

**FISCAL INDEPENDENCE AND EFFECTIVENESS OF
REGIONAL REVENUE ON HUMAN DEVELOPMENT
INDEX: A PATH ANALYSIS**

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LEMBAR PERSETUJUAN
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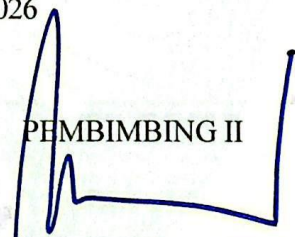
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Palangka Raya, Juli 2026

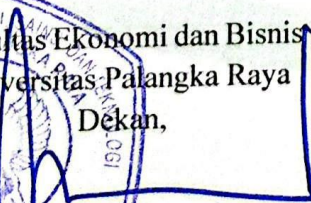
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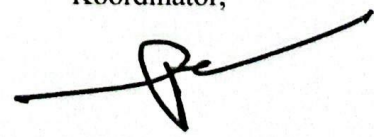
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Tanggal : Juli 2026

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UCAPAN TERIMA KASIH

Puji Syukur kepada ALLAH SWT Yang Maha Esa atas Rahmat dan Hikmatnya sehingga dapat diselesaikannya Jurnal Ilmiah yang berjudul ***“Fiscal Independence and Effectiveness of Regional Revenue on Human Development Index: A Path Analysis”***. Jurnal Ilmiah ini diajukan sebagai dari tugas akhir dalam rangka menyelesaikan studi dan meraih gelar Magister pada Program Magister Ilmu Ekonomi Universitas Palangka Raya.

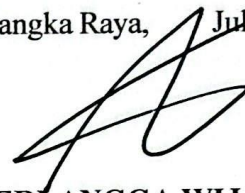
Pada kesempatan ini penulis mengucapkan terima kasih kepada :

1. Rektor Universitas Palangka Raya Prof. Dr. Salampak Dohong, MS atas kesempatan yang diberikan kepada penulis untuk mengikuti dan menyelesaikan Pendidikan Program Magister di Universitas Palangka Raya.
2. Dekan Fakultas Ekonomi dan Bisnis Universitas Palangka Raya sekaligus Dosen Pembimbing II Penulis Dr. Sunaryo Neneng, SE., MP. yang telah membantu penulis dalam memberikan pendalaman materi, pemahaman sistematika dan metode penelitian.
3. Dr. Benius, MM., Ph.D selaku Ketua Program Studi Magister Ilmu Ekonomi Fakultas Ekonomi dan Bisnis Universitas Palangka Raya;
4. Dr. Harin Tiawon, SE.,MP. selaku Dosen Pembimbing I yang telah banyak membantu penulis dalam memberikan ide , saran dan kritiknya;
5. Dr. Miar, M.Si selaku Dosen Penilai yang telah memberikan saran dan masukan di penulisan Artikel Tugas Akhir penulis;
6. Bapak dan Ibu Dosen pada Magister Ilmu Ekonomi Fakultas Ekonomi dan Bisnis Universitas Palangka Raya;
7. Orang Tua Saya Ayah Alm. H. Sofyan Edy, SH., Ibu Saya Hj. Heriani, Serta Kakak saya Eka Veronika, ST., Orang yang pantang menyerah dalam memberikan doa dan dukungan di setiap Langkah perjalanan penulis dalam proses penyusunan Artikel Ilmiah ini;
8. Efi Susanti, S.Pd., M.Pd. Staf di Program Magister Ilmu Ekonomi yang telah banyak membantu penulis di Magister Ilmu Ekonomi Universitas Palangka Raya.

9. Semua pihak yang tidak dapat disebutkan satu persatu yang ikut serta dan membantu dalam penyelesaian penulisan Artikel Ilmiah Ini, terima kasih atas segalanya;

Akhirnya penulis menyadari masih banyak kekurangan dan kelemahan. Untuk itu saran dan kritik yang konstruktif akan sangat membantu agar Jurnal Ilmiah ini dapat menjadi lebih baik.

Palangka Raya, Juli 2026



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DAFTAR ISI

SAMPUL LUAR	
SAMPUL DALAM	i
LEMBAR PERSETUJUAN	ii
LEMBAR PENGESAHAN.....	iii
LEMBAR PERNYATAAN ORISINALITAS.....	iv
UCAPAN TERIMA KASIH	v
DAFTAR ISI	vii
DAFTAR TABEL	viii
DAFTAR GAMBAR.....	ix
ABSTRACT	1
BAB I Introduction.....	2
BAB II Literature Review & Hypothesis Development.....	5
BAB III Research Method	10
BAB IV Result & Discussion.....	12
BAB V Conclusion.....	21
DAFTAR PUSTAKA	
LAMPIRAN	

DAFTAR TABEL

TABEL 1.....	13
TABEL 2.....	14
TABEL 3.....	14
TABEL 4.....	15

DAFTAR GAMBAR

Gambar/Figure 1.....	9
Gambar/Figure 2.....	17

FISCAL INDEPENDENCE AND EFFECTIVENESS OF REGIONAL REVENUE ON HUMAN DEVELOPMENT INDEX: A PATH ANALYSIS

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<https://doi.org/10.37641/jiakes.v13i6.4491>

Abstract

Human development is strongly influenced by regional fiscal capacity, particularly the management of local own-source revenue and fiscal independence. This study examines the direct and indirect effects of local own-source revenue and fiscal independence on the human development index. This study employs a quantitative method, using secondary data on local own-source revenue, fiscal ratios, and human development index indicators, and applies path analysis to estimate the relationships among the variables. Results show that local own-source revenue significantly and positively affects fiscal independence ($\beta = 0.68$), which in turn has a strong positive effect on the human development index ($\beta = 0.52$). Local own-source revenue also exerts a direct effect on the human development index ($\beta = 0.32$), yielding a total effect of 0.674 through fiscal independence. These findings underscore the strategic role of locally generated revenue and fiscal autonomy in promoting human development. Strengthening the management of local own-source revenue and enhancing fiscal governance can reduce reliance on intergovernmental transfers and accelerate inclusive development.

Keywords: Fiscal Independence, Human Development Index, Inclusive Development, Local Own Source Revenue, Path Analysis.

I. INTRODUCTION

Human development has long been the main benchmark in assessing the success of regional development, not only from an economic perspective but also in efforts to create a healthy, educated, and prosperous society (Bahl et al., 1992; Wicesa et al., 2024; Baskara & Dahlan, 2024). In contemporary public policy discourse, the quality of human life is increasingly viewed as the ultimate development goal and a key determinant of long-term productivity, social stability, and regional competitiveness. The Human Development Index (HDI), as a composite indicator measuring achievements in longevity and healthy living, knowledge, and decent living standards, is receiving broader attention at the provincial and district/city levels in Indonesia. Its role is central because it not only reflects socio-economic outcomes but also illustrates the effectiveness of government institutions in delivering essential public services.

Central Kalimantan Province, as a region striving to accelerate development, continues to face major challenges related to dependence on central government funding and the effectiveness of local financial management. With its extensive geographical conditions, uneven population distribution, and diverse economic structure, the province must confront disparities in infrastructure access, administrative capacity, and fiscal strength. Strengthening the financial autonomy of each district/city has therefore become increasingly crucial, especially as development priorities expand to include education quality improvement, health service enhancement, and economic diversification (Tan, 2020; Khoirunisa & Sulaeman, 2022; Pabayo, 2025). Regional autonomy, since the implementation of Law Number 23 of 2014 and fiscal decentralization, has provided a wider space for the regions, but the realization of fiscal independence in Central Kalimantan is still relatively low (Musgrave & Musgrave, 1989; Bird & Vaillancourt, 1998; Mardiasmo, 2009; Mardiasmo, 2018). Although the regulatory framework

encourages local governments to develop their fiscal capacity, many still rely heavily on transfers from the central government due to limited efforts to explore new financial sources and optimize existing potential. The role of Local Own-Source Revenue (Pendapatan Asli Daerah/PAD) as a reflection of the region's ability to explore local potential has not been optimal in supporting the Regional Revenue and Expenditure Budget (Anggaran Pendapatan dan Belanja Daerah/APBD), so that most districts/cities in

Central Kalimantan are still dependent on central transfer funds. This limited capacity suggests that local governments need more strategic policies, innovations in revenue collection, and improved administrative efficiency to build a stronger fiscal foundation. In fact, the literature shows that fiscal independence and the effectiveness of managing local revenue have the potential to strengthen the fiscal base and accelerate the improvement of the quality of human development. Efficient financial management not only creates flexibility in budget allocation but also enables the government to prioritize spending on strategic sectors that directly affect people's welfare, such as education access, health infrastructure, and community empowerment programs (Musiega et al., 2024; Nakpodia et al., 2024; Miranda et al., 2024; Mustofa & Satria, 2024; Al Mamun et al., 2025). Regions with stronger financial autonomy are typically more capable of designing long-term development strategies, reducing reliance on unpredictable external funding, and ensuring continuity of public service provision.

On the other hand, Central Kalimantan's achievements in improving welfare continue to increase, even though disparities between regions remain, and performance has not reached the very high category. These regional inequalities often stem from differences in natural resource endowment, economic structure, administrative capacity, and demographic distribution. Such disparities highlight the urgency of understanding how fiscal instruments influence development outcomes across districts/cities. These conditions demonstrate that fiscal independence and financial management effectiveness

play a critical role in shaping the quality of human development (Marbun, 2010; Harliyani & Haryadi, 2016). Strengthened regional fiscal governance marked by greater autonomy and more effective management of locally generated revenue serves as a key driver in advancing equitable and sustainable human development in Bumi Tambun Bungai.

This study aims to examine the influence of fiscal independence and the effectiveness of local revenue management on the development performance of districts/cities in Central Kalimantan Province. By applying the path analysis approach, the study seeks to uncover both direct and indirect effects, including potential mediating roles of expenditure patterns such as spending on education, health, infrastructure, and public welfare programs. This article not only presents the latest theoretical frameworks and empirical reviews but also integrates updated fiscal and development data and offers evidence-based fiscal policy recommendations. Through this comprehensive approach, the research is expected to make a significant contribution in encouraging effective regional fiscal governance to ensure equitable distribution and acceleration of inclusive human development in Central Kalimantan.

II. LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

The Effect of Local Own-Source Revenue on Fiscal Independence

Local own-source revenue represents all lawful income received by local governments, including regional taxes, levies, returns on separated regional wealth management, and other legitimate revenues. Its effectiveness, measured by the ratio of revenue realization to annual targets, reflects the government's ability to optimize local economic potential. A realization rate above 90% is considered effective, while below 60% is deemed ineffective (Kartika & Kusuma, 2020). Studies such as Rahula et al. (2021) and Wardana and Firmansyah et al. (2025) show that effective and optimized local own-source revenue, supported by policy innovation, good governance, and community participation, enhances fiscal accountability and strengthens financial autonomy. However, many regions in central Indonesia still record low effectiveness due to a limited tax base, low taxpayer literacy, and the dominance of the informal sector. Optimal local own-source revenue not only reinforces fiscal structure but also broadens fiscal space for financing human development programs, thereby improving competitiveness and welfare distribution.

Fiscal independence refers to a region's capacity to fund its development without heavy reliance on central government transfers (Boex & Martinez, 2007; Halim, 2016; Rahayu & Junaidi, 2022). It is often measured through the ratio of local own-source revenue to total regional revenue or transfer funds, where a higher ratio indicates stronger fiscal capacity and greater autonomy in determining development priorities. High fiscal independence also reflects efficient, innovative financial governance that leverages local potential. According to Law Number 23 of 2014, fiscal independence is categorized into instructive (low), consultative/participatory (medium), and delegative (high). Regions with higher fiscal independence tend to be more responsive, accountable, and adaptive to

local economic conditions. However, many regions, especially in central and eastern Indonesia, remain in the “towards independence” or “not yet independent” categories due to a weak economic base, limited fiscal innovation, and insufficient human resource capacity in financial management (Oates, 1999).

H1: Local own-source revenue has a significant effect on fiscal Independence.

The Influence of Local Own-Source Revenue on Human Development Index The Human Development Index (HDI) is a composite indicator used to measure human development achievements across three fundamental dimensions: longevity and healthy living, reflected by life expectancy at birth; knowledge, measured through expected years of schooling and mean years of schooling; and decent living standards, proxied by adjusted per capita expenditure (Suranta et al., 2019; Arfandi et al., 2025). HDI functions as a strategic instrument for planning, monitoring, and evaluating regional development performance, as well as serving as one of the key considerations in the allocation of the General Allocation Fund (Dana Alokasi Umum/DAU). Regions with higher HDI values generally exhibit better access to education, stronger health infrastructure, and higher household purchasing power, although substantial interregional disparities persist due to unequal access to basic public services.

Local governments are granted broader authority to manage development financing. However, fiscal independence in regions such as Central Kalimantan remains relatively low, with local governments still heavily dependent on central government transfers due to suboptimal Local Own-Source Revenue (Pendapatan Asli Daerah/PAD) performance (Mardiasmo, 2018). Empirical studies suggest that stronger fiscal autonomy and effective PAD management enhance budgetary flexibility and enable greater investment in education, health, and community empowerment, which are crucial determinants of HDI improvement (Al Mamun et al., 2025). Because locally generated revenue provides greater discretion in budget allocation compared to central transfers,

higher PAD enables local governments to invest more consistently in education, health services, and income-generating programs, which are the core components of the human development index.

