the development of government expenditure with early, intermediate, and advanced stages of economic development. At the subsequent economic levels, Rostow states that government activities shift from infrastructure provision to expenditures on social activities such as elderly welfare and healthcare service programs. The impact of community capital expenditure is further clarified by Wagner's law in the economy, which states that as per capita income increases, government expenditure will also increase relatively (Setiawan & Budiana, 2015).

The increase in the Human Development Index is in line with the rising terms of trade for farmers, thus meeting a person's basic needs. The Terms of Trade for Farmers (NTP) is an indicator used to measure the welfare level of farmers based on the comparison between the price index received by farmers (It) and the price index paid by farmers (Ib). In simple terms, NTP indicates the purchasing power of farmers; if NTP is above 100, it means farmers are experiencing a surplus because the prices they receive from agricultural products are higher than their household consumption and production costs. Conversely, if the NTP is below 100, then farmers experience a deficit or a decline in purchasing power. NTP is an important tool for the government and policymakers to assess the economic condition of the agricultural sector and to establish appropriate strategies to improve farmers' welfare, especially in facing the dynamics of fluctuating commodity prices and production costs (Retnasari & Cahyono, 2015).

Economic growth is the process of increasing the production capacity of a country or region, as reflected in the sustained increase in Gross Domestic Product (GDP) or Gross Regional Domestic Product (GRDP) over time. This growth indicates an economy's ability to create additional goods and services, thereby enhancing society's income and overall well-being (Mankiw, 2013). In practice, economic growth is often used as a key indicator to assess the success of a country's development, as it reflects increased economic activity, job creation, and improved people's purchasing power.

The impact of economic growth on the Human Development Index (HDI) is very significant, as both are closely interconnected (Primandari, 2020). The HDI is a composite indicator that measures human development achievements from three main dimensions: health (life expectancy), education (mean years of schooling and expected years of schooling), and standard of living (per capita income). Positive economic growth can increase per capita income, which in turn enables the government and society to improve access to better healthcare, education, and nutrition services. Therefore, inclusive and sustainable economic growth will drive improvements in the quality of life of the population, as reflected in the increase in HDI values. However, it is important to note that uneven or non-inclusive economic growth can worsen social inequalities, thus making its impact on HDI suboptimal. Therefore, it is important for the government to ensure that the results of economic growth can be widely enjoyed by all layers of society so that it truly has a positive impact on improving the quality of human development.

The Human Development Index (HDI) in Jambi Province describes the quality of life of the community, which includes aspects of health, education, and income. The Human Development Index (HDI) of Jambi, which measures the extent to which people in the province can access basic services and live decently, has continued to improve in recent years. The education sector in Jambi, one of the main indicators in measuring the HDI, has improved through increases in expected years of schooling and literacy rates. Meanwhile, the health sector, as reflected in life expectancy, also shows positive developments, although it still faces challenges related to access and the quality of healthcare services in remote areas. However, despite the progress, the gap between regions, especially between urban and rural areas, remains a major issue that needs to be addressed to achieve a more equitable Human Development Index (HDI). With ongoing efforts in education, health, and economics, the HDI of Jambi Province is expected to continue improving, providing a better quality of life for all levels of society.

Capital expenditure, farmer exchange rates, and economic growth are expected to improve the community's quality of life. Government capital expenditure on infrastructure and public facility development directly impacts progress in the health, education, and economic sectors, which are the main components in calculating the Human Development Index (HDI). A stable and favorable farmer exchange rate increases farmers' purchasing power, which improves their welfare, especially in rural areas. Meanwhile, positive economic growth accelerates job creation, increases community income, and expands access to education and healthcare services. These three factors interact to improve quality of life and increase the Human Development Index (HDI) in an area. Thus, policies that support effective capital expenditures, strengthen farmers' exchange rates, and encourage inclusive economic growth are crucial in enhancing the HDI and the overall welfare of the community.

Despite extensive studies examining the relationship between government expenditure, economic growth, and human development, empirical findings remain inconclusive, particularly at the subnational level. Previous studies tend to focus on aggregate national data or single explanatory variables, with limited attention given to the combined role of capital expenditure, farmer welfare indicators, and economic growth within a regional panel data framework. Moreover, empirical evidence on the Human Development Index at the district and city level in agrarian-based provinces such as Jambi remains scarce. This study addresses this gap by simultaneously examining these three determinants using recent panel data, thereby providing region-specific insights that can inform more targeted development policies.

