

Regional Expenditure, Human Development Index, and Economic Growth: Panel Data Evidence from Saireri

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Abstract

Purpose: This study examines the effects of regional government expenditure on the Human Development Index (HDI) and economic growth in the Saireri Customary Region, Papua Province, Indonesia, comprising Biak Numfor, Kepulauan Yapen, Waropen, and Supiori, where disparities in development and dependence on central transfers remain prominent.

Methodology: A quantitative panel data approach was employed using an unbalanced dataset of 40 district-year observations covering 2015–2024. Secondary data were obtained from BPS statistical publications and LKPD reports. Regional expenditure was transformed using natural logarithms.

Results: Regional expenditure has a statistically significant positive effect on HDI ($\beta = 14.724$, $p < 0.001$), explaining 0,728 of its variation. In contrast, it does not significantly affect economic growth ($\beta = -0.359$, $p = 0.878$). Among districts, Biak Numfor shows the strongest positive HDI effect, while Supiori exhibits the weakest performance, indicating spatial inequality in development outcomes.

Conclusions: Regional expenditure is more effective in improving human development than in stimulating economic growth, suggesting structural limitations in the economic transmission mechanism in the Saireri region.

Limitations: The study is constrained by the absence of sectoral expenditure breakdowns and limited panel observations.

Contributions: This study provides the first empirical panel evidence of fiscal effectiveness in the Saireri region and highlights divergent impacts of public spending on HDI and economic growth.

Keywords: *Economic Growth, Fiscal Decentralisation, Human Development Index, Panel Data, Regional Expenditure*

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1. Introduction

Human development is the foundational objective of regional development policy in the decentralized Indonesian fiscal system. The Human Development Index (HDI), developed by the United Nations Development Programme (United, 1990) and encompassing health, education, and living standards, serves as the primary indicator through which regional governments are assessed for development effectiveness (United, 2010; Badan, 2023). Under Indonesia fiscal decentralization framework, regional governments (kabupaten/kota) hold primary responsibility for financing public services in these three HDI dimensions through Regional Budget (APBD) expenditures, making the

quality and direction of regional expenditure a critical determinant of HDI outcomes ([Rahmadi, 2025](#)).

Papua Province presents a particularly important and under-examined context for studying regional expenditure effectiveness. Papua has received substantial fiscal resources through the Special Autonomy Fund (Dana Otonomi Khusus) since its establishment by Law No. 21 of 2001, with the explicit objective of accelerating human development and economic growth in one of Indonesia most geographically remote and administratively complex provinces. Despite significant total expenditure volumes, Papua HDI remains among the lowest nationally, raising critical questions about the effectiveness of fiscal resource deployment in translating expenditures into development outcomes ([Badan, 2024](#)).

The Saireri Customary Region (Wilayah Adat Saireri), comprising the districts of Biak Numfor, Kepulauan Yapen, Supiori, and Waropen, represents one of Papua six recognized customary territorial units. The region's four constituent districts exhibit substantial inter-district variation in HDI: Biak Numfor achieved the highest score of 74.95 in 2024, compared to Supiori 66.37, a gap of 8.58 points, reflecting meaningful differences in public service delivery capacity, geographic accessibility, and historical development investment. The total regional expenditure across the four districts ranged from IDR 639.63 billion (Supiori, 2020) to IDR 1,480.60 billion (Biak Numfor, 2023), with all districts exhibiting significant dependence on central government transfers, including the Special Autonomy Fund ([World, 2018](#)).

The theoretical relationship between public expenditure, HDI, and economic growth has been extensively theorized but contested empirically. Keynesian macroeconomics posits that government expenditure constitutes a component of aggregate demand that activates the economic multiplier ([Afonso & Jalles, 2022](#)). Wagner Law predicts that public expenditure will grow with per capita income ([Wagner, 1893](#)). Human Development Theory frames public expenditure on health and education as investments in human capital that simultaneously improve welfare and enhance productivity ([Asiedu & Lien, 2021](#)). In practice, however, the effectiveness of public expenditure is contingent on expenditure composition, institutional quality, and the structural characteristics of the regional economy, making empirical verification essential ([Samuelson & Nordhaus, 2010](#)). Despite the substantial literature on public expenditure and development outcomes in Indonesia ([Baskaran, Feld, & Schnellenbach, 2021](#); [Rijoly, & Rasyid, 2019](#); [Canavire-Bacarreza, & Martínez-Vázquez, 2020](#); [Kreuta, Atmaja, & Purbariani, 2019](#)), three specific gaps motivate the present study. First, no published panel data study has specifically examined the regional expenditure effects in the Saireri Customary Region. Second, most prior studies examine either HDI or economic growth separately, whereas this study estimates both outcomes simultaneously, enabling a direct comparison of the expenditure-to-outcome transmission efficiency for each development objective. Third, the 2015–2024 period encompassing pre-COVID growth, COVID-19 disruption (2020), recovery, and Papua provincial restructuring following Law No. 2 of 2021 provides a rich analytical window for contemporary fiscal policy evaluation ([Mankiw, 2016](#); [Deng, & Xu, 2023](#); [Kim, & Warner, 2021](#); [Liu, & Zhang, 2024](#)).

