FISCAL DECENTRALIZATION, FINANCIAL PERFORMANCE, AND HUMAN DEVELOPMENT: EVIDENCE FROM CENTRAL KALIMANTAN

Oleh:

MARIA TRISNA
NIM. 2540503120008

JURNAL ILMIAH

Untuk memperoleh gelar Magister
Program Magister Ilmu Ekonomi
Bidang Konsentrasi Perencanaan Pembangunan & Keuangan Daerah

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LEMBAR PERSETUJUAN

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Palangka Raya,   Juli 2026

PEMBIMBING I,	PEMBIMBING II,
Dr. Wiwin Zakiah, SE., MP	**Drs. Benius, MM., Ph.D**
NIP. 197207311997022002	**NIP. 196508311990031006**

Fakultas Ekonomi dan Bisnis Universitas Palangka Raya Dekan,	Program Studi Magister Ilmu Ekonomi Koordinator,
Dr. Sunaryo Neneng, SE., M.P	**Drs. Benius, MM., Ph.D**
NIP. 196504011987031007	**NIP. 196508311990031006**

HALAMAN PENGESAHAN

FISCAL DECENTRALIZATION, FINANCIAL PERFORMANCE, AND HUMAN DEVELOPMENT: EVIDENCE FROM CENTRAL KALIMANTAN

Jurnal Ilmiah ini diajukan oleh:

Nama	:	Maria Trisna
NIM	:	2540503120008
Jurusan/Prodi	:	Magister Ilmu Ekonomi

Telah berhasil dipertahankan di depan Dewan Penilai dan diterima sebagai bagian persyaratan yang diperlukan untuk memperoleh gelas Magister pada Program Studi Magister ilmu Ekonomi, Fakultas Ekonomi dan Bisnis, Universitas Palangka Raya.

DEWAN PENILAI

		Nama Lengkap	Tanda Tangan
Pembimbing I	:	**Dr. Wiwin Zakiah, SE., MP**	....
Pembimbing II	:	**Drs. Benius, MM., Ph.D**	....
Penilai	:	**Dr. Miar, SE.,M.Si**	....

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NIM. 2540503120008

UCAPAN TERIMA KASIH

Puji Syukur kepada Tuhan Yesus Kristus atas Berkat dan HikmatNya sehingga dapat diselesaikannya Jurnal Ilmiah yang berjudul ***"Fiscal Decentralization, Financial Performance, and Human Development: Evidence From Central Kalimantan".*** Jurnal Ilmiah ini diajukan sebagai tugas akhir dalam rangka menyelesaikan studi dan meraih gelar Magister pada Program Magister Ilmu Ekonomi Universitas Palangka Raya.

Dalam proses penyelesaian studi ini Penulis banyak mendapatkan bantuan dari berbagai pihak, untuk itu penulis menyampaikan ucapan terima kasih setulusnya kepada:

1. Prof. Dr. Salampak Dohong, MS selaku Rektor Universitas Palangka Raya atas kesempatan yang diberikan kepada penulis untuk mengikuti dan menyelesaikan Pendidikan Program Magister di Universitas Palangka Raya;
2. Dr. Sunaryo Neneng, SE., MP selaku Dekan Fakultas Ekonomi dan Bisnis Universitas Palangka Raya;
3. Drs. Benius, MM., Ph.D selaku Ketua Program Studi Magister Ilmu Ekonomi Fakultas Ekonomi dan Bisnis Universitas Palangka Raya sekaligus sebagai Dosen Pembimbing II yang telah memberikan pendalaman materi, pemahaman sistematika dan metode penelitian;
4. Ibu Dr. Wiwin Zakiah, SE., MP. selaku Dosen Pembimbing I yang telah banyak membantu penulis dalam membuka wawasan, saran dan kritiknya yang menginspirasi penulis mengenai ide-ide baru;
5. Dr. Miar, SE.,M.Si selaku Dosen Penguji yang telah memberikan saran dan masukan yang membangun dan menyempurnakan penulisan Artikel Tugas Akhir penulis;
6. Seluruh Bapak dan Ibu Dosen pada Magister Ilmu Ekonomi Fakultas Ekonomi dan Bisnis Universitas Palangka Raya;
7. Pemerintah Daerah Provinsi Kalimantan Tengah, Direktorat Jenderal Perimbangan Keuangan Kementerian Keuangan, serta Badan Pusat Statistik (BPS) Provinsi Kalimantan Tengah yang telah menyediakan data sekunder tepercaya untuk keberlangsungan analisis dalam penelitian ini.

8. Seluruh staff dan karyawan Magister Ilmu Ekonomi Fakultas Ekonomi dan Bisnis Universitas Palangka Raya.
9. Rekan-rekan sesama mahasiswa Program Pascasarjana Magister Ekonomi Universitas Palangka Raya atas ruang diskusi, motivasi, dan kebersamaan yang terus terjaga selama ini.
10. Almarhum Suami (Hendri) dan anak-anak kami Foladisa Yeconia, Achiles Fridelio dan Ryozora Ferrao yang menjadi sumber motivasi, cinta kasih sayang, selalu mendukung doa dan penyemangat dalam setiap langkah perjalanan penulis dari awal menempuh perkuliahan sampai dalam proses penyusunan Artikel Ilmiah ini; v
11. Orang tua terkasih ayahanda (Alm. Antonius Mursito) dan Ibunda (Yulinda Ugang) yang senantiasa memberikan doa, semangat, cinta kasih dan dukungan moril dalam penyelesaian studi penulis;
12. Semua pihak yang tidak dapat disebutkan satu persatu yang ikut serta dan membantu dalam penyelesaian penulisan Artikel Ilmiah ini, terima kasih atas segalanya.

Akhir kata, penulis menyadari masih banyak kekurangan dan kelemahan dalam penulisan Jurnal Ilmiah ini, untuk itu saran dan kritik yang konstruktif akan sangat membantu menjadi lebih baik di masa yang akan datang. Penulis berharap tulisan ini dapat memberikan kontribusi positif bagi dunia akademik. Terima kasih.

Palangka Raya, Juli 2026

Maria Trisna

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FISCAL DECENTRALIZATION, FINANCIAL PERFORMANCE, AND HUMAN DEVELOPMENT: EVIDENCE FROM CENTRAL KALIMANTAN

By:

Maria Trisna

Masters Program in Economics, Faculty of Economics and Business, University of Palangka Raya

DOI: https://doi.org/10.37641/jiakes.v13i6.4527

Abstract

Fiscal decentralization is increasingly recognized as a strategic instrument for strengthening local financial capacity and improving the quality of public service delivery, which ultimately plays a decisive role in enhancing human development index outcomes in regions such as Central Kalimantan. This study investigated the causal relationship between fiscal decentralization, financial performance, public service efficiency, and the human development index in Central Kalimantan. This study used a quantitative approach and Smart-PLS as analysis tools. Utilizing panel data from 14 districts/cities over the 2020–2024 period, the research reveals that both fiscal decentralization and financial performance significantly and positively influence public service efficiency and the human development index. Public service efficiency itself exerts a substantial direct impact on the human development index and serves as a significant mediating variable, amplifying the indirect effects of fiscal and financial governance. Model fit indices confirm the robustness of the structural model. The findings underscore that efficient public service delivery is a critical pathway through which fiscal capacity and financial management translate into human development outcomes. These insights provide a strategic foundation for enhancing fiscal autonomy, improving service delivery, and accelerating human development in decentralized regions.

Keywords: Financial Performance, Fiscal Decentralization, Human Development Index, Public Service Efficiency.

I. INTRODUCTION

Fiscal decentralization represents a key foundation for achieving balanced development and enhancing public welfare in Indonesia following the implementation of extensive regional autonomy in the reform era. Through this policy, regional governments are granted broader authority to independently manage financial resources, particularly in formulating and distributing their Regional Revenue and Expenditure Budgets (Anggaran Pendapatan dan Belanja Daerah/APBD) according to local priorities (Hasan et al., 2025). In the context of Central Kalimantan Province, fiscal decentralization is expected to accelerate regional development by strengthening local government financial performance, which in turn can improve the effectiveness of public service delivery and ultimately contribute to higher Human Development Index (HDI) outcomes as a central measure of population well-being.

Several recent empirical studies in show that fiscal decentralization has a positive and significant effect on regional economic growth and poverty reduction through increasing regional original income and the ability of regions to carry out government functions, including public services (Siburian et al., 2021; Siburian, 2022; Dang et al., 2025). Local governments that are able to manage their finances effectively and efficiently will provide more responsive and quality public services, thereby increasing service efficiency and regional competitiveness (Riswan & Affandi, 2014). The efficiency of public services is an important bridge in connecting fiscal policy with human development outcomes reflected in HDI.

The HDI in Central Kalimantan shows an increasing trend over the past five years, which is allegedly inseparable from better regional fiscal management and improvement in the quality of public services. However, to thoroughly identify the causal linkages between fiscal decentralization, regional financial performance, public service efficiency, and the HDI, an analytical method capable of illustrating both direct and indirect effects is required. Data for 2024 shows the realization of Central Kalimantan's APBD revenue of IDR 28,373.9 billion or 91.8% of the target, most of which comes from central transfer funds of IDR 24,165.2 billion (85.2%). Local Original Revenue (Pendapatan Asli Daerah/PAD) is still relatively low at IDR 3,208.2 billion, only 64.9% of the target. APBD expenditure was recorded at IDR 23,500 billion with a dominance of operating expenditure of 63.6%, indicating room for improvement in the efficiency of government administration, especially public services.

