

The Impact of Fiscal Decentralization, Social Funds and Indicators of Sustainable Development to Indonesian Human Development Index

Dyah Ayu Retno Inten ¹, Muhammad Zilal Hamzah ^{2*}, Eleonora Sofilda ³

¹ Faculty of Economics, Krisnadwipayana University, Indonesia.

^{2,3} Universitas Trisakti, Kyai Tapa Street No. 1 Grogol, West Jakarta, Indonesia.

*Corresponding author: mhd_zilal_hamzah@trisakti.ac.id

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Abstract: The Human Development Index (HDI) plays a crucial role in the economy because it encompasses 3 vital dimensions: Health, Education, and Income. This study aims to analyse the factors influencing HDI in Indonesia, with particular attention to regional disparities and the effectiveness of development policies. Specifically, the research seeks to explore global literature trends related to HDI, assess the impact of fiscal decentralization, social fund budget allocations, and sustainable development indicators on HDI at the national level as well as across the Western, Central, and Eastern regions of Indonesia. It also evaluates these impacts in regions with HDI levels above and below the national average. The study employs a mixed-methods approach, utilizing a qualitative method through a Systematic Literature Review (SLR) analysis, alongside a quantitative method using panel data from 2017 to 2023, covering all regencies and cities in Indonesia.

The results of the qualitative method show an increasing trend for literary performance. Meanwhile, based on the quantitative method, the results obtained are that the fiscal decentralization policy has an effect on the HDI, as indicated by the variables: (i). The national Health budget has a positive effect on the HDI, but is only significant in WIT; (ii). The Regional Independence Index (IKD) significantly increases the HDI in all regions (WIB, WITA, WIT); (iii). Education DAK has a significant effect on the HDI nationally and in WIB and WITA; (iv). Health DAK significantly increases the HDI in WIB and WITA.

The social fund budget has an effect on the HDI, as indicated by the variable of Village Funds, which has a positive effect on the HDI, nationally, significantly in WIT, but not in WIB and WITA. SDGs have an effect on the HDI, as indicated by the variables: (i). The Village Development Index (IDM) significantly increases the HDI in all regions (WIB, WITA, WIT); and (ii). The Average Length of Schooling for Women significantly increases the HDI in all regions.

Keywords: Human Development Index, Fiscal Decentralization, Social Budget Allocation, Sustainable Development Goals (SDGs).

Introduction

The fundamental concept of the United Nations Development Programme (UNDP) on human development in 1990 provided an understanding of a new perspective on development. The development approach used emphasizes improving the quality of life of individuals and not just pursuing economic growth. Development must aim to improve human capabilities, namely the real ability of humans to achieve life goals that they consider important. Therefore, the concept of human development to achieve prosperity is not only measured through economic indicators, but also through the ability of humans to get an education, live healthily, and have freedom of choice (see also Sen, 1990). Schultz (1961) in his theory on human capital argues that to increase productivity and economic growth, investment in education, health, and human skills is the key. Education and health, which are two main dimensions of human development, are considered forms of human capital investment. When humans are healthier and more educated, they can contribute more to economic and social development. This is in line with the concept of endogenous growth (Endogenous Growth Theory), which states that human development, education and health

function as catalysts for innovation and sustainable economic growth. This theory emphasizes that development must consider the sustainability of resources for future generations, with a focus on the balance between economic, social, and environmental (Rommer, 1996).

Indonesia is named the 4th most populous country in the world and has a large burden to realize the 17 pillars of the SDGs. One of the main factors that is still a major challenge that must be faced in realizing Indonesia's vision as a developed country is the quality of human resources (HR). Based on the Human Development Index (HDI) in the last year, Indonesia has shown gradual improvement, but is still lagging behind several neighboring countries in Southeast Asia, such as Singapore, Malaysia, and Thailand.

The Indonesian government has made major reforms to achieve inclusive development for all people. Indonesia issued Law No. 22 of 1999 concerning Regional Autonomy and Law No. 25 of 1999 concerning Fiscal Balance between the Central and Regional Governments. Both laws explain the expansion of decentralized powers on the part of the government, including decentralization in the fiscal sector. Fiscal decentralization is often associated with increasing the Human Development Index through budget management according to local needs (Martinez-Vazquez & McNab, 2003). A study by Akai and Sakata (2002) shows that fiscal decentralization can encourage the efficiency of public spending, which has a positive impact on education, health, and community income. However, other studies, such as by Faguet (2004), found that the impact of decentralization is highly dependent on the capacity of local governments and monitoring mechanisms, which, if weak, can actually widen the development gap. Meanwhile, social funds, such as social assistance programs or investments in health and education services, have been shown to contribute to improving community welfare. For example, a study by Barrientos (2013) shows that social protection programs such as cash transfers can reduce poverty and improve the HDI. Another study by Duflo (2004) highlights the importance of allocating social funds to children's education and maternal health, which directly affect the components of the HDI.

Several previous studies have tried to combine fiscal decentralization with social indicators (Sepulveda & Martinez-Vazquez, 2011), but they do not include the dimensions of sustainable development comprehensively. In addition, most studies that use social funds often isolate this factor from the context of fiscal decentralization, even though the relationship between the two is important to understand in the framework of public policy. Most studies on sustainable development use indicators other than the HDI, for example, the Environmental Sustainability Index, so the direct relationship between sustainable development and the HDI is still rarely explored. Ultimately, fiscal decentralization that began in 2000 is expected to improve the quality of human resources throughout Indonesia to realize sustainable development. The Human Development Index (HDI) of regencies/cities in the western zone has the highest average (69.18) compared to the central part, which only has an average HDI of 67.74, and the eastern zone with an average of 61.31.

The differences in the Human Development Index (HDI) across time zones in Indonesia reflect a significant development gap. Access to and quality of public services, especially in the education and health sectors, are the main factors influencing the HDI level in each region. The western zone tends to have more adequate education facilities and better health services, contributing to improved quality of life and higher HDI scores. In contrast, the eastern region faces challenges in the provision of public services that are still limited and uneven, which has a negative impact on human resource development in the region (Suparmi et al., 2018). In addition, the nature of the economy, which is still Java-centric, deepens this gap. The dominant economic activity in Java creates an imbalance in the distribution of resources and infrastructure investment, thus slowing growth in other regions, especially in the eastern region. Therefore, efforts to reduce the gap and encourage development can be achieved by increasing access to basic services.

