The Contribution of the Industrial Sector to Economic Growth: The Mediating Role of the Human Development Index (HDI) in Indonesia

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ABSTRACT

The present study utilizes data from 34 provinces in Indonesia for the period 2020–2024, sourced from Statistics Indonesia (BPS), the Ministry of Finance, and the United Nations Development Programme (UNDP). The provincial level constitutes the primary analytical unit, enabling a comprehensive assessment of regional dynamics across Indonesia. This research is motivated by the growing importance of strengthening future human resources with global competitiveness, and the examined programs are relevant for advancing such capacities while supporting the Sustainable Development Goals (SDGs). The objective of the analysis is to measure and evaluate the relationship between the dependent variable—such as economic growth—and a set of independent variables, including regional expenditure, local own-source revenue, and other regional economic indicators.The Structural Equation Modeling–Partial Least Squares (SEM-PLS) results reveal that macroeconomic variables exert a positive and significant influence on Gross Regional Domestic Product (GRDP) ($\beta = 0.543$; $p < 0.001$). This finding underscores the critical role of large-scale economic activities—such as the manufacturing sector and government fiscal policies—in fostering regional economic growth. Expansion in macroeconomic sectors generates substantial multiplier effects through employment creation, enhancement of innovative human capital, increased investment, and higher production output.

Keywords: Human Resource Management (HRM); Human Development Index (HDI); Industrialization; Gross National Product (GNP); Gross Regional Domestic Product (GRDP)

1. Introduction

Human development has become a fundamental pillar in promoting inclusive and sustainable economic growth. In the current era of globalization and digital transformation, the quality of human resources serves not only as an indicator

of social progress but also as a crucial determinant in increasing a country's Gross Regional Domestic Product (GRDP). Human development, as reflected in the Human Development Index (HDI), encompasses three key dimensions: health, education, and a decent standard of living. These aspects have been shown to contribute both directly and indirectly to improvements in national productivity and economic efficiency.

A number of empirical studies demonstrate a positive and significant relationship between HDI and GRDP growth. According to the United Nations Development Programme (UNDP, 2023), countries with higher HDI levels tend to experience more stable and inclusive economic growth. This is driven by the contribution of a healthier and more educated workforce to productive sectors, as well as increased purchasing power that stimulates domestic demand. Similarly, the World Bank (2022) notes that investment in human development—particularly in education and health—yields substantial long-term economic returns, especially in developing countries.

The free nutritious meal program (MBG), a political commitment implemented by the administration of President-elect Prabowo for the 2024–2029 period, has generated both support and criticism. Recently, Bill Gates, founder of Microsoft, provided assistance totaling approximately IDR 1.651 trillion. This includes USD 119 million (approximately IDR 1.9 trillion) allocated to the health sector, USD 5 million (approximately IDR 826 billion) for agriculture, and USD 5 million (approximately IDR 826 billion) for technology. Additionally, more than USD 28 million (approximately IDR 462 billion) has been distributed as social assistance across various sectors (BBC News Indonesia, May 7, 2025).

The industrial sector is a key pillar of Indonesia's national economic structure. Its contribution to GRDP has accelerated the transformation of the economy from primary to secondary and tertiary sectors. However, rapid industrial growth is not always linearly associated with improvements in societal welfare. Regional economic disparities, inequalities in human resources, and limited access to education and healthcare remain major challenges in achieving inclusive and sustainable growth. In this context, the HDI serves as an essential tool for measuring human development through health, education, and living standards, reflecting the overall quality of human capital.

Previous studies indicate that human development plays a significant role in driving economic growth, both as an independent factor and as a mediating variable across sectors. However, limited research has specifically examined how the industrial sector contributes to economic growth through the channel of human development, particularly in regional contexts within Indonesia.