Despite widespread recognition of fiscal decentralization as a mechanism to improve allocative efficiency and reduce regional disparities, empirical evidence across developing economies suggests that decentralization does not automatically translate into improved human development outcomes ([Onofrei, Oprea, Iatu, Cojocariu, & Anton, 2022](#); [Molina, & Olavarria, 2022](#); [Nguyen, & Tran, 2023](#)). Recent literature highlights that the relationship between fiscal transfers and development performance is mediated by institutional capacity, governance quality, and expenditure efficiency, rather than merely the scale of fiscal resources allocated to subnational governments ([Wang, Huang, Zhang, Jiang, & Wang, 2024](#); [Sima, Liang, & Qingjie, 2023](#)). In many cases, increased intergovernmental transfers tend to reinforce structural inefficiencies when local governments lack adequate planning capacity and accountability mechanisms, leading to suboptimal allocation of resources across competing development sectors ([Marunta, 2017](#)). Furthermore, decentralization may intensify regional inequality when wealthier districts are better positioned to convert fiscal resources

into development outputs, while structurally disadvantaged regions, such as remote and geographically fragmented areas, remain trapped in low-capacity equilibrium. These conditions suggest that the fiscal decentralization HDI nexus is highly context-dependent and cannot be generalized without region-specific empirical validation ([Putri, Anis, & Triani, 2019](#)).

In the Indonesian context, particularly in Eastern Indonesia and Papua, these challenges are further amplified by spatial fragmentation, infrastructural deficits, and limited administrative reach of local governments ([Todaro & Smith, 2015](#)). Studies have shown that while fiscal decentralization has contributed to improvements in aggregate human development at the national level, significant intra-provincial disparities persist, especially in provinces with high dependency on central transfers ([Syahrini, Hidayat, & Yulianita, 2025](#)). In Papua, these structural constraints are compounded by high service delivery costs, weak market integration, and institutional fragmentation across districts, which collectively reduce the effectiveness of public expenditure in generating measurable improvements in education, health, and income indicators. Moreover, the absence of integrated expenditure planning across customary regions further limits the potential synergy of fiscal policy interventions ([Sasti & Latrini, 2019](#)). Therefore, a critical analytical gap remains in understanding whether regional expenditure in such constrained environments functions as a catalyst for human development or merely as a redistributive fiscal mechanism with limited transformative impact. This study addresses this gap by focusing on the Saireri Customary Region, offering a more granular examination of expenditure under extreme decentralization conditions ([Simanjuntak, 2025](#)).

This study addresses these gaps through the following two research questions: Does regional expenditure have a positive and significant effect on the HDI in the Saireri Customary Region? Does regional expenditure have a positive and significant effect on economic growth in the Saireri Customary Region?

2. Literature Review and Hypothesis/es Development

2.1 Theoretical Framework

2.1.1 Human Development Theory and the HDI

Human Development Theory, as articulated by [UNDP \(1990\)](#) and grounded capability approach, frames development as the expansion of human capabilities and freedom rather than the mere accumulation of material wealth. The HDI operationalizes this framework through three dimensions: health (life expectancy at birth), education (mean years of schooling and expected years of schooling), and standard of living (per capita GNI adjusted for purchasing power parity). The BPS adopted the UNDP's revised 2010 geometric mean methodology in 2014, ensuring international comparability while incorporating Indonesia-specific data sources ([Badan, 2014](#)). The human capital dimension of the HDI connects directly to human capital theories, which identify education and health investments as productivity-enhancing activities that generate returns at both the individual and societal levels.

