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Central and Local Taxes: Which Plays a Greater Role in Improving the Human Development Index in Indonesian Regencies and Cities?

Nur Farida Liyana¹, Rizqi Haniyah², Arief Budi Wardhana³

¹²³Polytechnic of State Finance STAN, Banten, Indonesia

Correspondence: faridaliyana@pknstan.ac.id¹

Abstract

Taxation plays a fundamental role in financing public services and promoting human development through fiscal decentralization. However, empirical evidence comparing the contributions of central and local taxes to human development remains limited. This study examines whether central tax revenue sharing (DBH) or locally generated tax revenues (LTR) play a greater role in improving the Human Development Index (HDI) across Indonesian regencies and municipalities. Using balanced panel data from 486 regencies and municipalities during 2018–2022, panel data regression is employed to estimate the effects of tax-based fiscal resources on HDI, controlling for gross regional domestic product (GRDP), government expenditure, population, and unemployment. The results show that both DBH and LTR have positive and statistically significant effects on HDI, indicating that taxation supports human development through fiscal equalization and local fiscal autonomy. The larger coefficient of LTR suggests a stronger marginal association with HDI than DBH. GRDP positively affects HDI, while government expenditure is negatively associated with HDI, highlighting the importance of expenditure quality rather than magnitude. Population is not statistically significant, whereas unemployment has a relatively small effect. These findings extend the fiscal decentralization literature by demonstrating the complementary roles of central and local taxation: DBH strengthens local fiscal capacity through revenue redistribution, while LTR enhances fiscal autonomy and responsiveness to local priorities. Improving human development therefore requires effective revenue sharing, stronger local revenue mobilization, and more efficient public expenditure, particularly for education, healthcare, and human capital development.

KEYWORDS

human development index; revenue sharing fund; local taxes revenue; panel data; taxes.

Introduction

Taxes are one of the main sources of state revenue used to finance development and public services. In the context of Indonesia's regional development, taxes play a very important role. Funds obtained from taxes are used to finance state expenditures, such as infrastructure, education, health, and defense. Taxes play a role in development, and, ultimately, the community's welfare becomes a national goal. However, the economic conditions of the community are highly unequal across regions in Indonesia. This inequality in welfare is evident in the uneven development across Indonesia's regions. Many areas still need increased access to electricity and energy, while others no longer do. According to [Raharti et al. \(2021\)](#), Indonesia's development inequality across provinces between 2005 and 2019 is quite high. This inequality is influenced by factors such as the poverty rate.

One way to eradicate poverty is to increase the Human Development Index (HDI). This is in accordance with research conducted by [Salsabila et al. \(2024\)](#), which reveals that the HDI is a key factor in reducing poverty, emphasizing the need to enhance human

development outcomes to achieve sustainable economic welfare. Azzahra et al. (2022) supports this opinion, stating that HDI negatively influences poverty; the higher the HDI, the lower the poverty rate. Therefore, improving HDI must be the government's responsibility. However, inequality in HDI again occurs. For example, based on data from Central Bureau of Statistics (2021), there is a significant difference between Jakarta's HDI and Papua's HDI. Jakarta's HDI is 80, while Papua's is 60. This occurs for various reasons, including differences in regional financial capacity during the era of regional autonomy and differences in the quality of education across regions.

One solution to limited funds is tax collection. The income redistribution function of taxes can help improve community welfare. However, with regional autonomy, which gives regions greater authority to collect local taxes, this is still not enough to cover the regional budget. For this reason, the central government issued a Revenue Sharing policy consisting of Tax Revenue Sharing and Natural Resource Revenue Sharing. With the existence of the Tax Revenue Sharing Fund (DBH), it is expected to achieve welfare equalization by playing the tax function as income redistribution. The purpose of this DBH is to minimize the HDI gap between regions in Indonesia.

Previous studies have widely examined the relationship between intergovernmental transfers, local taxation, and human development outcomes. Overall, the literature suggests that DBH and other fiscal transfers are expected to contribute positively to improvements in the HDI by enhancing public service provision. This positive relationship is supported by studies such as Juniantari & Purwadinata (2025) and Rizkiyah & Anitasari (2023) who find that fiscal transfers have a significant positive effect on HDI. Similarly, Harahap (2017) shows that the General Allocation Fund, Special Allocation Fund, and Revenue Sharing Fund jointly influence HDI.

However, the empirical evidence is not fully consistent. Some studies report either insignificant or different effects of DBH on developmental outcomes. For instance, Arrosyid & Bawono (2025) and Rabiyyah et al., (2026) found that DBH does not significantly affect HDI in Indonesia and Riau Province. This inconsistency suggests that the effectiveness of fiscal transfers may depend on regional conditions and the efficiency of public fund allocation. A similar pattern is observed in the literature on local taxes. Several studies, including Sari & Rochmatullah (2023) and Agus (2020) found that local taxes have a positive and significant role in increasing HDI. However, Sofyan (2023) found other results. Sofyan revealed that owned-source regional revenue (PAD), which includes local taxes, does not influence HDI.

These mixed and sometimes contradictory findings highlight an unresolved empirical gap regarding the relative effectiveness of DBH versus local taxes revenue (LTR) in improving human development outcomes. Moreover, most previous studies rely on provincial-level analysis, which may mask substantial heterogeneity across lower administrative units. In contrast, regency and city level analyses provide more granular insights into differences in fiscal capacity, administrative efficiency, and local development priorities, which are likely to vary significantly within provinces. This finer level of disaggregation allows for a more precise identification of how fiscal instruments operate under different local conditions, thereby offering a more nuanced understanding of the fiscal-development relationship. Therefore, this study extends the literature by focusing on regencies and cities in Indonesia to capture intra-provincial variation that is not observable at the provincial level and to provide stronger empirical evidence on the differential roles of central transfers and local taxes in shaping human development outcomes.

Methods

This research uses a quantitative approach to measure the relationship between independent and dependent variables. The dependent variable is the HDI. The independent variable in this study is revenue from the taxation sector, for central taxes represented by DBH and LTR. The existence of the separation of taxation authority between the central government and local governments has resulted in taxation sector revenues not being the domain of the central government (Zhang et al., 2024). There is a side to tax revenue collected by local governments, both at the provincial and regencies/city levels (Dewi et al., 2022). For this reason, the independent variables of this study include all components of central and local tax revenues, both analyzed in aggregate and separately (Balunywa et al., 2014). In addition, there are control variables that potentially affect HDI, generally divided into four groups, namely government spending, unemployment rate, Gross Regional Domestic Product (GRDP), and population (UNDP, 2020).