Currently, Indonesia is experiencing a very high prevalence of stunting. The prevalence rate in Indonesia is still above the maximum limit set by WHO, which is <20% (Hamzah et.al, 2024). A study conducted by Bhutta, et al. (2020) showed that investment in both health and nutrition influences reducing stunting and increasing child growth. Hamzah et al (2024) produced a food security index, extreme poverty line, and length of schooling for women have a significant influence on stunting. In line with that, the government, through Presidential Regulation of the Republic of Indonesia No. 42 of 2013, is also committed to handling the problem of consumption quality (nutrition) and stunting.

A high level of stunting indicates low health outcomes and affects children's cognitive development, causing delays in academic development, which will affect a country's HDI in the future, according to research by Nwakeze & Kandala, (2019). Sustainable development involving economic, social, and environmental dimensions is increasingly becoming a concern in the literature. A study by Sachs (2015) shows that sustainable development has a long-term impact on the quality of life and human well-being. A study by Holden, Linnerud, and Banister (2014) explains the

importance of integrating environmental dimensions into development indicators to ensure long-term sustainability. Based on the description above, this study aims to: (i). Analyze how the impact of fiscal decentralization policy on the Human Development Index in Indonesia, especially in the Western, Central, and Eastern Regions; (ii). Analyze how the allocation of social fund budgets on the Human Development Index in Indonesia, especially in the Western, Central, and Eastern Regions; (iii). Analyze how the impact of sustainable development indicators on the Human Development Index in Indonesia, especially in the Western, Central, and Eastern Regions; and (iv). Analyze how the impact of fiscal decentralization, social fund budget allocations, and sustainable development indicators on the Human Development Index is above and below the national average.

Theoretical Background

Indonesia's Fiscal Policy and Its Relation to the Human Development Index

Fiscal policy is the government's main instrument in managing the economy through state expenditure and revenue. In Indonesia, fiscal policy plays an important role in encouraging human development, especially in improving the Human Development Index, which covers three main dimensions: education, health, and per capita income, all of which are influenced by how the government allocates the budget to support public welfare.

Gruber (2013) maps out several reasons related to government intervention in the economic sector, namely; (i). Market failure. This is related to inefficiencies that occur in the market; and (ii). Redistribution. Leading to the reallocation of resources in an effort to create equality. Furthermore, intervention in the economy can be done through: (i). Imposing taxes and providing subsidies; (ii). Restrictions or mandates on private sector purchases or sales; (iii). Provision of public goods and services; and (iv). Public financing. Of the four methods, the provision of subsidies (cash assistance) is an aspect that is relevant to this study (see also: Pass & Lowes, 1988 and Suparmoko, 2016). Although beneficial, subsidies can also cause price distortions and create excess burden or deadweight loss when consumption of subsidized goods exceeds the balance point between costs and marginal social benefits. In the framework of fiscal policy, the allocation of education and health budgets is positioned as a form of long-term investment to strengthen human capital. The Keynesian approach emphasizes that public spending, especially in the education sector, can drive economic growth through increased productivity.

The Indonesian government has set a minimum allocation of 20% of the APBN for education based on the mandate of the 1945 Constitution Article 31 Paragraph (4), while the health budget refers to Law No. 36 of 2009 as an effort to improve the quality of the workforce. In endogenous growth theory, health is considered an important component of human capital that contributes to long-term economic growth. Through state spending on health services, disease prevention programs, and nutritional improvements, the government seeks to increase life expectancy as an indicator of the health dimension in the Human Development Index (HDI). Gradually, the health budget continues to be increased to expand access to services, overcome stunting, and build health infrastructure in disadvantaged areas.

For income redistribution through subsidy and social assistance policies based on Law no. 11 of 2009, it aims to reduce economic disparities and increase the purchasing power of the poor. This approach is in line with Keynesian theory, where government spending on social assistance can increase consumption and aggregate demand. Programs such as Direct Cash Assistance (BLT), Family Hope Program (PKH), and energy subsidies (fuel, electricity) are government efforts to increase the income and welfare of the poor. This program helps reduce poverty and inequality, which has an impact on the income dimension in the HDI. Social infrastructure, such as hospitals, schools, and public facilities, is the result of government capital expenditures that function to directly improve people's welfare.

Fiscal policy in Indonesia plays an important role in increasing the HDI through: (i) Education budget to increase average length of schooling and expected length of schooling; (ii) Health spending to increase people's life expectancy; (iii) Social assistance programs to increase income and reduce poverty; (iv) Development of social infrastructure to ensure equal access to education and health; and (v) Tax management to support financing of human development. Fiscal policies that are in line with the dimensions of the Sustainable Development Goals (SDGs) are directed at increasing the Village Development Index (IDM), a composite index consisting of three main dimensions: social resilience, economic resilience, and ecological or environmental resilience. This index is built on the understanding that achieving the status of an advanced and independent village requires a sustainable development framework that synergizes social, economic, and environmental aspects. Within this framework, policies and activities for the development and empowerment of village communities are required to produce social equity and justice, strengthen local cultural values, and manage natural resources wisely and sustainably. These three dimensions of resilience act as main pillars that complement each other in driving the development process and achieving the goals of empowering village communities.

Stunting is a serious challenge for the Indonesian Government, as it has short-term impacts on children's physical growth and cognitive development, as well as long-term susceptibility to disease and a decline in the quality of human resources. The main causes of stunting include lack of nutritional intake, inappropriate parenting patterns, poor environmental sanitation, and limited access to health services. In response, the government issued Government Regulation No. 72 of 2021 concerning the Acceleration of Stunting Reduction, which emphasizes that mitigation efforts must involve all stakeholders, from the central government to village governments. In order to support the Indonesia Emas 2045 agenda, the Ministry of Finance allocates a budget for handling stunting through ministerial/institutional funds, Physical DAK, and Non-Physical DAK, with a target prevalence reduction to 14% by 2024. The Human Development Index (HDI) is influenced by various factors, including village funds, poverty, stunting, food security, government spending, fiscal decentralization, income, and educational attainment. Sijabat's (2024) study of 33 provinces in Indonesia found that village funds had a significant influence on increasing the HDI, which was also supported by the findings of Iskandar & Aritenang (2020) at the village level. In addition, poverty also plays a major role in influencing the HDI, as revealed by Sijabat (2024), who found a significant relationship between poverty levels and the HDI in several regions in Indonesia.