H2: Regional own-source revenue has a significant effect on human development index.

Fiscal Independence on Human Development Index

Empirical evidence in Indonesia indicates a generally positive, though sometimes nonlinear, relationship between fiscal independence, the effectiveness of local own-source revenue, and the human development index (Rosid et al., 2020; Rahayu & Jaeni, 2025). Marbun and Sukanto (2023) further show that fiscal independence and local government expenditure significantly improve the human development index, with regional ownsource revenue, along with its effectiveness, acting as a key fiscal lever for financing human development. However, Maulana (2022) finds that fiscal variables explain only a limited share of human development index variation in certain regions, suggesting that many non-fiscal factors also play major roles. Panel data analyses indicate that economic growth, Gross Domestic Product (GDP) per capita, and population size tend to strengthen fiscal independence, which subsequently supports improvements in the human development index. In contrast, real sector investment often shows no significant effect, suggesting that the effectiveness and quality of fiscal allocation play a more crucial role than merely increasing investment volume.

Fiscal independence reflects the extent to which local governments can generate and manage their own financial resources without excessive reliance on central transfers. Greater fiscal independence enhances budgetary discretion and allocation efficiency, enabling local governments to consistently invest in education, health services, and income-supporting programs that constitute the core dimensions of the Human Development Index (Mardiasmo, 2018). Many local governments still depend heavily on central transfers due to limited optimization of PAD, constraining budget flexibility and

long-term development planning.

H3: Fiscal independence has a significant effect on human development index. Mediation of Fiscal Independence

The mediating role of fiscal independence is increasingly recognized in recent decentralization and development research. Local own-source revenue may not directly influence human development outcomes unless local governments possess sufficient autonomy to allocate resources effectively. Fiscal independence strengthens this linkage by enabling regions to convert locally generated revenue into strategic expenditures that enhance education, health services, and community welfare. Recent decentralization literature highlights that greater fiscal autonomy improves local government responsiveness and allocative efficiency, ultimately fostering better development outcomes (Rondinelli et al., 1983; Aritenang & Chandramidi, 2023; Syarif et al., 2023). When fiscal independence increases, local governments gain more flexibility to prioritize spending based on community needs, ensuring that the benefits of revenue generation translate into tangible improvements in human development.

Likewise, Sofilda et al. (2023) find that fiscal capacity acts as an intermediary channel through which regional revenues influence human capital indicators, specifically education and health achievements. More recent panel studies also indicate that regions with stronger fiscal independence achieve better development outcomes because autonomous fiscal systems tend to be more innovative and responsive in allocating resources (Mardiasmo, 2018; Suranta et al., 2019). These findings imply that fiscal independence does not merely function as a financial condition but as a governance mechanism that amplifies the developmental impact of local own-source revenue. Therefore, fiscal independence is expected to mediate the effect of local own-source revenue on the human development index, strengthening the indirect pathway through improved fiscal capacity and more effective public service delivery.

H4: Fiscal independence mediates the effect between local own-source revenue and the human development index.

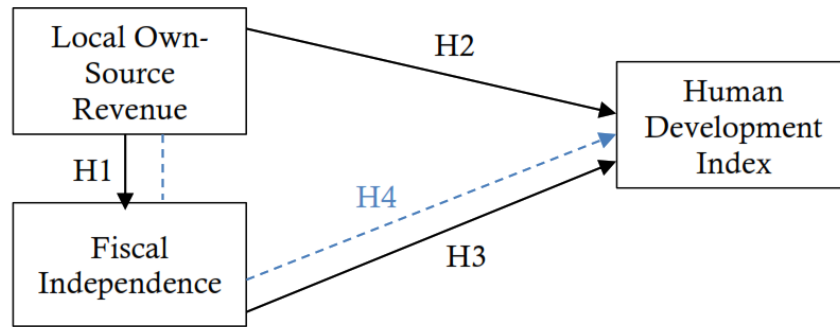


Figure 1. Conceptual Framework

Figure 1 illustrates the hypothesized relationships among the study variables. Local own-source revenue is posited to directly influence both fiscal independence (H1) and the human development index (H2). Fiscal independence, in turn, is hypothesized to have a direct effect on the human development index (H3). Additionally, fiscal independence is expected to serve as a mediating variable, transmitting the effect of local own-source revenue on the human development index (H4). This conceptual model highlights both the direct and indirect pathways through which regional financial capacity may impact human development outcomes, emphasizing the critical role of fiscal autonomy in optimizing the use of locally generated resources for societal well-being.

III. RESEARCH METHODS

This study uses a quantitative-descriptive and inferential approach, with a crosssectional design (cross-time) and panel data processing that records differences between districts/cities in Central Kalimantan Province in 2023–2024 (Sugiyono,2019). The main analysis model uses path analysis to measure the direct and indirect influence between fiscal independence and local own-source revenue effectiveness on the human development index, with control variables in the form of GDP per capita and population, in accordance with supporting literature.

The research focuses on 14 districts and cities in Central Kalimantan Province, based on the administrative structure during 2018–2024. Both time series and cross-sectional data were collected from multiple sources to ensure comprehensive coverage. First, data from the Central Kalimantan Central Statistics Agency were used, including regional financial statistics and Human Development Index data, which encompass components such as life expectancy, Healthy Life Expectancy (HLS), Relative Living Standards (RLS), and per capita expenditure. Second, information from the Directorate General of Financial Balance of the Ministry of Finance was obtained, covering reports on the realization and targets of local own-source revenue, the amount of transfer funds, and documents related to the consolidated regional budgets. Third, the study also utilized Regional Budget Realization Reports published by provincial and district/city governments. Finally, official publications and news statistics were consulted to update data on APBD realization, PAD ratios, and fiscal effectiveness measures, with the latest available data up to May 2025.

In this study, the operational definitions of the research variables are as follows. First, the Human Development Index (HDI) is a composite index published by Central Statistics Agency (Badan Pusat Statistik/BPS), based on three main dimensions: health,

education, and decent living standards. The most recent data for 2023–2024 are used. Second, fiscal independence is measured by the ratio of local own-source revenue to total revenue and transfer income, classified according to the provisions of the Ministry of Finance and the Financial and Development Supervisory Agency (Badan Pemeriksaan Keuangan/BPK) through the Directorate of Fiscal Balance. Third, local own-source revenue effectiveness is assessed using the ratio of local own-source revenue realization to its target, with a region considered effective if the ratio exceeds 90% and very effective if it exceeds 100%.

Based on theoretical and empirical studies, the path analysis model assumes that Fiscal Independence and local own-source revenue effectiveness directly and indirectly affect the human development index. The model is mathematically expressed as:

$$\begin{aligned}\text{Fiscal Independence} &= \gamma_0 + \gamma_1 \cdot \text{PAD Effectiveness} + v \\ \text{HDI} &= \beta_0 + \beta_1 \cdot \text{Fiscal Independence} + \beta_2 \cdot \text{PAD Effectiveness} + \varepsilon\end{aligned}$$

The path analysis model was used to identify direct and indirect influences between variables by the multiple regression statistical method using SPSS Version 25 (Winarno,2017).

IV. RESULT AND DISCUSSION

IV.I RESULTS

This study aims to examine the causal relationship between PAD, Fiscal Independence, and HDI at the district/city level of Central Kalimantan during 2018-2024. Local own-source revenue in all districts and cities of Central Kalimantan showed a consistent increasing trend during 2018–2024. The highest local own-source revenue was generally observed in Palangka Raya City, the administrative and economic center of the province, while regencies such as West Kotawaringin, Kapuas, and South Barito also recorded relatively high local own-source revenue, reflecting their capacity to generate local revenues. In contrast, districts with more challenging geographical conditions and limited economic bases had lower local own-source revenue. The variation of local ownsource revenue between regions was significant, ranging from tens to hundreds of billions of rupiah, with Palangka Raya exceeding IDR 160 billion in the final years of observation. Newly established autonomous regions initially had lower local own-source revenue but showed upward trends as their local economies developed.

Fiscal independence, measured as the ratio of local own-source revenue to total regional revenue, gradually increased across Central Kalimantan during the same period, indicating progress in regions' ability to manage their own revenues. Palangka Raya City maintained the highest fiscal independence, reaching over 7%, whereas smaller and remote districts remained below 4%, reflecting higher reliance on central transfers. Annual fluctuations were influenced by national fiscal policies and regional economic conditions.

Human Development Index (HDI), combining health, education, and living standards, also showed improvement across all districts and cities. Palangka Raya led with an HDI above 74 in 2024, while districts with lower HDI remained below 70 but generally demonstrated steady improvement. The increase in HDI was largely supported by the availability of health facilities, access to education, and effective socio-economic management. Regions with higher local own-source revenue and fiscal independence tended to achieve better HDI, as greater financial capacity enabled more optimal public service provision.

Table 1. Comparison Between Regions

Regency/City	Average PAD (IDR Billion)	Average Fiscal Independence (%)	Average HDI
Palangka Raya	150 - 170	6.5 - 7.3	73 - 74.3
West Kotawaringin	90 - 105	5.0 - 5.7	71 - 72.5
Kapuas	80 - 95	4.8 - 5.5	70.5 - 72
South Barito	85 - 110	4.0 - 5.1	70 - 72
Other (average)	40 - 65	3.2 - 4.5	69 - 71.5

Table 1 presents the descriptive analysis, which shows that there has been a significant increase in local own-source revenue, fiscal independence, and Human Development Index (HDI) across all districts and cities in Central Kalimantan during 2018–2024. Palangka Raya City consistently ranks highest in all indicators, reflecting its status as a more developed administrative and economic center. Regions with higher local ownsource revenue and fiscal independence generally achieve higher HDI, suggesting a positive relationship between regional fiscal capacity and the quality of human development. At the same time, variations among districts indicate substantial disparities, highlighting opportunities for fiscal policy improvements and more equitable social development.

Table 2. Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Local Own-Source Revenue (IDR Billion)	75.454	32.121	37.8	180.0
Fiscal Independence (%)	4.38	1.03	3.2	7.3
Human Development Index	71.56	1.98	69.2	74.7

Based on Table 2, the descriptive statistical analysis shows that local own-source revenue across Central Kalimantan districts and cities averaged around IDR 75.454 billion, with a standard deviation of IDR 32.121 billion, indicating considerable variation between regions. The local own-source revenue values ranged from a minimum of IDR 37.8 billion to a maximum of IDR 180 billion. The highest revenues were recorded in Palangka Raya City and several economically significant districts, while smaller districts exhibited lower income levels, reflecting disparities in economic and fiscal capacity.

Fiscal independence averaged 4.38% with a standard deviation of 1.03%, fluctuating between 3.2% and 7.3%. Regions with higher fiscal independence generally correspond to areas with substantial local own-source revenue and effective revenue management, whereas lower ratios indicate greater dependence on central government transfers. The Human Development Index (HDI) across the districts averaged 71.56, with a standard deviation of 1.98, ranging from 69.2 to 74.7. HDI generally showed an upward trend over the years, with Palangka Raya City and districts with higher local own-source revenue achieving better scores. This pattern reflects a positive relationship between regional fiscal capacity and the quality of human development.

Table 3. Regression Analysis Model 1

Coefficient	B	Std. Error	Standardized Beta	T-Statistic	P-value
(Constant)	0.847	0.296		2.86	0.007
Local Own-Source Revenue	0.035	0.005	0.68	7.56	<0.001
Model sig.	$R^2 = 0.46$				

Ased on Table 3, the regression analysis of local own-source revenue on fiscal independence indicates a strong and positive relationship. The regression coefficient of 0.68 suggests that for every 1 unit increase in local own-source revenue (e.g., in billions of IDR), fiscal independence increases by 0.68 units, assuming other variables remain constant. This relationship is highly statistically significant, as evidenced by a t-statistic of 7.56 and a p-value of less than 0.001, indicating that the observed effect is unlikely to occur by chance. The coefficient of determination (R^2) of 0.46 shows that 46% of the variation in fiscal independence can be explained by local own-source revenue, while the remaining 54% is influenced by other factors.

This result highlights the crucial role of local own-source revenue in strengthening regional fiscal independence. Regions with higher local own-source revenue are more financially autonomous, reducing their reliance on central government transfers. From a policy perspective, local governments should focus on increasing local own-source revenue by improving tax collection systems, managing local levies more effectively, and developing the local economic potential to enhance fiscal independence. The validity of the regression model is supported by a significant F-test ($p < 0.05$), confirming that the model is suitable for explaining the relationship between local own-source revenue and fiscal independence. In summary, increasing local own-source revenue is a key strategy for enhancing regional fiscal autonomy and supporting independent and sustainable development in Central Kalimantan.

Table 4. Regression Analysis Model 2

Coefficient	B	Std. Error	Standardized Beta	T-Statistic	P-value
(Constant)	69.715	0.520		134.07	<0.001
Local Own-Source Revenue	0.053	0.013	0.32	4.00	<0.001
Fiscal Independence	0.618	0.083	0.52	7.43	<0.001
Model sig.	$R^2=0.64$				

The second regression analysis tested the effect of fiscal independence and local ownsource revenue effectiveness on the Human Development Index (HDI) in Central Kalimantan. The model is significant, with an R^2 value of 0.64, indicating that together, fiscal independence and local own-source revenue effectiveness explain 64% of the variation in HDI, while the remaining 36% is influenced by other factors.