The data used in this study consist of quantitative panel data from 514 districts/cities in Indonesia over the period 2018–2022. The dataset was obtained from official government sources, including Statistics Indonesia (BPS), the Directorate General of Taxes (DGT), and the Directorate General of Fiscal Balance (DJPK) of the Ministry of Finance. However, several observations were excluded to ensure data consistency and comparability. The provinces of DKI Jakarta, Gorontalo, and Maluku were excluded due to incomplete or inconsistent reporting of key fiscal variables over the study period, which may affect panel balance and the reliability of the estimates. In addition, several newly established or administratively fragmented districts namely Tolikara, Central Mamberamo, Puncak Intan Jaya, and Pegunungan Arfak were excluded due to structural breaks in the time-series data resulting from regional expansion, frequent data gaps, and non-comparable fiscal indicators over time. These conditions could introduce measurement bias and distort regression estimates. Thus, the initial balanced panel consists of 514 districts/cities observed over five years (2018–2022), resulting in 2,570 potential observations. The final dataset comprises 486 districts/cities across Indonesia, which includes 2,430 observations after excluding cases with incomplete data, representing the administrative units for which complete and consistent data were available throughout the study period. This procedure ensures data consistency and estimation reliability without materially affecting the dataset's representativeness. Although some districts/cities were omitted due to data limitations, the resulting dataset retains extensive national coverage and a substantial number of observations.

Given that the data used in this study are secondary data, the author collected and compiled publicly available datasets from relevant government agencies. The data were obtained from official publications and open-access databases of BPS, DGT, and DJPK. For certain variables for which complete data were not publicly available, the author obtained additional administrative data directly from the relevant agencies, subject to data confidentiality regulations. All datasets used in the final analysis were harmonized into a balanced panel structure for the period 2018–2022.

This study uses three models to provide an overview of the relationship between the HDI of central tax revenue represented by DBH, local tax revenue, and other factors as follows:

$$HDI_{it} = \beta_0 + \beta_1 \ln(DBH_{it}) + \beta_2 \ln(GRDP_{it}) + \beta_3 \ln(POP_{it}) + \beta_4 UNEMP_{it} + \beta_5 \ln(GEXP_{it}) + \varepsilon_{it} \dots \dots \dots (1)$$

Model 1 examines the effect of central tax revenue on HDI. In Equation (1), HDI_{it} denotes the Human Development Index of district/city i in year t . DBH_{it} denotes tax revenue-sharing funds transferred from the central government to district/city

Table 1. Panel Data Model Selection

Model 1				Model 2				Model 3			
Test	Test Statistic	p-value	Conclusion	Test	Test Statistic	p-value	Conclusion	Test	Test Statistic	p-value	Conclusion
Chow Test	F(485, 1939) = 552.90	0	FEM is preferred over CEM.	Chow Test	F(485, 1939) = 426.47	0	FEM is preferred over CEM.	Chow Test	F(485, 1938) = 418.18	0	FEM is preferred over CEM.
Hausman Test	$\chi^2 = 0.9314$	0.9314	REM is preferred over FEM.	Hausman Test	$\chi^2 = 356.91$	0	FEM is preferred over REM.	Hausman Test	$\chi^2 = 356.91$	0	FEM is preferred over REM.
Breusch-Pagan LM Test	$\chi^2 = 4217.67$	0	REM is preferred over CEM.								
Final Model	Random Effect Model			Fixed Effect Model			Fixed Effect Model				

Source: Processed by author

governments, comprising shared revenues from personal income taxes (Articles 21, 25, and 29), land and building taxes for plantation, forestry, and mining sectors, and tobacco excise revenue-sharing funds. $GRDP_{it}$ denotes regional gross domestic product, POP_{it} is the total population, $UNEMP_{it}$ represents the unemployment rate, and $GEXP_{it}$ denotes government expenditure on infrastructure and education. The subscripts i and t refer to district/city and year, respectively. The variables DBH , $GRDP$, POP , and $GEXP$ are transformed into natural logarithms to reduce heteroscedasticity, mitigate scale differences across districts, and allow the estimated coefficients to be interpreted as elasticities. Finally, ε_{it} denotes the stochastic error term that captures unobserved factors affecting the HDI.

$$HDI_{it} = \beta_0 + \beta_1 \ln(LTR_{it}) + \beta_2 \ln(GRDP_{it}) + \beta_3 \ln(POP_{it}) + \beta_4 UNEMP_{it} + \beta_5 \ln(GEXP_{it}) + \varepsilon_{it} \dots \dots \dots (2)$$

Model 2 examines the effect of local tax revenue on HDI, while controlling for regional economic and socioeconomic characteristics. Equation (2) is specified as follows: where HDI_{it} denotes the HDI of district/city i in year t ; LTR_{it} represents local tax revenue; $GRDP_{it}$ denotes gross regional domestic product; POP_{it} represents the total population; $UNEMP_{it}$ denotes the unemployment rate; and $GEXP_{it}$ represents government expenditure on infrastructure and education. The subscripts i and t indicate district/city and year, respectively. The variables LTR , $GRDP$, POP , and $GEXP$ are transformed into natural logarithms to reduce heteroscedasticity, account for differences in scale across districts/cities, and facilitate the interpretation of the estimated coefficients as elasticities. Finally, ε_{it} denotes the stochastic error term that captures unobserved factors affecting the Human Development Index.

$$HDI_{it} = \beta_0 + \beta_1 \ln(DBH_{it}) + \beta_2 \ln(LTR_{it}) + \beta_3 \ln(GRDP_{it}) + \beta_4 \ln(POP_{it}) + \beta_5 UNEMP_{it} + \beta_6 \ln(GEXP_{it}) + \dots \dots \dots (3)$$

Model 3 is employed to examine the simultaneous relationship between central tax transfers and local tax revenue on HDI, while controlling for regional economic output, population size, unemployment rate, and government expenditure. In Equation (3), HDI_{it} denotes the Human Development Index of district/city (i) in year (t); DBH_{it} represents tax revenue-sharing funds; LTR_{it} represents local tax revenue; $GRDP_{it}$ denotes regional gross domestic product; POP_{it} refers to total population; $UNEMP_{it}$ denotes the unemployment rate; and $GEXP_{it}$ represents government expenditure on infrastructure and education. The subscripts (i) and (t) indicate district/city and year, respectively, while ε_{it} is the stochastic error term. Variables DBH , LTR , $GRDP$, POP , and $GEXP$ are transformed into natural logarithms to improve normality, reduce heteroscedasticity, and facilitate coefficient interpretation.