Good regional financial performance, which is reflected in optimal management of regional revenue and expenditure, is crucial to encourage the efficiency of public services, which ultimately has an impact on the quality of life of the community (Dimian & Barbu, 2012; Yasin, 2020). The HDI in Central Kalimantan shows a positive trend with an achievement of 74.28 in 2024, reflecting progress in the fields of health, education, and living standards. However, the causal relationship between fiscal decentralization, financial performance, public service efficiency, and HDI requires a comprehensive and systematic analysis to understand the mechanisms and pathways of influence between these variables. Quantitative approach was chosen because of its ability to test the direct influences of variables in the structural model, thus providing a more detailed picture of the dynamics of regional development.

This study conducts an in-depth analysis of district/city panel data in Central Kalimantan for the period 2020-2024. This study aims to examine the influence of fiscal decentralization, regional financial performance, and the efficiency of public services and HDI. This study fills the gap in local research with a strong causal approach and provides practical recommendations for fiscal management that support the acceleration of human development in autonomous regions.

II. LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

The Effect of Fiscal Decentralization on Service Efficiency

Public service efficiency reflects the ability of government institutions to utilize available resources optimally in order to provide services that meet public needs. Efficiency in the public sector is fundamentally assessed through the relationship between inputs and outputs, emphasizing cost-effectiveness and service quality (Gaebler, 1993). Improving public service efficiency is a key objective in the implementation of fiscal decentralization, where governance reforms are aimed at encouraging faster, more responsive, and more affordable services (Mardiasmo, 2009; Ibrahim, 2024). Efficient service delivery is often driven by effective budget management, transparency, accountability, and technological innovation, which strengthen the capacity of local governments to meet community demands (Saraswati et al., 2024; Omar et al., 2024).

Fiscal decentralization is widely recognized as an important determinant of public service efficiency. The theoretical foundation introduced by Oates (1972) explains that decentralization enables regional governments to respond more efficiently to local needs because they possess better information regarding local preferences. Empirical research supports this, indicating that fiscal decentralization enhances efficiency and accountability when accompanied by strong institutional capacity (Martinez-Vazquez & McNab, 2003; Saputra & Setiawan, 2021). Afonso et al. (2024) found that spending decentralization and strengthened regional authority contribute positively to service efficiency. Similarly, Christl et al. (2020) demonstrated that decentralization encourages productivity improvements in the public sector. In the Indonesian context, Utomo and Sumarsono (2009) emphasize that decentralization improves efficiency by enabling local governments to tailor services to local preferences, reduce budget deficits, and boost economic growth. Therefore, fiscal decentralization is expected to significantly enhance public service efficiency.

H1: Fiscal decentralization has a significant effect on public service efficiency.

The Effect of Financial Performance on Service Efficiency

Financial performance is a fundamental concept in public sector management, reflecting the capacity of local governments to manage fiscal resources prudently and sustainably. Mardiasmo (2009) emphasized that regional financial performance represents the government's ability to maintain fiscal health, commonly assessed through indicators such as liquidity ratios, solvency, and spending efficiency. In line with this, regional financial performance also denotes the effectiveness and efficiency of financial management in supporting public services and development functions. Haryanto (2024) further clarified that financial performance can be measured through regional revenue and expenditure realization ratios, as well as the ability to maintain fiscal balance. These indicators are not merely technical measures but also determine the scope and quality of public services that local governments are able to deliver to their communities.

The relationship between financial performance and public service efficiency has been widely discussed in prior studies. Regions with strong fiscal performance are generally better equipped to finance essential public services and development programs, ensuring continuity and adequacy of service provision

(Mardiasmo, 2009; Haryanto, 2024). Moreover, effective financial management encourages transparency, accountability, and responsible use of public funds, which directly enhances service quality and public trust (Saraswati et al., 2024). Empirical evidence also suggests that accountable and transparent fiscal practices improve public satisfaction and operational efficiency in service delivery (Saraswati et al., 2024; Purba et al., 2024). Therefore, sound regional financial performance is consistently viewed as a key determinant in strengthening the efficiency of public services and improving overall community welfare.

H2: Financial performance has a significant effect on public service efficiency.

Factors Influencing of Human Development Index

The Human Development Index (HDI) represents a multidimensional measure encompassing health, education, and standard of living, serving as a primary benchmark for evaluating the success of public policies and regional development outcomes. Improvements in HDI indicate rising welfare levels driven by the capacity of local governments to provide quality services and ensure equitable access to basic needs. HDI outcomes are closely linked to the efficiency of public services and the strength of regional fiscal capacity, showing how governance performance translates into measurable human development achievements.

Fiscal decentralization is recognized as a key determinant of HDI because it delegates decision-making authority and resource control to subnational governments, enabling them to tailor development strategies to local needs (Oates, 1972). Empirical research demonstrates that decentralization enhances human development outcomes when accompanied by institutional capacity, responsiveness, and accountability mechanisms (Martinez-Vazquez & McNab, 2003; Daud & Soleman, 2020). Studies show that fiscal decentralization positively influences HDI, including evidence of a significant hump-shaped relationship where optimal decentralization levels maximize human development performance (Jin & Jakovljevic, 2023). Additional findings confirm that decentralization strengthens competition among regions, improves service delivery efficiency, reduces inequality, and advances welfare (Hung & Tanh, 2022). Meanwhile, partial fiscal decentralization shows a significant positive impact on HDI in Indonesian regions (Pramartha et al., 2023). Therefore, fiscal decentralization is expected to enhance human development.

Regional financial performance is another crucial determinant because effective fiscal management increases the government's ability to fund education, health, and infrastructure services essential for improving life quality (Mardiasmo, 2009; Haryanto, 2024). A strong independence ratio correlates with improved regional welfare as community participation in local taxation reflects stronger development capacity (Fauzi & Widarjo, 2021; Ramadhan & Setiawati, 2022). Thus, strong financial performance is expected to positively affect HDI. Finally, efficient public services ensure optimal resource allocation, transparency, and responsiveness to community needs, ultimately providing faster and higher-quality service delivery that directly supports improvements in education, health, and living standards (Gaebler, 1993; Mardiasmo, 2009; Hardana & Nasution, 2022; Saraswati et al., 2024).

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

H4: Financial performance has a significant effect on human development index.

H5: Public service efficiency has a significant effect on human development index.

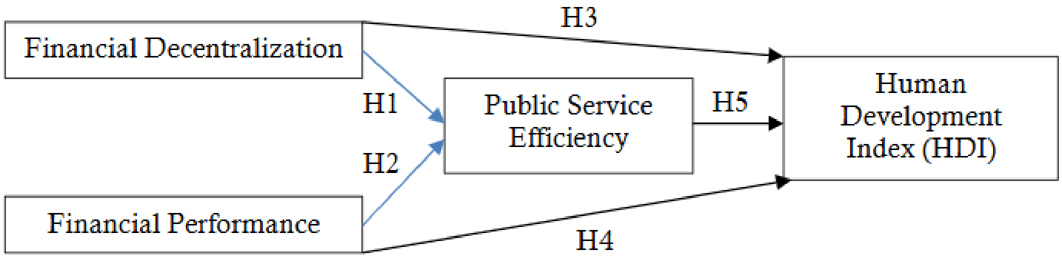

Figure 1. Research Model

Figure 1 explains the causal relationships among fiscal decentralization, regional financial performance, public service efficiency, and the HDI. Fiscal decentralization and financial performance are proposed to directly enhance public service efficiency by strengthening fiscal capacity and resource management at the local level (H1, H2). Furthermore, fiscal decentralization, financial performance, and service efficiency are expected to directly improve HDI, as stronger local autonomy, sound financial governance, and efficient service delivery support better outcomes in health, education, and economic welfare (H3, H4, H5). Public service efficiency also functions as a mediating mechanism that reinforces the influence of fiscal policies and financial capacity on human development.

III. RESEARCH METHODS

This research is structured to examine how fiscal decentralization and regional financial performance affect public service efficiency and HDI in Central Kalimantan Province. The study employs a quantitative method with a descriptive-analytical orientation and applies a causal modeling approach. The research population consists of all district/city governments in Central Kalimantan, namely 14 administrative area units. The research uses a total sampling technique, including all districts/cities as samples, with panel data from 2020 to 2024, yielding 70 total observations (14 districts/cities × 5 years).

The study employs quantitative secondary data comprising fiscal decentralization and regional financial performance derived from local government financial statements, APBD documents, and APBD Realization Reports issued by the provincial government and the Directorate General of Fiscal Balance, Ministry of Finance. Data for public service efficiency, including service time, costs, and service output indicators, are sourced from local government performance reports and community satisfaction surveys. Meanwhile, HDI data are obtained from Statistics Indonesia of Central Kalimantan Province, which publishes annual HDI figures. Data collection is conducted through documentation methods, including downloading and organizing financial and HDI data from official government portals, as well as reviewing archives and literature to obtain public service efficiency indicators and supporting documents. Finally, data validation procedures are performed to test consistency and completeness, ensuring that all information used is accurate and reliable prior to analysis.