Efforts to enhance future human capital competitiveness make such programs relevant, particularly in supporting the Sustainable Development Goals (SDGs). Nevertheless, concerns remain regarding potential mistargeting and unequal distribution. The success of such programs depends heavily on sound budget planning, effective distribution mechanisms, and robust monitoring systems to ensure that their benefits are not merely populist but also sustainable and well-targeted.

Indonesia has shown a positive trend in improving its HDI; however, regional disparities and limited access to basic services continue to pose significant challenges. The contribution of each province illustrates the varying levels of

regional participation in advancing overall human development. Therefore, a deeper understanding of the extent to which human development influences GDP is essential for formulating more targeted economic and social policies. Indonesia's HDI value in 2023 reached 0.728, placing the country in the "high human development" category and ranking 113th out of 193 countries and territories. Over a 33-year period (1990–2023), Indonesia's HDI increased from 0.531 to 0.728, representing a 37.1% improvement (Human Development Report, UNDP, 2025).

Given this background, examining the relationship between human development and GDP is not only academically relevant but also strategically important for supporting national development planning oriented toward public welfare. Moreover, Indonesia is experiencing a demographic bonus that has the potential to become a significant global labor force contributor. Several studies highlight the strong linkage between human development and GDP growth. Todaro and Smith (2020) emphasize that investments in education and health enhance labor productivity, which directly contributes to increased national output. Similarly, Pradana et al. (2024) find that domestic investment and provincial minimum wages have positive but insignificant effects on HDI in Indonesia, while health complaints have a negative and significant impact. These findings suggest that difficulties in meeting basic needs hinder the achievement of a decent standard of living, a key component of HDI.

The industrial sector in Indonesia plays a strategic role in the national economy as a major contributor to GDP. The manufacturing sector, in particular, is one of the largest contributors. As a vital source of foreign exchange, manufacturing not only supplies domestic needs but also drives exports. Key competitive products in the global market include food and beverages, textiles, and electronics. These achievements indicate that Indonesia's industrial sector has strong growth potential and a strategic role in driving economic expansion (Nurhayani, 2022).

However, not all studies find a strong relationship between human development and GRDP. Hermawan and Sulastri (2023) show that improvements in HDI are not always followed by significant GRDP growth, particularly in regions with high development inequality. This is attributed to weak linkages between human development investments and labor-absorbing productive sectors. Furthermore, Asghar (2008) finds that the impact of human development on economic growth tends to be long-term and may not be immediately reflected in annual GDP figures.

These differing findings indicate that the relationship between human development and GRDP is not linear and may be influenced by contextual factors such as economic structure, public policy effectiveness, and equitable development distribution. Therefore, more comprehensive research is needed to better understand this relationship, particularly in Indonesia, which has complex geographical and socio-economic diversity. Economic growth is the result of optimal financial management that supports both human and physical development. Such support indirectly promotes regional economic growth (Aisyah et al., 2023). Large developing countries typically have vast territories with unevenly distributed economic resources; therefore, they must implement development strategies that facilitate a gradual transition from unbalanced to balanced growth (Ouyang, 2019).

2. Research Methods

This study employs a quantitative research design with both descriptive and inferential approaches. The data utilized are secondary data, meaning they have been previously collected and published by official institutions. The data sources include Statistics Indonesia (Badan Pusat Statistik/BPS), the Ministry of Finance, the United Nations Development Programme (UNDP), as well as regional government financial reports and other relevant publications.

The dataset consists of both cross-sectional and panel data. Cross-sectional data describe provincial-level conditions at a specific point in time, while panel data combine time series and cross-sectional dimensions, covering multiple provinces over a specified period. This study is conducted at the national level in Indonesia, encompassing data from 34 provinces over the last five years (2020–2024). Data collection and analysis were carried out in 2025.

Data were collected using a documentation study method, which involves identifying, reviewing, and recording relevant information from official documents published by government institutions, scientific journals, and other statistical data sources.