Considering the data structure and research design, the author used panel data regression. To determine the appropriate model, we conducted Chow, Hausman, and Lagrange Multiplier tests. After

collecting secondary data, the data were analyzed with panel data regression in Stata to test whether the hypothesis is accepted. Table 1 presents the results of the panel data model selection tests for the three estimated models. The Chow test results indicate that all models significantly favor the Fixed Effect Model (FEM) over the Common Effect Model (CEM), as evidenced by p-values of 0.0000. For Model 1, the Hausman test yields a p-value of 0.9314 (> 0.05), indicating that the Random Effect Model (REM) is more appropriate than the FEM; this result is further supported by the significant Breusch–Pagan LM test (p-value = 0.0000), which confirms that REM is preferred over CEM. In contrast, the Hausman test results for Models 2 and 3 are both statistically significant (p-value = 0.0000), indicating that FEM is preferred over REM. Accordingly, the final estimation model is REM for Model 1 and FEM for Models 2 and 3.

Result and Discussion

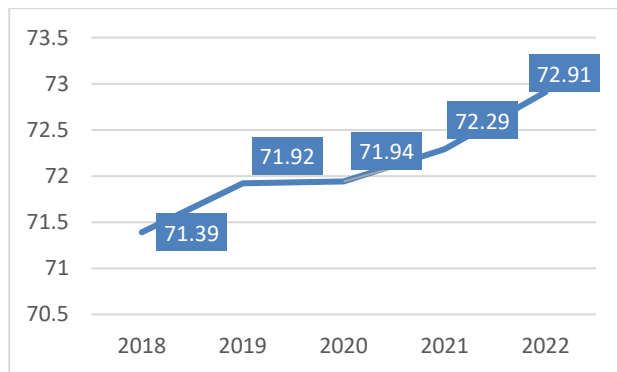
Descriptive Statistics

Indonesia's Human Development Index increased from 2018 to 2022. As shown in Figure 1, from 71.39 to 72.91 in 2022. If we look at these results, there has been a numerical improvement in Indonesia's human quality from year to year. Indirectly, this quality improvement leads to improvements in education, health, and income, as these are the determining factors in the HDI.

Indonesia's HDI shows a general upward trend over time. During the 2018–2022 study period, HDI across Indonesian provinces continued to improve, reflecting gradual progress in human development outcomes. For instance, during this period, DKI Jakarta consistently recorded the highest HDI, reaching 81.65 in 2022, while D.I. Yogyakarta remained in the “very high” category ($HDI \geq 80$). In contrast, Papua recorded one of the lowest HDI levels at 61.39 in 2022, highlighting persistent regional disparities in development outcomes. Several provinces also experienced notable improvements, such as Central Papua, which moved from the “low” to “medium” category, and West Sulawesi, which progressed from the “medium” to “high” category during the observed period. Although outside the main study period, the most recent available data show that Indonesia's national HDI reached 75.02 in 2024, an increase of 0.63 points (0.85%) compared to 2023. This indicates that Indonesia continues to experience steady improvement in human development beyond the analytical period of this study. However, these 2024 figures are presented only as supplementary background information and are not included in the regression analysis. Overall, these patterns indicate persistent disparities in human development across regions in Indonesia, underscoring the need for continued policy attention to reduce regional inequality.

The main indicator supporting HDI is Indonesia's average life expectancy in 2024, at 73.89 years. Expected years of

Figure 1. Indonesia Human Development Index (2018 to 2022)



Source: [Central Bureau of Statistics \(2021\)](#)

schooling increased to 13.48 years, while the average years of schooling reached 8.81 years ([Central Bureau of Statistics, 2024](#)). The HDI is used to measure the quality of human development based on three main dimensions: long and healthy life, knowledge, and decent standard of living ([Jin & Jakovljevic, 2023](#)). Increasing numbers indicate positive developments in various social and economic aspects.

The varying HDI figures require the government to play a role in equalizing development. For this reason, as explained in the previous chapter, the government is present for the welfare of the people and utilizes tax funds that have an income redistribution function to help equalize Indonesia's human development. One of the policies implemented during the era of regional autonomy is the Tax Revenue Sharing Funds ([Kementerian Keuangan Republik Indonesia, 2022](#)). DBH is an important instrument in Indonesia's regional financial system. DBH serves to distribute a portion of state revenue derived from resources in the regions to local governments ([Hidayat et al., 2024](#); [Pidhego et al., 2025](#)). It aims to improve fiscal justice and support regional development. The function and purpose of DBH is to provide a share of state revenue to resource-producing regions as compensation for the exploitation of natural resources or taxes collected in the region ([Ashari et al., 2026](#)). DBH also functions to increase regional financial capacity, reduce fiscal imbalances between regions, and provide incentives for regions to increase their production or contribution to state revenue ([Hanindya & Bintoro, 2024](#)).

In this study, DBH is derived solely from tax revenue-sharing funds sourced from Income Tax (PPh), Value Added Tax (VAT), Land and Building Tax (PBB), and Fees on Acquisition of Land and Building Rights (BPHTB). Based on [Table 2](#), the highest DBH was recorded in 2021 at IDR 63 T.

Problems and challenges in DBH implementation include disbursement delays ([Fahrezy et al., 2025](#)). In some cases, DBH disbursement is often late, which can hamper the implementation of regional development programs. Regional dependency is also an obstacle to DBH. Many regions become highly dependent on DBH, leading to less innovation in identifying sources of PAD ([Pramudya & Marseto, 2025](#)). However, DBH has a positive impact on regional development in Indonesia. DBH assists regions in financing infrastructure, public services, and community welfare programs ([Mulyani Utami & Diantimala, 2023](#)).

Over time, the DBH policy faced several challenges, such as allocation uncertainty and revenue realization mismatches ([Fahrezy et al., 2025](#)). In Law No. 1 of 2022 on Financial Relations between Central and Local Governments (HKPD), the DBH policy was revised to improve fairness, transparency, and accountability. This redesign introduces an allocation system based on the previous year's revenue realization (T-1), increases the share of regions, such as 100% for PBB, and regulates the utilization of DBH in a more targeted manner,

for example, to address the impact of externalities, such as Tobacco Excise.

Meanwhile, regarding GRDP, data for regencies/cities in Indonesia show an upward year-over-year trend, as shown in [Table 2](#). Based on [Table 2](#) for the period 2018-2022, many regions show positive developments, especially in sectors such as trade, services, and manufacturing. However, inter-regional variations in growth remain significant, especially between urban and rural areas and between Java and the rest of Indonesia. This is due to different regional growth. Urban areas such as DKI Jakarta, Surabaya, and Medan continue to show stable growth, supported by the dominance of the services and industrial sectors. Outside Java, cities such as Balikpapan and Makassar also recorded positive growth, largely driven by the natural resources and logistics sectors. Regions that depend on the primary sector (agriculture and mining) exhibit greater fluctuations in growth than those with a more diversified economic base. Furthermore, some regions in Papua and Maluku still have relatively low per capita GRDP, despite recent increases.