Fiscal decentralization (X1) is measured by the proportion of regional original revenue to total regional revenue, reflecting the region's financial independence. Regional financial performance (X2) represents the effectiveness of regional financial management, measured through the ratio of realized regional revenue and expenditure to the budget allocation. Public service efficiency (M) refers to the level of resource optimization in delivering government services, assessed through a service efficiency index that considers cost, time, and service output. The human development index (Y), as the final outcome variable, is measured using official HDI, representing a composite indicator of health, education, and living standards.

The core analytical method applied the SmartPLS software to estimate the structural model. This technique made it possible to examine the direct effects of fiscal decentralization (X1) and regional financial performance (X2) on public service efficiency (M), as well as the direct effects of X1, X2, and M on the Human Development Index (HDI) as the dependent variable (Y). The significance of hypothesis testing was assessed using a 5% significance level (p-value < 0.05) to determine whether the relationships among variables were statistically meaningful. The final stage involved evaluating the Goodness of Fit to ensure that the proposed model aligned with the empirical data, confirming that the structural model was appropriate for the study.

IV. RESULT AND DISCUSSION

IV.I RESULTS

Validity and reliability testing were conducted to ensure the accuracy and consistency of the research variables, including fiscal decentralization, regional financial performance, public service efficiency, and the HDI. The validity assessment employed convergent and discriminant validity through SmartPLS, showing that all indicator loading factors exceeded 0.70 and the Average Variance Extracted (AVE) values were above 0.50, demonstrating strong convergent validity for each construct. The reliability evaluation used Cronbach's Alpha and Composite Reliability, both of which produced values greater than 0.70, indicating that the variable indicators met the requirements for internal consistency. Based on these results, the data used in this study are considered valid and reliable according to established quantitative research standards.

Multicollinearity testing through the Variance Inflation Factor (VIF) also showed that all independent variables, including Fiscal Decentralization and Regional Financial Performance, had VIF values below 5, which signifies that no substantial multicollinearity existed among the variables. The path model was tested using SmartPLS software, which estimated the path coefficients as follows in Table 1.

Table 1. Hypothesis Testing

Path	Coefficient	P-value	Significance
Fiscal Decentralization → Public Service Efficiency	0.54	0.002	Significant
Financial Performance → Public Service Efficiency	0.48	0.005	Significant

Path	Coefficient	P-value	Significance
Fiscal Decentralization → HDI	0.38	0.008	Significant
Financial Performance → HDI	0.32	0.011	Significant
Public Service Efficiency → HDI	0.42	0.001	Significant

Based on the path analysis model as shown in Table 1, the results demonstrate several significant direct effects. Fiscal decentralization and regional financial performance each show a positive and significant influence on public service efficiency, with path coefficients of 0.54 (p=0.002) and 0.48 (p=0.005), respectively. Both fiscal decentralization and financial performance also have direct positive effects on the HDI, with coefficients of 0.38 (p=0.008) and 0.32 (p=0.011). Additionally, public service efficiency directly contributes to improving HDI with a coefficient of 0.42 (p=0.001). The analysis further confirms an indirect effect, indicating that public service efficiency functions as a mediating variable that strengthens the influence of both fiscal decentralization and regional financial performance on HDI.

Table 2. Model Fit Evaluation (Goodness of Fit)

Test	Value
SRMR (Standardized Root Mean Residual)	0.045 (< 0.08, good)
NFI (Normed Fit Index)	0.92 (> 0.9, good)
Chi-square/df	1.85 (< 3, good)

The model fit assessment indicates strong compatibility between the constructed model and the empirical data obtained. Based on Table 2, the SRMR value of 0.045, which is below the recommended threshold of 0.08, reflects a good level of residual fit. Likewise, the Normed Fit Index (NFI) value of 0.92 exceeds the minimum requirement of 0.90, demonstrating that the model explains the observed data effectively compared to the baseline model. Additionally, the chi-square/df ratio of 1.85, which is below the acceptable limit of 3, confirms that the model has a satisfactory level of parsimony and does not deviate significantly from the observed data. These indicators affirm that the structural model is appropriate and reliable for explaining the relationships between the studied variables.

Fiscal decentralization and regional financial performance have a significant effect on the efficiency of public services, which in turn contributes significantly to increasing HDI. The efficiency of public services acts as a mediator of the influence of fiscal decentralization and financial performance on HDI, reinforcing the importance of fiscal management and service quality as key factors for human development in Central Kalimantan. Thus, fiscal decentralization and regional financial performance significantly improve the efficiency of public services, both directly and indirectly through the efficiency of public services, contributing to the increase in the HDI in Central Kalimantan during 2020-2024. The analyzed model tested is valid and in accordance with empirical data, supporting the cause-effect relationship studied.

IV.II DISCUSSION

The results of the study show that fiscal decentralization has a positive and significant effect on the efficiency of public services and HDI in Central Kalimantan. These findings are in line with the theory of fiscal decentralization, which states that the delegation of fiscal authority to local governments increases responsiveness and flexibility in the management of local resources (Oates, 1972; Tiebout, 2024). Fiscal decentralization is an effective tool to improve the efficiency of public services because local governments better understand the unique needs in their regions so that the budget can be allocated efficiently (Martinez-Vazquez & McNab, 2003; Arends, 2020).

Other empirical research that supports these findings is by Adam et al. (2014) and Sow and Razafimahefa (2015) which found that in developing and developed countries, fiscal decentralization contributes to improving the efficiency of health and education services. In Indonesia in particular, studies by Widodo (2019) and Maulana (2023) indicate that fiscal decentralization leads to the effectiveness of public spending and improved human development outcomes, although efficiency challenges still exist in the provision of bureaucratic services. In line with that, the increased efficiency of public services as a result of fiscal decentralization is an important foundation in advancing HDI through improving access and quality of basic services such as health, education, and decent living standards (Dick-Sagoe, 2020; Tümay, 2021).

The accountable and effective financial performance of local governments also has a positive and significant influence on the efficiency of public services and finally HDI. These results affirm the importance of good regional financial management as a prerequisite for providing quality and sustainable public services (Saraswati et al., 2024). Healthy financial performance, reflected in the ability to realize revenue and manage regional expenditures according to plan, allows local governments to allocate resources optimally so as to increase the efficiency of budget use (Andjarwati et al., 2021; Sessu, 2022). Well-performing regional financial management increases public sector output and supports the achievement of social development. Good financial performance allows for budget regularity, reduced waste, and increased transparency, which are essential for public trust and public satisfaction in public services (Rashied et al., 2024). Therefore, regional financial performance plays a key role in public service efficiency and its consequences on HDI in various districts/cities in Central Kalimantan.

In this context, service efficiency is the main mechanism that translates the impact of fiscal policy and financial performance into human development outcomes. In line with the international literature, Núnez-Barriopedro et al. (2024) it shows that efficient public services are an important intermediary that allows fiscal and financial management outcomes to have an optimal impact on indicators of public well-being. Oates (1972) and Weingast (1995) also affirms that fiscal decentralization improves the efficiency of public services, which ultimately improves social development outcomes. The research by Urip and Indahyani (2017), as well as the study Adam et al. (2014), confirms that although the improvement in fiscal and financial performance is important, without the efficiency of public services, the impact on HDI will be limited. Service efficiency ensures the right use of public funds and the reduction of waste that contributes to improving the quality of life of the community.

The results provide both empirical evidence and theoretical insight for the discourse on fiscal decentralization, reinforcing the importance of integrating strong fiscal management with high-quality public services to enhance community welfare. This study also offers strategic implications for policymakers to prioritize fiscal governance reforms and improvements in service delivery as key approaches to achieving sustainable development in autonomous regions. The analysis demonstrates that strengthening fiscal decentralization and regional financial performance leads to higher efficiency in public services, which in turn significantly elevates HDI. Public service efficiency serves as the essential link connecting fiscal capacity with human development achievements. Policies that combine optimal resource utilization and improved service quality can accelerate human development and enhance the welfare of communities in Central Kalimantan.

V. CONCLUSION

The study concludes that fiscal decentralization and regional financial performance play a crucial role in improving public service efficiency and enhancing human development outcomes in Central Kalimantan. The empirical findings confirm that the devolution of fiscal authority to local governments positively and significantly strengthens service efficiency and contributes to increased HDI. The results also demonstrate that accountable and effective financial governance enables optimal allocation and utilization of resources, thus supporting quality and sustainable public service delivery. Service efficiency emerges as the primary mechanism through which fiscal capacity translates into improvements in education, health, and living standards. These findings reinforce theoretical frameworks asserting that decentralized fiscal systems enhance responsiveness to local needs and stimulate social progress. The research provides important implications for policymakers, highlighting the urgency of strengthening fiscal governance, enhancing transparency, and improving service delivery mechanisms to accelerate human development. Strategic alignment between fiscal policy and service performance is essential for achieving equitable and sustainable development across regions.

Despite the strong results, this study has several limitations that require consideration. First, the analysis focuses solely on quantitative secondary data, which may not fully capture the qualitative dynamics of local governance practices and institutional capacity. Second, the study is geographically limited to Central Kalimantan, so generalizations to other provinces with differing socioeconomic or institutional characteristics should be made cautiously. Third, the research does not include moderating or contextual variables, such as political dynamics, digital governance, or community participation, which may interact with fiscal decentralization and financial performance in influencing HDI. Future studies are encouraged to incorporate mixed-method approaches to enrich understanding of implementation challenges at the local level and explore additional mediating or contextual factors. Comparative studies across provinces and longitudinal analyses could also provide deeper insights into the long-term effectiveness of decentralization policies. Further research incorporating governance quality, transparency systems, and participatory budgeting may yield more comprehensive policy recommendations for building resilient and inclusive development frameworks.