This study analyzes data from 34 provinces in Indonesia during the 2020–2024 period obtained from BPS, the Ministry of Finance, and UNDP. The province serves as the unit of analysis, focusing on regional-level data across Indonesia. The relationships among the Industrial Sector (X), Human Development Index (Z), and Gross Regional Domestic Product (GRDP)/Economic Growth (Y) are examined using Structural Equation Modeling–Partial Least Squares (SEM-PLS). This method is suitable for predictive models with non-normally distributed data, moderate sample sizes, and the ability to simultaneously test mediation and moderation effects.

The analysis aims to measure and explain the relationships between the dependent variable (e.g., economic growth) and independent variables (such as regional expenditure, locally generated revenue, and others). Panel data estimation enables more accurate identification of relationships by accounting for variations across time and entities.

In SmartPLS, hypothesis testing is conducted using a bootstrapping procedure, which involves resampling from the original data. This approach is used to obtain alpha (α) values from path coefficient analysis and corresponding t-statistics. In this study, a significance level of 5% (α = 0.05) is applied, with a critical t-statistic value of 1.96. A hypothesis is accepted if the significance probability is ≤ 5% or if the t-statistic exceeds 1.96 (Hair et al., 2017).

3. Result

Table 1
Hypothesis Results

Correlation	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
HDI (Z) -> PDRB (Y)	0,200	0,200	0,044	4,583	0,000
Makro (X1) -> HDI (Z)	0,030	0,038	0,121	0,245	0,807

Mikro (X1) -> HDI (Z)	0,028	0,020	0,101	0,275	0,784
Makro (X1) -> PDRB (Y)	0,543	0,564	0,115	4,713	0,000
Mikro (X1) -> PDRB (Y)	-0,670	-0,692	0,107	6,244	0,000
Makro (X1) -> HDI (Z) -> PDRB (Y)	0,006	0,008	0,025	0,239	0,812
Mikro (X1) -> HDI (Z) -> PDRB (Y)	0,006	0,004	0,021	0,270	0,788

Based on the SEM-PLS analysis results, the Human Development Index (HDI) has a positive and significant effect on Gross Regional Domestic Product (GRDP), indicating that improvements in human development quality contribute to economic growth. Macroeconomic variables also exhibit a positive and significant effect on GRDP, while microeconomic variables show a negative and significant effect on GRDP. However, neither macroeconomic nor microeconomic variables have a significant effect on HDI. Furthermore, the mediation test results reveal that HDI does not mediate the relationship between macroeconomic and microeconomic variables and GRDP. Thus, the effects observed in this model are predominantly direct rather than indirect through the mediating variable.

4. Discussion

4.1. The Effect of the Macroeconomic Sector on Economic Growth

The results of the SEM-PLS analysis indicate that the macroeconomic variable has a positive and significant effect on GRDP ($\beta = 0.543$; $p < 0.001$). This finding demonstrates that large-scale economic activities, such as the manufacturing industry and government fiscal policies, play a crucial role in driving regional economic growth. Growth in the macro sector generates multiplier effects through employment policies, the development of innovative human capital, increased investment, and higher production output. These findings are consistent with Todaro and Smith (2015), who argue that the industrial sector is a primary engine of economic growth and structural transformation.

4.2. The Effect of the Microeconomic Sector on Economic Growth

The microeconomic variable shows a negative and significant effect on GRDP ($\beta = -0.670$; $p < 0.001$). This suggests that micro-level economic activities, such as micro, small, and medium enterprises (MSMEs), have not yet been able to effectively promote economic growth. Factors such as low productivity, labor dependence on the formal sector for income, limited access to financing, and the dominance of the informal sector hinder the micro sector from contributing optimally to GRDP growth. These findings are in line with Ranis et al. (2000), who emphasize that MSMEs require policy interventions to improve efficiency and competitiveness.

4.3. The Effect of Macroeconomic and Microeconomic Sectors on the Human Development Index

The analysis shows that both macroeconomic and microeconomic sectors do not have a significant effect on HDI. This is reflected in the path coefficients of Macro → HDI (β = 0.030; p = 0.807) and Micro → HDI (β = 0.028; p = 0.784), both of which exceed the 0.05 significance level. These results indicate that increased industrial economic activity, whether at a large or small scale, has not yet translated into improvements in human development quality.