Increased infrastructure investment across various regions has helped some regions increase their GRDP. This infrastructure investment is reflected in government capital expenditure. Based on [Table 2](#), government expenditure fluctuates from year to year. Capital expenditure can represent government spending on investment in fixed assets such as infrastructure, health facilities, and education, playing an important role in driving economic growth and improving HDI.

Capital expenditure allocated to infrastructure development (such as roads, bridges, and transportation) improves regional connectivity, supports economic activity, and attracts private investment ([Kadyraliev et al., 2022](#)). This increases economic output in the region. Development projects increase people's income through job creation in the construction sector, which in turn encourages further consumption and investment. Capital expenditure can help regions dependent on the primary sector (such as agriculture and mining) expand into the secondary (industry) and tertiary (services) sectors ([Kadyraliev et al., 2022](#)). Investments in educational infrastructure, such as schools, laboratories, and learning facilities, improve access to education, thereby increasing Expected Years of Schooling and Average Years of Schooling, components of HDI ([Sanusi et al., 2023](#)). In addition, the construction of hospitals, health centers, and sanitation facilities improves public health ([Huang et al., 2025](#)). This increases Life Expectancy, one of HDI indicators. Capital spending on economic infrastructure improves people's access to jobs and income, supporting better living standards ([Patimat et al., 2025](#)). By 2022, increased capital spending on education and health in some provinces directly contributes to higher HDI, especially in eastern regions such as Papua, which is beginning to move from the "low" to the "medium" HDI category. Regions with high infrastructure capital expenditure, such as West Java and East Java, show improvements in both GRDP and HDI as improved connectivity increases economic activity and access to public services.

Furthermore, Indonesia is a large country with a population of more than a quarter of a billion people. This is certainly very important for Indonesia's human development. A large population can create significant domestic market potential for products and services. It can drive economic investment, increase growth, and provide resources to improve quality of life, such as education and healthcare. A large population is also a source of labor that supports the growth of the industrial and service sectors, which indirectly supports HDI components such as decent living standards ([Arshed et al., 2023](#)).

For this reason, it is necessary to examine Indonesia's unemployment rate to further strengthen the role of its large population. The unemployment rate in Indonesia has shown a downward trend in recent years. Based on the latest data,

Table 2. Data per variable 2018 to 2022

	2018	2019	2020	2021	2022
DBH (Billion Rupiah)	25369	23752	23672	63525	33782
GRDP (Billion Rupiah)	20605	21642	21187	21965	23130
Total Population (Million)	255	255	257	262	265
Unemployment Rate	4	4	6	5	5
Local Tax Revenue (Billion Rupiah)	114	128	107	119	145
Government Expenditure (Billion Rupiah)	299	331	244	250	137
HDI	69	70	70	70	71

Source: Data processed from BPS and DJPK

the Open Unemployment Rate (TPT) in February 2024 was at 4.82%, lower than the same period the previous year, which was recorded at 5.32%. This decline is also better than before the COVID-19 pandemic (4.94% in February 2020).

The number of unemployed people in February 2024 was recorded at 7.2 million people (Huruta, 2024). This decrease was due to an increase in employment in various sectors, especially food and beverage accommodation, trade, and government administration. Overall, the number of workers increased by 3.55 million people in the past year. The Labor Force Participation Rate also increased, reaching 69.8% of the total working-age population of 214 million people. This trend reflects stronger economic conditions, which encourage job creation and reduce unemployment. Nonetheless, challenges remain, such as the high proportion of informal workers who still dominate the labor force structure. However, the downward trend from 60.12% in February 2023 to 59.17% in February 2024 indicates an improvement in the quality of employment. The way forward involves strengthening labor-intensive sectors of the economy and optimizing fiscal policy to continue supporting inclusive growth.

This fiscal policy is evident in Indonesia's existing taxation system. When looking at what happens in the regions, local taxes are a very important instrument. Local taxes are among the main instruments for increasing local fiscal capacity, which reflects the ability of local governments to manage and use their financial resources (Kiziltan & Yereli, 2023). PAD including from local taxes, is an important factor in supporting local development and reducing dependence on central transfers (Hasanah et al., 2025). Increased local taxes enable local governments to provide better public services and to encourage infrastructure development.

Although local taxes contribute significantly to PAD, many regions have not optimally utilized their tax potential. Some regions still depend on central transfers, particularly the general allocation fund (DAU) and special allocation fund (DAK), to finance their spending. There is a large gap in local tax revenue between developed regions such as Java and Sumatra and eastern Indonesia. Developed regions have a stronger economic base, access to adequate infrastructure, and better tax administration, which can maximize local tax revenue.

The 2024 Central and Local Government Financial Relations Law (HKPD Law) is an important step to improve the governance of local taxes and levies. Local governments are now encouraged to use trend analysis to set realistic tax targets and improve tax collection efficiency.

Local tax revenues are influenced by the level of local economic activity, population, and tax administration capacity. Local governments with thriving local economies are better able to increase tax revenue. Through better tax management, local governments can increase fiscal independence, reduce regional inequality, and accelerate development. However, key challenges such as a lack of technical capacity and regional disparities still require special attention. Local tax data in Indonesia show a gap between

regions with good tax management and those with suboptimal tax management. DKI Jakarta consistently records the highest local tax revenue in Indonesia, owing to its status as the center of government and the economy. In 2021, DKI Jakarta's Regional Fiscal Capacity Index reached 11.39, far above those of other provinces, such as West Java (3.60) and East Java (2.54). Then Bali recorded significant growth in local taxes, especially in the tourism sector. Hotel tax in Bali in 2023 increased by 240.4% compared to the previous year. However, several regions have suboptimal local taxes. Papua and West Papua provinces show low local revenue realization, with a percentage below 25% of the predetermined target. Meanwhile, Gorontalo has the lowest KFD index nationally (0.16), indicating the region's low fiscal capacity to increase tax revenue.

Overall, regions such as DKI Jakarta and Bali show excellent local tax performance, while provinces in eastern Indonesia still face major challenges in increasing their tax potential. Improving fiscal capacity and tax administration is key to narrowing this gap.

Regression Analysis and Interpretations

The Role of Central Taxes in Improving HDI in Regencies/Cities in Indonesia

Central taxes play an important role in improving HDI in Indonesian regencies/cities by allocating funds from the central government to the regions. In this study, central tax is represented by DBH. DBH plays an important role in improving HDI in Indonesian regencies/cities. DBH is part of the tax revenue distributed by the central government to the regions, including Income Tax, Land and Building Tax, and Fees for Acquisition of Land and Building Rights.