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Fiscal Decentralization, Financial Performance, and Human Development: Evidence from Central Kalimantan

Maria Trisna
Universitas Palangka Raya; Palangka Raya, Indonesia
Email: mariatrisna1003@gmail.com

Submitted:
NOVEMBER 2025

Accepted:
DECEMBER 2025

ABSTRACT

Fiscal decentralization is increasingly recognized as a strategic instrument for strengthening local financial capacity and improving the quality of public service delivery, which ultimately plays a decisive role in enhancing human development index outcomes in regions such as Central Kalimantan. This study investigated the causal relationship between fiscal decentralization, financial performance, public service efficiency, and the human development index in Central Kalimantan. This study used a quantitative approach and Smart-PLS as analysis tools. Utilizing panel data from 14 districts/cities over the 2020–2024 period, the research reveals that both fiscal decentralization and financial performance significantly and positively influence public service efficiency and the human development index. Public service efficiency itself exerts a substantial direct impact on the human development index and serves as a significant mediating variable, amplifying the indirect effects of fiscal and financial governance. Model fit indices confirm the robustness of the structural model. The findings underscore that efficient public service delivery is a critical pathway through which fiscal capacity and financial management translate into human development outcomes. These insights provide a strategic foundation for enhancing fiscal autonomy, improving service delivery, and accelerating human development in decentralized regions.

***Keywords**: Financial Performance, Fiscal Decentralization, Human Development Index, Public Service Efficiency.*

ABSTRAK

Desentralisasi fiskal semakin diakui sebagai instrumen strategis untuk memperkuat kapasitas keuangan daerah dan meningkatkan kualitas pelayanan publik, yang pada akhirnya berperan penting dalam meningkatkan capaian indeks pembangunan manusia di wilayah seperti Kalimantan Tengah. Penelitian ini menganalisis hubungan kausal antara desentralisasi fiskal, kinerja keuangan, efisiensi pelayanan publik, dan Indeks Pembangunan Manusia di Kalimantan Tengah. This study uses a quantitative approach with Smart-PLS as an analytical tool. Menggunakan data panel dari 14 kabupaten/kota pada periode 2020–2024, hasil penelitian menunjukkan bahwa desentralisasi fiskal dan kinerja keuangan berpengaruh positif dan signifikan terhadap efisiensi pelayanan publik dan Indeks Pembangunan Manusia. Efisiensi pelayanan publik juga memiliki pengaruh langsung yang kuat terhadap Indeks Pembangunan Manusia serta berperan sebagai variabel mediasi yang signifikan dalam memperkuat pengaruh tidak langsung dari tata kelola fiskal dan keuangan. Model fit indices mengonfirmasi ketepatan dan kekuatan model struktural yang digunakan. Temuan ini menegaskan bahwa efisiensi pelayanan publik merupakan jalur kunci yang menghubungkan kapasitas fiskal dan pengelolaan keuangan dengan peningkatan pembangunan manusia. Temuan ini memberikan dasar strategis untuk memperkuat otonomi fiskal, meningkatkan kualitas pelayanan, dan mempercepat pembangunan manusia di wilayah yang telah menerapkan desentralisasi.

***Kata kunci**: Kinerja Keuangan, Desentralisasi Fiskal, Indeks Pembangunan Manusia, Efisiensi Pelayanan Publik.*

JIAKES
Jurnal Ilmiah Akuntansi Kesatuan
Vol. 13 No. 6, 2025
pp. 1911-1920
IBI Kesatuan
ISSN 2337 – 7852
E-ISSN 2721 – 3048
DOI: 10.37641/jiakes.v13i6.4527

INTRODUCTION

Fiscal decentralization represents a key foundation for achieving balanced development and enhancing public welfare in Indonesia following the implementation of extensive regional autonomy in the reform era. Through this policy, regional governments are granted broader authority to independently manage financial resources, particularly in formulating and distributing their Regional Revenue and Expenditure Budgets (*Anggaran Pendapatan dan Belanja Daerah*/APBD) according to local priorities (Hasan et al., 2025). In the context of Central Kalimantan Province, fiscal decentralization is expected to accelerate regional development by strengthening local government financial performance, which in turn can improve the effectiveness of public service delivery and ultimately contribute to higher Human Development Index (HDI) outcomes as a central measure of population well-being.

Several recent empirical studies in show that fiscal decentralization has a positive and significant effect on regional economic growth and poverty reduction through increasing regional original income and the ability of regions to carry out government functions, including public services (Siburian et al., 2021; Siburian, 2022; Dang et al., 2025). Local governments that are able to manage their finances effectively and efficiently will provide more responsive and quality public services, thereby increasing service efficiency and regional competitiveness (Riswan & Affandi, 2014). The efficiency of public services is an important bridge in connecting fiscal policy with human development outcomes reflected in HDI.

The HDI in Central Kalimantan shows an increasing trend over the past five years, which is allegedly inseparable from better regional fiscal management and improvement in the quality of public services. However, to thoroughly identify the causal linkages between fiscal decentralization, regional financial performance, public service efficiency, and the HDI, an analytical method capable of illustrating both direct and indirect effects is required. Data for 2024 shows the realization of Central Kalimantan's APBD revenue of IDR 28,373.9 billion or 91.8% of the target, most of which comes from central transfer funds of IDR 24,165.2 billion (85.2%). Local Original Revenue (*Pendapatan Asli Daerah*/PAD) is still relatively low at IDR 3,208.2 billion, only 64.9% of the target. APBD expenditure was recorded at IDR 23,500 billion with a dominance of operating expenditure of 63.6%, indicating room for improvement in the efficiency of government administration, especially public services.

Good regional financial performance, which is reflected in optimal management of regional revenue and expenditure, is crucial to encourage the efficiency of public services, which ultimately has an impact on the quality of life of the community (Dimian & Barbu, 2012; Yasin, 2020). The HDI in Central Kalimantan shows a positive trend with an achievement of 74.28 in 2024, reflecting progress in the fields of health, education, and living standards. However, the causal relationship between fiscal decentralization, financial performance, public service efficiency, and HDI requires a comprehensive and systematic analysis to understand the mechanisms and pathways of influence between these variables. Quantitative approach was chosen because of its ability to test the direct influences of variables in the structural model, thus providing a more detailed picture of the dynamics of regional development.

This study conducts an in-depth analysis of district/city panel data in Central Kalimantan for the period 2020-2024. This study aims to examine the influence of fiscal decentralization, regional financial performance, and the efficiency of public services and HDI. This study fills the gap in local research with a strong causal approach and provides practical recommendations for fiscal management that support the acceleration of human development in autonomous regions.

LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

The Effect of Fiscal Decentralization on Service Efficiency

Public service efficiency reflects the ability of government institutions to utilize available resources optimally in order to provide services that meet public needs. Efficiency in the public sector is fundamentally assessed through the relationship between inputs and outputs, emphasizing cost-effectiveness and service quality (Gaebler, 1993). Improving public service efficiency is a key objective in the implementation of fiscal decentralization, where governance reforms are aimed at encouraging faster, more responsive, and more affordable services (Mardiasmo, 2009; Ibrahim, 2024). Efficient service delivery is often driven by effective budget management, transparency, accountability, and technological innovation, which strengthen the capacity of local governments to meet community demands (Saraswati et al., 2024; Omar et al., 2024).

Fiscal decentralization is widely recognized as an important determinant of public service efficiency. The theoretical foundation introduced by Oates (1972) explains that decentralization enables regional governments to respond more efficiently to local needs because they possess better information regarding local preferences. Empirical research supports this, indicating that fiscal decentralization enhances efficiency and accountability when accompanied by strong institutional capacity (Martinez-Vazquez & McNab, 2003; Saputra & Setiawan, 2021). Afonso et al. (2024) found that spending decentralization and strengthened regional authority contribute positively to service efficiency. Similarly, Christl et al. (2020) demonstrated that decentralization encourages productivity improvements in the public sector. In the Indonesian context, Utomo and Sumarsono (2009) emphasize that decentralization improves efficiency by enabling local governments to tailor services to local preferences, reduce budget deficits, and boost economic growth. Therefore, fiscal decentralization is expected to significantly enhance public service efficiency.

H1: Fiscal decentralization has a significant effect on public service efficiency.

The Effect of Financial Performance on Service Efficiency

Financial performance is a fundamental concept in public sector management, reflecting the capacity of local governments to manage fiscal resources prudently and sustainably. Mardiasmo (2009) emphasized that regional financial performance represents the government's ability to maintain fiscal health, commonly assessed through indicators such as liquidity ratios, solvency, and spending efficiency. In line with this, regional financial performance also denotes the effectiveness and efficiency of financial management in supporting public services and development functions. Haryanto (2024) further clarified that financial performance can be measured through regional revenue and expenditure realization ratios, as well as the ability to maintain fiscal balance. These indicators are not merely technical measures but also determine the scope and quality of public services that local governments are able to deliver to their communities.