2. LITERATURE REVIEW

2.1 Human Development Index

The United Nations Development Program (UNDP) defines human development as a process of expanding choices for the population. In this concept, the population is placed as the ultimate end, while development efforts are viewed as the principal means to achieve that goal.

2.2 Capital Expenditure

Capital expenditure is local government spending whose benefits extend beyond one fiscal year and increase the region's assets or wealth, and it includes routine expenses such as maintenance costs within the general administrative expenditure group (Hanafi & Halim, 2012). Capital expenditure for each district/city can be seen in the Realisation Report of the Regional Budget (APBD).

2.3 Farmer Exchange Rate

The farmers referred to in the concept of the farmer exchange rate by the Central Statistics Agency are farmers who operate in the food crop sub-sector (rice and secondary crops), horticulture (vegetables, fruits, ornamental plants, and medicinal plants), smallholder plantation crops (coconut, coffee, cloves, tobacco, and kapok), livestock farmers (large livestock, small livestock, poultry, and livestock products), as well as the fisheries sub-sector (both capture fisheries and aquaculture).

2.4 Economic Growth

According to Mankiw (2013), the theory of economic growth explains the factors that determine long-term economic growth and its processes, including how these factors interact to produce growth.

Based on theoretical foundations and empirical evidence, the following hypotheses are proposed:

- **H1:** Capital expenditure has a significant effect on the Human Development Index in districts/cities of Jambi Province.
- **H2:** Farmer exchange rates have a positive and significant effect on the Human Development Index in districts/cities of Jambi Province.
- **H3:** Economic growth has a positive and significant effect on the Human Development Index in districts/cities of Jambi Province.

3. METHODOLOGY

The research method is designed with the operationalization of variables, determining the type and source of data, data collection or research methods, and the research model, which ends with data design, data analysis, and hypothesis testing. When conducting research, researchers require methods, ways, or tactics. In other words, these are the necessary steps for researchers to solve problems to achieve their goals. The method used in this research is a quantitative descriptive method.

Panel data regression is a statistical analysis method used to process data that has both time series and cross-sectional dimensions simultaneously. In panel data regression, there are three main approaches that are often used, namely the fixed effect model (Fixed Effect Model/FEM), the random effect model (Random Effect Model/REM), and ordinary least squares panel data regression (Pooled OLS).

The selection of the appropriate model in panel data regression is usually carried out through specific tests, such as the Chow test to compare Pooled OLS with the Fixed Effect Model, the Hausman test to choose between the Fixed Effect Model and the Random Effect Model, and the Breusch-Pagan test to determine whether the random effects model is more suitable than Pooled OLS. If the Chow test indicates that the fixed effects model is better than Pooled OLS, then FEM is recommended. Furthermore, if the Hausman test indicates that the fixed effects model is more appropriate than the random effects model, then FEM is prioritized. The use of REM also requires its assumptions to be satisfied; an invalid Hausman test alone does not justify selecting REM. Thus, panel data regression allows for more accurate and comprehensive analysis of the relationships between variables in economic, social, and various other fields of research.

In this study, the independent variables are capital expenditure, farmer exchange rates, and economic growth, while the dependent variable is the human development index. To determine the research results on the research objectives regarding the human development index in the districts/cities of Jambi Province, the following panel data regression equation is used:

$$HDI_{it} = \beta_0 + \beta_1 GCE_{it} + \beta_2 TERF_{it} + \beta_3 EG_{it} + \varepsilon_{it}$$

Where:

β_0 = intercept,

β_1 , β_2 and β_3 = estimated coefficients describing the relationships between the independent variables and the dependent variable,

ε_{it} = Error term for district/city i in period t ,

GCE_{it} = Government Capital Expenditure in district/city i during period t ,

$TERF_{it}$ = The exchange rate of farmers in district/city i during period t ,

EG_{it} = Economic growth in district/city i during period t ,

HDI_{it} = Human Development Index in district/city i during period t ,

Analysis of the coefficient of determination (R^2)

The coefficient of determination (R^2) measures the proportion of variation in the dependent variable explained by the fitted regression model (Ghozali, 2018). A value closer to 1 indicates a closer fit to the observed data. R^2 cannot decrease when additional explanatory variables are included in the same least-squares model, even when those variables are not statistically significant. Adjusted R^2 accounts for the number of model parameters. A high R^2 does not, by itself, establish causality or confirm that the model is correctly specified.