Food security and stunting prevalence are closely related to the HDI. Ardiningrum et al.'s (2021) study in 10 provinces in Sumatra confirmed that the Food Security Index had a significant effect on the HDI. Furthermore, Zuhana et al. (2024) showed similar findings related to stunting in NTT. The cycle between poverty and stunting reinforces limited access to nutrition, health, and sanitation, which has an impact on long-term productivity and extends the cycle of poverty. Meanwhile, research conducted by Hamzah et al. (2024) revealed that the prevalence of stunting in Indonesia is influenced by fiscal decentralization, food security, and socio-economics. On the other hand, government budget allocation in education and health also plays an important role in improving the quality of life. Likewise, Sari et al.'s (2022) study of 34 provinces showed a significant relationship between the health budget and the HDI.

In addition to government spending, fiscal decentralization also supports increasing the HDI by strengthening regional authority in managing financial resources independently. Mauludin & Dewi's (2020) study in Banten showed that the Regional Independence Index (IKD) had a significant influence on the HDI through strengthening public services in education, health, and economic welfare.

Furthermore, in addition to policy and budget factors, individual aspects such as education and income are also the main drivers of the HDI. Soviz & Chavooshi (2019) highlighted that years of schooling had a significant impact on the HDI. On the other hand, Maqin & Sidharta (2017) found that Gross Regional Domestic Product (GRDP) or GDRP had a positive effect on increasing the HDI. These findings confirm that economic growth, both through income and quality of education, is an important factor in building overall societal welfare.

The Relationship between the SDGs Concept and the Human Development Index

The concept of human development has undergone significant changes over time, starting from ancient views to modern thinking today. In the ancient view, human development only concentrated on meeting human physical needs such as food, water, shelter, and clothing. This aims to enable humans to survive and continue their lives (Sen, 1999). In the Middle Ages, human development focused more on spiritual and moral progress with the aim of achieving a better life in the afterlife (Alatas, 1977).

In the Age of Enlightenment, human development leaned more towards intellectual progress with the aim of creating a more educated and rational society. In the early modern era, human development began to focus on economic progress with the aim of improving human living standards (Sen, 1999). However, human development is increasingly developing and expanding its views to achieve comprehensive and sustainable human welfare. The goal is to improve the quality of human life in all aspects of life, including health, education, employment, access to resources, and social justice (UNDP, 2022). The measurement of HDI in Indonesia refers to three dimensions introduced by UNDP in 1990. The three dimensions consist of a long and healthy life, knowledge, and a decent standard of living. In addition, Indonesia also always adjusts the methodology in accordance with the improvements made by UNDP. Starting from 2015 until now, Indonesia has used the latest methodology refined by UNDP in 2014 as the standard for calculating HDI (BPS 2023).

Data and Research Method

This study uses quantitative and qualitative methods. As explained by Creswell (2010), the quantitative approach is pre-determined, using statistical data analysis and interpretation to test theories through specific hypotheses. The qualitative research method is a method used in certain situations where a deeper understanding of a process or experience is desired by the researcher (see also Bazeley & Jackson, 2013). This study uses a panel data analysis

method. The advantages of panel data analysis include taking into account individual heterogeneity, controlling heterogeneity to build complex models, and being suitable for static adjustment studies (Gujarati, 2010; Baltagi, 2005; Cheng, 2014; Davidson & MacKinnon, 2004). The analysis steps include data stationarity tests, model feasibility tests, and hypothesis tests. In the panel data analysis method, three types of estimation techniques can be used to estimate parameters, namely: the Common Effect (Pooled Least Squares) model, the Fixed Effect model, and the Random Effect model. To make the best selection of this estimation model, there are several tests that need to be done, namely: (i). Chow test, conducted for model selection between PLS and FE. If the P-value <0.05, then the FE model is accepted; (ii). LM test, conducted for model selection between PLS and RE. If the LM statistic value is greater than the Chi-square statistic value, then RE will be selected; and (iii). Hausman test to select between FE and RE. If the P value <0.05, then the FE model will be selected, and vice versa.

The type of data used is secondary data from 34 provinces in Indonesia, sourced from the Indonesian Ministry of Finance, Ministry of Health, Ministry of Villages, Development of Disadvantaged Regions and Transmigration of the Republic of Indonesia and BPS. The data are the human development index, special allocation funds for education, special allocation funds for health, health budget realization, regional independence index (IKD), village funds, social assistance (PKH), poverty line, income, food security index, village development index, stunting prevalence, length of schooling. The time span used is 2017-2023.

As the research objectives have been explained previously, in this research, the following equations will be compiled:

$$Y_{1it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} + \beta_8 X_{8it} + \beta_9 X_{9it} + \beta_{10} X_{10it} + \beta_{11} X_{11it} + \beta_{12} X_{12it} + \varepsilon_{it}$$

Where: X_1 = special allocation fund for Education, X_2 = special allocation fund for Health, X_3 = realization of Health Budget, X_4 = regional independence index, X_5 = village fund, X_6 = social assistance (PKH), X_7 = poverty line, X_8 = income, X_9 = food security index, X_{10} = village development index, X_{11} = stunting prevalence, X_{12} = average length of schooling, and Y_1 = Human Development index.

Meanwhile, related to the qualitative approach, a specific literature review mapping will be carried out through the Systematic Literature Review (SLR) analysis technique. A SLR is a research method used to identify, evaluate, and critically synthesize various relevant study results in order to answer certain research questions (Kitchenham, 2004, in Siswanto, 2010). This technique is usually used in meta-analysis. Meta-analysis is an analysis of several empirical studies (not from a group of people) that aims to integrate and explain a literature on a parameter measurement (see among others: Stanley & Jarell, 1989 and Lipsey & Wilson, 2001). Several studies, especially in the social sciences, have used meta-analysis, such as psychology (Shapiro & Shapiro, 1982; Rosenthal, 1984), management science (Assmus et al., 1984 and Stanley & Jarell, 1998), and even to the field of macroeconomics (Farly et al., 1981 and Doucouliagos, 1997). Related to the stages, first, the author will collect several articles through the Web of Science database with certain keywords. After being obtained, inclusion and exclusion criteria are carried out on the available data sources using the help of the PRISMA diagram approach. Furthermore, articles that meet the selected requirements will be analyzed using R (bibliometrix package) and Vos Viewer to perform the analysis. These steps are usually called method triangulation (Sutopo, 2016).