The relationship between financial performance and public service efficiency has been widely discussed in prior studies. Regions with strong fiscal performance are generally better equipped to finance essential public services and development programs, ensuring continuity and adequacy of service provision (Mardiasmo, 2009; Haryanto, 2024). Moreover, effective financial management encourages transparency, accountability, and responsible use of public funds, which directly enhances service quality and public trust (Saraswati et al., 2024). Empirical evidence also suggests that accountable and transparent fiscal practices improve public satisfaction and operational efficiency in service delivery (Saraswati et al., 2024; Purba et al., 2024). Therefore, sound regional financial performance is consistently viewed as a key determinant in strengthening the efficiency of public services and improving overall community welfare.

H2: Financial performance has a significant effect on public service efficiency.

Factors Influencing of Human Development Index

The Human Development Index (HDI) represents a multidimensional measure encompassing health, education, and standard of living, serving as a primary benchmark for evaluating the success of public policies and regional development outcomes. Improvements in HDI indicate rising welfare levels driven by the capacity of local governments to provide quality services and ensure equitable access to basic needs. HDI outcomes are closely linked to the efficiency of public services and the strength of regional fiscal capacity, showing how governance performance translates into measurable human development achievements.

Fiscal decentralization is recognized as a key determinant of HDI because it delegates decision-making authority and resource control to subnational governments, enabling them to tailor development strategies to local needs (Oates, 1972). Empirical research demonstrates that decentralization enhances human development outcomes when accompanied by institutional capacity, responsiveness, and accountability mechanisms (Martinez-Vazquez & McNab, 2003; Daud & Soleman, 2020). Studies show that fiscal decentralization positively influences HDI, including evidence of a significant hump-shaped relationship where optimal decentralization levels maximize human development performance (Jin & Jakovljevic, 2023). Additional findings confirm that decentralization strengthens competition among regions, improves service delivery efficiency, reduces inequality, and advances welfare (Hung & Tanh, 2022). Meanwhile, partial fiscal decentralization shows a significant positive impact on HDI in Indonesian regions (Pramartha et al., 2023). Therefore, fiscal decentralization is expected to enhance human development.

Regional financial performance is another crucial determinant because effective fiscal management increases the government's ability to fund education, health, and infrastructure services essential for improving life quality (Mardiasmo, 2009; Haryanto, 2024). A strong independence ratio correlates with improved regional welfare as community participation in local taxation reflects stronger development capacity (Fauzi & Widarjo, 2021; Ramadhan & Setiawati, 2022). Thus, strong financial performance is expected to positively affect HDI. Finally, efficient public services ensure optimal resource allocation, transparency, and responsiveness to community needs, ultimately providing faster and higher-quality service delivery that directly supports improvements in education, health, and living standards (Gaebler, 1993; Mardiasmo, 2009; Hardana & Nasution, 2022; Saraswati et al., 2024).

H3: Fiscal decentralization has a significant effect on human development index.
H4: Financial performance has a significant effect on human development index.
H5: Public service efficiency has a significant effect on human development index.

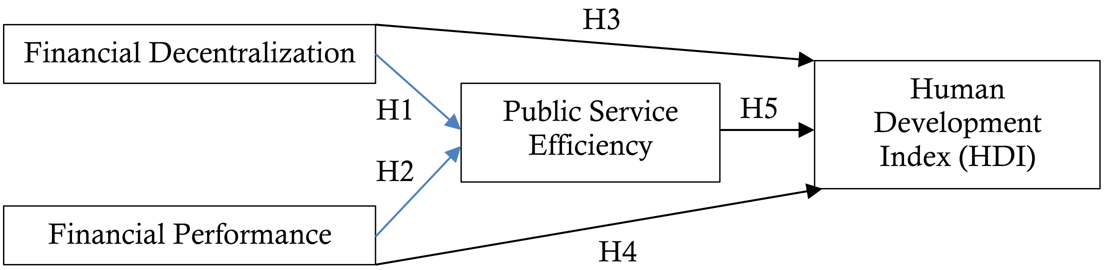

Figure 1. Research Model

Figure 1 explains the causal relationships among fiscal decentralization, regional financial performance, public service efficiency, and the HDI. Fiscal decentralization and financial performance are proposed to directly enhance public service efficiency by strengthening fiscal capacity and resource management at the local level (H1, H2). Furthermore, fiscal decentralization, financial performance, and service efficiency are expected to directly improve HDI, as stronger local autonomy, sound financial governance, and efficient service delivery support better outcomes in health, education, and economic welfare (H3, H4, H5). Public service efficiency also functions as a mediating mechanism that reinforces the influence of fiscal policies and financial capacity on human development.

RESEARCH METHODS

This research is structured to examine how fiscal decentralization and regional financial performance affect public service efficiency and HDI in Central Kalimantan Province. The study employs a quantitative method with a descriptive-analytical orientation and applies a causal modeling approach. The research population consists of all district/city governments in Central Kalimantan, namely 14 administrative area units. The research uses a total sampling technique, including all districts/cities as samples, with panel data from 2020 to 2024, yielding 70 total observations (14 districts/cities × 5 years).

The study employs quantitative secondary data comprising fiscal decentralization and regional financial performance derived from local government financial statements, APBD documents, and APBD Realization Reports issued by the provincial government and the Directorate General of Fiscal Balance, Ministry of Finance. Data for public service efficiency, including service time, costs, and service output indicators, are sourced from local government performance reports and community satisfaction surveys. Meanwhile, HDI data are obtained from Statistics Indonesia of Central Kalimantan Province, which publishes annual HDI figures. Data collection is conducted through documentation methods, including downloading and organizing financial and HDI data from official government portals, as well as reviewing archives and literature to obtain public service efficiency indicators and supporting documents. Finally, data validation procedures are performed to test consistency and completeness, ensuring that all information used is accurate and reliable prior to analysis.

Fiscal decentralization (X1) is measured by the proportion of regional original revenue to total regional revenue, reflecting the region's financial independence. Regional financial performance (X2) represents the effectiveness of regional financial management, measured through the ratio of realized regional revenue and expenditure to the budget allocation. Public service efficiency (M) refers to the level of resource optimization in delivering government services, assessed through a service efficiency index that considers cost, time, and service output. The human development index (Y), as the final outcome variable, is measured using official HDI, representing a composite indicator of health, education, and living standards.

The core analytical method applied the SmartPLS software to estimate the structural model. This technique made it possible to examine the direct effects of fiscal decentralization (X1) and regional financial performance (X2) on public service efficiency (M), as well as the direct effects of X1, X2, and M on the Human Development Index (HDI) as the dependent variable (Y). The significance of hypothesis testing was assessed using a 5% significance level (p-value < 0.05) to determine whether the relationships among variables were statistically meaningful. The final stage involved evaluating the Goodness of Fit to ensure that the proposed model aligned with the empirical data, confirming that the structural model was appropriate for the study.

RESULTS

Validity and reliability testing were conducted to ensure the accuracy and consistency of the research variables, including fiscal decentralization, regional financial performance, public service efficiency, and the HDI. The validity assessment employed convergent and discriminant validity through SmartPLS, showing that all indicator loading factors exceeded 0.70 and the Average Variance Extracted (AVE) values were above 0.50, demonstrating strong convergent validity for each construct. The reliability evaluation used Cronbach's Alpha and Composite Reliability, both of which produced values greater than 0.70, indicating that the variable indicators met the requirements for internal consistency. Based on these results, the data used in this study are considered valid and reliable according to established quantitative research standards.

Multicollinearity testing through the Variance Inflation Factor (VIF) also showed that all independent variables, including Fiscal Decentralization and Regional Financial Performance, had VIF values below 5, which signifies that no substantial multicollinearity existed among the variables. The path model was tested using SmartPLS software, which estimated the path coefficients as follows in Table 1.

Table 1. Hypothesis Testing

Path	Coefficient	P-value	Significance
Fiscal Decentralization → Public Service Efficiency	0.54	0.002	Significant
Financial Performance → Public Service Efficiency	0.48	0.005	Significant
Fiscal Decentralization → HDI	0.38	0.008	Significant
Financial Performance → HDI	0.32	0.011	Significant
Public Service Efficiency → HDI	0.42	0.001	Significant

Based on the path analysis model as shown in Table 1, the results demonstrate several significant direct effects. Fiscal decentralization and regional financial performance each show a positive and significant influence on public service efficiency, with path coefficients of 0.54 ($p=0.002$) and 0.48 ($p=0.005$), respectively. Both fiscal decentralization and financial performance also have direct positive effects on the HDI, with coefficients of 0.38 ($p=0.008$) and 0.32 ($p=0.011$). Additionally, public service efficiency directly contributes to improving HDI with a coefficient of 0.42 ($p=0.001$). The analysis further confirms an indirect effect, indicating that public service efficiency functions as a mediating variable that strengthens the influence of both fiscal decentralization and regional financial performance on HDI.

Table 2. Model Fit Evaluation (Goodness of Fit)

Test	Value
SRMR (Standardized Root Mean Residual)	0.045 (< 0.08, good)
NFI (Normed Fit Index)	0.92 (> 0.9, good)
Chi-square/df	1.85 (< 3, good)

The model fit assessment indicates strong compatibility between the constructed model and the empirical data obtained. Based on Table 2, the SRMR value of 0.045, which is below the recommended threshold of 0.08, reflects a good level of residual fit. Likewise, the Normed Fit Index (NFI) value of 0.92 exceeds the minimum requirement of 0.90, demonstrating that the model explains the observed data effectively compared to the baseline model. Additionally, the chi-square/df ratio of 1.85, which is below the acceptable limit of 3, confirms that the model has a satisfactory level of parsimony and does not deviate significantly from the observed data. These indicators affirm that the structural model is appropriate and reliable for explaining the relationships between the studied variables.