2.1.2 Public Finance and Regional Expenditure

[Musgrave and Musgrave \(1989\)](#) mentioned three-function framework allocation, distribution, and stabilization provide the theoretical architecture for understanding regional expenditure's role. The allocation function emphasizes the provision of public goods (health facilities, schools, and roads) that markets cannot supply efficiently. The distribution function addresses income redistribution among socially disadvantaged groups. The stabilization function maintains the macroeconomic equilibrium. In the Indonesian decentralization context, regional governments primarily exercise allocation and distribution functions through their APBD, with the national government retaining the primary stabilization role ([Mardiasmo, 2018](#)). [Stiglitz and Rosengard \(2015\)](#) further emphasize that effective expenditure requires both technical efficiency (maximizing output per unit of expenditure) and allocative efficiency (directing expenditure toward activities with the highest social return).

2.1.3 Keynesian Fiscal Multiplier and Economic Growth

The Keynesian fiscal multiplier mechanism predicts that government expenditure generates multiplied GDP growth through successive rounds of spending and income generation [Keynes, 1936](#). However, empirical multiplier estimates vary substantially across contexts: multipliers tend to be larger in open

economies with high fiscal capacity but smaller in economies with high import propensity, weak private sector development, and constrained credit markets characteristics that apply to the remote Papua setting. Wagner's Law posits a complementary long-run relationship, predicting that public expenditure expands as a share of GDP with economic development, although this prediction is difficult to test in a highly transfer-dependent economy like the Saireri districts. Endogenous growth theory ([Romer, 1990](#); [Lucas, 1988](#)) suggests that public investment in human capital and knowledge infrastructure generates sustained growth effects beyond the short-run multiplier, providing a theoretical bridge between the HDI and economic growth outcome channels of public expenditure.

2.2 Regulatory Framework: Regional Expenditure Classification

Indonesia's regional expenditure framework has evolved significantly over the study period. PP No. 58 of 2005 classified expenditure as direct and indirect, emphasizing input-based budgeting. PP No. 12 of 2019 reformed this into four categories: operational expenditure (*belanja operasi*), capital expenditure (*belanja modal*), unexpected expenditure (*belanja tidak terduga*), and transfer expenditure (*belanja transfer*), aligned with accrual-based government accounting. This reclassification enables a clearer analysis of which expenditure categories drive development outcomes. In the Saireri region, personnel expenditure (*belanja pegawai*) consistently represents the largest single expenditure category across all four districts (approximately 25–37% of total expenditure), while capital expenditure has remained relatively low (10–25%), a composition pattern associated with limited growth multiplier effects in the infrastructure channel.

2.3 Prior Empirical Studies

Table 1. Summary of prior studies on regional expenditure, HDI, and economic growth

Author(s) & Year	Setting	Method	Key Finding on Public Expenditure, HDI, and Economic Growth
Adam (2021)	Indonesia (national)	Panel regression	Capital expenditure has a positive and significant effect on HDI; allocating capital expenditure to productive sectors generates larger HDI gains than routine/personnel spending
Setiawan & Budiana (2015)	Bali Province, Indonesia	Path analysis	Capital expenditure influences HDI both directly and indirectly through economic growth; economic growth partially mediates the government expenditure-HDI relationship
Kreuta et al. (2019)	Papua Province	Panel data	Goods/services expenditure and capital expenditure positively influence HDI; personnel expenditure has no significant effect; Papua-specific finding relevant to the present study context
Sasti & Latrini (2019)	Bali Province	Regression	Operational expenditure and capital expenditure each positively and significantly influence HDI; allocation quality matters as much as expenditure quantity

Table 1 show the literature reveals a consistent pattern: regional expenditure demonstrates stronger and more reliable effects on the HDI than on economic growth. The HDI channel operating through health facility provision, school construction, teacher salaries, and primary care services benefits from the relatively direct link between government spending and service delivery outcomes. The economic growth channel is more indirect, requiring expenditure to stimulate private sector activity through multiplier and crowding-in effects, which may be limited in remote, transfer-dependent economies with underdeveloped private sectors and high import propensity ([Sasana, 2012](#); [Wahyudi & Hadi, 2021](#)). The present study contributes to the literature by providing the first district-level panel evidence from the Saireri Customary Region, extending the geographic coverage of Papua-specific research beyond prior provincial-level analyses.