Result and Discussion

Model Estimation Test and Hypothesis Estimation Analysis

The selection of the estimation model in this study was carried out through the Chow Test and Hausman Test (see table 1 below). The results of the Chow Test show that the Fixed Effect model is more appropriate than the Common Effect because the Chi-square probability value is <0.05. Furthermore, the Hausman Test shows that most models are more appropriate using the Fixed Effect because the probability value is <0.05. However, for the district/city model with an average HDI above the national average, the probability value is >0.05, so the Random Effect model is considered more appropriate.

Table 1: The Result of Model Estimation Test

Model	Chow Test		LM Test		Hausman Test		Result
	T-stat	P-value	T-stat	P-value	T-stat	P-value	
Indonesia	8496.01	0.0000	5405.91	0.0000	888.00	0.0000	FEM
Above IPM	272.68	0.0000	72.27	0.0000	0.00	1.0000	REM
Below IPM	2319.68	0.0000	1930.94	0.0000	83.39	0.0000	FEM
WIB	4743.41	0.0000	3492.73	0.0000	118.54	0.0000	FEM
WITA	2289.93	0.0000	1634.67	0.0000	162.19	0.0000	FEM
WIT	1164.21	0.0000	683.60	0.0000	143.38	0.0000	FEM

Source: Data processed

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Table 2: Processed Data Results Per Region in Indonesia

Variable	Theor	Indonesia (FEM)		WIB (FEM)		WITA (FEM)		WIT (FEM)	
		Beta	P-val (1 Ta	Beta	P-val (1 Ta	Beta	P-val (1 Ta	Beta	P-val (1 Ta
C		52.6424	0.000	51.7794	0.000	51.7298	0.000	46.1508	0.000
Special allocation for Education	+	0.00423	0.000	0.00600	0.000	0.00160	0.000	0.00089	0.183
Special allocation for Health	+	0.00105	0.000	0.00320	0.000	0.00147	0.000	-6.55E-	0.43
Realization of Health Budget	+	-0.0093	0.005	-0.0022	0.314	-0.4534	0.000	0.05655	0.075
Regional independence index	+	-0.0044	0.000	-0.0019	0.000	-0.0222	0.000	-0.0164	0.000
Village fund	+	-0.2028	0.011	-1.0493	0.000	-0.6506	0.000	0.58474	0.053
Social assistance (PKH)	+	-0.0989	0.285	-0.0005	0.004	0.3225	0.252	0.00015	0.460
Poverty line	-	11.3732	0.000	-0.9421	0.000	13.5118	0.000	12.1572	0.000
Income	+	-0.0029	0.108	0.01655	0.005	-0.0040	0.018	0.00660	0.314
Food security index	+	0.01297	0.000	0.02145	0.000	0.01758	0.000	-0.0092	0.000
Village development index	+	2.75120	0.000	5.45254	0.000	2.58018	0.000	3.49464	0.000
Stunting prevalence	-	-0.0083	0.000	-0.0151	0.000	-0.0144	0.000	0.0150	0.000
Average length of schooling	+	1.06540	0.000	1.67600	0.000	1.13000	0.000	1.04764	0.000
Goodness of Fit									
R-squared		0.995845		0.992440		0.997018		0.997775	
Adjusted R-squared		0.995114		0.991101		0.996454		0.997304	
F-statistic		1362.264		740.8044		1767.927		2118.845	
Prob (F-statistic)		0.000000		0.000000		0.000000		0.000000	

Source: Data processed

Table 3: Processed Results of Regency/City Data Based on Above and Below the National Human Development Index Average

Variable	Theor	Indonesia (FEM)		IPM Below Average (FEM)		IPM Above Average (REM)	
		Beta	P-val (1 Ta	Beta	P-val (1 Ta	Beta	P-val (1 Ta
C		52.6424	0.000	41.9299	0.000	65.1763	0.000
Special allocation fund for Education	+	0.00423	0.000	0.00191	0.010	-0.00097	0.601
Special allocation fund for Health	+	0.00105	0.000	0.00148	0.000	0.00034	0.849
Realization of Health Budget	+	-0.00937	0.005	-0.13749	0.003	-0.00322	0.496
Regional independence index	+	-0.00447	0.000	0.01117	0.000	-0.01032	0.117
Village fund	+	-0.20280	0.011	0.38864	0.047	0.73906	0.196
Social assistance (PKH)	+	-0.09891	0.285	-0.62605	0.067	0.74324	0.393
Poverty line	-	11.3732	0.000	3.68443	0.000	13.0982	0.000
Income	+	-0.00290	0.108	0.02064	0.000	0.00795	0.279
Food security index	+	0.01297	0.000	0.07751	0.000	0.00314	0.885

Village development index	+	2.75120	0.000	6.34176	0.000	3.13859	0.001
Stunting prevalence	-	-0.00835	0.000	-0.01880	0.000	-0.02448	0.001
Average length of schoolir	+	1.06540	0.000	1.90984	0.000	0.50908	0.000
Goodness of Fit							
R-squared		0.995845		0.976364		0.958392	
Adjusted R-squared		0.995114		0.972261		0.949632	
F-statistic		1362.264		237.9639		109.4099	
Prob (F-statistic)		0.000000		0.000000		0.000000	

Source: Data processe

The table above shows the results of econometric tests of the variables studied, in accordance with the hypotheses proposed. The results of this test can be described as follows:

1. For the first hypothesis (H_1), is there a positive influence of DAK Education on the Human Development Index in Indonesia? The estimation results on the processing of all districts/cities in Indonesia show the coefficient of the DAK Education variable of 0.004232. The test results show a significance value (p value) of 0.0000 < 0.05 (alpha 5%) so H_1 is supported. The estimation results at the regional level show that DAK Education significantly increases the Human Development Index in two regions, namely WIB and WITA. In the processing that divides based on regions with an average Human Development Index above and below the National, it shows that DAK Education is able to increase the Human Development Index in processed regions that have an average Human Development Index below the National.
2. For the second hypothesis (H_2) is there a positive influence of DAK Health on the Human Development Index in Indonesia? The estimation results on the processing of all districts/cities in Indonesia show the coefficient of the DAK Health variable of 0.001050. with a value of 0.0000 < 0.05 (alpha 5%) then H_2 is supported. The test results at the regional level show that DAK Health significantly increases the Human Development Index in two regions, namely WIB and WITA. In the processing that divides based on districts and cities that have an average HDI above and below the National, it shows that DAK Health is able to increase HDI in processed regions with an average HDI below the National.
3. For the third hypothesis (H_3), is there a positive effect of Health Budget Realization on HDI in Indonesia? In the estimation on the processing of all districts/cities in Indonesia, the coefficient of the Health Budget Realization variable is -0.009372. The estimation results are different from the previously proposed hypothesis, so that the significance test cannot be continued and H_3 is not supported. The test results at the regional level show that Health Budget Realization significantly increases the Human Development Index at WIT, while in the other two regions, namely WITA and WIB, Health Budget Realization has no impact on increasing HDI. In the processing that divides based on districts and cities that have an average HDI above and below the National, it shows that the Health Budget Realization is unable to increase the HDI, both in areas that have an average HDI both above and below the National.
4. For the fourth hypothesis (H_4), is there a positive influence of the Regional Independence Index on the HDI in Indonesia? The test results show that in the processing of all districts/cities in Indonesia, the coefficient of the Regional Independence Index variable is -0.004471. The estimation results show a direction of influence that is not in accordance with the hypothesis, where the IKD has a positive influence on the Human Development Index so that the significance test cannot be continued and H_4 is not supported. It is concluded statistically that there is no influence of the Regional Independence Index on the Human Development Index in Indonesia. The test results at the regional level show that the Regional Independence Index significantly increases the Human Development Index in all three regions. In the processing that divides based on districts and cities that have an average HDI above and below the National, it shows that the Regional Independence Index is able to increase the Human Development Index in districts/cities that have an average HDI below the National.

5. For the fifth hypothesis (H_5), is there a positive influence of Village Funds on the Human Development Index in Indonesia? The test results show that in the processing of all districts/cities in Indonesia, the coefficient of the Village Fund variable is -0.202802. The test results also show a discrepancy with the proposed hypothesis. The estimation results at the regional level show that Village Funds significantly increase the Human Development Index in WIT, while in the other two regions, namely WITA and WIB, Village Funds are unable to increase the Human Development Index. In the processing that divides based on districts and cities that have an average Human Development Index above and below the National, it shows that Village Funds are able to increase the Human Development Index in regions that have an average Human Development Index both above and below the National.
6. For the sixth hypothesis (H_6), is there a positive influence of the Family Hope Program on the Human Development Index in Indonesia? The estimation results in the processing of all regions in Indonesia show a large coefficient of the Regional Independence Index variable of -0.09891. The estimation results also show a discrepancy with the hypothesis developed. The regional estimation results show that the Family Hope Program significantly increases the Human Development Index in all three regions. In the analysis that divides it based on districts and cities that have an average HDI above and below the national average, it shows that the Family Hope Program was unable to increase the HDI in areas that have an average HDI above and below the national average.
7. For the seventh hypothesis (H_7), is there a negative influence of the Poverty Line on the Human Development Index in Indonesia? The test results show that in the processing of all districts/cities in Indonesia, the coefficient of the Poverty Line variable is 11.37327. These results also show a discrepancy with the previously constructed hypothesis. The results of the regional level estimation show that the Poverty Line significantly reduces the Human Development Index in WIB, while in the other two regions, namely WITA and WIT, the Poverty Line is unable to reduce the Human Development Index. In the processing that divides based on districts/cities that have an average Human Development Index above and below the National, it shows that the Poverty Line is unable to reduce the Human Development Index.
8. For the eighth hypothesis (H_8), is there a positive influence of Income on the Human Development Index in Indonesia? The results of the estimation of all districts/cities in Indonesia, the coefficient of the Income variable is -0.002905. The discrepancy between the results obtained and the hypothesis constructed occurs in this variable. So statistically, the income variable on the Human Development Index in Indonesia. The test results at the regional level show that income significantly increases the Human Development Index at WIB, while in the other two regions, namely WITA and WIT, income is unable to increase the Human Development Index. In the processing that divides based on districts/cities that have an average HDI above and below the National, it shows that income is able to increase the Human Development Index in districts/cities that have an average HDI above the National.
9. For the ninth hypothesis (H_9), is there a positive influence of the Food Security Index on the Human Development Index in Indonesia? The test results show that in the processing of all districts/cities in Indonesia, the coefficient of the Food Security Index variable is 0.012979. The estimation results show that the direction of influence is in accordance with the hypothesis developed. The estimation results show a significance value of $0.0000 < 0.05$ (alpha 5%). The test results at the regional level show that the IKP significantly increases the HDI in two regions, namely WIB and WITA. In the processing that divides based on districts and cities that have an average HDI above and below the National, it shows that the Food Security Index is able to increase the Human Development Index in the processing of districts and cities that have an average HDI below the National.
10. For the tenth hypothesis (H_{10}), is there a positive influence of the Village Development Index on the HDI in Indonesia? The estimation results on the processing of all districts/cities in Indonesia show the coefficient of the Village Development Index variable of 2.751205, the test results show a significance value of $0.0000 < 0.05$ (alpha 5%) so H_{10} is supported. The estimation results at the regional level show that IDM significantly increases the HDI in the three regions, namely WIB, WITA and WIT. In the processing that divides based on districts/cities that have an average HDI above and below the National average, it shows that the Village Development Index is able to increase the HDI.

11. For the eleventh hypothesis (H_{11}), is there a negative effect of stunting on the Human Development Index in Indonesia? The test results show that in the processing of all regions in Indonesia, the coefficient of the stunting variable is -0.008356. The test results also show a significance value of $0.0000 < 0.05$ (alpha 5%). The test results at the regional level show that stunting significantly reduces the HDI in two regions, namely WIB and WITA. In the processing that divides based on city districts that have an average HDI above and below the National, it shows that stunting can reduce HDI.
12. For the twelfth hypothesis (H_{12}), is there a positive effect of Average Length of Schooling on HDI in Indonesia? The estimation results in the processing of all regions in Indonesia show a large coefficient of the Average Length of Schooling variable of 1.065402, the estimation results have a significance value of $0.0000 < 0.05$ (alpha 5%). The test results at the regional level show that the Average Length of Schooling significantly increases the Human Development Index in the three regions, namely WIB, WITA and WIT. In the processing that divides based on city districts that have an average HDI above and below the National, it shows that the Average Length of Schooling can increase HDI.