Fiscal decentralization and regional financial performance have a significant effect on the efficiency of public services, which in turn contributes significantly to increasing HDI. The efficiency of public services acts as a mediator of the influence of fiscal decentralization and financial performance on HDI, reinforcing the importance of fiscal management and service quality as key factors for human development in Central Kalimantan. Thus, fiscal decentralization and regional financial performance significantly improve the efficiency of public services, both directly and indirectly through the efficiency of public services, contributing to the increase in the HDI in Central Kalimantan during 2020-2024. The analyzed model tested is valid and in accordance with empirical data, supporting the cause-effect relationship studied.

DISCUSSION

The results of the study show that fiscal decentralization has a positive and significant effect on the efficiency of public services and HDI in Central Kalimantan. These findings are in line with the theory of fiscal decentralization, which states that the delegation of fiscal authority to local governments increases responsiveness and flexibility in the management of local resources (Oates, 1972; Tiebout, 2024). Fiscal decentralization is an effective tool to improve the efficiency of public services because local governments better understand the unique needs in their regions so that the budget can be allocated efficiently (Martinez-Vazquez & McNab, 2003; Arends, 2020).

Other empirical research that supports these findings is by Adam et al. (2014) and Sow and Razafimahefa (2015) which found that in developing and developed countries, fiscal decentralization contributes to improving the efficiency of health and education services. In Indonesia in particular, studies by Widodo (2019) and Maulana (2023) indicate that fiscal decentralization leads to the effectiveness of public spending and improved human development outcomes, although efficiency challenges still exist in the provision of bureaucratic services. In line with that, the increased efficiency of public services as a result of fiscal decentralization is an important foundation in advancing HDI through improving access and quality of basic services such as health, education, and decent living standards (Dick-Sagoe, 2020; Tümay, 2021).

The accountable and effective financial performance of local governments also has a positive and significant influence on the efficiency of public services and finally HDI. These results affirm the importance of good regional financial management as a prerequisite for providing quality and sustainable public services (Saraswati et al., 2024). Healthy financial performance, reflected in the ability to realize revenue and manage regional expenditures according to plan, allows local governments to allocate resources optimally so as to increase the efficiency of budget use (Andjarwati et al., 2021; Sessu, 2022). Well-performing regional financial management increases public sector output and supports the achievement of social development. Good financial performance allows for budget regularity, reduced waste, and increased transparency, which are essential for public trust and public satisfaction in public services (Rashied et al., 2024). Therefore, regional financial performance plays a key role in public service efficiency and its consequences on HDI in various districts/cities in Central Kalimantan.

In this context, service efficiency is the main mechanism that translates the impact of fiscal policy and financial performance into human development outcomes. In line with the international literature, Núnez-Barriopedro et al. (2024) it shows that efficient public services are an important intermediary that allows fiscal and financial management outcomes to have an optimal impact on indicators of public well-being. Oates (1972) and Weingast (1995) also affirms that fiscal decentralization improves the efficiency of public services, which ultimately improves social development outcomes. The research by Urip and Indahyani (2017), as well as the study Adam et al. (2014), confirms that although the improvement in fiscal and financial performance is important, without the efficiency of public services, the impact on HDI will be limited. Service efficiency ensures the right use of public funds and the reduction of waste that contributes to improving the quality of life of the community.

The results provide both empirical evidence and theoretical insight for the discourse on fiscal decentralization, reinforcing the importance of integrating strong fiscal management with high-quality public services to enhance community welfare. This study also offers strategic implications for policymakers to prioritize fiscal governance reforms and improvements in service delivery as key approaches to achieving sustainable development in autonomous regions. The analysis demonstrates that strengthening fiscal decentralization and regional financial performance leads to higher efficiency in public services, which in turn significantly elevates HDI. Public service efficiency serves as the essential link connecting fiscal capacity with human development achievements. Policies that combine optimal resource utilization and improved service quality can accelerate human development and enhance the welfare of communities in Central Kalimantan.

CONCLUSION

The study concludes that fiscal decentralization and regional financial performance play a crucial role in improving public service efficiency and enhancing human development outcomes in Central Kalimantan. The empirical findings confirm that the devolution of fiscal authority to local governments positively and significantly strengthens service efficiency and contributes to increased HDI. The results also demonstrate that accountable and effective financial governance enables optimal allocation and utilization of resources, thus supporting quality and sustainable public service delivery. Service efficiency emerges as the primary mechanism through which fiscal capacity translates into improvements in education, health, and living standards. These findings reinforce theoretical frameworks asserting that decentralized fiscal systems enhance responsiveness to local needs and stimulate social progress. The research provides important implications for policymakers, highlighting the urgency of strengthening fiscal governance, enhancing transparency, and improving service delivery mechanisms to accelerate human development. Strategic alignment between fiscal policy and service performance is essential for achieving equitable and sustainable development across regions.

Despite the strong results, this study has several limitations that require consideration. First, the analysis focuses solely on quantitative secondary data, which may not fully capture the qualitative dynamics of local governance practices and institutional capacity. Second, the study is geographically limited to Central Kalimantan, so generalizations to other provinces with differing socioeconomic or institutional characteristics should be made cautiously. Third, the research does not include moderating or contextual variables, such as political dynamics, digital governance, or community participation, which may interact with fiscal decentralization and financial performance in influencing HDI. Future studies are encouraged to incorporate mixed-method approaches to enrich understanding of implementation challenges at the local level and explore additional mediating or contextual factors. Comparative studies across provinces and longitudinal analyses could also provide deeper insights into the long-term effectiveness of decentralization policies. Further research incorporating governance quality, transparency systems, and participatory budgeting may yield more comprehensive policy recommendations for building resilient and inclusive development frameworks.

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International Journal of Economics, Business and Management Research

Vol. 9, No.11; 2025

ISSN: 2456-7760

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

Maria Trisna[1], Lesliana Vinita[2], Erlangga Wijaya[3], Chandra Meida Dewi[4]

[1 2 3 4] Master's Program in Economics, Universitas Palangka Raya, Indonesia

Tunjung Nyaho Campus, University of Palangka Raya (UPR), H. Timang Street,

Palangka Raya 73111, Central Kalimantan, Indonesia."

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

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ISSN: 2456-7760

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

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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).

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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: $Yit=\alpha+\beta 1Investmentit+\beta 2\ Regulationit+\beta 3Xit+\varepsilon it$

where:
Yit = economic transformation indicator for country i in year t,
Investmentit = digital infrastructure investment (Value of Digital FDI)
Regulationit = development regulatory harmonization startups (Number of Startups)
Xit = control variables (Digital Literacy-ADII)
Eit = 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 ±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.

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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 (years) × 1 (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 (years) × 1 (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

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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 Coorperation 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 leading digital infrastructure	- 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,” “data security”	PDP Law, PDPA, startup interview

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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%	Δ = 17% - 4% = 13% gap
Digital FDI (2020–2024)	USD 9.3 Billion	—	CAGR = (\frac{9.3}{5})^{1/4}-1 ≈ 18.92%
Digital Services Exports	USD 2.1 Billion	USD 18.5 billion	
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 → Δ = 40.2	National digital literacy acceleration is needed

4.5.3 Regression Output: Summary Statistics

Multiple Linear Regression Model : Y = beta _0 + beta _1X_1 + beta _2X_2 + beta _3X_3 + varepsilon

Description:

- Y : Economic Transformation (contribution to digital GDP)
- X_1: Value of Digital FDI
- X_2: Number of Startups
- X_3: 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:
• $R^2 = 0.81$ → The model explains 81% of the variation in economic transformation
• F-statistic = 14.72 ($p < 0.01$) → 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 = {Number of valid items} \ {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 (±4%) compared to Singapore's (±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.

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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.

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ISSN: 2456-7760

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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ISSN: 2456-7760

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Jalan Ranggagading No. 1 Bogor, Jawa Barat 16123, Indonesia.