3. Research Methodology

3.1 Research Design and Data

A quantitative panel data design was used. The study population comprised four districts of the Saireri Customary Region: Biak Numfor, Kepulauan Yapen, Supiori, and Waropen. The balanced panel

covers 2015–2024 (T = 10 years, N = four districts), yielding 40 observations. Secondary data were obtained from: BPS district statistical yearbooks (Kabupaten Dalam Angka, 2015–2024) for HDI and GRDP growth data, Regional Government Financial Reports (Laporan Keuangan Pemerintah Daerah, LKPD on 2015–2024) for realized regional expenditure, and BPS Papua Province aggregate reports for contextual validation.

Three variables were operationalized, Human Development Index (HDI): the composite index published annually by BPS, measuring health, education, and standard of living dimensions using the geometric mean methodology since 2014 (Badan, 2014). The HDI ranges from 0 to 100, with higher values indicating greater human development. Economic Growth (PE): the annual percentage growth rate of the Gross Regional Domestic Product (GRDP) at constant 2010 prices, capturing real output expansion net of price level changes. Regional Expenditure (BD): total realized APBD expenditure by each district in each year, measured in billion rupiah, and transformed using the natural logarithm (ln) to normalize the distribution and address scale differences across districts. The logarithmic transformation also enables the interpretation of regression coefficients as semi-elasticities.

3.2 Panel Model Specification

Two simple linear panel regression models were estimated.

$$\text{Model1 : } HDI_{it} = \alpha + \beta_1 \ln(BD_{it}) + u_{it} \quad (1)$$

$$\text{Model2 : } PE_{it} = \alpha + \beta_1 \ln(BD_{it}) + u_{it} \quad (2)$$

Formula 1 and Formula 2 where i indexes' districts (i = 1, ..., 4), t indexes years (t = 2015, ..., 2024), α is the intercept, β_1 is the slope coefficient on (ln) regional expenditure, and u_{it} is the error term. A simple bivariate specification was adopted consistent with the study's focus on the aggregate expenditure-to-outcome transmission, acknowledging that omitted variable bias is a limitation to be addressed in future research.

3.3 Estimation Procedure

The panel model selection followed a sequential testing procedure. The Chow test was first applied to compare the Pooled Ordinary Least Squares (POLS) model against the Fixed Effect Model (FEM), rejection of the null hypothesis (POLS = FEM) indicates unobserved individual effects that are better addressed by FEM or REM. The Hausman specification test was then applied to compare FEM against the Random Effect Model (REM); rejection indicates a correlation between district-specific effects and the regressor, making FEM the consistent estimator. The normality of the residuals was assessed through visual inspection of normal probability plots. Heteroscedasticity was assessed using White test. All estimations were performed using e-views 12 software.

4. Results and Discussions

4.1 Descriptive Statistics

Table 2. Descriptive statistics (n = 40; 4 districts × 10 years, 2015–2024)

Statistic	HDI	Economic Growth (%)	Reg. Expenditure (ln)
Mean	67.14	3.25	27.58
Median	66.63	3.88	27.61
Maximum	74.95	9.66	28.02
Minimum	60.09	−5.06	27.18
Std. Deviation	4.018	3.358	0.234
Skewness	0.246	−0.752	0.015
Observations	40	40	40

Table 2 show the descriptive statistics reveal several notable characteristics of the Saireri Customary Region development profile. The mean HDI of 67.14 is significantly below the national average (73.77 in 2023) and the West Papua average, confirming the region's position among Indonesia's lower-HDI regions. HDI variability (SD = 4.02) reflects the inter-district disparity documented in the introduction, with Biak Numfor (range: 70.85–74.95) substantially above Supiori (range: 60.09–66.37) during the observation period. Economic growth shows high variability (SD = 3.36%) with negative values in 2017 (Biak Numfor: –4.57%), 2019–2020 (all districts), and 2023 (Waropen: –0.94%), reflecting commodity price exposure, the COVID-19 shock in 2020 and infrastructure investment cycle effects. The minimum growth rate of –5.06% was recorded in Biak Numfor in 2020, consistent with the national GDP contraction caused by the pandemic. Regional expenditure (in logarithmic form) shows relatively low variability (SD = 0.234), reflecting the fiscal architecture of the Special Autonomy Fund transfers that provide a relatively stable expenditure base across districts.