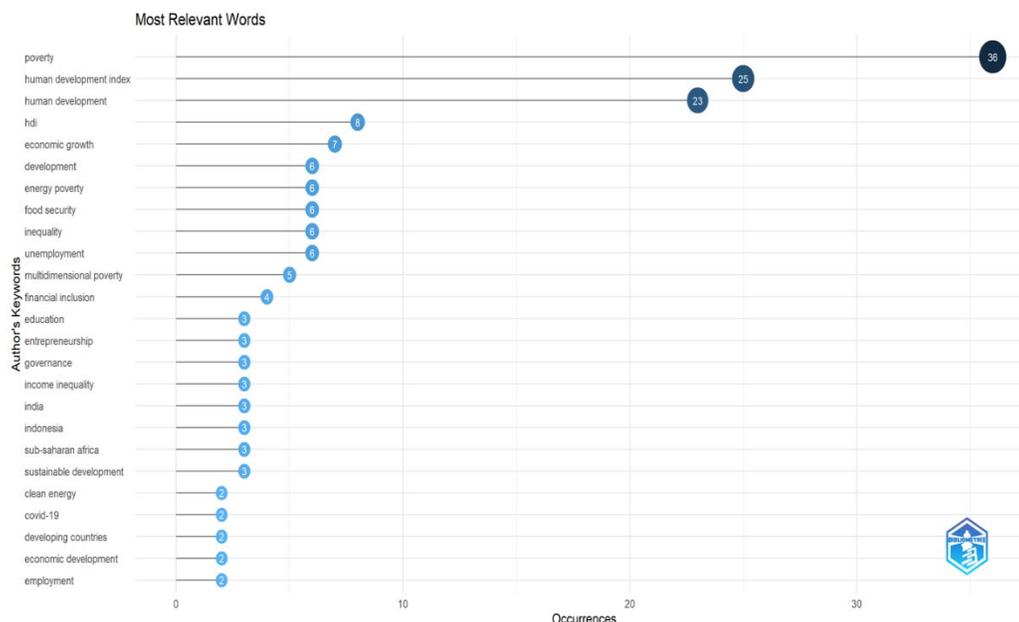
Systematic Literature Review Analysis

This section will show the results and analysis of data processing carried out using the Systematic Literature Review (SLR) approach. This study uses 5 keywords, namely: (i). Human Development Index AND Poverty; (ii). Human Development Index AND Government Spending; (iii). Human Development Index AND Malnutrition; (iv). Government Transfers; (v). Regional Development AND Human Development Index.

Based on this, there are several criteria for the SLR data. The first criterion (Year of Publication) there are 892 excluded data. The second criterion (Document Type) there are 111 excluded data. The third criterion (Language) there are 14 excluded data. The fourth criterion (Research Area) there are 126 excluded data. For last criterion (Keyword) there are 188 excluded data. So in this case, from 1446 articles, the remaining is 135 data in the form of articles that will be processed for further data processing (eligible articles).

Word frequency analysis was conducted on the first keyword (“Human Development Index” AND “Poverty”) which produced several keywords as shown in the figure below:

Figure 1: Most Frequent Word Analysis - (“Human Development Index” AND “Poverty”)



Source: Data processed

The figure above shows the emergence of several keywords related to the variables of this study, namely: "Poverty", "Food Security", "Education", and "Income". The significant influence of the education budget allocation variable (EDUC), health (HEALTH) shows findings that are consistent with the systematic literature review conducted. According to Ruzima &

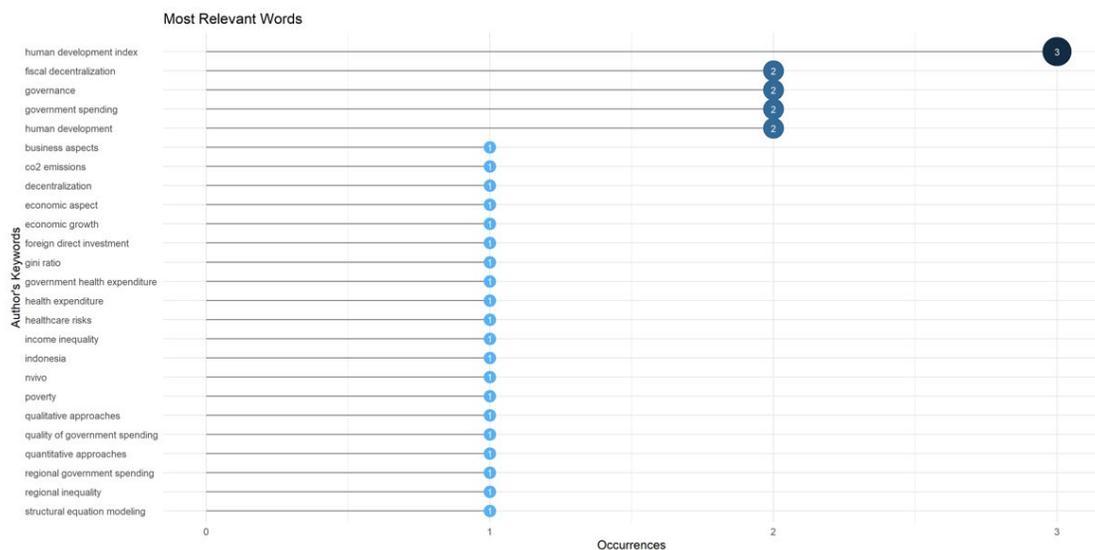
Veerachamy (2023) government spending in education and health has been shown to have a significant influence on increasing the Human Development Index (HDI). Furthermore, the findings on the significance of the influence of the Food Security Index (IKP) on the Human Development Index (HDI) are also consistent with the results of a systematic literature review conducted where a study by Bernard Jr. et al. (2023) implicitly shows that food security resulting from increasing Total Productivity Factors in the agricultural sector can have an impact on the human development index in 35 African countries.

Furthermore, these findings confirm that food security resulting from increasing agricultural productivity (TFP) has a strategic role in increasing the HDI and indirectly reducing the prevalence of stunting by improving access to adequate nutrition. Regarding the length of schooling (RLS), the results of the systematic literature review show consistency with the results of the estimation carried out. This can be seen from the study of Bloom et al. (2021) where the study showed that educational attainment had a positive effect on the human development index.

