

Analysis of The Effect of Poverty Level, Unemployment, and Population on The Human Development Index in Solo Raya During 2014–2024

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Abstract

Human development is a key indicator of regional welfare and sustainable development. Understanding the factors that influence the Human Development Index (HDI) is therefore essential for designing effective development policies. This study examines the effects of poverty, unemployment, population, and Gross Regional Domestic Product (GRDP) on HDI in the Solo Raya region, Indonesia, during the 2014–2024 period. The study employs a quantitative approach using panel data regression analysis. To determine the most appropriate estimation model, the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) were compared using the Chow Test and Hausman Test. The results indicate that the Fixed Effect Model is the most suitable model, suggesting the presence of significant regional heterogeneity across districts and the city within Solo Raya. The findings reveal that poverty, population, and GRDP significantly affect HDI, while unemployment has no statistically significant effect. Among the explanatory variables, GRDP exerts the strongest positive influence on HDI, highlighting the importance of economic performance in supporting human development. Population also contributes positively to HDI, indicating the potential role of demographic resources in regional development. The positive relationship between poverty and HDI suggests that government interventions and social protection programs may have mitigated some of the adverse effects of poverty on human development outcomes. These findings imply that improvements in HDI depend not only on economic conditions but also on the effectiveness of local governance in translating economic resources into better education, health, and living standards. Therefore, policies promoting inclusive economic growth, human capital development, and integrated public service delivery are crucial for achieving sustainable human development.

Introduction

Development is a multidimensional process aimed at improving the quality of human life through economic, social, political, cultural, and environmental advancement (Hariram et al., 2013; Mignaqui, 2014; Haq & Zia, 2013). In developing countries, economic growth remains one of the primary indicators of development success because it reflects the increasing capacity of a region to produce goods and services and improve public welfare. However, development should not be measured solely through economic achievements. Sustainable development requires improvements in human capabilities, including access to education, healthcare, and decent living standards, which collectively contribute to the quality of human resources (Moldovan et al., 2022; Landorf et al., 2008; Kruk et al., 2018; Haque et al., 2025; Leal et al., 2019; Šlaus & Jacobs, 2011).

Consequently, human development has become a central objective of public policy because it reflects the extent to which economic progress translates into better living conditions for society. One of the most widely used indicators for assessing human development is the Human Development Index (HDI). The HDI was developed to provide a broader measure of

development beyond economic growth by incorporating three fundamental dimensions: health, education, and standard of living. According to the Central Statistics Agency (BPS, 2021), the HDI serves as a composite indicator that evaluates the quality of human development outcomes and the accessibility of communities to essential development achievements. A higher HDI indicates better human welfare and greater opportunities for individuals to achieve productive and meaningful lives (Ghislandi et al., 2018; Anand & Sen, 2000). Therefore, HDI has become an important benchmark for evaluating regional development performance and determining policy priorities aimed at improving social welfare.

The achievement of human development is closely associated with socioeconomic conditions within a region (Manyanga et al., 2017; Hinnig et al., 2018; Currie, 2009). Various factors influence the level of human development, including poverty, unemployment, population dynamics, and regional economic performance. These factors shape the ability of individuals and households to access education, healthcare services, employment opportunities, and adequate living conditions. As a result, understanding the determinants of HDI is essential for designing effective development strategies that promote inclusive growth and equitable welfare distribution (Mahroji & Nurkhasanah, 2019; Andriyani et al., 2024).

Poverty remains one of the most persistent development challenges in Indonesia. Poverty is generally defined as a condition in which individuals or households are unable to meet basic needs, including food, clothing, housing, education, and healthcare services (Gweshengwe & Hassan, 2020). High poverty rates often limit access to quality education and health services, thereby reducing opportunities for human capital development. Consequently, regions with higher levels of poverty tend to experience lower human development outcomes (Atina & Setyowati, 2022). Previous studies have shown that poverty negatively affects HDI because poor households face greater constraints in improving their quality of life and productivity (Ekeocha & Iheonu, 2021). Therefore, poverty reduction remains a critical component of development policies aimed at enhancing human welfare.

In addition to poverty, unemployment is another important factor that may influence human development. Unemployment reflects the inability of the labor market to absorb available workers and often results in reduced household income and purchasing power (Dosi et al., 2018). Individuals who are unemployed may face difficulties in accessing education, healthcare, and other essential services, which can adversely affect their overall welfare (Primandari, 2019). High unemployment rates may also contribute to social problems such as inequality and economic insecurity. Consequently, persistent unemployment can hinder improvements in human development and limit the effectiveness of economic growth in improving welfare outcomes (Rosyid et al., 2025). Although several studies have reported a negative relationship between unemployment and HDI, empirical findings remain inconsistent across regions and time periods (Putri & Muljaningsih, 2022).