The regression coefficients show a positive relationship for both variables. Fiscal independence has a coefficient of 0.52, meaning that a 1 percent increase in fiscal independence corresponds to an increase of 0.52 points in HDI, assuming other variables remain constant. Local own-source revenue effectiveness has a coefficient of 0.32, indicating that a 1 percent increase in its effectiveness leads to a 0.32-point increase in HDI. Both variables are highly statistically significant, with t-statistics greater than the ttable And p-values below 0.001, confirming that improvements in fiscal independence and local own-source revenue effectiveness significantly contribute to enhancing human development.

These results highlight the importance of independent and efficient fiscal management in promoting human development at the regional level. Enhancing fiscal independence and improving the efficiency of local own-source revenue management are key strategies to increase the quality of life and community welfare. Simultaneous or partial improvements in either variable are likely to result in significant increases in HDI, suggesting that regional policies should focus on strengthening fiscal autonomy and optimizing PAD management to support sustainable and optimal human development.

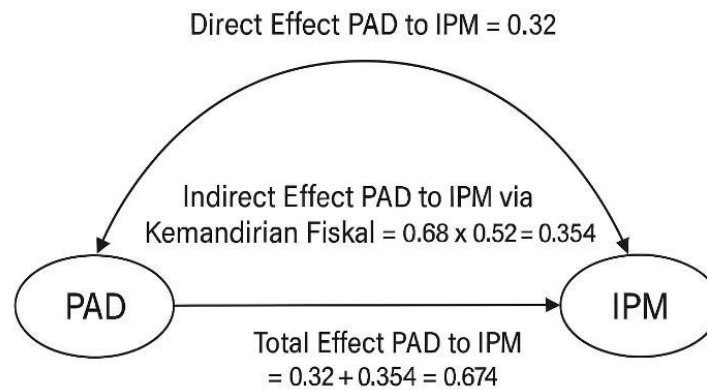


Figure 2. Direct and Indirect Effects

Based on Figure 2, descriptive statistics and linear regression analysis, the study examined both the direct and indirect effects of local own-source revenue on the Human Development Index (HDI) through fiscal independence. The direct effect of local ownsource revenue on HDI is 0.32, while the indirect effect, mediated through fiscal independence, is calculated as $0.68 \times 0.52 = 0.354$. Consequently, the total effect of local own-source revenue on HDI amounts to 0.674, indicating a substantial influence.

These results confirm that local own-source revenue has a significant and strong impact on regional fiscal independence ($\beta = 0.68$), which in turn is positively associated with HDI ($\beta = 0.52$). Local own-source revenue also directly affects HDI ($\beta = 0.32$), and the combined effect highlights the critical role of local own-source revenue in promoting human development. Therefore, development policies in Central Kalimantan should prioritize increasing local own-source revenue and strengthening fiscal independence, as these measures are essential for advancing the quality of human development in the region.

IV.II DISCUSSION

Data and analysis show that local own-source revenue has a positive and significant effect on fiscal independence. The path coefficient of 0.68 indicates that an increase in local own-source revenue encourages greater regional fiscal independence. This aligns with the observation that increasing local own-source revenue strengthens the regional revenue base, reduces dependence on central fund transfers, and enhances regional fiscal capabilities. Previous studies by Saragih and Nurlinda (2023) reinforced this point, highlighting that building fiscal capacity through local own-source revenue is crucial to support fiscal autonomy and enable regions to develop independently. However, some studies also caution that local own-source revenue management must be effective to ensure that fiscal capacity is truly optimal and supports sustainable development.

Regarding the influence of local own-source revenue and fiscal independence on the Human Development Index (HDI), pathway analysis indicates that local own-source revenue has a direct positive effect on HDI with a coefficient of 0.32. This suggests that increasing local own-source revenue provides greater fiscal space for financing human development programs, including education, health, and social services, supporting the literature that emphasizes local own-source revenue as a primary source of funding for human development in autonomous regions (Swandewi, 2014; Darmawan, 2025). Fiscal independence also has a significant effect on HDI, with a path coefficient of 0.52, showing that regions with higher fiscal independence are able to implement services and development programs that substantially improve the HDI. Greater fiscal independence allows flexibility and effectiveness in budget allocation, reducing the risks associated with dependence on central government policies (Marwati, 2024).

The model further demonstrates that fiscal independence mediates the influence of local own-source revenue on HDI. The indirect effect, calculated by multiplying the local own-source revenue to fiscal independence coefficient and the fiscal independence to HDI coefficient ($0.68 \times 0.52 = 0.3536$), exceeds the direct effect of local own-source revenue on HDI (0.32). Consequently, the total effect of local own-source revenue on HDI is 0.674, indicating that most of the influence of local own-source revenue on human development occurs through strengthening fiscal independence. This underscores that improving local own-source revenue management in a way that not only increases revenue but also enhances fiscal independence produces the greatest impact on human development.

In terms of policy implications, local governments should continue to optimize local own-source revenue by expanding the tax base, improving levies, and increasing collection efficiency to strengthen fiscal independence. Strengthening fiscal independence enhances self-sufficiency in development financing, reduces reliance on central government transfers, and provides greater flexibility and responsiveness in human development programs. Finally, investments in local own-source revenue and fiscal independence should be directed toward sectors that directly affect HDI, particularly health, education, and social services, to ensure sustainable and effective human development outcomes. This pattern is consistent with international evidence showing that locally generated revenue enhances human development outcomes when accompanied by stronger fiscal autonomy, although the magnitude of the mediating effect varies across institutional and decentralization contexts (Miranda-Lescano et al., 2024).

This study is limited to data from 2018 to 2024 and focuses on a limited set of key variables. Therefore, further research is recommended to incorporate economic growth as a mediating variable, extend the study period, and include additional independent variables to provide a more comprehensive analysis. The results of the path analysis, supported by relevant literature, indicate several important findings. First, local ownsource revenue significantly enhances fiscal independence. Second, both fiscal independence and local own-source revenue have direct and indirect positive effects on the HDI. Finally, the findings underscore that independent and effective regional fiscal management serves as a fundamental foundation for promoting human development at the regional level.

V. CONCLUSION

This study demonstrates that local own-source revenue has a positive and significant influence on fiscal independence in Central Kalimantan regencies and cities during 2018–2024. Increased local own-source revenue strengthens regional fiscal autonomy by reducing dependence on central government transfers, reflecting that higher local revenue generation enhances financial independence. Fiscal independence, in turn, has a significant positive effect on the HDI providing local governments with flexibility to allocate budgets for programs that improve education, health, and social welfare. The path analysis indicates that the majority of local own-source revenue influence on HDI occurs indirectly through fiscal independence, highlighting that effective financial management is crucial to translate revenue growth into improved human development outcomes. The model explains 65% of the variation in HDI, underscoring the central role of regional fiscal capacity and autonomy in shaping human development.

From a policy perspective, local governments should focus not only on increasing PAD but also on strengthening fiscal governance to ensure that additional revenues are efficiently and strategically allocated to sectors that directly impact human development. Enhancing financial management capacity and budgetary flexibility can further optimize the relationship between local revenue and HDI, promoting sustainable regional development and competitiveness. This study is limited to the 2018–2024 period and considers only local own-source revenue and fiscal independence as key variables. Future research is recommended to expand the analysis by including economic growth and other socio-economic indicators as mediators, extending the study period, and incorporating additional independent variables to obtain a more comprehensive understanding of the factors influencing HDI.

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Fiscal Independence and Effectiveness of Regional Revenue on Human Development Index: A Path Analysis

*Fiscal Independence
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1713

Submitted:
OCTOBER 2025

Accepted:
DECEMBER 2025

ABSTRACT

Human development is strongly influenced by regional fiscal capacity, particularly the management of local own-source revenue and fiscal independence. This study examines the direct and indirect effects of local own-source revenue and fiscal independence on the human development index. This study employs a quantitative method, using secondary data on local own-source revenue, fiscal ratios, and human development index indicators, and applies path analysis to estimate the relationships among the variables. Results show that local own-source revenue significantly and positively affects fiscal independence ($\beta = 0.68$), which in turn has a strong positive effect on the human development index ($\beta = 0.52$). Local own-source revenue also exerts a direct effect on the human development index ($\beta = 0.32$), yielding a total effect of 0.674 through fiscal independence. These findings underscore the strategic role of locally generated revenue and fiscal autonomy in promoting human development. Strengthening the management of local own-source revenue and enhancing fiscal governance can reduce reliance on intergovernmental transfers and accelerate inclusive development.

Keywords: Fiscal Independence, Human Development Index, Inclusive Development, Local Own-Source Revenue, Path Analysis.

ABSTRAK

Pembangunan manusia sangat dipengaruhi oleh kapasitas fiskal daerah, khususnya dalam pengelolaan pendapatan asli daerah dan kemandirian fiskal. Penelitian ini menganalisis pengaruh langsung dan tidak langsung pendapatan asli daerah dan kemandirian fiskal terhadap indeks pembangunan manusia. Penelitian ini menggunakan pendekatan kuantitatif dan data sekunder mengenai pendapatan asli daerah, rasio fiskal, dan indikator indeks pembangunan manusia dikompilasi, kemudian analisis jalur digunakan untuk mengestimasi hubungan antarvariabel. Hasil menunjukkan bahwa pendapatan asli daerah berpengaruh signifikan dan positif terhadap kemandirian fiskal ($\beta = 0.68$), yang selanjutnya memiliki pengaruh positif kuat terhadap indeks pembangunan manusia ($\beta = 0.52$). Pendapatan asli daerah juga memiliki efek langsung terhadap indeks pembangunan manusia ($\beta = 0.32$), sehingga total efek melalui kemandirian fiskal mencapai 0.674. Temuan ini menegaskan peran strategis pendapatan daerah dan kemandirian fiskal dalam mendorong pembangunan manusia. Penguatan pengelolaan pendapatan asli daerah dan

JIAKES

Jurnal Ilmiah Akuntansi
Kesatuan
Vol. 13 No. 6, 2025
pp. 1713-1724
IBI Kesatuan
ISSN 2337 – 7852
E-ISSN 2721 – 3048

DOI: 10.37641/jiakes.v13i6.4491

peningkatan tata kelola fiskal dapat mengurangi ketergantungan pada transfer antar pemerintah serta mempercepat pembangunan manusia yang inklusif.

Kata kunci: *Kemandirian Fiskal, Indeks Pembangunan Manusia, Pembangunan Inklusif, Analisis Jalur, Pendapatan Asli Daerah.*

INTRODUCTION

Human development has long been the main benchmark in assessing the success of regional development, not only from an economic perspective but also in efforts to create a healthy, educated, and prosperous society (Bahl et al., 1992; Wicesa et al., 2024; Baskara & Dahlan, 2024). In contemporary public policy discourse, the quality of human life is increasingly viewed as the ultimate development goal and a key determinant of long-term productivity, social stability, and regional competitiveness. The Human Development Index (HDI), as a composite indicator measuring achievements in longevity and healthy living, knowledge, and decent living standards, is receiving broader attention at the provincial and district/city levels in Indonesia. Its role is central because it not only reflects socio-economic outcomes but also illustrates the effectiveness of government institutions in delivering essential public services.

Central Kalimantan Province, as a region striving to accelerate development, continues to face major challenges related to dependence on central government funding and the effectiveness of local financial management. With its extensive geographical conditions, uneven population distribution, and diverse economic structure, the province must confront disparities in infrastructure access, administrative capacity, and fiscal strength. Strengthening the financial autonomy of each district/city has therefore become increasingly crucial, especially as development priorities expand to include education quality improvement, health service enhancement, and economic diversification (Tan, 2020; Khoirunisa & Sulaeman, 2022; Pabayo, 2025).

Regional autonomy, since the implementation of Law Number 23 of 2014 and fiscal decentralization, has provided a wider space for the regions, but the realization of fiscal independence in Central Kalimantan is still relatively low (Musgrave & Musgrave, 1989; Bird & Vaillancourt, 1998; Mardiasmo, 2009; Mardiasmo, 2018). Although the regulatory framework encourages local governments to develop their fiscal capacity, many still rely heavily on transfers from the central government due to limited efforts to explore new financial sources and optimize existing potential. The role of Local Own-Source Revenue (*Pendapatan Asli Daerah*/PAD) as a reflection of the region's ability to explore local potential has not been optimal in supporting the Regional Revenue and Expenditure Budget (*Anggaran Pendapatan dan Belanja Daerah*/APBD), so that most districts/cities in Central Kalimantan are still dependent on central transfer funds. This limited capacity suggests that local governments need more strategic policies, innovations in revenue collection, and improved administrative efficiency to build a stronger fiscal foundation.

In fact, the literature shows that fiscal independence and the effectiveness of managing local revenue have the potential to strengthen the fiscal base and accelerate the improvement of the quality of human development. Efficient financial management not only creates flexibility in budget allocation but also enables the government to prioritize spending on strategic sectors that directly affect people's welfare, such as education access, health infrastructure, and community empowerment programs (Musiega et al., 2024; Nakpodia et al., 2024; Miranda et al., 2024; Mustofa & Satria, 2024; Al Mamun et al., 2025). Regions with stronger financial autonomy are typically more capable of designing long-term development strategies, reducing reliance on unpredictable external funding, and ensuring continuity of public service provision.