DBH provides additional revenue to regions that can be allocated to basic services relevant to HDI, such as education, health, and welfare. DBH is used to build or rehabilitate schools, improve teacher capacity, and provide access to free education. In addition, these funds support the provision of public health services such as community health centers, immunization, stunting, and malnutrition. Finally, DBH is expected to help improve welfare by improving the quality of clean water, sanitation, and social protection programs. DBH redistributes revenue from regions with high economic potential to less-developed regions, helping equalize access to basic services that affect the HDI. Regions that previously lacked fiscal capacity can access funds to improve the quality of education and health services.

DBH provides fiscal space for regions to fund economic empowerment programs, such as job training, MSME development, and labor-intensive programs. Improved economic welfare will be reflected in the per capita expenditure indicator, one of the components of HDI. Local governments can use DBH to implement programs tailored to local needs, such as eradicating illiteracy in certain areas or constructing health facilities in remote areas.

However, based on the regression results conducted on 486 regencies/cities for 5 (five) years, the role of DBH on HDI is significantly positive. The model constructed is as follows:

Table 3. Regression Results of DBH Role on HDI

Random-effects GLS regression			Number of obs = 2,430			
Group variable: id			Number of groups = 486			
R-sq:			Obs per group:			
within = 0.5820			min = 5			
between = 0.3354			avg = 5.0			
overall = 0.3375			max = 5			
corr(u_i, X) = 0 (assumed)			Wald chi2(5) = 2818.28			
			Prob > chi2 = 0.0000			
HDI	Coef.	Std. Err.	z	P> z	[95% Conf.	Interval]
LnDBH	.1075825	.0195761	5.50	0.000	.069214	.1459511
LnGRDP	3.556339	.1232995	28.84	0.000	3.314676	3.798001
LnPOP	-.0029617	.0523038	-0.06	0.955	-.1054751	.0995518
UNEMP	.0430405	.008517	5.05	0.000	.0263475	.0597335
LnGEXP	-.6410426	.0211668	-30.29	0.000	-.6825288	-.5995564
_cons	51.35627	1.459797	35.18	0.000	48.49512	54.21742
sigma_u	4.3313425					
sigma_e	.42431661					
rho	.99049424	(fraction of variance due to u_i)				

Source: Data processed by authors

$$HDI = 51.35 + 0.11LnDBH + 3.56LnGRDP - 0.002LnPOP + 0.043UNEMP - 0.641LnGEXP$$

With 2,430 observations, we ran the data in Stata, yielding an R-squared of 34%, indicating that approximately 34% of the variation in the HDI is explained by the independent variables in the model (Table 3). A P-value of 0.00 suggests that the model is jointly significant. From these results, all variables are statistically significant except LnPOP (population), with the following explanation:

1. The constant value of 51.36 means that without the influence of other variables, the HDI of regencies and cities in Indonesia is 51.36.
2. DBH has a statistically significant positive effect on HDI, with a coefficient of 0.108 implying that an increase in tax revenue-sharing funds is associated with an improvement in HDI.
3. Meanwhile, GRDP has a significant positive effect on HDI. When GRDP in Indonesian regencies and cities increases by 1%, HDI will increase by 3.56.
4. The population, which is expected to have a significant positive relationship, has an insignificant relationship in this model.
5. The Unemployment Rate, which is predicted to have a significant negative impact, actually has a positive and significant impact. If the unemployment rate increases by 1 point, the HDI will also increase by 0.043.
6. Meanwhile, government spending, in this case capital expenditure, also has a significant negative impact. If capital expenditure increases by 1%, the HDI decreases by -0.64. The results of this study certainly contradict theoretical expectations, as DBH is generally thought to improve public services, such as education and health, which improve HDI (Siregar, 2024).

The results indicate that DBH have a positive and statistically significant effect on HDI, suggesting that central government tax revenues contribute to human development through fiscal decentralization. As a mechanism for redistributing centrally collected taxes, DBH strengthens local fiscal capacity, enabling local governments to finance essential public services such as education, healthcare, and infrastructure that directly support improvements in HDI. This finding demonstrates that the developmental benefits of taxation extend beyond revenue collection, as tax revenues redistributed to subnational governments can enhance human capital and improve social welfare.

Among the control variables, GRDP also has a positive and significant effect, indicating that economically stronger regions tend to achieve higher levels of human development

through higher income and productive economic activities. In contrast, government expenditure shows a negative coefficient, suggesting that higher spending alone does not necessarily translate into better human development, possibly reflecting inefficiencies in expenditure allocation or the concentration of spending in less-developed regions. Population does not have a significant effect, implying that population size itself is not a key determinant of HDI after controlling for economic and fiscal factors. Meanwhile, unemployment is negatively associated with HDI, although the effect is relatively small, suggesting that limited employment opportunities may reduce household welfare and access to education and healthcare.

Overall, these findings underscore that while regional economic performance and labor market conditions influence human development, tax revenue-sharing transfers play a pivotal role by linking central tax collection with improvements in local public services and human development outcomes. This highlights the importance of designing an effective tax-and-transfer system to ensure that national tax revenues translate into tangible improvements in quality of life at the local level.

The Role of Local Taxes in Improving HDI in Regency / City in Indonesia.

Local taxes play a strategic role in improving the HDI in Indonesia's regencies and cities. Local taxes are a source of PAD managed directly by local governments, including motor vehicle, hotel, restaurant, and billboard taxes, among others. Local taxes are a major source of revenue for public services, particularly sectors that affect HDI, such as education, health, and welfare. Local taxes can be allocated to school construction, teacher training, the provision of scholarships, and the support of facilities such as libraries. Local taxes fund the construction of health centers, hospitals, immunization programs, and other preventive health services. Funding for basic infrastructure such as clean water, electricity, and sanitation, which directly improves people's quality of life.

With fiscal autonomy, regions have the flexibility to design development policies and programs that suit local needs. Local taxes allow regions to fund specific programs, such as increasing average years of schooling, addressing stunting, or empowering the poor. Local taxes are an important source of revenue for regency governments, supporting local development, including improvements in the HDI. However, the structure of local taxes in Indonesia shows significant disparities across regions, which affect regions' ability to finance public services that support HDI.