This phenomenon can be explained by several factors. First, the value added generated by the macro sector tends to be reinvested for capital expansion and profit accumulation, rather than being allocated to improving education, healthcare, human resources, or overall social welfare. Second, the micro sector is dominated by small and medium enterprises with limitations in productivity, capital, and technology, which constrain their ability to improve income levels and quality of life.

Historically, however, Indonesia experienced a different dynamic during the 1998 economic crisis, when the MSME sector became a key pillar of national economic resilience. As noted by Tulus Tambunan in *Micro, Small, and Medium Enterprises in Indonesia*, during the 1997/1998 crisis—characterized by high inflation—MSMEs were among the few sectors able to survive. Nevertheless, in the current context, the contributions of both macro and micro sectors have not been significant in improving HDI at the regional level.

These findings are consistent with Ranis et al. (2000), who argue that economic growth does not automatically lead to human development without well-designed redistribution policies and social interventions. Furthermore, UNDP (2023) emphasizes that improvements in HDI require long-term investments in education, healthcare, and income distribution. However, these findings differ from those of Hermawan and Sulastri (2019), who found that increases in HDI are not always accompanied by significant GRDP growth, particularly in regions with high development inequality due to weak linkages between human development investment and labor-absorbing productive sectors.

4.4. The Impact of the Human Development Index on Economic Growth

The Human Development Index has a positive and significant effect on GRDP (β = 0.200; p < 0.001). Improvements in indicators such as reduced infant mortality, increased access to education, and higher per capita income contribute to enhanced labor productivity and regional competitiveness. This finding highlights that human development is a fundamental pillar in supporting sustainable economic growth. It is consistent with UNDP (2023), which states that progress in human development strengthens the capacity of individuals to participate in the production process.

4.5. Mediation Test of the Human Development Index

The mediation analysis indicates that HDI does not act as a mediator in the relationship between macroeconomic variables and GRDP (β = 0.006; p = 0.812), nor in the relationship between microeconomic variables and GRDP (β = 0.006; p = 0.788). This suggests that economic growth generated by both

macro-level industrial sectors and micro-level activities has not significantly contributed to improvements in human development quality.

In other words, economic growth alone does not automatically enhance human welfare unless it is accompanied by effective policies in income distribution and equitable public service provision. These findings are consistent with Ranis et al. (2000), who argue that the relationship between economic growth and human development is indirect and largely influenced by social policies.

5. Conclusion

This study demonstrates that the macro-industrial sector has a positive and significant effect on economic growth, as measured by Gross Regional Domestic Product (GRDP), while the micro-industrial sector exhibits a negative and significant effect. These findings suggest that both regional and national economic growth remain largely dependent on large-scale industrial (macro) sectors.

Furthermore, the Human Development Index (HDI) shows a positive effect on economic growth; however, it does not function as a mediating variable between macro- and micro-industrial sectors and economic growth. This result appears somewhat contradictory, as both macro and micro industrial activities contribute to economic growth, yet human development does not play a mediating role. This finding contrasts with the theoretical framework of HDI, which emphasizes improving per capita income as one of its primary objectives. In this context, the increase in economic activity in Indonesia has not been fully accompanied by a direct improvement in the quality of human development.

Future research is encouraged to incorporate additional variables to identify other factors influencing economic growth. Based on these findings, policymakers should prioritize increased investment in education, healthcare, and workforce skill development to ensure that economic growth contributes more effectively to improvements in societal well-being. Strengthening the micro-industrial sector is also essential and can be achieved by enhancing productivity through improved access to financing, human resource training to foster innovation and competitiveness, technological support, and business management assistance. Moreover, industrial development should be aligned with social policies that ensure the equitable distribution of economic benefits across all segments of society.

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