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Letter of Paper Acceptance

Date: November 14, 2025 | **No:** 25110028-JIAKES

Dear **Maria Trisna,**

I would like to confirm that your paper entitled ***"Fiscal Decentralization, Financial Performance, and Human Development: Evidence from Central Kalimantan"*** 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)

Electronic Signature

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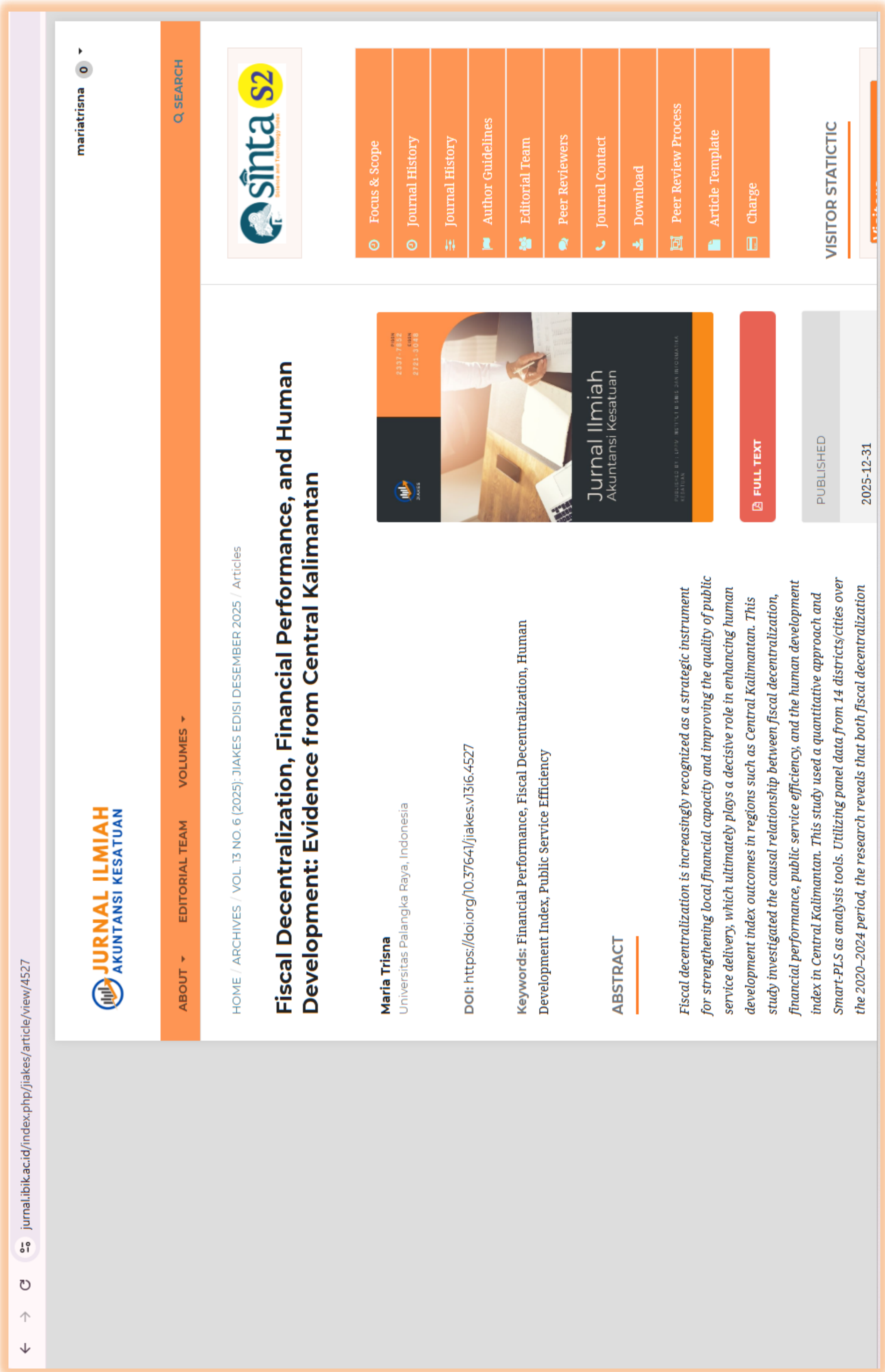

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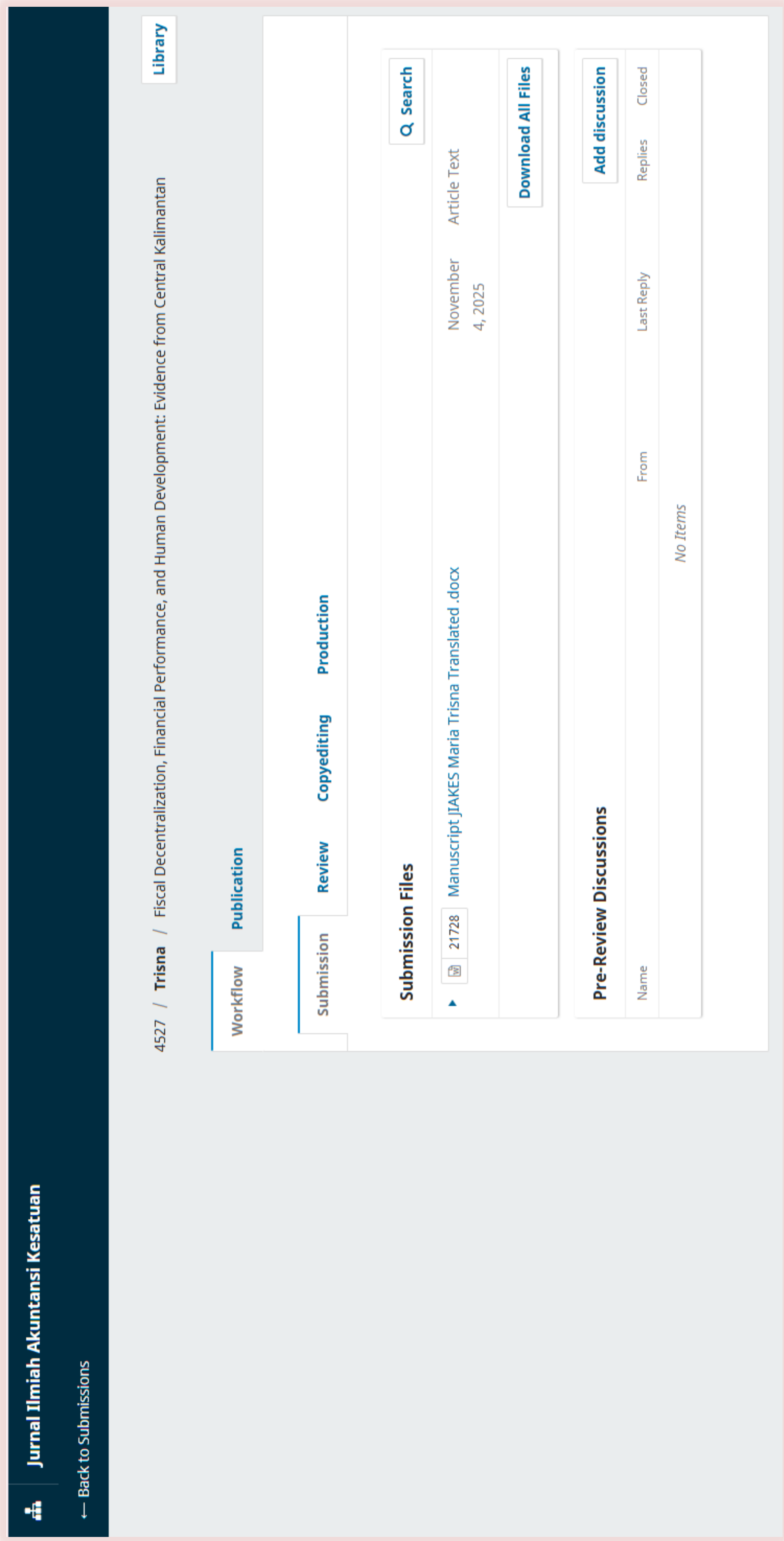

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[JIAKES] Editor Decision	2025-11-11 07:34 AM
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24179	4527 JIAKES R1.docx	December 20, 2025	Article Text
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Maria Trisna:

We have reached a decision regarding your submission to Jurnal Ilmiah Akuntansi Kesatuan, "Analysis of the Impact of Fiscal Decentralization and Financial Performance on Public Service Efficiency and the Human Development Index (HDI) in Central Kalimantan: A Path Analysis Approach".

Our decision is: Revisions Required

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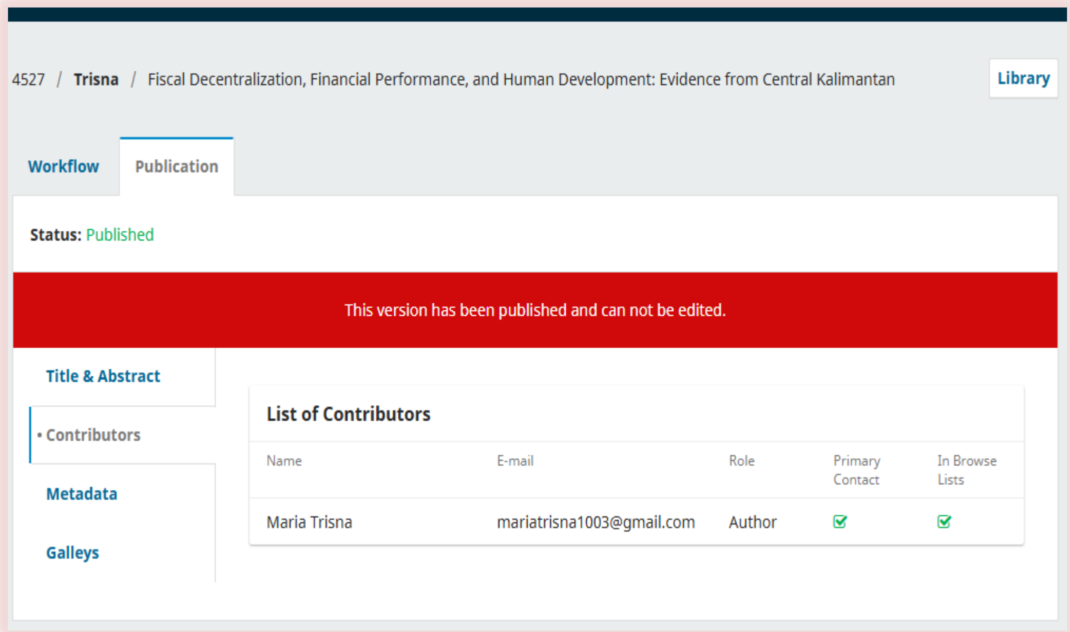