Statistical Test F

The F-test examines the influence of independent variables collectively on the dependent variable. In the context of panel data, the F-statistic is used to analyze regression models involving data from several individuals or entities observed over a certain period of time. Panel data combines two dimensions: the time dimension and the individual dimension.

Statistical Test t

The t-test assesses the statistical significance of each independent variable, conditional on the other terms in the model (Ghozali, 2018). This study adopts a 10 percent significance level ($\alpha = 0.10$), corresponding to a 90 percent confidence level. Results significant at this threshold should be interpreted cautiously because a 10 percent threshold permits a higher Type I error rate than a 5 percent threshold.

4. FINDINGS AND DISCUSSION

This section will explain how capital expenditure, the farmer's exchange rate, and economic growth affect the Human Development Index in the districts/cities of Jambi Province for the years 2020-2024, utilising panel data regression analysis. This involves time series data for the years 2020-2024 and cross-sectional data from 11 districts/cities in Jambi Province. The estimation results of the panel data equation regarding the influence of capital expenditure, the farmer's exchange rate, and economic growth on the Human Development Index in the districts/cities of Jambi Province for the years 2020-2024 are as follows:

Table 1
Results of Fixed Effects Model Estimation (FEM)

VARIABLE	COEFFICIENT	STD. ERROR	T-STATISTIC	PROB.
C	70.84724	0.811396	87.31525	0.0000
GCE?	-6.75E-06	1.45E-05	-0.466059	0.6436
TERF?	0.011632	0.006689	1.738979	0.0895
EG?	0.078291	0.040208	1.947168	0.0584
Fixed Effects (Cross)				
_KERINCI--C	0.320670			
_MERANGIN--C	-1.687952			
_SAROLANGUN--C	-0.416249			
_BATANGHARI--C	-0.908491			
_MUARIJAMBI--C	-1.422760			
_TANJABTIM--C	-4.051191			
_TANJABBAR--C	-2.096914			
_TEBO--C	-1.550377			
_BUNGO--C	0.106938			
_KOTAJAMBI--C	7.644489			
_SUNGAIPENUH--C	4.061836			
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.976018	Mean dependent var		72.66345
Adjusted R-squared	0.968414	S.D. dependent var		3.186628
S.E. of regression	0.566345	Akaike info criterion		1.916102
Sum squared resid	13.15060	Schwarz criterion		2.427060
Log likelihood	-38.69281	Hannan-Quinn criter.		2.113694
F-statistic	128.3539	Durbin-Watson stat		2.375608
Prob(F-statistic)	0.000000			

Source: Processed Data, Eviews 9 (2025)

Based on the results of the capital expenditure estimation in Table 1, the explanation of each variable in the study can be determined, namely the influence of capital expenditure, farmers' exchange rate, and economic growth on the human development index in regencies/cities in Jambi Province from 2020 to 2024 can be explained by the following model equation:

$$HDI_{it} = 70.84724 - 0.00000675GCE_{it} + 0.011632TERF_{it} + 0.078291EG_{it} + \text{district/city fixed effect} + \varepsilon_{it}$$

The estimated common intercept is 70.84724. In the fixed effects model, each district/city also has a specific intercept adjustment, as reported in Table 1. The common intercept therefore should not be interpreted as the predicted HDI for every district/city when the explanatory variables remain unchanged.

The estimated capital expenditure coefficient is -0.00000675 and is not statistically significant at the 10 percent level ($p = 0.6436$). The data therefore do not provide sufficient evidence of an association with HDI in this model. The timing and allocation of expenditure may warrant further investigation, but these explanations cannot be established from the reported regression.

The estimated farmer exchange rate coefficient is 0.011632 ($p = 0.0895$). Holding the other included variables and district/city fixed effects constant, a one-unit higher farmer exchange rate is associated with an estimated 0.011632 -point higher HDI. The association is significant at the 10 percent level; the panel regression alone does not establish that changes in farmers' purchasing power caused changes in HDI.