The finding of the insignificance of the variable (PKH) on the human development index (HDI) is not in line with the results of the studies of Unnikrishnan (2022) and Ruzima & Veerachamy (2023) where the social assistance provided was able to have an impact on the human development index (HDI). One reason that can be considered is that although PKH is considered right on target, the outcome of the program, especially education, may take longer to see a significant impact. The insignificant effect of the income variable (INCOME) on the HDI is inconsistent with several studies resulting from the screening of systematic literature reviews conducted such as Marwanti et al. (2024). Given that the Gini Ratio is still relatively high in Indonesia, it is possible that this is one of the causes. Income inequality causes income increases to only be felt by certain groups, so that the HDI is not significantly affected.

The results of the word frequency analysis were also carried out on the second keyword (“Human Development Index” AND “Government Spending”). The following is a picture that shows what is meant:

Figure 2: Most Frequent Word - (“Human Development Index” AND “Government Spending”)

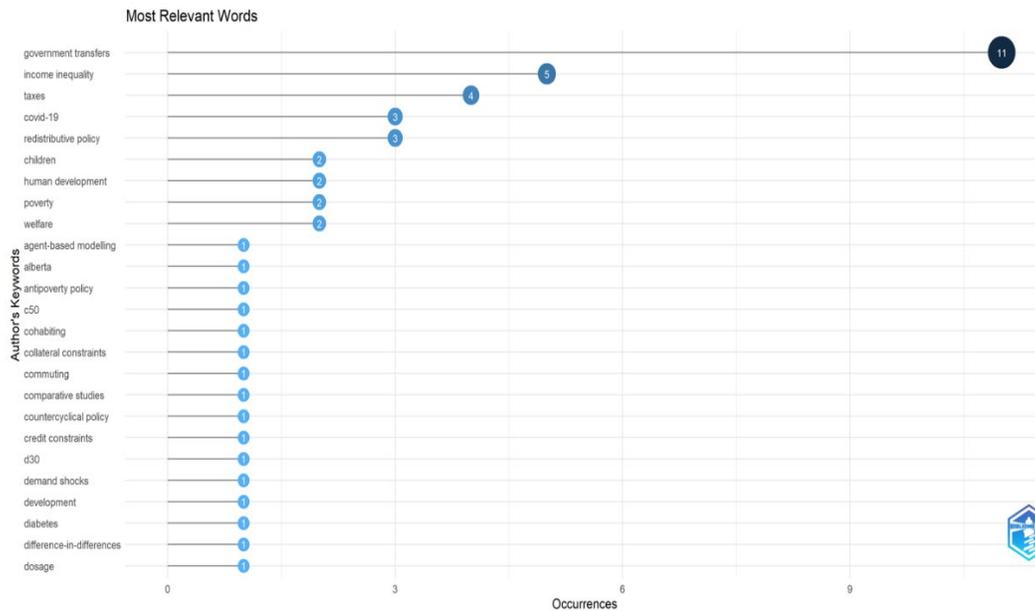


Source: Data processed

The findings on the second keyword also support the results of the first keyword. In this case, there are keywords: "Government Health Expenditure", "Health Expenditure", and "Fiscal Decentralization". Related to health expenditure, Alfons et al. (2024) and Lescano et al. (2023) in their studies found that government spending in the field of human development can have an impact on the HDI and also reduce inequality. The presence of the keyword "Fiscal Decentralization" also shows a relationship with the Regional Independence Index (IKD) variable. Jin & Jakovljevic (2023) in their study concluded that the degree of fiscal decentralization at a certain level affects the human development index in a sample of 50 countries. Furthermore, the study recommends that the implementation of fiscal decentralization with a degree that is too low is not effective in developing a region (measured by the HDI), so a more moderate degree is needed. These results support the finding that the variable (IKD) affects the Human Development Index. Related to the level of poverty, the results of the study by Masduki et al. (2022) also supports the findings from the estimation results conducted where the poverty variable influenced by local government spending has an effect on increasing the Human Development Index.

Similar results were also found in the key "Government Transfers", the following is a Figure that shows what is meant:

Figure 3: Most Frequent Word – (“Government Transfers”)

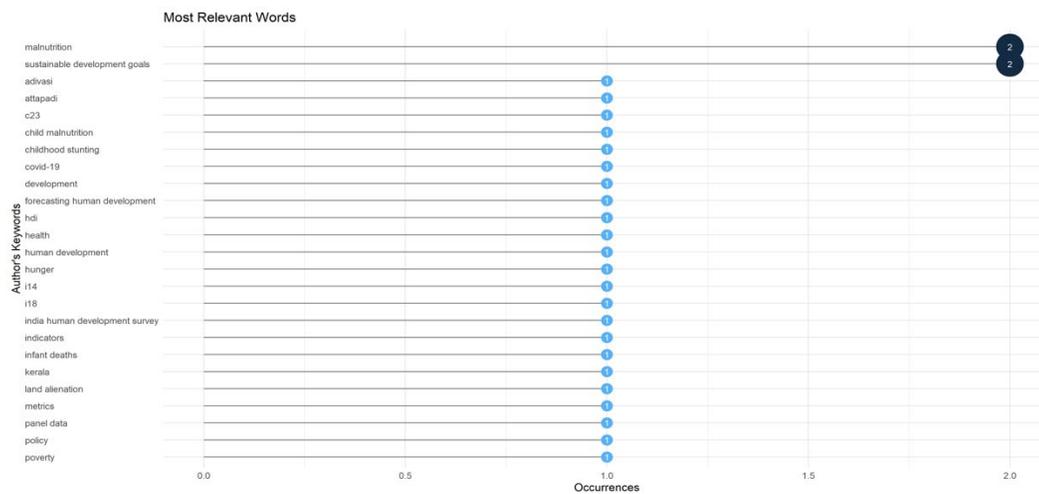


Source: Data processed

The insignificance of the Village Fund (DD) variable directly indicates a discrepancy with the findings in a systematic literature review, where one of the studies by Claveria & Sorić, (2024) showed a concept where government transfer schemes have a significant effect on poverty reduction in 16 European countries. Village Funds, which are generally more intended for village development, such as empowerment and infrastructure, may have an indirect effect. The Village Development Index (IDM) which covers more social, economic, and environmental aspects, may have a direct effect on the HDI. A study conducted by Zhang et al. (2024) at the provincial level in China, implicitly shows that the development of the HDI is also influenced by the level of social and economic development that follows it. This implicitly means that the higher the level of development of a region, the higher the HDI will be.