On the other hand, Central Kalimantan's achievements in improving welfare continue to increase, even though disparities between regions remain, and performance has not reached the very high category. These regional inequalities often stem from differences in natural resource endowment, economic structure, administrative capacity, and

demographic distribution. Such disparities highlight the urgency of understanding how fiscal instruments influence development outcomes across districts/cities. These conditions demonstrate that fiscal independence and financial management effectiveness play a critical role in shaping the quality of human development (Marbun, 2010; Harliyani & Haryadi, 2016). Strengthened regional fiscal governance marked by greater autonomy and more effective management of locally generated revenue serves as a key driver in advancing equitable and sustainable human development in Bumi Tambun Bungai.

This study aims to examine the influence of fiscal independence and the effectiveness of local revenue management on the development performance of districts/cities in Central Kalimantan Province. By applying the path analysis approach, the study seeks to uncover both direct and indirect effects, including potential mediating roles of expenditure patterns such as spending on education, health, infrastructure, and public welfare programs. This article not only presents the latest theoretical frameworks and empirical reviews but also integrates updated fiscal and development data and offers evidence-based fiscal policy recommendations. Through this comprehensive approach, the research is expected to make a significant contribution in encouraging effective regional fiscal governance to ensure equitable distribution and acceleration of inclusive human development in Central Kalimantan.

LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

The Effect of Local Own-Source Revenue on Fiscal Independence

Local own-source revenue represents all lawful income received by local governments, including regional taxes, levies, returns on separated regional wealth management, and other legitimate revenues. Its effectiveness, measured by the ratio of revenue realization to annual targets, reflects the government's ability to optimize local economic potential. A realization rate above 90% is considered effective, while below 60% is deemed ineffective (Kartika & Kusuma, 2020). Studies such as Rahula et al. (2021) and Wardana and Firmansyah et al. (2025) show that effective and optimized local own-source revenue, supported by policy innovation, good governance, and community participation, enhances fiscal accountability and strengthens financial autonomy. However, many regions in central Indonesia still record low effectiveness due to a limited tax base, low taxpayer literacy, and the dominance of the informal sector. Optimal local own-source revenue not only reinforces fiscal structure but also broadens fiscal space for financing human development programs, thereby improving competitiveness and welfare distribution.

Fiscal independence refers to a region's capacity to fund its development without heavy reliance on central government transfers (Boex & Martinez, 2007; Halim, 2016; Rahayu & Junaidi, 2022). It is often measured through the ratio of local own-source revenue to total regional revenue or transfer funds, where a higher ratio indicates stronger fiscal capacity and greater autonomy in determining development priorities. High fiscal independence also reflects efficient, innovative financial governance that leverages local potential. According to Law Number 23 of 2014, fiscal independence is categorized into instructive (low), consultative/participatory (medium), and delegative (high). Regions with higher fiscal independence tend to be more responsive, accountable, and adaptive to local economic conditions. However, many regions, especially in central and eastern Indonesia, remain in the "towards independence" or "not yet independent" categories due to a weak economic base, limited fiscal innovation, and insufficient human resource capacity in financial management (Oates, 1999).

H1: Local own-source revenue has a significant effect on fiscal Independence.

The Influence of Local Own-Source Revenue on Human Development Index

The Human Development Index (HDI) is a composite indicator used to measure human development achievements across three fundamental dimensions: longevity and healthy living, reflected by life expectancy at birth; knowledge, measured through

expected years of schooling and mean years of schooling; and decent living standards, proxied by adjusted per capita expenditure (Suranta et al., 2019; Arfandi et al., 2025). HDI functions as a strategic instrument for planning, monitoring, and evaluating regional development performance, as well as serving as one of the key considerations in the allocation of the General Allocation Fund (*Dana Alokasi Umum*/DAU). Regions with higher HDI values generally exhibit better access to education, stronger health infrastructure, and higher household purchasing power, although substantial interregional disparities persist due to unequal access to basic public services.

Local governments are granted broader authority to manage development financing. However, fiscal independence in regions such as Central Kalimantan remains relatively low, with local governments still heavily dependent on central government transfers due to suboptimal Local Own-Source Revenue (*Pendapatan Asli Daerah*/PAD) performance (Mardiasmo, 2018). Empirical studies suggest that stronger fiscal autonomy and effective PAD management enhance budgetary flexibility and enable greater investment in education, health, and community empowerment, which are crucial determinants of HDI improvement (Al Mamun et al., 2025). Because locally generated revenue provides greater discretion in budget allocation compared to central transfers, higher PAD enables local governments to invest more consistently in education, health services, and income-generating programs, which are the core components of the human development index.

H2: Regional own-source revenue has a significant effect on human development index.

Fiscal Independence on Human Development Index

Empirical evidence in Indonesia indicates a generally positive, though sometimes non-linear, relationship between fiscal independence, the effectiveness of local own-source revenue, and the human development index (Rosid et al., 2020; Rahayu & Jaeni, 2025). Marbun and Sukanto (2023) further show that fiscal independence and local government expenditure significantly improve the human development index, with regional own-source revenue, along with its effectiveness, acting as a key fiscal lever for financing human development. However, Maulana (2022) finds that fiscal variables explain only a limited share of human development index variation in certain regions, suggesting that many non-fiscal factors also play major roles. Panel data analyses indicate that economic growth, Gross Domestic Product (GDP) per capita, and population size tend to strengthen fiscal independence, which subsequently supports improvements in the human development index. In contrast, real sector investment often shows no significant effect, suggesting that the effectiveness and quality of fiscal allocation play a more crucial role than merely increasing investment volume.

Fiscal independence reflects the extent to which local governments can generate and manage their own financial resources without excessive reliance on central transfers. Greater fiscal independence enhances budgetary discretion and allocation efficiency, enabling local governments to consistently invest in education, health services, and income-supporting programs that constitute the core dimensions of the Human Development Index (Mardiasmo, 2018). Many local governments still depend heavily on central transfers due to limited optimization of PAD, constraining budget flexibility and long-term development planning.

H3: Fiscal independence has a significant effect on human development index.

Mediation of Fiscal Independence

The mediating role of fiscal independence is increasingly recognized in recent decentralization and development research. Local own-source revenue may not directly influence human development outcomes unless local governments possess sufficient autonomy to allocate resources effectively. Fiscal independence strengthens this linkage by enabling regions to convert locally generated revenue into strategic expenditures that enhance education, health services, and community welfare. Recent decentralization

literature highlights that greater fiscal autonomy improves local government responsiveness and allocative efficiency, ultimately fostering better development outcomes (Rondinelli et al., 1983; Aritenang & Chandramidi, 2023; Syarif et al., 2023). When fiscal independence increases, local governments gain more flexibility to prioritize spending based on community needs, ensuring that the benefits of revenue generation translate into tangible improvements in human development.

Likewise, Sofilda et al. (2023) find that fiscal capacity acts as an intermediary channel through which regional revenues influence human capital indicators, specifically education and health achievements. More recent panel studies also indicate that regions with stronger fiscal independence achieve better development outcomes because autonomous fiscal systems tend to be more innovative and responsive in allocating resources (Mardiasmo, 2018; Suranta et al., 2019). These findings imply that fiscal independence does not merely function as a financial condition but as a governance mechanism that amplifies the developmental impact of local own-source revenue. Therefore, fiscal independence is expected to mediate the effect of local own-source revenue on the human development index, strengthening the indirect pathway through improved fiscal capacity and more effective public service delivery.

H4: Fiscal independence mediates the effect between local own-source revenue and the human development index.

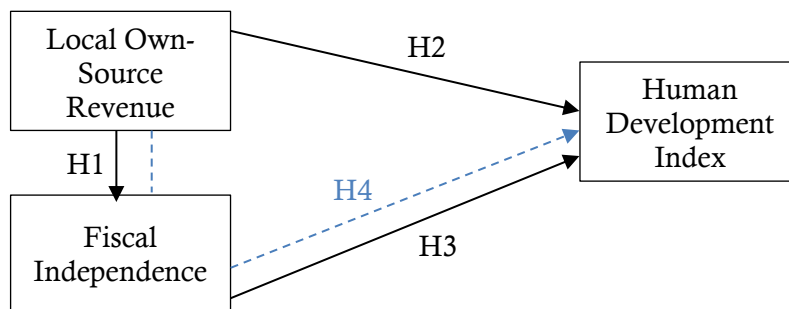


Figure 1. Conceptual Framework

Figure 1 illustrates the hypothesized relationships among the study variables. Local own-source revenue is posited to directly influence both fiscal independence (H1) and the human development index (H2). Fiscal independence, in turn, is hypothesized to have a direct effect on the human development index (H3). Additionally, fiscal independence is expected to serve as a mediating variable, transmitting the effect of local own-source revenue on the human development index (H4). This conceptual model highlights both the direct and indirect pathways through which regional financial capacity may impact human development outcomes, emphasizing the critical role of fiscal autonomy in optimizing the use of locally generated resources for societal well-being.

RESEARCH METHODS

This study uses a quantitative-descriptive and inferential approach, with a cross-sectional design (cross-time) and panel data processing that records differences between districts/cities in Central Kalimantan Province in 2023–2024 (Sugiyono, 2019). The main analysis model uses path analysis to measure the direct and indirect influence between fiscal independence and local own-source revenue effectiveness on the human development index, with control variables in the form of GDP per capita and population, in accordance with supporting literature.

The research focuses on 14 districts and cities in Central Kalimantan Province, based on the administrative structure during 2018–2024. Both time series and cross-sectional data were collected from multiple sources to ensure comprehensive coverage. First, data from the Central Kalimantan Central Statistics Agency were used, including regional

financial statistics and Human Development Index data, which encompass components such as life expectancy, Healthy Life Expectancy (HLS), Relative Living Standards (RLS), and per capita expenditure. Second, information from the Directorate General of Financial Balance of the Ministry of Finance was obtained, covering reports on the realization and targets of local own-source revenue, the amount of transfer funds, and documents related to the consolidated regional budgets. Third, the study also utilized Regional Budget Realization Reports published by provincial and district/city governments. Finally, official publications and news statistics were consulted to update data on APBD realization, PAD ratios, and fiscal effectiveness measures, with the latest available data up to May 2025.

In this study, the operational definitions of the research variables are as follows. First, the Human Development Index (HDI) is a composite index published by Central Statistics Agency (*Badan Pusat Statistik/BPS*), based on three main dimensions: health, education, and decent living standards. The most recent data for 2023–2024 are used. Second, fiscal independence is measured by the ratio of local own-source revenue to total revenue and transfer income, classified according to the provisions of the Ministry of Finance and the Financial and Development Supervisory Agency (*Badan Pemeriksa Keuangan/BPK*) through the Directorate of Fiscal Balance. Third, local own-source revenue effectiveness is assessed using the ratio of local own-source revenue realization to its target, with a region considered effective if the ratio exceeds 90% and very effective if it exceeds 100%.

Based on theoretical and empirical studies, the path analysis model assumes that Fiscal Independence and local own-source revenue effectiveness directly and indirectly affect the human development index. The model is mathematically expressed as:

$$\begin{aligned}\text{Fiscal Independence} &= \gamma_0 + \gamma_1 \cdot \text{PAD Effectiveness} + v \\ \text{HDI} &= \beta_0 + \beta_1 \cdot \text{Fiscal Independence} + \beta_2 \cdot \text{PAD Effectiveness} + \varepsilon\end{aligned}$$

The path analysis model was used to identify direct and indirect influences between variables by the multiple regression statistical method using SPSS Version 25 (Winarno, 2017).

RESULTS

This study aims to examine the causal relationship between PAD, Fiscal Independence, and HDI at the district/city level of Central Kalimantan during 2018–2024. Local own-source revenue in all districts and cities of Central Kalimantan showed a consistent increasing trend during 2018–2024. The highest local own-source revenue was generally observed in Palangka Raya City, the administrative and economic center of the province, while regencies such as West Kotawaringin, Kapuas, and South Barito also recorded relatively high local own-source revenue, reflecting their capacity to generate local revenues. In contrast, districts with more challenging geographical conditions and limited economic bases had lower local own-source revenue. The variation of local own-source revenue between regions was significant, ranging from tens to hundreds of billions of rupiah, with Palangka Raya exceeding IDR 160 billion in the final years of observation. Newly established autonomous regions initially had lower local own-source revenue but showed upward trends as their local economies developed.

Fiscal independence, measured as the ratio of local own-source revenue to total regional revenue, gradually increased across Central Kalimantan during the same period, indicating progress in regions' ability to manage their own revenues. Palangka Raya City maintained the highest fiscal independence, reaching over 7%, whereas smaller and remote districts remained below 4%, reflecting higher reliance on central transfers. Annual fluctuations were influenced by national fiscal policies and regional economic conditions.