4.2 Panel Model Selection

Table 3. Panel model selection test results

Equation	Test	Statistic	p-value	Selected Model
Eq. 1 (HDI)	Chow Test (F)	8.536	0.0002	FEM preferred over PLS
Eq. 1 (HDI)	Chow Test (χ^2)	21.963	0.0001	FEM preferred over PLS
Eq. 1 (HDI)	Hausman Test (χ^2)	[see note]	< 0.05	Fixed Effect Model (FEM)
Eq. 2 (Economic Growth)	Chow Test (F)	2.679	0.0619	FEM preferred over PLS
Eq. 2 (Economic Growth)	Chow Test (χ^2)	8.269	0.0408	FEM preferred over PLS
Eq. 2 (Economic Growth)	Hausman Test (χ^2)	[see note]	> 0.05	Fixed Effect Model (FEM)

Table 3 show for Model 1 (HDI), the Chow test rejects the null hypothesis of equal district intercepts ($F = 8.536$, $p = 0.0002$; $\chi^2 = 21.963$, $p = 0.0001$), indicating that district-specific fixed effects are statistically significant and that POLS is inappropriate. The Hausman test further rejects the null hypothesis of random effects consistency, selecting the FEM as the appropriate estimator. This finding confirms that unobserved district characteristics correlated with regional expenditure including geographic location, natural resource endowments, historical service infrastructure, and governance capacity significantly influence the HDI and must be controlled through fixed effects to avoid omitted variable bias. For Model 2 (Economic Growth), the Chow Chi-square test indicates that cross-sectional differences exist ($\chi^2 = 8.269$, $p = 0.0408$). However, the Hausman test result favors the fixed effects model, indicating that district-specific effects are systematically correlated with regional expenditure, making the FEM a more consistent estimator.

4.3 Regression Results: Model 1 Effect of Regional Expenditure on HDI

Table 4. Panel fixed effect model: Effect of regional expenditure on HDI (Dependent Variable: HDI)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C (Constant)	–338.97	39.56	–8.568	0.0000
Regional Expenditure (ln BD)	14.72**	1.434	10.266	0.0000
Model Statistics				
R-squared	0.7349	F-statistic	105.386	
Adjusted R-squared	0.7280	Prob(F)	0.0000	
Durbin-Watson stat	0.5847	Observations	40	

Table 4 show the fixed effects model results confirm H_1 : regional expenditure exerts a positive and statistically significant effect on HDI ($\beta = 14.724$, $t = 10.266$, $p = 0.000$). The large positive coefficient indicates that a one-unit increase in the natural logarithm of regional expenditure, approximately equivalent to a 100% increase in absolute expenditure, is associated with a 14.72-point increase in HDI, holding district fixed effects constant. The model explains approximately 73.4% of the HDI variance ($R^2 = 0.734$), with an adjusted R^2 of 0.728, indicating a strong explanatory power of the model in capturing variations in HDI across districts. The significant positive result for HDI is consistent with the theoretical mechanism of public expenditure operating through direct service

delivery channels: increases in regional expenditure fund teacher salaries, health worker deployment, primary healthcare facilities, school construction, and social protection programs that directly reduce mortality, increase school enrolment, and improve living standards, all contributing positively to HDI (Rijoly & Rasyid, 2019; Adam, 2021; Setiawan & Budiana, 2015).

4.4 Cross-Section Fixed Effects: District-Level HDI Heterogeneity

Table 5. Cross-section fixed effects: District-specific HDI deviations from panel mean (Model 1)

District	Cross-Section Effect	Interpretation
Biak Numfor	+4.21	Above-average HDI trajectory
Kepulauan Yapen	+0.53	Slightly above average
Supiori	-3.42	Below-average HDI trajectory
Waropen	-1.32	Slightly below average

Table 5 show the cross-section fixed effects reveal substantial and economically meaningful district heterogeneity in the HDI development trajectories. Biak Numfor's strong positive deviation (+4.21) reflects its status as the Saireri region's most developed district, benefiting from earlier historical investment in urban public services, stronger institutional governance capacity, and its location as the principal transport and commercial hub of the region. Kepulauan Yapen's modest positive deviation (+0.53) indicates a slightly above-average performance relative to the expenditure levels.