Areas with developed economies (for example, large cities

Table 4. The Role of Taxes on HDI

Fixed-effects (within) regression				Number of obs = 2,430		
Group variable: id				Number of groups= 486		
R-sq:				Obs per group:		
Within = 0.5876				min = 5		
between = 0.3431				avg = 5.0		
overall = 0.3450				max = 5		
corr(u_i, Xb) = -0.2461				F(5, 1939) = 552.66		
				Prob > F = 0.0000		
HDI	Coef.	Std. Err.	t	P> t	[95% Conf.	Interval]
LnLTR	.1972555	.0310557	6.35	0.000	.1363494	.2581616
LnGRDP	3.914296	.1717474	22.79	0.000	3.577467	4.251125
LnPOP	.092876	.0510474	1.82	0.069	-.0072376	.1929897
UNEMP	.046334	.008235	5.63	0.000	.0301836	.0624844
LnGEXP	-.6067828	.0212095	-28.61	0.000	-.6483786	-.565187
_cons	43.77424	1.851367	23.64	0.000	40.14336	47.40512
sigma_u	5.1314766					
sigma_e	.4230227					
rho	.99325004					
F test that all u_i=0: F(485, 1939) = 426.47				(fraction of variance due to u_i)		
				Prob > F = 0.0000		

Source: Data processed by the author

and metropolitan areas such as Jakarta, Surabaya, and Bandung) have much greater tax potential than remote or rural areas. Tax sources such as motor vehicle tax (PKB), hotel and restaurant tax, and billboard tax are higher in urban areas with intensive economic activities. Regions with high tax potential have larger budgets to finance education, health, and basic infrastructure, which improves HDI. In contrast, regions with low tax potential (for example, agrarian-based or remote economies) face limitations in financing HDI improvement programs.

Many regions and cities still depend on transfers from the central government (such as the General Allocation Fund and Revenue Sharing Fund) because the contribution of local taxes to total local revenue is relatively small. This dependency is particularly evident in regions with low local revenue, where local taxes only contribute a small portion to the total budget. This dependency limits the flexibility of local governments to allocate budgets according to their region-specific needs, which can slow down improvements in HDI. Some regions show low tax-collection efficiency due to limited administrative capacity, weak taxpayer databases, or a lack of technological innovation. More developed regions tend to have better tax systems, such as digital-based taxes, while lagging regions still rely on conventional methods. Low tax collection reduces the budget for public services essential to education, health, and welfare.

Most local tax revenues are allocated to routine expenditures, such as employee salaries, rather than capital expenditures that support education and health services. Only a few regions rely heavily on local taxes for programs that directly affect HDI, such as improving health or education facilities. Untargeted budget allocation results in a lack of direct impact of local taxes on HDI improvement. Some regions provide tax incentives to attract investment, which often reduces tax revenues in the short term. Regions that are successful in attracting investment tend to have a higher HDI because such investment often has a positive impact on the local economy and on infrastructure provision. Improperly targeted tax incentive policies can reduce local revenues and hinder efforts to improve HDI.

In this study, the role of local taxes on HDI is in accordance with the theory. The following is the resulting model:

$$HDI = 43.77 + 0.2LnLTR + 3.91LnGRDP + 0.09LnPOP + 0.05UNEMP - 0.61LnGEXP$$

Based on Table 4, the Fixed Effects regression model is

jointly significant, as indicated by the F-statistic of 552.66 ($p < 0.001$). The model explains approximately 58.76% of the within-region variation in the HDI, as reflected by the within R-squared of 0.5876.

1. The constant (43.77) states that when all independent variables are zero (although unrealistic), HDI is estimated at 43.77. This constant represents the baseline HDI, excluding the contribution of the other variables.
2. The coefficient of local taxes is 3.91. 1% increase in local taxes is associated with a 3.19-point increase in HDI. This positive relationship can be explained by the relatively direct fiscal link between locally generated revenues and the provision of public services. This mechanism is consistent with development theory, which suggests that higher locally generated revenues enhance local governments' capacity to deliver quality public services, thereby contributing more directly to improvements in human development outcomes.
3. GRDP coefficient: 3.91. A 1% increase in GRDP increases HDI by 3.91. GRDP reflects the region's economic activity. Higher economic growth positively impacts people's well-being, including access to education and healthcare. This is consistent with economic development theory, which emphasizes the positive relationship between economic growth and people's quality of life.
4. Population (LnPOP) has a negative coefficient but is not statistically significant at the 5% level ($p\text{-value} = 0.069$), implying that population size alone does not substantially influence HDI after controlling for fiscal and economic conditions.
5. Unemployment Rate coefficient 0.05. A 1-point increase in the unemployment rate increases HDI by 0.32. This relationship seems contrary to expectations, as unemployment is usually associated with a decline in welfare. This positive coefficient may reflect that regions with high unemployment have additional income, such as from the informal sector, or that subsidy policies support an increase in HDI despite high unemployment. This requires further analysis to understand the true relationship.
6. Government Expenditure, in this case represented by Capital Expenditure, coefficient: -0.61. A 1% increase in capital expenditure decreases HDI by 0.61. Theoretically, capital expenditure (investment in infrastructure such as roads, schools, or hospitals) should increase HDI. This negative relationship may be due to inefficient spending, such as on infrastructure projects that do not directly impact human development. Focus of capital expenditure

on non-priority projects (e.g., grandiose infrastructure that is irrelevant to the basic needs of the people). High capital expenditure in underdeveloped regions, resulting in low HDI despite increased investment.

HDI is a key indicator of human-centered development, which includes education, health, and welfare. Positive local taxes and GRDP reflect increased government capacity to finance services that improve people's quality of life. Malthusian Theory states that a negative relationship between population and HDI indicates population pressure on local resources, which is consistent with Malthusian theory. Capital expenditure should have a positive impact on HDI if managed properly. However, the negative relationship in this model may indicate inefficiency or suboptimal allocation, consistent with criticisms in public expenditure management theory. A high GRDP usually leads to increased community welfare. The positive relationship between GRDP and HDI suggests that economic growth supports human development. For this reason, it is necessary to optimize the collection and use of local taxes.

Strengthening tax administration to increase local revenue and allocating local taxes to priority programs that support education and health will certainly improve HDI. Efficient management of capital expenditure is equally important. It is necessary to focus on infrastructure projects that directly impact HDI, such as health and education facilities, and to improve transparency and accountability in the use of capital expenditure. It is necessary to capitalize on economic growth. With this, it is expected to encourage economic inclusion to ensure GRDP growth impacts all levels of society and develop labor-based economic sectors to absorb unemployment.

The model shows the relationship of economic variables with HDI. The theoretically sound results (Local Tax and GRDP) indicate the importance of income efficiency for human development. However, anomalies in the Unemployment Rate and Capital Expenditure suggest that expenditure management and employment policies require further evaluation to ascertain their impact on HDI.

These results show that the role of local taxes is crucial for improving HDI. However, several challenges, including administrative capacity, still need to be improved. There are still regions with limited capacity to optimally manage and collect local taxes. Regions with a weak economic base may have low tax revenues, affecting their ability to improve HDI. Local tax allocation is often suboptimal, with most of the budget spent on routine expenditures rather than on human development investments. Surabaya City, for example, has a large local tax potential, mainly from hotel, restaurant and vehicle taxes, which is used to fund free education, quality health services and infrastructure development. This has resulted in a relatively high HDI. Meanwhile, Regencies in Disadvantaged Areas with low local tax potential have limited budgets for education and health, which results in a stagnant HDI.