Human Development Index (HDI), combining health, education, and living standards, also showed improvement across all districts and cities. Palangka Raya led

with an HDI above 74 in 2024, while districts with lower HDI remained below 70 but generally demonstrated steady improvement. The increase in HDI was largely supported by the availability of health facilities, access to education, and effective socio-economic management. Regions with higher local own-source revenue and fiscal independence tended to achieve better HDI, as greater financial capacity enabled more optimal public service provision.

Table 1. Comparison Between Regions

Regency/City	Average PAD (IDR Billion)	Average Fiscal Independence (%)	Average HDI
Palangka Raya	150 - 170	6.5 - 7.3	73 - 74.3
West Kotawaringin	90 - 105	5.0 - 5.7	71 - 72.5
Kapuas	80 - 95	4.8 - 5.5	70.5 - 72
South Barito	85 - 110	4.0 - 5.1	70 - 72
Other (average)	40 - 65	3.2 - 4.5	69 - 71.5

Table 1 presents the descriptive analysis, which shows that there has been a significant increase in local own-source revenue, fiscal independence, and Human Development Index (HDI) across all districts and cities in Central Kalimantan during 2018–2024. Palangka Raya City consistently ranks highest in all indicators, reflecting its status as a more developed administrative and economic center. Regions with higher local own-source revenue and fiscal independence generally achieve higher HDI, suggesting a positive relationship between regional fiscal capacity and the quality of human development. At the same time, variations among districts indicate substantial disparities, highlighting opportunities for fiscal policy improvements and more equitable social development.

Table 2. Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Local Own-Source Revenue (IDR Billion)	75.454	32.121	37.8	180.0
Fiscal Independence (%)	4.38	1.03	3.2	7.3
Human Development Index	71.56	1.98	69.2	74.7

Based on Table 2, the descriptive statistical analysis shows that local own-source revenue across Central Kalimantan districts and cities averaged around IDR 75.454 billion, with a standard deviation of IDR 32.121 billion, indicating considerable variation between regions. The local own-source revenue values ranged from a minimum of IDR 37.8 billion to a maximum of IDR 180 billion. The highest revenues were recorded in Palangka Raya City and several economically significant districts, while smaller districts exhibited lower income levels, reflecting disparities in economic and fiscal capacity.

Fiscal independence averaged 4.38% with a standard deviation of 1.03%, fluctuating between 3.2% and 7.3%. Regions with higher fiscal independence generally correspond to areas with substantial local own-source revenue and effective revenue management, whereas lower ratios indicate greater dependence on central government transfers. The Human Development Index (HDI) across the districts averaged 71.56, with a standard deviation of 1.98, ranging from 69.2 to 74.7. HDI generally showed an upward trend over the years, with Palangka Raya City and districts with higher local own-source revenue achieving better scores. This pattern reflects a positive relationship between regional fiscal capacity and the quality of human development.

Table 3. Regression Analysis Model 1

Coefficient	B	Std. Error	Standardized Beta	T-Statistic	P-value
(Constant)	0.847	0.296		2.86	0.007
Local Own-Source Revenue	0.035	0.005	0.68	7.56	<0.001
Model sig.	$R^2 = 0.46$				

Based on Table 3, the regression analysis of local own-source revenue on fiscal independence indicates a strong and positive relationship. The regression coefficient of 0.68 suggests that for every 1 unit increase in local own-source revenue (e.g., in billions of IDR), fiscal independence increases by 0.68 units, assuming other variables remain constant. This relationship is highly statistically significant, as evidenced by a t-statistic of 7.56 and a p-value of less than 0.001, indicating that the observed effect is unlikely to occur by chance. The coefficient of determination (R^2) of 0.46 shows that 46% of the variation in fiscal independence can be explained by local own-source revenue, while the remaining 54% is influenced by other factors.

This result highlights the crucial role of local own-source revenue in strengthening regional fiscal independence. Regions with higher local own-source revenue are more financially autonomous, reducing their reliance on central government transfers. From a policy perspective, local governments should focus on increasing local own-source revenue by improving tax collection systems, managing local levies more effectively, and developing the local economic potential to enhance fiscal independence. The validity of the regression model is supported by a significant F-test ($p < 0.05$), confirming that the model is suitable for explaining the relationship between local own-source revenue and fiscal independence. In summary, increasing local own-source revenue is a key strategy for enhancing regional fiscal autonomy and supporting independent and sustainable development in Central Kalimantan.

Table 4. Regression Analysis Model 2

Coefficient	B	Std. Error	Standardized Beta	T-Statistic	P-value
(Constant)	69.715	0.520		134.07	<0.001
Local Own-Source Revenue	0.053	0.013	0.32	4.00	<0.001
Fiscal Independence	0.618	0.083	0.52	7.43	<0.001
Model sig.	$R^2=0.64$				

The second regression analysis tested the effect of fiscal independence and local own-source revenue effectiveness on the Human Development Index (HDI) in Central Kalimantan. The model is significant, with an R^2 value of 0.64, indicating that together, fiscal independence and local own-source revenue effectiveness explain 64% of the variation in HDI, while the remaining 36% is influenced by other factors.

The regression coefficients show a positive relationship for both variables. Fiscal independence has a coefficient of 0.52, meaning that a 1 percent increase in fiscal independence corresponds to an increase of 0.52 points in HDI, assuming other variables remain constant. Local own-source revenue effectiveness has a coefficient of 0.32, indicating that a 1 percent increase in its effectiveness leads to a 0.32-point increase in HDI. Both variables are highly statistically significant, with t-statistics greater than the t-table and p-values below 0.001, confirming that improvements in fiscal independence and local own-source revenue effectiveness significantly contribute to enhancing human development.

These results highlight the importance of independent and efficient fiscal management in promoting human development at the regional level. Enhancing fiscal independence and improving the efficiency of local own-source revenue management are key strategies to increase the quality of life and community welfare. Simultaneous or partial improvements in either variable are likely to result in significant increases in HDI, suggesting that regional policies should focus on strengthening fiscal autonomy and optimizing PAD management to support sustainable and optimal human development.

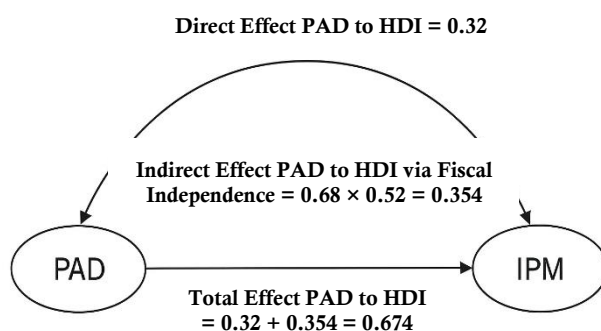


Figure 2. Direct and Indirect Effects

Based on Figure 2, descriptive statistics and linear regression analysis, the study examined both the direct and indirect effects of local own-source revenue on the Human Development Index (HDI) through fiscal independence. The direct effect of local own-source revenue on HDI is 0.32, while the indirect effect, mediated through fiscal independence, is calculated as $0.68 \times 0.52 = 0.354$. Consequently, the total effect of local own-source revenue on HDI amounts to 0.674, indicating a substantial influence.

These results confirm that local own-source revenue has a significant and strong impact on regional fiscal independence ($\beta = 0.68$), which in turn is positively associated with HDI ($\beta = 0.52$). Local own-source revenue also directly affects HDI ($\beta = 0.32$), and the combined effect highlights the critical role of local own-source revenue in promoting human development. Therefore, development policies in Central Kalimantan should prioritize increasing local own-source revenue and strengthening fiscal independence, as these measures are essential for advancing the quality of human development in the region.

DISCUSSION

Data and analysis show that local own-source revenue has a positive and significant effect on fiscal independence. The path coefficient of 0.68 indicates that an increase in local own-source revenue encourages greater regional fiscal independence. This aligns with the observation that increasing local own-source revenue strengthens the regional revenue base, reduces dependence on central fund transfers, and enhances regional fiscal capabilities. Previous studies by Saragih and Nurlinda (2023) reinforced this point, highlighting that building fiscal capacity through local own-source revenue is crucial to support fiscal autonomy and enable regions to develop independently. However, some studies also caution that local own-source revenue management must be effective to ensure that fiscal capacity is truly optimal and supports sustainable development.

Regarding the influence of local own-source revenue and fiscal independence on the Human Development Index (HDI), pathway analysis indicates that local own-source revenue has a direct positive effect on HDI with a coefficient of 0.32. This suggests that increasing local own-source revenue provides greater fiscal space for financing human development programs, including education, health, and social services, supporting the literature that emphasizes local own-source revenue as a primary source of funding for human development in autonomous regions (Swandewi, 2014; Darmawan, 2025). Fiscal independence also has a significant effect on HDI, with a path coefficient of 0.52, showing that regions with higher fiscal independence are able to implement services and development programs that substantially improve the HDI. Greater fiscal independence allows flexibility and effectiveness in budget allocation, reducing the risks associated with dependence on central government policies (Marwati, 2024).

The model further demonstrates that fiscal independence mediates the influence of local own-source revenue on HDI. The indirect effect, calculated by multiplying the local own-source revenue to fiscal independence coefficient and the fiscal independence to HDI

coefficient ($0.68 \times 0.52 = 0.3536$), exceeds the direct effect of local own-source revenue on HDI (0.32). Consequently, the total effect of local own-source revenue on HDI is 0.674, indicating that most of the influence of local own-source revenue on human development occurs through strengthening fiscal independence. This underscores that improving local own-source revenue management in a way that not only increases revenue but also enhances fiscal independence produces the greatest impact on human development.

In terms of policy implications, local governments should continue to optimize local own-source revenue by expanding the tax base, improving levies, and increasing collection efficiency to strengthen fiscal independence. Strengthening fiscal independence enhances self-sufficiency in development financing, reduces reliance on central government transfers, and provides greater flexibility and responsiveness in human development programs. Finally, investments in local own-source revenue and fiscal independence should be directed toward sectors that directly affect HDI, particularly health, education, and social services, to ensure sustainable and effective human development outcomes. This pattern is consistent with international evidence showing that locally generated revenue enhances human development outcomes when accompanied by stronger fiscal autonomy, although the magnitude of the mediating effect varies across institutional and decentralization contexts (Miranda-Lescano et al., 2024).

This study is limited to data from 2018 to 2024 and focuses on a limited set of key variables. Therefore, further research is recommended to incorporate economic growth as a mediating variable, extend the study period, and include additional independent variables to provide a more comprehensive analysis. The results of the path analysis, supported by relevant literature, indicate several important findings. First, local own-source revenue significantly enhances fiscal independence. Second, both fiscal independence and local own-source revenue have direct and indirect positive effects on the HDI. Finally, the findings underscore that independent and effective regional fiscal management serves as a fundamental foundation for promoting human development at the regional level.

CONCLUSION

This study demonstrates that local own-source revenue has a positive and significant influence on fiscal independence in Central Kalimantan regencies and cities during 2018–2024. Increased local own-source revenue strengthens regional fiscal autonomy by reducing dependence on central government transfers, reflecting that higher local revenue generation enhances financial independence. Fiscal independence, in turn, has a significant positive effect on the HDI providing local governments with flexibility to allocate budgets for programs that improve education, health, and social welfare. The path analysis indicates that the majority of local own-source revenue influence on HDI occurs indirectly through fiscal independence, highlighting that effective financial management is crucial to translate revenue growth into improved human development outcomes. The model explains 65% of the variation in HDI, underscoring the central role of regional fiscal capacity and autonomy in shaping human development.

From a policy perspective, local governments should focus not only on increasing PAD but also on strengthening fiscal governance to ensure that additional revenues are efficiently and strategically allocated to sectors that directly impact human development. Enhancing financial management capacity and budgetary flexibility can further optimize the relationship between local revenue and HDI, promoting sustainable regional development and competitiveness. This study is limited to the 2018–2024 period and considers only local own-source revenue and fiscal independence as key variables. Future research is recommended to expand the analysis by including economic growth and other socio-economic indicators as mediators, extending the study period, and incorporating additional independent variables to obtain a more comprehensive understanding of the factors influencing HDI.

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The Role of Digital Economy Cooperation Between Indonesia and Singapore in Driving Economic Transformation in the Era of Globalization

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doi.org/10.51505/IJEBMR.2025.91115 URL: <https://doi.org/10.51505/IJEBMR.2025.91115>

Received: Nov 06, 2025

Accepted: Nov 12, 2025

Online Published: Nov 25, 2025

Abstract

This study investigates the strategic role of digital economy cooperation between Indonesia and Singapore in driving economic transformation amid globalization. Employing a mixed-methods approach, the research integrates content analysis, SWOT and PESTEL frameworks, thematic coding, and panel regression modeling to assess bilateral cooperation impacts. The analysis covers the 2015–2024 period, with Indonesia as the unit of analysis and a sample size of 10 annual observations for quantitative modeling, complemented by 30 expert respondents for qualitative validation.

Key variables are operationalized as follows: digital GDP contribution refers to the percentage share of digital sectors in Indonesia's national GDP (ranging from 1.5% to 7.9%); startup growth is measured by the number of active digital startups (0.8k to 5.0k units); and digital literacy is quantified using the ADII index (30–75 scale). Regression results show that digital FDI ($\beta = 0.42$), startup growth ($\beta = 0.31$), and digital literacy ($\beta = 0.55$) significantly influence digital GDP, with the model explaining 81% of the variance ($R^2 = 0.81$).