Furthermore, the description of the results for the third keyword ("Human Development Index" AND "Malnutrition") is shown in the Figure below:

Next page

Figure 4: Most Frequent Word Analysis - (“Human Development Index” AND “Malnutrition”)

Source: Data processed

The use of these keywords is used to identify literature related to stunting. Based on the Figure above, several keywords that appear are "Malnutrition", "Childhood Stunting", and "Child Malnutrition". Regarding the significant influence of stunting, the results of the systematic literature review conducted support the findings produced. A study by Chatterjee & Dubey (2024) links maternal independence (financial, for example) to health quality (one of the indicators representing the HDI) in India. The study implies that maternal independence can have an impact on the prevalence rate of stunting which ultimately affects health outcomes.

There are similarities between the regression estimates and the systematic literature review made, especially in the variables of the Village Development Index, Poverty Line, Education and Health Budget, Average Length of Schooling, Stunting, Food Security Index, and Regional Independence Index. Therefore, it can be concluded that the significant influence of the variables in question on the Human Development Index (HDI) is also evident in global literature (SCOPUS). Meanwhile, the results of the two methods used also showed discrepancies, especially in the variables PKH, INCOME, and Village Funds. One of the reasons that can be considered is the short-term effect, especially on the education aspect which requires a certain time lag to achieve outcomes, the relatively high level of inequality that affects the influence of income variables on the HDI, and Village Funds which generally tend to be used for infrastructure development and empowerment purposes.

Conclusion And Recommendation

Conclusion

Based on the research objectives and findings, this study concludes:

1. For the impact of fiscal decentralization policies on the Human Development Index in Indonesia and in each of the Western, Central and Eastern Regions. Overall, there is a positive influence of Health Budget Realization on the Human Development Index in Indonesia. At the regional level, it shows that Health Budget Realization significantly increases the Human Development Index in WIT, while in the other two regions (WITA and WIB), Health Budget Realization is unable to increase the Human Development Index. For the Regional Independence Index (IKD), there is a positive influence of IKD on the Human Development Index in Indonesia. At the regional level, it shows that the Regional Independence Index significantly increases the Human Development Index in all three regions. Related to DAK Education, there is a significant influence of DAK Education on the Human Development Index in Indonesia. The test results at the regional level show that DAK Education significantly increases the Human Development Index in two regions, namely WIB and WITA. Meanwhile, for DAK Health, there is a positive influence of DAK Health on the Human Development Index in Indonesia. The test results at the regional level show that DAK Health significantly increases the Human Development Index in two regions, namely WIB and WITA.

2. For the impact of the social fund budget allocation on the Human Development Index in Indonesia and in each of the Western, Central and Eastern Regions. There is a positive influence of Village Funds on the Human Development Index in Indonesia. The test results at the regional level show that Village Funds significantly increase the Human Development Index in WIT, while in the other two regions (WITA and WIB), Village Funds are unable to increase the Human Development Index. Meanwhile, for the Family Hope Program, the test results show that in the processing of all districts/cities in Indonesia it does not have a significant influence on the Human Development Index. The test results at the regional level show that the Family Hope Program significantly increases the Human Development Index in all three regions.
3. For the impact of the sustainable development indicators on the Human Development Index in Indonesia and in each of the Western, Central and Eastern Regions. The Village Development Index (IDM) has a significant positive influence on the Human Development Index nationally and in all regions (WIB, WITA, WIT). The poverty line significantly reduces the Human Development Index nationally and in the WIB region, but is not significant in WITA and WIT. The average length of schooling for women significantly increases the Human Development Index throughout Indonesia. Income is not significant to HDI nationally, but significantly increases HDI in WIB, while it has no effect in WITA and WIT. The Food Security Index significantly increases HDI nationally as well as in WIB and WITA. The prevalence of stunting significantly decreases HDI nationally and in the WIB and WITA regions.
4. In the analysis that divides based on districts and cities that have an average HDI above and below the national, it shows that the Health Budget Realization is unable to increase HDI in districts/cities with an average HDI above or below the national. The Regional Independence Index, Education DAK, and Health DAK are able to increase HDI in districts/cities with an average HDI below the national. Village Funds are able to increase HDI in districts/cities with an average HDI both above and below the national, while the Family Hope Program has no effect on HDI. The Village Development Index is able to increase HDI in districts/cities in all categories, while the Poverty Line does not reduce HDI. Average Length of Schooling significantly increases the HDI in all regions (WIB, WITA, WIT) and districts/cities with an average HDI above or below the national level. Income is only able to increase the HDI in districts/cities with an average HDI above the national level, and the Food Security Index increases the HDI in districts/cities with an average HDI below the national level.
5. There are similarities between the regression estimates and the systematic literature review. The significant influence of the dependent variables on the Human Development Index (HDI) is also proven in global literature (SCOPUS). Meanwhile, the results of the two methods used also showed discrepancies, especially in the variables PKH, Income, and Village Funds.

Recommendations

1. Based on the findings that the Special Allocation Fund (DAK) for education and health has a significant influence on increasing the Human Development Index (HDI), it is recommended that the government increase the allocation and effectiveness of DAK use, especially in the education, health, and basic infrastructure sectors;
2. Based on the findings that Village Funds have a less significant effect on increasing the Human Development Index (HDI), it is recommended that the government optimize the planning and utilization of Village Funds by focusing on programs that directly support education, health, and improving community welfare;
3. Based on the findings that the implementation of the Sustainable Development Goals (SDGs) has a significant effect on increasing the Human Development Index (HDI), it is recommended that the government strengthen the integration of SDGs programs in national and regional development policies. This effort can be done by prioritizing SDGs goals that are directly related to the HDI dimensions, such as quality education (SDG 4), good health (SDG 3), and poverty alleviation (SDG 1); and
4. The policy that needs to be implemented by the government is to focus village funds on education, health, and welfare with strict supervision and increasing village capacity. SDGs are integrated into development policies with priorities on education, health, and poverty alleviation. Monitoring and evaluation are strengthened for program effectiveness.

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