Local taxes play an important role in improving HDI by funding education, health, and community welfare. With good management, local taxes can be a key instrument for sustainably improving people's quality of life and reducing the development gap between regions in Indonesia. Recommendations to Improve Local Taxes for HDI include increasing the capacity of Local Tax administration by adopting digital technology for tax collection and developing a more comprehensive taxpayer database. Then the need to optimize tax allocations by focusing on capital expenditures that improve education, health, and basic infrastructure. Furthermore, it is necessary to increase PAD in Regions with Low Tax Potential by developing the local economy's potential to expand the tax base, for example through tourism and the MSME sector. Reducing dependence on Transfer Funds must

also continue by increasing the efficiency of PAD management, so that regions are more independent in financing development programs. Finally, there is a need for fiscal redistribution. The central government can help regions with low tax potential through a fairer policy for redistributing transfer funds.

Local tax conditions in Indonesia vary widely and directly affect the ability of Regencies/cities to improve HDI. Regions with high tax potential tend to have better HDI because they can finance education, health, and community welfare services. However, regions with low tax potential require fiscal redistribution policies and capacity-building to maximize their capacity to support human development.

Between central and local taxes, which one has a greater role in improving the HDI of Regencies/cities in Indonesia?

To assess whether DBH tax or local tax has more role in improving Human Development Index (HDI) in regencies/cities in Indonesia, we need to analyze its characteristics, management, and impact on human development based on economic theory and practice in the field.

1. DBH tax is a transfer of funds from the central government to the regions, based on tax revenue in the region. DBH is part of fiscal transfers, so these funds are relatively stable and certain to be received by regions every year. Then the impact on HDI is because DBH Tax is used to support local government spending, including education and health. In accordance with the principle of fiscal decentralization, DBH increases regions' capacity to provide public services, especially in regions with limited PAD. The drawback of DBH is the fiscal dependency of regions. Regions that rely too much on DBH tend to have no incentive to increase own-source revenue.
2. Local taxes are part of the PAD, which comes from motor vehicle tax, hotel tax, restaurant tax, and others. The advantage of local taxes is fiscal independence. Local taxes grant local governments autonomy to manage their own revenues, allowing flexibility in planning development programs. The impact on HDI is that high local taxes are often associated with developed regions that are able to fund free education, health facilities, and basic infrastructure development. Local governments can directly allocate taxes to priority sectors that improve HDI, such as education and health services. The principle of financial decentralization encourages regions to be more innovative in increasing their tax revenue and allocating the budget optimally. Regarding local tax shortfalls, there is an imbalance in tax potential. Regions with a weak economic base have low tax potential, so their contribution to HDI is relatively small compared to developed regions. Many regions still face obstacles to managing taxes effectively due to administrative and technological limitations.

The author has run a panel regression in Stata to compare the roles of DBH and local taxes in HDI. The results are shown in Table 5 below.

The Fixed Effects regression model is jointly significant, as indicated by the F-statistic of 470.26 with a p-value of 0.000. The model explains approximately 59.28% of the within-region variation in the HDI, as reflected by the within R-squared of 0.5928. However, the effect of each independent variable on HDI is as follows:

$$HDI = 43.2 + 0.09LnDBH + 0.2LnLTR + 3.7LnGRDP + 0.08LnPOP + 0.04UNEMP - 0.6LnGEXP$$

This model explains the influence of economic and demographic variables on the HDI. The following is an analysis of each component of the regression model.

1. The constant indicates that if all independent variables are zero, HDI is estimated to be at 43.22. This constant represents the baseline HDI, excluding the influence of other variables.

Table 5. The Role of DBH Tax and Local Tax on HDI

Fixed-effects (within) regression				Number of obs = 2,430		
Group variable: id				Number of groups = 486		
R-sq:				Obs per group:		
within = 0.5928				min = 5		
between = 0.3414				avg = 5.0		
overall = 0.3434				max = 5		
corr(u_i, Xb) = -0.2195				F(6, 1938) = 470.26		
				Prob > F = 0.0000		
HDI	Coef.	Std. Err.	t	P> t	[95% Conf.	Interval]
LnDBH	.0937738	.0189007	4.96	0.000	.056706	.1308416
LnLTR	.1872476	.0309342	6.05	0.000	.1265799	.2479153
LnGRDP	3.743982	.1741282	21.50	0.000	3.402483	4.08548
LnPOP	.0787117	.0508196	1.55	0.122	-.0209552	.1783786
UNEMP	.0436675	.0082029	5.32	0.000	.02758	.059755
LnGEXP	-.595968	.0211939	-28.12	0.000	-.6375332	-.5544028
_cons	43.22322	1.843543	23.45	0.000	39.60769	46.83876
sigma_u	5.1043256					
sigma_e	.42046996					
rho	.99326006					
				(fraction of variance due to u_i)		
F test that all u_i=0: F(485, 1938) = 418.18				Prob > F = 0.0000		

Source: Data processed by the author

2. DBH Tax, with a coefficient of 0.094. A 1% increase in DBH Pajak reduces HDI by 0.094. It already meets the theory. DBH, including Tax DBH, should have a positive impact by increasing regions' fiscal capacity to fund public services.
3. Local Tax Revenue with a coefficient of 0.2. A 1% increase in local taxes increases HDI by 0.2 points. Local taxes are the main source of local own-source revenue (PAD), providing local governments with flexibility to finance priority programs. This positive relationship suggests that increasing local fiscal independence through local taxes directly impacts sectors that support HDI, such as education, health, and basic infrastructure.
4. GRDP with a coefficient of 2.48. A 1% increase in GRDP increases HDI by 3.7. GRDP represents the economic strength of a region. This positive relationship reflects that economic growth contributes to improving people's quality of life, including access to education and health. Human development theory states that economic growth provides greater resources for investment in human development.
5. Population has a positive but statistically insignificant coefficient, indicating that population size alone does not significantly influence HDI after accounting for fiscal and economic factors.
6. Unemployment Rate with coefficient: 0.04. 1-point increase in the unemployment rate increases HDI by 0.04. This relationship is contrary to expectations, as unemployment usually has a negative impact on people's well-being. This positive coefficient may reflect special phenomena, such as government support and educated unemployment. Regions with high unemployment rates may receive welfare-enhancing social assistance. Then in some cases, a high unemployment rate may reflect the high education level of the community, which contributes to the HDI even though the labor force has not been fully absorbed.
7. The estimated coefficient for capital expenditure is -0.6. Since capital expenditure is specified in logarithmic form, the coefficient should be interpreted as an elasticity, meaning that a 1% increase in capital expenditure is associated with -0.6 decrease in HDI. This result is counterintuitive from a theoretical perspective, as capital expenditure on education, health, and public infrastructure is generally expected to enhance human development outcomes. However, this negative relationship should be interpreted with caution and may

reflect several underlying factors. This may indicate inefficiencies in expenditure allocation, a concentration of spending on administrative or recurrent expenditures, or the tendency for governments to allocate larger budgets to relatively underdeveloped regions.