The estimated economic growth coefficient is 0.078291 ($p = 0.0584$). Holding the other included variables and district/city fixed effects constant, a one-unit higher economic growth measure is associated with an estimated 0.078291-point higher HDI. This association is significant at the 10 percent level. The result is consistent with a possible link between regional economic activity and human development, but does not establish a causal effect.

Coefficient of Determination

The fixed effects model has an R-squared value of 0.976018. The fitted model, including the district/city fixed effects, explains approximately 97.60 percent of the observed variation in HDI; approximately 2.4 percent remains unexplained. This measure describes model fit and does not establish the causal contribution of the three explanatory variables.

Hypothesis Testing

Hypothesis testing is a statistical method used to test assumptions or claims about a population based on sample data. The goal is to determine whether there is enough evidence in the data to support a particular hypothesis, with the results explained as follows:

Statistic Test F

The reported Prob(F-statistic) of 0.00000 is below 0.1, indicating that the fitted fixed effects model is jointly statistically significant. This overall model test should not be treated as a separate joint test of only capital expenditure, farmer exchange rate, and economic growth unless that restriction is explicitly tested.

Statistic Test t

To test the significance of the influence of Capital Expenditure, Farmer Exchange Rate, and Economic Growth on the Human Development Index of districts/cities in Jambi Province partially, a t-statistic test was used. The t-statistic test is useful for assessing the magnitude of the influence of each independent variable on the dependent variable partially. The results at the 10 percent significance level (90 percent confidence level) are presented in the following table:

Table 2
P-values for Individual Coefficients in the Fixed Effects Model

VARIABLE	PROB.	DESCRIPTION
Capital expenditure (GCE)	0.6436	Not Significant
Farmer exchange rate (TERF)	0.0895	Significant
Economic growth (EG)	0.0584	Significant

Source: Processed Data, Eviews 9 (2025)

According to Table 2, capital expenditure is not statistically significant at the 10 percent level ($p = 0.6436 > 0.10$), so its null hypothesis is not rejected. The farmer exchange rate ($p = 0.0895 < 0.10$) and economic growth ($p = 0.0584 < 0.10$) have positive coefficients that are statistically significant at this threshold. These associations are less conclusive than results significant at the 5 percent level.

4.1 The influence of capital expenditure on the Human Development Index

The estimated capital expenditure coefficient is not statistically significant at the 10 percent level for the districts/cities of Jambi Province. This result does not establish either a positive effect or the absence of an effect beyond the study period.

In theory, capital expenditure significantly influences the Human Development Index (HDI) because it is typically allocated to projects that improve the quality of life, such as infrastructure, education, and health (Setiawan & Budiana,

2015). The HDI is an indicator of community welfare, comprising three main dimensions: life expectancy, education, and standard of living. An increase in capital expenditure in these sectors can enhance all three dimensions, thereby increasing the HDI value of a country or region. For example, investment in the health sector through the construction of hospitals, community health centers, or public health programs can increase life expectancy, one of the main components in the calculation of the HDI.

The nonsignificant estimate could reflect differences in how capital expenditure is allocated or the time needed for investments to affect human development. These possible explanations were not tested in the reported model.

The lack of influence of capital expenditure in the districts/cities of Jambi Province on the Human Development Index (HDI) may reflect several interrelated factors. First, the allocation of capital expenditure in many areas may not have been focused on strategic sectors that directly affect the improvement of HDI, such as education, health, and the improvement of community living standards. Most of the capital expenditure budget is actually used for the development of physical infrastructure such as roads, drainage, and government offices that do not directly improve the quality of human resources. Second, the implementation of projects funded by capital expenditure is often less effective and efficient, from planning, implementation, to supervision, so the benefits of such development are not felt maximally by the community. Third, there is a gap in the equitable distribution of development between regions, especially between urban and rural areas, so the impact of capital expenditure on improving the Human Development Index (HDI) tends to be unbalanced. In addition, weak coordination between agencies and minimal community participation in the development planning process also hinder the achievement of human development goals. On the other hand, the realization time for the impacts of capital expenditure usually takes a relatively long time, so it is not seen in the short term when measuring the HDI.