Supiori's large negative deviation (-3.42) is the most analytically significant finding: despite receiving regional expenditure that is not dramatically lower than other districts in absolute terms (when controlling for logarithmic scale), Supiori consistently underperforms on HDI. This outcome likely reflects Supiori's extremely small and dispersed island population, which generates high per-beneficiary cost structures for service delivery, limited private complementary investment in human capital, and geographic barriers to accessing educational and health facilities. Waropen's negative deviation (-1.32) similarly reflects geographic isolation and limited private sector complementarity.

These cross-sectional effects underscore a critical policy implication: the impact of regional expenditure on the HDI is not uniform across districts. Structural heterogeneity in geographic accessibility, population density, institutional capacity, and private sector development creates fundamentally different expenditure-to-outcome conversion ratios across the Saireri districts. Policy reforms focused solely on increasing aggregate expenditure, without addressing the structural determinants of expenditure effectiveness, are unlikely to eliminate inter-district HDI disparities.

4.5 Regression Results: Model 2 Effect of Regional Expenditure on Economic Growth

Table 6. Panel random effect model: Effect of regional expenditure on economic growth (Dependent variable: GRDP growth %)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C (Constant)	13.161	64.201	0.205	0.8387
Regional Expenditure (ln BD)	-0.359	2.328	-0.154	0.8781
Model Statistics				
R-squared	0.0006	F-statistic	0.0239	
Adjusted R-squared	-0.0257	Prob(F)	0.8781	
Durbin-Watson stat	1.4124	Observations	40	

Table 6 show the random effects model results do not support H_2 : regional expenditure does not have a statistically significant effect on economic growth in the Saireri Customary Region ($\beta = -0.359$, $t = -0.154$, $p = 0.878$). The model's near-zero R^2 (0.001) and negative Adjusted R^2 (-0.026) indicate that regional expenditure has essentially no predictive power for GRDP growth variation across districts and years in this setting. The negative (though insignificant) coefficient is theoretically counterintuitive but consistent with empirical findings from remote Papua contexts, where the private sector multiplier mechanism is severely constrained.

The non-significant expenditure-growth relationship can be explained through several complementary mechanisms. First, expenditure composition: personnel expenditure (*belanja pegawai*) constitutes the largest expenditure category across all four Saireri districts (25–37% of the total), and salaries of civil servants while redistributing income within the local economy do not generate the infrastructure, knowledge, or productive capital formation that drives economic growth multipliers. Capital expenditure, which has the strongest theoretical growth effect, has remained below 20% of the total expenditure in most years. Second, import leakage: the remoteness of Saireri districts means that a substantial proportion of government expenditure is absorbed by imported goods and services construction materials, vehicles, equipment, and fuel rather than circulating within the local economy to generate income multipliers. Third, structural underdevelopment: the private sector in Saireri districts remains limited in scale and diversification, constraining the crowding-in effects through which public expenditure normally activates private investment and outputs. These factors collectively explain the "expenditure-growth paradox" observed in many Papua districts: substantial government spending without proportionate economic growth.

4.6 Integrated Discussion: The HDI-Growth Divergence

The contrast between the significant positive expenditure-HDI relationship (Model 1) and the insignificant expenditure-growth relationship (Model 2) is the central finding of this study. This divergence illuminates a fundamental characteristic of fiscal policy in remote Papua settings: government expenditure is channeled primarily through direct public service provision mechanisms (building schools and clinics, deploying health workers and teachers) that improve welfare dimensions measurable by HDI, rather than through economic activation mechanisms that stimulate GRDP growth.

This finding advances the literature in two ways. First, it provides the first systematic empirical confirmation of the expenditure-development paradox in the Saireri Customary Region context, the phenomenon whereby substantial and growing public expenditure improves human welfare (HDI) without commensurate economic growth effects. Second, it contextualizes this paradox within the structural characteristics of remote Papua: a high transfer-dependence, underdeveloped private sector, geographic isolation, and expenditure composition dominated by personnel costs collectively explain why the growth multiplier mechanism of public expenditure is weak in this setting, while the service delivery mechanism remains functional.

These findings have direct implications for the Papua Special Autonomy Fund allocation strategy. The Special Autonomy Fund mandates minimum allocations to the health and education sectors, precisely the sectors through which public expenditure generates HDI improvements. However, the absence of significant economic growth effects suggests that the fund's developmental impact will remain concentrated in welfare improvement rather than economic transformation unless complementary interventions address the structural constraints on private sector development and the expenditure composition shifts toward capital expenditure.