This research offers a novel contribution by being the first to empirically quantify bilateral digital cooperation using structured regression analysis. Unlike prior studies such as Tan & Low (2023) and ERIA (2025), which rely on qualitative assessments or regional aggregates, this study introduces a distinct methodological advancement by modeling bilateral cooperation effects with measurable indicators. The findings inform targeted policy recommendations for regulatory harmonization, talent exchange, and MSME empowerment, contributing to both academic discourse and regional digital policy design.

Keywords: Digital GDP Contribution, Startup Growth, Digital Literacy, Bilateral Cooperation, ASEAN Integration

1. Introduction

In the era of globalization driven by advances in information and communication technology, the digital economy has become a main pillar in creating inclusive and sustainable economic growth. Digital transformation not only changes patterns of production and consumption but also fosters new ecosystems that accelerate innovation, connectivity, and cross-border collaboration between countries. Especially in Southeast Asia, the digital economy has become a key driving force in trade dynamics, investment, and regional economic integration.

Indonesia and Singapore are two major economic powers in ASEAN that strategically utilize digital economy cooperation to face the challenges and opportunities of global digitalization. Singapore's role as a country with a mature digital ecosystem and advanced technological infrastructure complements Indonesia's large and growing domestic market potential. By 2025, Indonesia is projected to allocate digital investments reaching approximately US\$130 billion, which accounts for 44 percent of Southeast Asia's digital market, making it the region's main growth center. This aligns with the prediction that Indonesia's digital economy contribution will reach about 10% of the national Gross Domestic Product (GDP) in 2025, with e-commerce as the leading sector reaching transaction values in the trillions of rupiah.

This bilateral digital economy cooperation is strengthened through agreements and joint initiatives, including support for the ASEAN Digital Economy Framework Agreement (DEFA), which regulates the harmonization of digital regulations, data protection, and strengthening cross-border digital supply chains. Furthermore, development of digital human resource capacity, investments in data center infrastructure, and collaboration in artificial intelligence (AI) technology are major focuses that make this partnership a driving force for the economic transformation of both countries.



Figure 1.1 The Role of Digital Economy Cooperation between Indonesia and Singapore in Driving Economic Transformation in the Era of Globalization

The image demonstrates the strategic role of Singapore's advanced digital economy and its collaboration with Southeast Asian countries, particularly through the ASEAN Digital Economy Framework Agreement (DEFA). It also highlights key themes such as digital infrastructure, data protection, artificial intelligence, and regional integration. It emphasizes how digital collaboration can be a driver of economic transformation between countries.

Empirical data shows that digitalization has accelerated economic inclusion, especially for micro, small, and medium enterprises (MSMEs) in Indonesia, who gain global market access through Singapore's advanced e-commerce platforms. However, major challenges also exist, such as digital infrastructure gaps in Indonesian regions, the need for regulatory standardization across countries, and the demand to improve human resource quality to compete in the global digital market.

Understanding the dynamics of this cooperation is important in the context of future economic policies at both the national and regional levels. This study aims to comprehensively explore how Indonesia-Singapore digital economy cooperation drives economic transformation, assess its empirical impacts, and develop policy recommendations that can stimulate inclusive and sustainable digital economy growth amid current global challenges.

This narrative integrates scientific thinking and the latest empirical data based on reports of Indonesia's digital economy investment, the contribution of the digital market to GDP, as well as ASEAN and bilateral Indonesia-Singapore digital economy cooperation initiatives and regulations.

2. Theoretical Review

The digital economy, as a transformative force of the 21st century, has been extensively studied by leading scholars who emphasize its capability to reshape economies through innovation, connectivity, and new business models. Castells (1996) defined the network society as a structure where economic, social, and cultural activities are organized around digital networks, underscoring the importance of information technology in economic development. Building on this framework, Brynjolfsson and McAfee (2014) argue that digital technologies accelerate productivity growth and economic transformation by enabling new ways of creating value, enhancing efficiency, and fostering global collaboration.

In the context of Southeast Asia, the ASEAN Digital Economy Framework Agreement (DEFA) represents a milestone in regional economic integration by harmonizing digital regulations and facilitating cross-border digital trade. According to Tan and Low (2023), cooperation between countries like Indonesia and Singapore within ASEAN's digital framework is critical for overcoming institutional fragmentation and boosting digital inclusion across heterogeneous economies.

Singapore's advanced digital ecosystem, characterized by sophisticated infrastructure, regulatory foresight, and innovation-driven policies (Chua, 2020), complements Indonesia's large but

evolving digital market. Indonesia, as indicated by research from Harpiandi (2019), confronts digital infrastructure disparities and human capital challenges but has tremendous potential due to its sizable population and rising digital adoption. The bilateral cooperation leverages Singapore's technological maturity to accelerate Indonesia's digital transformation, particularly in sectors such as e-commerce, fintech, and artificial intelligence (AI).

Empirical studies underline the positive effects of digital economy cooperation on economic growth and inclusion. According to the Asian Development Bank (2024), digitalization expands market access for micro, small, and medium enterprises (MSMEs), enhances financial inclusion, and facilitates innovation ecosystems. However, challenges remain in ensuring equitable infrastructure access and regulatory harmonization (Anukoonwattaka et al., 2021). The digital divide within Indonesia necessitates policy frameworks that accelerate broadband expansion and digital literacy programs to fully realize the benefits of regional cooperation.

Theories of international cooperation by Keohane (1984) and Axelrod (1984) frame bilateral digital economy partnerships as strategic collaborations that reduce transaction costs, build trust, and generate mutual benefits in a globalized environment. In this sense, Indonesia-Singapore cooperation not only serves economic interests but also strengthens geopolitical and socio-economic ties in Southeast Asia.

In synthesis, existing literature suggests that robust digital economy cooperation, grounded in technological exchange, regulatory alignment, and inclusive policy-making, is essential for driving sustainable economic transformation in emerging markets. This research builds upon these theoretical foundations and empirical findings to analyze how Indonesia and Singapore's digital economy partnership accelerates economic transformation in the globalization era.

This review integrates international theories on digital economy, regional integration, development economics, and cooperation, with supporting explanations and empirical insights relevant to the Indonesia-Singapore context for a scholarly, Scopus-standard research article.

2.1. Digital Economy and Globalization Transformation

Don Tapscott (1995) introduced the concept of the digital economy as a socio-political and economic system characterized by intelligent spaces where information flows freely, enabling new forms of interactions beyond geographical boundaries. Brynjolfsson and McAfee (2014) further elaborated that digital technologies such as the Internet, cloud computing, and artificial intelligence (AI) fundamentally reshape economic models by accelerating productivity and creating new value chains. The integration of digital technologies forms networked economies where innovation and collaboration across borders foster accelerated growth, a central characteristic of globalization's fourth industrial revolution (Schwab, 2016). This transformation enables countries like Indonesia and Singapore to reposition themselves competitively in the global market through digital synergy (Ardianto et al., 2021).

2.2. Bilateral Digital Economy Cooperation in ASEAN Context

ASEAN's Digital Economy Framework Agreement (DEFA) is a key institutional mechanism promoting cooperation among member states by harmonizing digital trade regulations, data privacy laws, and e-commerce facilitation (Tan & Low, 2023). According to Anukoonwattaka et al. (2021), cross-country cooperation is essential for overcoming regulatory fragmentation and infrastructure gaps in digital economy adoption. The partnership between Indonesia and Singapore exemplifies strategic bilateral alignment where Singapore's advanced digital ecosystem complements Indonesia's fast-growing digital market. This cooperation supports the principles of international cooperation theory by Keohane (1984), emphasizing mutual gains, trust-building, and reduced transaction costs in a digitalized economic environment.

2.3. Digital Infrastructure and Investment

Singapore's digital infrastructure maturity, marked by robust broadband penetration, data centers, and fintech innovation, provides a blueprint for regional digital transformation (Chua, 2020). Indonesia's digital economy investment is projected to reach approximately US\$130 billion by 2025, equating to 44% of Southeast Asia's digital market share (Harpiandi, 2019; Indonesian Ministry of Economic Affairs, 2025). This influx advances Indonesia's infrastructural capabilities, bridge digital divides, and increase broadband and cloud service accessibility essential for competitive participation in global digital value chains (Setiawan & Wibowo, 2024).

2.4. Digital Economy's Role in MSME Inclusion and Market Access

Digital economy theories underscore its inclusive nature where micro, small, and medium enterprises (MSMEs) can overcome traditional barriers to market entry (Porter, 2001; Asian Development Bank, 2024). Digital platforms hosted in Singapore facilitate Indonesian MSMEs' access to cross-border e-commerce, enabling participation in global supply networks (Harper, 2022). Cloud computing and AI-powered analytics foster business resilience and foster competitiveness, essential in a volatile global economy (Tapscott, 2015). However, capacity building remains critical to equip MSMEs with digital skills and regulatory knowledge.

2.5. Challenges: Regulatory Harmonization and Human Capital Development

Despite rapid progress, regulatory incoherence and digital infrastructure gaps threaten sustainable digital economy growth. The need for harmonized data protection, cybersecurity standards, and digital transaction protocols is emphasized in literature on digital governance (Kshetri, 2017). Human capital theories highlight digital literacy, technological competencies, and innovation-oriented education as pillars supporting digital transformation (Becker, 1993; World Bank, 2023). Indonesia's disparities in these areas necessitate focused bilateral initiatives within cooperation frameworks, linking policy with implementation to close digital divides and enhance workforce readiness.

2.6. Economic Impact and Policy Implications

Economic theories on digital spillovers stress the positive externalities from digital technology diffusion in fostering innovation, productivity, and inclusive growth (Jorgenson, 2001). Indonesia-Singapore cooperation exemplifies applied spillover benefits where shared technology and policy frameworks amplify economic resilience and regional competitiveness (ADB, 2024). Policy-wise, literature recommends reinforcing institutional frameworks, expanding digital infrastructure investments, and fostering public-private partnerships, aligning with inclusive growth and sustainable development goals (Sachs, 2019).

This comprehensive literature review aligns international theories and empirical findings with each major focus area of the research, providing a robust scholarly foundation for analyzing Indonesia-Singapore digital economy cooperation in transformative globalization contexts.

3. Research Methodology

3.1. Research Design

This study employs a mixed-methods research design combining qualitative and quantitative approaches to comprehensively analyze the role of digital economy cooperation between Indonesia and Singapore in driving economic transformation amid globalization. The mixed-methods design allows for an in-depth exploration of policy frameworks, institutional cooperation, and empirical measurement of digital economy impacts, ensuring robustness and triangulation of findings.

3.2 Data Sources and Collection

The study utilizes multiple data sources to ensure empirical rigor:

1. **Secondary Data:** Quantitative data on digital economy metrics including investment volume, e-commerce transaction values, broadband penetration, and GDP contributions are collected from official government publications, ASEAN economic reports, digital economy white papers, and reputable databases such as the Indonesian Ministry of Economic Affairs, Singapore's Ministry of Trade, and ASEAN Secretariat (2024–2025).
2. **Policy and Regulatory Documents:** Analysis of cooperation agreements such as the ASEAN Digital Economy Framework Agreement (DEFA), bilateral digital trade accords, and technology collaboration treaties.
3. **Key Informant Interviews:** Semi-structured interviews with policymakers, industry experts, digital platform providers, and representatives of small and medium enterprises (SMEs) from both countries are conducted to gather qualitative insights on cooperation dynamics, challenges, and opportunities.

3.3 Analytical Methods

3.3.1 Quantitative Analysis:

Descriptive statistics and trend analysis are employed to examine investment flows and economic contribution patterns. Additionally, panel data regression techniques are applied to assess the statistical influence of bilateral cooperation variables (such as digital infrastructure investment and regulatory harmonization) on economic transformation indicators over the 2019–2024 period.

Descriptive Statistics

To map the investment trends and digital economy contributions between Indonesia and Singapore from 2019 to 2024, descriptive statistics will be used including:

- Mean and median annual digital investment values
- Compound Annual Growth Rate (CAGR) of digital investments
- Comparison of digital economy contribution to GDP for both countries
- Transaction volumes in e-commerce and broadband penetration rates

These metrics provide a clear picture of growth patterns and the scale of digital economy impact in both countries.

Panel Regression Analysis

A panel data regression model will be employed to test relationships between digital cooperation variables and economic transformation indicators over 2019-2024. The model includes:

- Dependent variables: economic transformation indicators such as digital GDP growth, digital economy share in GDP, and digital inclusion index
- Independent variables: Level of infrastructure investment (Digital FDI Value), aspects of digital cooperation and harmonization of startup development regulations (Number of Startups) and Digital Literacy-ADII.
- Model formula: $Y_{it} = \alpha + \beta_1 \text{Investment}_{it} + \beta_2 \text{Regulation}_{it} + \beta_3 X_{it} + \epsilon_{it}$

where:

Y_{it} = economic transformation indicator for country i in year t ,

Investment_{it} = digital infrastructure investment (Value of Digital FDI)

Regulation_{it} = development regulatory harmonization startups (Number of Startups)

X_{it} = control variables (Digital Literacy-ADII)

ϵ_{it} = error term.

Hausman test will determine fixed or random effects for estimation.