The results indicate that both central tax revenue transfers (DBH) and local tax revenues (LTR) make positive and statistically significant contributions to improving the Human Development Index (HDI). However, the estimated coefficient of local tax revenue ($\beta = 0.2$) is larger than that of tax revenue-sharing transfers ($\beta = 0.09$), suggesting that ceteris paribus, locally generated tax revenues have a stronger marginal association with HDI than transfers from centrally collected taxes. This finding may reflect the greater flexibility and fiscal autonomy associated with local tax revenues. Unlike DBH, which is allocated according to nationally determined formulas and regulations, locally generated taxes can be more directly aligned with local development priorities. Greater fiscal autonomy enables local governments to respond more effectively to local needs by financing education, healthcare, and infrastructure projects that directly contribute to human development.

Nevertheless, the positive and significant effect of DBH remains an important finding. As an instrument of fiscal decentralization, tax revenue-sharing transfers redistribute centrally collected taxes to local governments, particularly those with limited fiscal capacity. Consequently, DBH promotes horizontal equity by ensuring that less affluent regions have sufficient resources to provide essential public services. In this sense, central taxation contributes to human development not through direct expenditure, but through the redistribution of fiscal resources across regions.

Therefore, the findings should not be interpreted as indicating that local taxes are more important than central taxes, but rather that the two are complementary. Local taxes strengthen fiscal autonomy, while central tax revenue-sharing strengthens fiscal equalization. Sustainable improvements in HDI require both an effective local revenue system and an equitable intergovernmental transfer system. Together, these fiscal instruments enhance local governments' capacity to invest in education, healthcare, and public infrastructure, thereby improving human development outcomes.

Thus, while locally generated tax revenues exhibit a larger marginal effect on HDI, tax revenue-sharing transfers remain indispensable for reducing regional fiscal disparities. Local

taxes are more effective at enhancing development where fiscal capacity already exists, whereas central tax transfers ensure that regions with weaker tax bases can also finance essential public services. Accordingly, improving human development in Indonesia depends not on choosing between central and local taxation, but on strengthening the complementarity between fiscal equalization through tax revenue sharing and fiscal autonomy through local revenue mobilization.

The findings provide several policy implications for improving human development through Indonesia's fiscal decentralization framework. First, the positive effect of DBH suggests that the central government should continue strengthening the intergovernmental fiscal transfer system to reduce regional disparities in fiscal capacity. However, increasing the amount of DBH alone is insufficient. Transfer policies should increasingly emphasize performance-oriented allocation mechanisms, in which a portion of the transfer is linked to measurable improvements in education, healthcare, and other HDI-related outcomes. Such an approach would encourage local governments to utilize transferred resources more effectively while maintaining fiscal equalization across regions.

Second, the larger coefficient of local tax revenue indicates that strengthening local revenue mobilization can generate greater improvements in HDI. Therefore, local governments should enhance tax administration through digitalization, a broader tax base, improved taxpayer compliance, and more efficient tax collection, rather than increasing tax rates. Higher local revenues expand fiscal autonomy, allowing local governments to finance development programs that are more responsive to local needs.

Third, the negative coefficient of government expenditure suggests that increasing public spending alone does not guarantee better human development outcomes. Policymakers should therefore shift their focus from the quantity of expenditure to its quality. Budget allocations should prioritize productive spending on education, healthcare, sanitation, and basic infrastructure while reducing inefficient or low-impact expenditures. Strengthening expenditure planning, monitoring, and evaluation is also essential to improve the effectiveness of public spending.

Finally, the complementary effects of central tax transfers and local tax revenues indicate that improving HDI requires a balanced fiscal strategy. Central government transfers remain essential for ensuring fiscal equity across regions, particularly for areas with limited revenue-generating capacity, while stronger local tax systems enhance fiscal autonomy and accountability. Accordingly, future fiscal decentralization reforms should integrate both objectives, namely fiscal equalization through tax revenue sharing and fiscal sustainability through stronger local revenue mobilization to maximize improvements in human development.

Conclusion

This study examines the relationship between central tax revenue-sharing transfers (DBH), locally generated tax revenues (LTR), and the Human Development Index (HDI) across 486 Indonesian regencies and municipalities during the period 2018–2022 within the fiscal decentralization framework. Using a panel regression model, the findings reveal

that both DBH and LTR have positive and statistically significant effects on HDI, confirming that taxation contributes to human development through two complementary fiscal channels. However, the larger coefficient of LTR suggests that local taxes play a greater marginal role in improving HDI, reflecting the importance of fiscal autonomy in enabling local governments to finance development programs that are more responsive to local needs. Nevertheless, central tax revenue-sharing remains indispensable for strengthening the fiscal capacity of regions with limited revenue potential and reducing regional disparities in human development. Among the control variables, GRDP positively influences HDI, highlighting the role of regional economic growth in improving education, health, and living standards. In contrast, government expenditure is negatively associated with HDI, suggesting that the effectiveness of public spending depends more on the quality and allocation of expenditure than on its magnitude. Population size is not a significant determinant of HDI, while unemployment has only a relatively small effect after controlling for fiscal and economic conditions.

This study contributes to the fiscal decentralization and public finance literature by demonstrating that taxation's role in human development extends beyond revenue generation. While central taxes promote human development through fiscal equalization by redistributing tax revenues across regions, local taxes contribute through fiscal autonomy by enabling governments to tailor public spending to local priorities. Rather than substituting for one another, these fiscal instruments perform complementary functions in improving human development outcomes. From a policy perspective, enhancing HDI requires an integrated fiscal strategy that combines an effective and performance-oriented tax revenue-sharing system with stronger local revenue mobilization and more efficient public expenditure. Strengthening local tax administration, improving the targeting of intergovernmental transfers, and prioritizing productive spending on education, healthcare, and basic infrastructure will maximize the developmental impact of both central and local tax revenues.

This study is subject to several limitations. It focuses primarily on tax-based fiscal resources and does not explicitly consider institutional quality, governance, or the composition of public expenditure, all of which may influence how fiscal resources are translated into human development outcomes. Future research should incorporate these institutional dimensions and examine whether the effectiveness of central and local taxes varies across regions with different levels of fiscal capacity and governance quality. Such analyses would provide a deeper understanding of how fiscal decentralization can more effectively promote sustainable and inclusive human development.

Author contributions

Nur Farida Liyana was responsible for data collection, data analysis, and manuscript writing. Rizqi Haniyah contributed to data collection and manuscript revision, while Arief Budi Wardana was involved in manuscript revision and proofreading.

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