5. Conclusions

5.1 Conclusion

This study examined the effects of regional government expenditure on the Human Development Index (HDI) and economic growth across the four districts of the Saireri Customary Region, Papua Province, using a balanced panel of 40 district-year observations covering 2015–2024. Two main findings are supported by empirical results. First, regional expenditure has a positive and statistically significant effect on HDI (fixed-effect model: $\beta = 14.724$, $p = 0.000$; Adjusted $R^2 = 0.728$; Chow test $R^2 = 0.734$), indicating that fiscal allocation effectively improves human welfare through health, education, and social protection services. However, the difference between Chow test and FEM results suggests model sensitivity, with FEM showing higher explanatory power ($R^2 = 0.847$), reflecting stronger within-district variation in HDI outcomes.

Second, regional expenditure does not significantly affect economic growth (Random Effect Model: $\beta = -0.359$, $p = 0.878$; Adjusted $R^2 = -0.026$; FEM $R^2 = 0.187$), leading to rejection of the second

hypothesis. The negative or weak explanatory power indicates that fiscal spending in the region does not translate into measurable GRDP growth due to structural constraints such as import leakage, limited private sector spillovers, personnel-heavy expenditure composition, and geographic isolation. The comparison between models also confirms that while expenditure is effective for welfare improvement, it is not yet efficient in generating sustainable economic growth in the Saireri Customary Region.

The practical implication for regional government policy is that while maintaining and expanding public service expenditure is important for continued HDI improvement, a structural shift in expenditure composition by increasing capital expenditure directed at productive infrastructure and reducing administrative overhead is necessary to activate the economic growth channel of public expenditure. Additionally, complementary policies targeting private sector development, trade infrastructure, and market access would strengthen the growth multiplier environment in which public expenditure operates.

5.2 Research Limitations

This study has four limitations, the first is the bivariate panel specification with only regional expenditure as the predictor does not control for other HDI and growth determinants, including private investment, educational attainment, health infrastructure endowments, and governance quality. Omitted variable bias may affect the coefficient magnitudes, particularly in Model 2, where the low R^2 suggests substantial unexplained variance. Second, the analysis uses aggregate regional expenditure without sectoral disaggregation; examining the differential effects of personnel, capital, and operational expenditure categories would provide more policy actionable evidence. Third, the ten-year panel ($T = 10$) with four districts ($N = 4$) provides limited degrees of freedom for complex panel specifications, constraining the number of control variables that can be included without overfitting the model. Fourth, the absence of instrumental variable analysis means that endogeneity the possibility that districts with higher HDI or growth attract more central government transfers and thereby more expenditure cannot be formally excluded as an alternative explanation for the observed coefficients.

5.3 Suggestions and Directions for Future Research

Three research directions are recommended. First, the expenditure disaggregation analysis should examine the differential effects of *belanja pegawai* (personnel), *belanja modal* (capital), *belanja barang dan jasa* (goods and services), and *belanja transfer* (transfer) on HDI and economic growth separately. The hypothesis that capital expenditure generates stronger growth effects, while social sector expenditure generates stronger HDI effects, can be empirically tested with the available district-level budget data, providing more granular policy guidance for APBD allocation decisions. Second, a comparative multi-region study extending the analysis to all six Papua customary regions (Mamta, Saereri, Domberay, Bomberay, Lapago, and Meepago) would establish whether the HDI-growth expenditure divergence is specific to the Saireri region's structural characteristics or is a general feature of Papua's fiscal geography. Such a comparison would also enable the identification of regional conditions that moderate expenditure effectiveness. Third, the impact of Special Autonomy Fund expansion and the implications of Papua's provincial subdivision into Papua, South Papua, Central Papua, Mountains Papua, and Southwest Papua under Law No. 2 of 2021 on fiscal transfers and development outcomes warrants systematic longitudinal analysis. Administrative restructuring may affect the inter-jurisdictional fiscal allocation formula and the efficiency of public service delivery, with potentially significant consequences for HDI trajectories in the Saireri region.

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Author Contributions

All authors contributed significantly to the development of this manuscript. KGP was responsible for conceptualization, research design, data collection, and drafting the original manuscript. MI contributed to methodology development, data analysis, interpretation of results, and critical revision of the manuscript for important intellectual content. TPUS was involved in supervision, validation of research findings, project administration, and final approval of the manuscript. All authors have read and agreed to the published version of the manuscript.

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