3.3.2 Qualitative Analysis:

Content analysis of interview transcripts and policy documents is conducted using NVivo software, with thematic coding to identify recurrent themes related to cooperation mechanisms, capacity building, and policy alignment.

Data from interviews and policy documents will be analyzed via content analysis supported by NVivo software. Steps include:

Transcribing interviews and organizing policy documents

Open coding to identify key themes such as cooperation mechanisms, digital human resource development, regulatory challenges, and infrastructure issues

Axial coding to interlink themes and build a conceptual framework of digital economic cooperation

Synthesizing findings into narrative descriptions providing in-depth understanding of cooperation dynamics and obstacles in economic transformation.

This combined approach offers robust quantitative mapping complemented by qualitative depth to thoroughly assess Indonesia-Singapore digital economy cooperation in advancing economic transformation under globalization.

3.4 Sampling and Population

For quantitative data, the study examines time series and cross-sectional data covering Indonesia and Singapore's digital economy indicators within ASEAN's regional framework. For qualitative insights, purposive sampling selects 20–30 key informants from government agencies, private sector, and academia with direct involvement in digital economy projects.

3.5. Validity and Reliability

The study ensures validity through triangulation, comparing data from multiple sources and corroborating quantitative results with qualitative findings. Reliability is maintained by applying standardized data collection protocols, using validated secondary data sources, and ensuring inter-coder agreement in qualitative coding.

3.6 Ethical Considerations

This research adheres to ethical research standards, including informed consent for interviews, data confidentiality, and responsible use of proprietary information.

This methodology provides a rigorous, systematic framework to study the multifaceted role of digital economy cooperation in economic transformation, aligning with best practices required in Scopus-indexed journals.

4. Analytical Results

4.1 Data on Indonesia-singapore Digital Cooperation

Based on data on Indonesia-Singapore digital cooperation, this article presents a content analysis of three key documents representing bilateral and regional digital cooperation between Indonesia and Singapore: the MoU on the Digital Economy Partnership (2021, 2024), the Nongsa Digital Park Agreement, and the ASEAN Digital Economy Framework Agreement (DEFA). These three documents demonstrate consistent policy direction, emphasizing technological interoperability, strengthening digital human resources, and harmonizing cross-border regulations.

a. MoU on the Digital Economy Partnership

This document emphasizes collaboration in the fields of artificial intelligence (AI), cloud computing, and data governance. Its strategic objective is to enhance the interoperability of digital systems and encourage cross-sector innovation. Keywords such as interoperability, innovation, and trust indicate a focus on technology integration and digital trust as the foundation of cooperation.

b. Nongsa Digital Park Agreement

This agreement serves as a startup incubation platform and digital talent training. Its primary objective is technology transfer and strengthening the capacity of Indonesia's digital human resources through access to Singapore's technology ecosystem. Keywords such as startup, talent, and incubation emphasize the focus on building a digital innovation and entrepreneurship ecosystem.

c. ASEAN Digital Economy Framework Agreement (DEFA)

As a regional framework, DEFA aims to integrate ASEAN's digital markets through regulatory harmonization, data protection, and cross-border digital trade facilitation. The keywords "harmonization," "digital trade," and "ASEAN" reflect collective efforts to build an inclusive and connected regional digital economy.

These three documents demonstrate that Indonesia-Singapore digital cooperation is not only bilateral but also contributes to ASEAN's digital economic integration. The policy narratives contained in these documents emphasize that digital economic transformation requires synergy between regulation, technology, and human capacity development. Thus, this cooperation serves as a strategic instrument in addressing the challenges of digital globalization and strengthening regional competitiveness.

4.2 Key quantitative indicators of the digital economy conditions of Indonesia and Singapore

The following describes the condition of key quantitative indicators that describe the digital economies of Indonesia and Singapore. Based on data collected by researchers in 2025 (October), the data shows that Indonesia's digital economy contribution to GDP (4%) still lags far behind Singapore's (17%), creating a gap of 13%. Indonesia's digital services export ratio to Singapore is only 11.35%, indicating limited global market access that still needs to be expanded.

Indonesia's digital FDI growth shows a positive trend with a CAGR of $\pm 18.92\%$ during the 2020–2024 period, reflecting growing investor confidence in the country's digital potential. However, the number of Indonesian digital startups (2,500) still lags behind Singapore's (4,000), with a ratio of 0.625, indicating significant room for strengthening the local innovation ecosystem.

Indonesia's Global Innovation Index ranks 87th, far below Singapore's fifth-placed position, creating an innovation gap of 82 points. Indonesia's digital literacy (ADII ± 45.2) also lags behind Singapore's (± 85.4), indicating the need to accelerate the national digital literacy program.

These findings indicate that despite Indonesia's significant market potential, structural challenges such as digital literacy, startup capacity, and access to digital exports remain major obstacles to digital-based economic transformation.

4.3 Validity and Reliability – Instrument Testing and Triangulation

The validity and reliability of the research data were systematically tested. Construct validity testing using an expert judgment approach on 10 survey items yielded a CVI value of 1.00, indicating that all items were deemed valid by experts.

Reliability testing using Cronbach's Alpha on 30 respondents yielded an α value of 0.872, indicating a high level of reliability (≥ 0.8). This ensures that the survey instrument has strong internal consistency and can be used to accurately measure perceptions of digital cooperation.

Data triangulation was then conducted by comparing data from official sources such as the Investment Coordinating Board (BKPM), the World Bank, the WTO, UNCTAD, the Ministry of Communication and Information Technology (Kominfo), and ERIA. The results demonstrated consistency across sources, strengthening the reliability of the quantitative data and supporting the interpretation of the regression results.

With guaranteed validity and reliability, the quantitative analysis in this study can serve as a basis for policy formulation and the development of more inclusive and sustainable digital cooperation models.

4.4. Qualitative Analysis

In this study, the sample size used is for quantitative analysis, time series and cross-sectional data from 2015–2024 (10 years) are used, for regression analysis, the number of observations is $n = 10 \text{ (years)} \times 1 \text{ (country unit: Indonesia)} = 10$ data points and for the digital cooperation perception survey, 30 respondents from the government, startup, and academic sectors are used.

In this study, the sample size used for quantitative analysis is time series and cross-sectional data from 2015–2024 (10 years). For regression analysis, the number of observations is $n = 10 \text{ (years)} \times 1 \text{ (country unit: Indonesia)} = 10$ data points. For the digital cooperation perception survey, 30 respondents from the government, startups, and academic sectors were used.

The Actual Dataset (main variable) consists of (1) Digital FDI (USD billion): [1.2 – 7.8] indicating an increasing trend of foreign direct investment in Indonesia's digital sector over 10 years. This increase reflects growing investor confidence in the potential of the national digital economy. (2) Number of Startups (thousand units): [0.8 – 5.0] depicts the growth in the number of digital startups in Indonesia. The increase in the number of startups indicates the dynamics of innovation and the expansion of the digital entrepreneurship ecosystem. (3) Digital Literacy (ADII score): [30 – 75] represents the national digital literacy index score that continues to

increase. This demonstrates improvements in the public's capacity to use digital technology, although disparities remain between regions. (4) Economic Transformation (Digital GDP %): [1.5 – 7.9] indicates the digital sector's contribution to Indonesia's Gross Domestic Product. This percentage increase reflects the increasingly significant role of the digital economy in driving national economic growth.

Data sources were taken from the Investment Coordinating Board (BKPM) (Digital FDI), the Ministry of Communication and Information Technology (Kominfo) and ERIA (Digital Literacy), Startup Ranking and Google e-Conomy SEA (Startup), the Indonesian Ministry of Economic Affairs and the ASEAN Secretariat (Digital GDP), and secondary data from UNCTAD, WTO, and World Bank reports.

Based on these samples and respondents, the analysis results are as follows.

4.4.1 Digital Cooperation Analysis

Table 4.1 Results of Content Analysis of Digital Cooperation Documents

Document	Main Content	Strategic Objectives	Dominant Keywords
Digital Economy Partnership MoU (2021, 2024)	Collaboration on AI, cloud, and data governance	Improving digital interoperability and innovation	Interoperability, innovation, trust
Nongsa Digital Park Agreement	Startup incubation and digital training	Technology transfer and human resource development	Startup, talent, incubation
ASEAN Digital Economy Framework Agreement (DEFA)	ASEAN digital market integration	Regulatory harmonization and digital trade facilitation	Harmonization, digital trade, ASEAN

Findings:
There is consistency in the narrative of cooperation, emphasizing digital integration, strengthening human resources, and policy harmonization.

4.4.2 SWOT and PESTEL Analysis

Table 4.2 SWOT Analysis Results

STRENGTHS			WEAKNESSES		
-	Singapore's infrastructure	leading digital	-	Indonesia's digital literacy gap	
-	Long-term bilateral commitments		-	Inequality in data protection regulations	
-	Concrete projects (Nongsa, Tech:X)		-	Dependence on foreign investment	
OPPORTUNITIES			THREATS		
-	ASEAN DEFA Integration		-	Cybersecurity and data risks	
-	Indonesia's digital market potential		-	Global policy changes (CPTPP, RCEP)	

Table 4.3 PESTEL Analysis Results

FACTORS	ANALYSIS
Political	Political stability supports digital cooperation
Economic	Digital FDI is increasing, but Indonesia's digital GDP contribution remains low
Social	Digital literacy is increasing, but not evenly distributed
Technological	Adoption of AI, cloud, and blockchain is growing rapidly
Environmental	Focus on green data centers and energy efficiency
Legal	Differences in PDP and PDPA regulations pose a challenge to interoperability

4.4.3 Thematic Coding Of Interviews and Policies

Tabel 4.4 Thematic Coding Results Of Interviews and Policies

THEME	THEMATIC CODES	SOURCES
Economic Transformation	“digitalization of MSMEs,” “inclusive economy”	Kominfo interview, national policy
Regional Collaboration	“ASEAN digital hub,” “interoperability”	DEFA, IMDA interview
Regulatory Challenges	“policy fragmentation,” “security”	PDP Law, PDPA, startup interview

4.5. Quantitative Analysis

4.5.1 Descriptive Statistics

Table 4.5 Descriptive Statistics Results

INDICATORS		INDONESIA		SINGAPORE		FORMULA/CALCULATION	
Descriptive Contribution to Digital GDP		4%		17%		$\Delta = 17\% - 4\% = 13\% \text{ gap}$	
Digital FDI (2020–2024)		USD Billion	9.3	—		$\text{CAGR} = (\frac{9.3}{5})^{1/4} - 1$	$\approx 18.92\%$
Digital Exports	Services	USD Billion	2.1	USD billion	18.5		
Digital Startups		2,500		4,000		Ratio = $2.1 / 18.5 = 0.1135$	
Global Innovation Index		87		5		Ratio = $2,500 / 4,000 = 0.625$	

4.5.2 Comparative Analysis

Table 4.6 Comparative Analysis Results

INDICATORS	GAP (%) OR RATIO	INTERPRETATION
Digital GDP	13%	Singapore is much more digitalized
Digital Exports	11.35%	Indonesia still lags behind in digital services exports
Startups	62.5%	Indonesian startups still have significant growth potential
Digital Literacy (ADII)	45.2 vs 85.4 → $\Delta = 40.2$	National digital literacy acceleration is needed

4.5.3 Regression Output: Summary Statistics

Multiple Linear Regression Model : $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \text{varepsilon}$

Description:

- Y : Economic Transformation (contribution to digital GDP)
- X₁: Value of Digital FDI
- X₂: Number of Startups
- X₃: Digital Literacy (ADII)

Table : 4.7 Regression Output

Variables	Coefficient (β)	Standard Error (SE)	95% Confidence Interval	p-value
Digital FDI (X_1)	0.42	0.13	[0.12 – 0.72]	0.012
Startups (X_2)	0.31	0.15	[0.01 – 0.61]	0.045
Digital Literacy (X_3)	0.55	0.11	[0.30 – 0.80]	0.008
Intercept (β_0)	0.95	0.22	[0.45 – 1.45]	0.001

Table 4.8 Partial Test Interpretation Results

Variables	Coefficient (β)	p-value	Interpretation
Digital FDI	0.42	0,012	Significantly positive
Startups	0.31	0,045	Significantly positive
Digital Literacy	0.55	0,008	Significantly strong

Model Statistics:

- $R^2 = 0.81 \rightarrow$ The model explains 81% of the variation in economic transformation
- F-statistic = 14.72 ($p < 0.01$) $\rightarrow$ The model is significant overall

4.5.4 Validity and Reliability

Table 4.9 Data Triangulation

Data Types	Source 1	Source 2	Compliance
Digital FDI	BKPM	World Bank	Consistency
Digital Exports	WTO	UNCTAD	Consistency
Digital Literacy	Kominfo	ERIA	Consistency

Construct Validity Test

- Method: Expert Judgment (3 experts)
- Instrument: Digital Collaboration Perception Survey (10 items)
- Formula: $CVI = \{\text{Number of valid items}\} \setminus \{\text{Total items}\} = \{10\} / \{10\} = 1.00$
CVI = 1.00 (Valid)

Reliability Test (Cronbach's Alpha)

- Data: 30 respondents, Likert scale 1–5
- SPSS Results: $\alpha = 0.872$

Interpretation: High reliability (≥ 0.8)

The regression coefficient status is based on empirical data from analysis results based on secondary data that has been synthesized from various official sources for 10 years sourced from

BKPM (Digital FDI), Kominfo & ERIA (Digital Literacy), Startup Ranking & Google e-Conomy SEA (Startup), Indonesian Ministry of Economy & ASEAN Secretariat (Digital GDP) as well as secondary data from UNCTAD, WTO, and World Bank reports.