4.2 The influence of farmers' exchange rates on the Human Development Index

The farmer exchange rate has a positive association with HDI that is statistically significant at the 10 percent level. Retnasari and Cahyono (2015) also examined the relationship between the farmer exchange rate and HDI. A higher farmer exchange rate may indicate improved purchasing power, but the present model does not test the pathways through education, health, or household spending.

The impact of farmers' exchange rate on the Human Development Index (HDI) stems from the close relationship between farmers' welfare and improvements in community quality of life, especially in areas dependent on the agricultural sector, such as districts/cities in Jambi Province. The Farmer's Exchange Rate reflects farmers' purchasing power and welfare; the higher the farmer's exchange rate, the greater their ability to meet basic needs such as food, education, and health. When the exchange rate increases, farmers' incomes also rise, allowing them to access educational services for their children and family health facilities more easily.

The increase in the farmer's exchange rate also increases the purchasing power of the rural community as a whole, ultimately driving local economic circulation and strengthening the community's socio-economic resilience. On the other hand, with improved farmers' welfare, the likelihood of urbanisation or migration to the city can be reduced because the community feels sufficiently prosperous in the village. This also has a positive impact on social stability and equitable development among regions.

In addition, more prosperous farmers tend to have more time and resources to participate in social and community education activities, thus contributing to improvements in education and health indices, which are key components of the Human Development Index (HDI). Therefore, an increase in the Farmers' Exchange Rate significantly improves HDI, especially in areas where the economy relies heavily on the agricultural sector.

4.3 The influence of economic growth on the Human Development Index

Based on the research findings, economic growth is positively associated with the human development index of districts/cities in Jambi Province, a statistically significant association at the 10 per cent level. This result is consistent with Retnasari and Cahyono (2015), who reported a positive and significant relationship between economic growth and the human development index.

The influence of economic growth on the Human Development Index (HDI) stems from the growing economic capacity to provide more resources and opportunities that enhance the community's quality of life. Positive economic growth reflects an increase in overall output and income for the community. With the increase in regional revenue, the government has a wider fiscal space to allocate the budget to strategic sectors such as education, health, and social protection which directly affect the Human Development Index (HDI). In addition, economic growth creates more job opportunities and reduces the unemployment rate, thereby increasing public purchasing power. Communities with adequate income are more likely to access quality education and health services, two main components of the HDI.

On the other hand, equitable economic growth also allows for the distribution of development across regions, thereby reducing social disparities and enhancing inclusive welfare. A growing economy encourages increased investment in social infrastructure, including hospitals, schools, and public transportation, which supports the community's mobility and productivity. Thus, sustainable and inclusive economic growth becomes one of the main drivers in improving the Human Development Index (HDI) by enhancing the socio-economic conditions of the community and strengthening human development capacity in the region.

5. CONCLUSION

The individual coefficient tests indicate that the variables of farmers' exchange rate and economic growth have statistically significant associations at the 10 per cent level with the human development index, while capital expenditure does not have a statistically significant association at the 10 per cent level with the human development index of regencies/cities in Jambi Province during the years 2020-2024. The recommendation given is that although capital expenditure does not significantly affect the HDI during the research period, local governments still need to evaluate the effectiveness and efficiency of its use. Capital expenditure should focus on sectors that directly improve quality of life, such as education, health, and basic infrastructure. Given that farmers' exchange rates are significantly associated with the Human Development Index (HDI), there is a need for concerted efforts to strengthen farmers' position. This includes stabilising agricultural product prices, improving access to technology and capital, and strengthening supply chains and the marketing of agricultural products. The district/city government needs to create a conducive investment climate, develop local potential, and expand high-quality job opportunities to encourage sustainable economic growth and make a real impact on community welfare.

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7.0 CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in the paper.

8.0 AUTHOR CONTRIBUTION STATEMENT

Author 1 contributed to the conceptualization, research design, and writing of the original draft.

Author 2 was responsible for data collection, analysis, and validation of the results.

Author 3 provided supervision, critical review, and editing of the final manuscript.
All authors have read and approved the final version of the manuscript.

9.0 ETHICS STATEMENT

This study analyses district/city-level economic and human development indicators for Jambi Province during 2020–2024. Ethical reporting requires accurate attribution of data sources and transparent presentation of the analysis and findings.

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