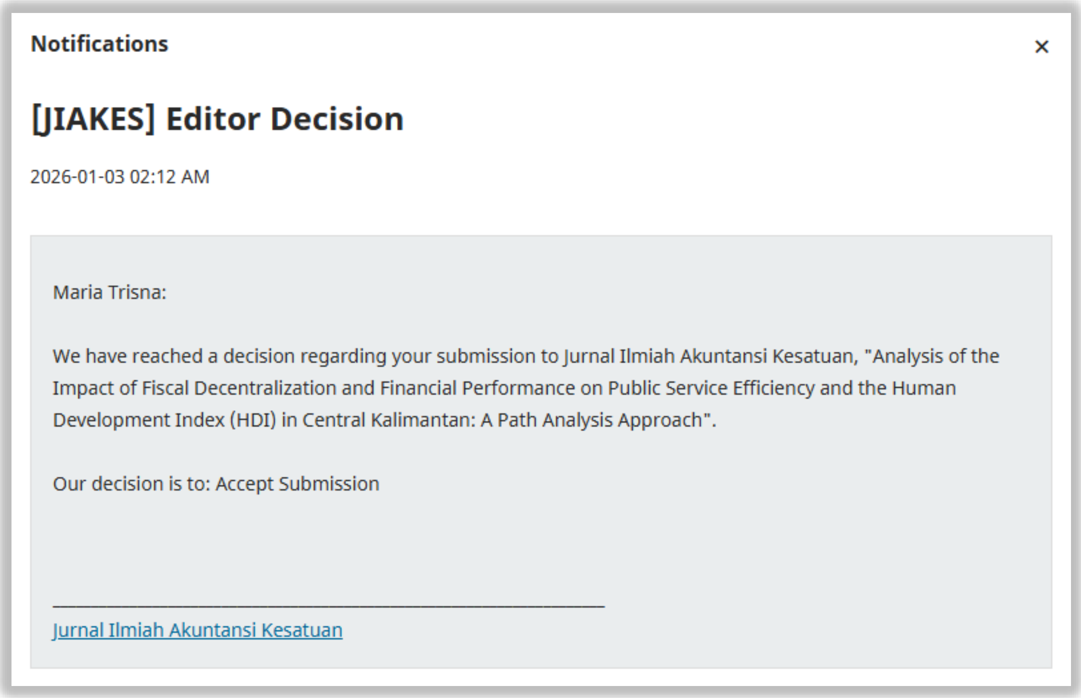

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Our decision is to: Accept Submission

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ISSN: 2456-7760

CERTIFICATE OF PUBLICATION

Certificate of publication for the article titled:

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

Authored by:

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

Published by: Alicon Publications

www.ijebmr.com

LAMPIRAN :

TABEL REKAPITULASI DATA VARIABEL PENELITIAN (2020-2024)
KABUPATEN/KOTA DI KALIMANTAN TENGAH

1. Kota Palangka Raya, Kab Kotawaringin Barat dan Kapuas

Tahun	Daerah	X1 Fiscal Decentralization (%)	X2 Regional Financial Performance (Efektivitas PAD %)	M Public Service Efficiency (Rasio Belanja Modal %)	Y Human Development Index (IPM)
2020	Palangka Raya	22.1	98.5	24.3	73.8
2021	Palangka Raya	23.0	99.2	25.1	74.5
2022	Palangka Raya	24.2	100.0	26.0	75.1
2023	Palangka Raya	25.0	100.0	27.2	75.8
2024	Palangka Raya	26.3	100.0	28.0	76.5
2020	Kotawaringin Barat	18.5	97.0	22.0	72.5
2021	Kotawaringin Barat	19.2	97.8	22.8	73.1
2022	Kotawaringin Barat	20.1	98.6	23.5	73.8
2023	Kotawaringin Barat	21.0	99.3	24.1	74.3
2024	Kotawaringin Barat	22.0	100.0	25.0	74.8
2020	Kapuas	17.8	96.5	21.5	71.0
2021	Kapuas	18.5	97.3	22.2	71.6
2022	Kapuas	19.3	98.0	23.0	72.2
2023	Kapuas	20.0	98.8	23.7	72.8
2024	Kapuas	21.0	99.5	24.5	73.3

2. Kabupaten Kotawaringin Timur, Barito Selatan dan Barito Utara

Tahun	Daerah	X1 Fiscal Decentralization (%)	X2 Regional Financial Performance (%)	M Public Service Efficiency (%)	Y Human Development Index (IPM)
2020	Kotawaringin Timur	17.5	96.8	21.0	71.5
2021	Kotawaringin Timur	18.3	97.5	21.8	72.1
2022	Kotawaringin Timur	19.0	98.2	22.5	72.7
2023	Kotawaringin Timur	19.8	99.0	23.2	73.3
2024	Kotawaringin Timur	20.5	99.6	24.0	73.9

2020	Barito Selatan	16.8	96.0	20.5	70.8
2021	Barito Selatan	17.5	96.7	21.2	71.3
2022	Barito Selatan	18.2	97.5	21.9	71.9
2023	Barito Selatan	19.0	98.3	22.6	72.4
2024	Barito Selatan	19.8	99.0	23.3	73.0
2020	Barito Utara	17.2	96.3	20.8	71.2
2021	Barito Utara	18.0	97.0	21.5	71.8
2022	Barito Utara	18.7	97.8	22.2	72.4
2023	Barito Utara	19.5	98.6	22.9	73.0
2024	Barito Utara	20.2	99.3	23.6	73.6

3. Kabupetn Murung Raya, Gunung Mas dan Pulang Pisau

Tahun	**Daerah**	**X1 Fiscal Decentralization (%)**	**X2 Regional Financial Performance (%)**	**M Public Service Efficiency (%)**	**Y Human Development Index (IPM)**
2020	Murung Raya	16.5	95.8	20.0	70.5
2021	Murung Raya	17.2	96.6	20.8	71.1
2022	Murung Raya	18.0	97.4	21.5	71.7
2023	Murung Raya	18.8	98.2	22.3	72.3
2024	Murung Raya	19.6	99.0	23.0	72.9
2020	Gunung Mas	17.0	96.2	20.5	71.0
2021	Gunung Mas	17.8	97.0	21.2	71.6
2022	Gunung Mas	18.6	97.8	22.0	72.2
2023	Gunung Mas	19.4	98.6	22.7	72.8
2024	Gunung Mas	20.2	99.4	23.5	73.4
2020	Pulang Pisau	16.2	95.5	19.8	70.2
2021	Pulang Pisau	17.0	96.3	20.5	70.8
2022	Pulang Pisau	17.8	97.1	21.2	71.4
2023	Pulang Pisau	18.6	97.9	22.0	72.0
2024	Pulang Pisau	19.4	98.7	22.8	72.6

4. Kabupaten Katingan, Seruyan dan Sukamara

Tahun	Daerah	X1 Fiscal Decentralization (%)	X2 Regional Financial Performance (%)	M Public Service Efficiency (%)	Y Human Development Index (IPM)
2020	Katingan	16.8	95.9	20.2	70.7
2021	Katingan	17.5	96.7	21.0	71.3
2022	Katingan	18.3	97.5	21.8	71.9
2023	Katingan	19.0	98.3	22.6	72.5
2024	Katingan	19.8	99.1	23.4	73.1
2020	Seruyan	16.2	95.5	19.8	70.3
2021	Seruyan	17.0	96.3	20.5	70.9
2022	Seruyan	17.8	97.1	21.2	71.5
2023	Seruyan	18.6	97.9	22.0	72.1
2024	Seruyan	19.4	98.7	22.8	72.7
2020	Sukamara	15.9	95.2	19.5	69.8
2021	Sukamara	16.6	96.0	20.2	70.4
2022	Sukamara	17.3	96.8	20.9	71.0
2023	Sukamara	18.0	97.6	21.6	71.6
2024	Sukamara	18.8	98.4	22.3	72.2

5. Kabupaten Lamandau dan Barito Timur

Tahun	Daerah	X1 Fiscal Decentralization (%)	X2 Regional Financial Performance (%)	M Public Service Efficiency (%)	Y Human Development Index (IPM)
2020	Lamandau	17.0	96.0	20.5	71.0
2021	Lamandau	17.8	96.8	21.2	71.6
2022	Lamandau	18.6	97.6	22.0	72.2
2023	Lamandau	19.4	98.4	22.7	72.8
2024	Lamandau	20.2	99.2	23.5	73.4
2020	Barito Timur	16.5	95.7	20.0	70.5
2021	Barito Timur	17.3	96.5	20.8	71.1
2022	Barito Timur	18.1	97.3	21.6	71.7
2023	Barito Timur	18.9	98.1	22.4	72.3
2024	Barito Timur	19.7	98.9	23.2	72.9

Sumber Data : Pemerintah Kota Palangka Raya 2020-2025
Pemerimtah Kabupaten se Kalten 2020-2025