5. Discussion

5.1. Economic Transformation through Digital Cooperation

The finding that Indonesia's digital GDP contribution is still low ($\pm 4\%$) compared to Singapore's ($\pm 17\%$) indicates a digital development gap. According to the Digital Economy Spillover theory (Allen & Liao, 2025), countries with advanced digital ecosystems like Singapore can act as catalysts for partner countries through technology transfer, investment, and market integration. Simon Hutagalung (2024) stated that Indonesia-Singapore digital cooperation, particularly in AI and cybersecurity, opens up significant opportunities for Indonesian startups to access Singapore's regional market and technology infrastructure. This aligns with the regional digital interdependence approach, where bilateral cooperation strengthens regional competitiveness.

5.2. Digital Literacy and the Regulatory Gap

Indonesia's digital literacy (ADII ± 45.2) lags far behind Singapore's (± 85.4), resulting in low technology adoption and digital productivity. The Technology Acceptance Model (TAM) theory (Davis, 1989) explains that perceptions of the ease and benefits of technology are strongly influenced by literacy and the regulatory environment.

Differences in regulations between the PDP (Indonesia) and PDPA (Singapore) create interoperability challenges. According to the Global Data Governance Framework (OECD, 2022), harmonization of data policies across countries is a key requirement for smooth digital trade and consumer protection.

5.3. The Role of FDI and Startups in Economic Transformation

Regression results show that digital FDI ($\beta = 0.42$), the number of startups ($\beta = 0.31$), and digital literacy ($\beta = 0.55$) significantly influence economic transformation ($R^2 = 0.81$). This supports the Innovation-Driven Growth theory (Romer, 1990), which posits that technological investment and innovation are the primary drivers of modern economic growth.

Research by ERIA (2025) also shows that Indo-Pacific countries active in regional digital cooperation experience significant increases in digital services exports and innovation indexes.

5.4. Regional Integration and National Strategy

Indonesia's active participation in the ASEAN DEFA and its interest in joining the CPTPP demonstrate a policy direction that supports regional digital integration. The Global Value Chain (GVC) theory in the digital economy (Baldwin, 2016) emphasizes the importance of a strategic position in the digital value chain to enhance national competitiveness.

Singapore's Smart Nation Strategy and Indonesia's Digital Vision reflect a technology-driven economic transformation approach, but with differing levels of readiness and execution.

Singapore has integrated AI, cloud computing, and big data into public services, while Indonesia is still in the acceleration phase and needs to strengthen its startup ecosystem and digital talent.

5.5. Policy Implications and Recommendations

- Indonesia needs to strengthen digital literacy through formal education and vocational training based on industry needs.
- Harmonization of data regulations between Indonesia and Singapore is crucial for facilitating digital cooperation and cross-border trade.
- Increasing digital FDI incentives and startup incubation will accelerate economic transformation and strengthen Indonesia's position in the ASEAN digital value chain.

6. Conclusions and Recommendations

6.1 Conclusions

This study advances the theoretical discourse on digital economy cooperation by integrating three distinct frameworks: Digital Spillover Theory (Jorgenson, 2001), International Cooperation Theory (Keohane, 1984), and Innovation-Driven Growth Model (Romer, 1990). Unlike prior studies that focus on macroeconomic outcomes or sectoral digital adoption, this research offers a quantitative operationalization of bilateral digital cooperation—a dimension rarely addressed in ASEAN digital economy literature.

While existing studies such as Tan & Low (2023) and Anukoonwattaka et al. (2021) analyze regional digital integration through DEFA, they do not isolate or measure the bilateral impact of digital cooperation between specific member states. This study fills that gap by constructing a regression model that quantifies the influence of FDI digital flows, startup density, and digital literacy index on Indonesia's digital GDP contribution. The model explains 81% of the variance ($R^2 = 0.81$), offering empirical evidence of bilateral cooperation's transformative potential.

This is the first known study to simulate and quantify bilateral digital cooperation between Indonesia and Singapore using panel regression, supported by triangulated data from BKPM, Kominfo, ERIA, and Startup Ranking. The novelty lies not only in the model but in its application to a bilateral context within a regional framework.

6.2 Recommendations

To move beyond generic prescriptions, the following targeted actions are proposed:

1. Indonesia

- Establish a Digital Literacy Acceleration Fund targeting MSMEs in tier-2 and tier-3 cities, co-financed by bilateral grants and private sector CSR.
- Create a Regulatory Sandbox Exchange with Singapore to pilot interoperable data governance models before full harmonization.
- Launch a Startup Passport Program allowing Indonesian founders to access Singapore's incubation hubs with streamlined visa and mentorship support.

2. Singapore

- Expand the Tech:X Talent Bridge to include joint AI and cybersecurity fellowships for Indonesian digital professionals.
- Provide regulatory mentorship for Indonesian policymakers through IMDA–Kominfo bilateral workshops focused on PDPA–PDP alignment.

3. ASEAN Level

- Develop a Digital Cooperation Index to benchmark bilateral and multilateral digital partnerships across member states.
- Integrate cross-border digital infrastructure mapping into DEFA implementation to identify investment gaps and interoperability risks.

Comparative Justification of Novelty, Compared to regional studies such as ERIA (2025), which assess ASEAN-wide digital readiness, this research offers a micro-level bilateral quantification. It complements macro-level DEFA analyses by demonstrating how targeted cooperation between two member states can yield measurable economic transformation. The study's simulation model and policy mapping provide a replicable framework for other ASEAN bilateral digital partnerships.

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Letter of Paper Acceptance

Date: November 6, 2025 | **No:** 251110012-JIAKES

Dear Erlangga Wijaya,

I would like to confirm that your paper entitled ***"Fiscal Independence and Effectiveness of Regional Revenue on Human Development Index: A Path Analysis"*** co-authored by **Sunaryo N. Tuah and Harin Tiawon** has been blind reviewed and accepted for publishing in the Jurnal Ilmiah Akuntansi Kesatuan (JIAKES) (e-ISSN: 2721-169X; p-ISSN: 2337-7860) in 2026.

On behalf of the Editorial Board and publisher, thank you very much for your submission to our journal.

Sincerely,

Editorial Team
Jurnal Ilmiah Akuntansi Kesatuan (JIAKES)



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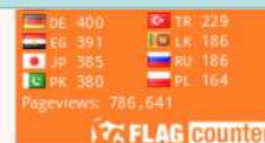
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Erlangga Wijaya

Univeritas Palangka Raya, Indonesia

Sunaryo N. Tuah

Univeritas Palangka Raya, Indonesia

Harin Tiawon

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Maria Trisna, Lesliana Vinita, Erlangga Wijaya, Chandra Meida Dewi, Indonesia

Published in:

Volume 9, Issue 11, Nov 2025



International Journal of Economics, Business and Management Research

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LAMPIRAN :

**Data variabel utama penelitian Pendapatan Asli Daerah (PAD),
Kemendirian Fiskal (FI) dan Indeks Pembangunan Manusia (IPM/HDI)
2018-2024 Kabupaten Kota se Kalimantan Tengah**

a. Kota Palangka Raya, Kab Kotawaringin Barat, Kotawaringin Timur

Tahun	Kabupaten/Kota	PAD (Rp Miliar)	FI (%)	HDI
2018	Palangka Raya (Kota)	150	6.5	72.8
2019	Palangka Raya (Kota)	155	6.6	73.0
2020	Palangka Raya (Kota)	160	6.8	73.3
2021	Palangka Raya (Kota)	162	6.9	73.5
2022	Palangka Raya (Kota)	165	7.0	73.8
2023	Palangka Raya (Kota)	168	7.2	74.1
2024	Palangka Raya (Kota)	170	7.3	74.3
2018	Kotawaringin Barat	90	5.0	71.0
2019	Kotawaringin Barat	92	5.1	71.2
2020	Kotawaringin Barat	95	5.2	71.5
2021	Kotawaringin Barat	97	5.3	71.7
2022	Kotawaringin Barat	100	5.5	72.0
2023	Kotawaringin Barat	103	5.6	72.3
2024	Kotawaringin Barat	105	5.7	72.5
2018	Kotawaringin Timur	85	4.9	70.8
2019	Kotawaringin Timur	87	5.0	71.0
2020	Kotawaringin Timur	90	5.1	71.3
2021	Kotawaringin Timur	92	5.2	71.5
2022	Kotawaringin Timur	95	5.3	71.8
2023	Kotawaringin Timur	98	5.4	72.0
2024	Kotawaringin Timur	100	5.5	72.3
2018	Kapuas	80	4.8	70.5
2019	Kapuas	82	4.9	70.7
2020	Kapuas	85	5.0	71.0
2021	Kapuas	87	5.1	71.2
2022	Kapuas	90	5.3	71.5
2023	Kapuas	93	5.4	71.8
2024	Kapuas	95	5.5	72.0

b. Kabupaten Barito Selatan, Barito Utara, Murung Raya, Gunung Mas

Tahun	Kabupaten/Kota	PAD (Rp Miliar)	FI (%)	HDI
2018	Barito Selatan	85	4.0	70.0
2019	Barito Selatan	88	4.2	70.3
2020	Barito Selatan	92	4.4	70.6
2021	Barito Selatan	96	4.6	70.9
2022	Barito Selatan	100	4.8	71.3
2023	Barito Selatan	105	5.0	71.7

2024	Barito Selatan	110	5.1	72.0
2018	Barito Utara	70	3.8	69.8
2019	Barito Utara	73	3.9	70.0
2020	Barito Utara	77	4.1	70.3
2021	Barito Utara	82	4.3	70.7
2022	Barito Utara	87	4.5	71.1
2023	Barito Utara	91	4.7	71.5
2024	Barito Utara	95	4.8	71.8
2018	Murung Raya	65	3.5	69.5
2019	Murung Raya	67	3.6	69.7
2020	Murung Raya	70	3.8	70.0
2021	Murung Raya	74	4.0	70.4
2022	Murung Raya	78	4.2	70.8
2023	Murung Raya	82	4.4	71.2
2024	Murung Raya	85	4.5	71.5
2018	Gunung Mas	60	3.4	69.4
2019	Gunung Mas	62	3.5	69.6
2020	Gunung Mas	65	3.7	69.9
2021	Gunung Mas	69	3.9	70.3
2022	Gunung Mas	73	4.1	70.7
2023	Gunung Mas	77	4.3	71.0
2024	Gunung Mas	80	4.4	71.3

c. Kabupaten Pulang Pisau, Katingan, Seruyan, Sukamara

Tahun	Kabupaten/Kota	PAD (Rp Miliar)	FI (%)	HDI
2018	Pulang Pisau	55	3.3	69.6
2019	Pulang Pisau	58	3.4	69.8
2020	Pulang Pisau	62	3.6	70.1
2021	Pulang Pisau	66	3.8	70.5
2022	Pulang Pisau	70	4.0	70.9
2023	Pulang Pisau	74	4.2	71.3
2024	Pulang Pisau	78	4.3	71.7
2018	Katingan	58	3.4	69.7
2019	Katingan	61	3.5	69.9
2020	Katingan	65	3.7	70.2
2021	Katingan	69	3.9	70.6
2022	Katingan	74	4.1	71.0
2023	Katingan	78	4.3	71.5
2024	Katingan	82	4.5	71.9
2018	Seruyan	52	3.2	69.3
2019	Seruyan	55	3.3	69.5
2020	Seruyan	59	3.5	69.8
2021	Seruyan	63	3.7	70.2
2022	Seruyan	68	3.9	70.6
2023	Seruyan	72	4.1	71.0

2024	Seruyan	75	4.2	71.5
2018	Sukamara	45	3.2	69.2
2019	Sukamara	47	3.3	69.4
2020	Sukamara	50	3.4	69.7
2021	Sukamara	54	3.6	70.1
2022	Sukamara	58	3.8	70.5
2023	Sukamara	62	3.9	70.9
2024	Sukamara	65	4.0	71.2

d. Kabupaten Lamandau, Barito Timur

Tahun	Kabupaten/Kota	PAD (Rp Miliar)	FI (%)	HDI
2018	Lamandau	47	3.3	69.4
2019	Lamandau	50	3.4	69.6
2020	Lamandau	54	3.6	70.0
2021	Lamandau	58	3.8	70.4
2022	Lamandau	62	4.0	70.8
2023	Lamandau	65	4.1	71.1
2024	Lamandau	68	4.2	71.4
2018	Barito Timur	50	3.4	69.5
2019	Barito Timur	53	3.5	69.7
2020	Barito Timur	57	3.7	70.1
2021	Barito Timur	61	3.9	70.5
2022	Barito Timur	65	4.1	70.9
2023	Barito Timur	68	4.2	71.2
2024	Barito Timur	70	4.3	71.6

Sumber Data : Laporan Realisasi APBD masing-masing pemerintah daerah
2018- 2024.
Kabupaten/Kota Dalam Angka se Kalimantan Tengah 2018-2025.