Population size also plays a significant role in the development process. A large population can serve as a valuable development asset by providing a substantial labor force and consumer market. When supported by adequate education, healthcare, and employment opportunities, population growth can contribute positively to economic expansion and human development. However, rapid population growth may also place pressure on public services, infrastructure, and employment availability if not accompanied by sufficient economic capacity (Satterthwaite, 2011). According to BPS (2022), population dynamics significantly influence regional development outcomes because they affect both the demand for public services and the availability of productive labor. Several empirical studies have found that population size positively contributes to HDI through increased labor participation and economic activity (Nurnaningsih et al., 2019). Nevertheless, the relationship between population growth and

human development remains context-dependent and requires further investigation. Economic performance, commonly measured by Gross Regional Domestic Product (GRDP), is another crucial determinant of human development (Ferraz et al., 2025; Al et al., 2024; Lopian et al., 2023; Weckroth et al., 2015; Gulcema, 2020). GRDP reflects the total value added generated by economic activities within a region and serves as an indicator of regional economic capacity (Hasibuan et al., 2022). Regions with higher GRDP generally possess greater financial resources to invest in education, healthcare, infrastructure, and social protection programs. Increased economic activity can also generate employment opportunities and raise household incomes, thereby improving living standards and human welfare (Llena-Nozal et al., 2019; Anand & Ravallion, 1993). Previous studies have consistently demonstrated that GRDP positively influences HDI because economic growth enhances the ability of both governments and households to allocate resources toward human development (Kiha et al., 2021; Karenina et al., 2022).

The Greater Solo region, commonly known as Solo Raya, consists of Surakarta City and six surrounding regencies: Boyolali, Klaten, Sukoharjo, Wonogiri, Karanganyar, and Sragen. This region represents one of the most important economic and administrative centers in Central Java Province. Despite being integrated within the same regional development framework, substantial differences in socioeconomic conditions exist among the constituent districts and municipality (Rodríguez-Pose & Wilkie, 2017). Variations in poverty levels, labor market conditions, population characteristics, and economic performance have contributed to differing levels of human development across the region. These disparities make Solo Raya an appropriate setting for examining the factors influencing HDI at the regional level. The importance of this topic is also reflected in previous studies that specifically investigated HDI determinants in Solo Raya during 2014–2024.

Data from the Central Statistics Agency indicate that HDI values in all districts and municipalities of Solo Raya increased steadily between 2014 and 2024. Surakarta City consistently recorded the highest HDI, increasing from 79.34 in 2014 to 84.40 in 2024, while Wonogiri Regency remained the region with the lowest HDI despite experiencing gradual improvement from 66.77 to 72.54 during the same period. These trends suggest that human development has generally improved across Solo Raya; however, disparities between regions remain evident. Such differences indicate that the benefits of development may not be distributed equally and that variations in socioeconomic conditions continue to influence human development outcomes.

Although numerous studies have examined the determinants of HDI in Indonesia, existing evidence remains inconclusive. Some studies report that poverty and unemployment significantly reduce HDI, while others find weak or insignificant relationships. Likewise, the effects of population size and economic growth on HDI vary across regions due to differences in demographic characteristics, institutional capacity, and development policies (Putri & Muljaningsih, 2022; Uddin et al., 2021; Huazheva et al., 2024; Kim, 2017). Furthermore, most previous studies have focused on national or provincial analyses, with relatively limited attention given to subregional economic areas such as Solo Raya. The availability of recent panel data covering multiple districts and municipalities over the period 2014–2024 provides an opportunity to obtain a more comprehensive understanding of the socioeconomic factors affecting human development in this region.

Therefore, investigating the effects of poverty, unemployment, population size, and GRDP on HDI in Solo Raya is important both academically and practically. The findings are expected to enrich the empirical literature on regional human development while providing evidence-based insights for policymakers in designing strategies that promote inclusive growth, reduce

regional disparities, and improve the overall quality of human resources. By identifying the key determinants of HDI, development policies can be directed more effectively toward achieving sustainable and equitable human development throughout the Greater Solo region.

Method

Research Design

This study employs a quantitative research approach to examine the influence of poverty, unemployment, population size, and Gross Regional Domestic Product (GRDP) on the Human Development Index (HDI) in the Greater Solo region. Quantitative research is appropriate for this study because it enables the measurement of relationships among variables using statistical and econometric techniques. The approach allows researchers to objectively evaluate the magnitude and direction of the effects of socioeconomic factors on human development outcomes. By utilizing numerical data and empirical analysis, the study seeks to generate evidence-based conclusions regarding the determinants of HDI in the Greater Solo region.

Data Sources and Study Area

The study relies exclusively on secondary data obtained from the Central Statistics Agency (Badan Pusat Statistik/BPS). Secondary data were selected because they are officially published, reliable, consistent across regions, and widely used in economic and development research. The data cover the period from 2014 to 2024 and include annual observations for all variables analyzed in this study.

The study area consists of seven administrative regions that form the Greater Solo (Solo Raya) area in Central Java Province, namely Surakarta City, Boyolali Regency, Klaten Regency, Sukoharjo Regency, Wonogiri Regency, Karanganyar Regency, and Sragen Regency. These regions were selected because they are integrated within the same regional development framework while exhibiting varying levels of economic performance, poverty, employment conditions, and human development achievements. Such variations provide an appropriate setting for investigating the socioeconomic determinants of HDI.

Variables and Operational Definitions

The dependent variable in this study is the Human Development Index (HDI). HDI is a composite index that measures human development achievements based on three fundamental dimensions: health, education, and standard of living. The HDI data are expressed in index values published annually by BPS.

The independent variables consist of poverty rate, unemployment rate, population size, and Gross Regional Domestic Product (GRDP). The poverty rate is measured as the percentage of the population living below the official poverty line in each district or city. The unemployment rate is measured using the Open Unemployment Rate (OUR), which represents the percentage of the labor force that is unemployed and actively seeking employment. Population size refers to the total number of residents in each district or city. Meanwhile, GRDP represents the total value added generated by all economic sectors within a region during a given year and is measured in billion rupiah.

To improve estimation quality and reduce scale differences among variables, the population and GRDP variables are transformed into natural logarithmic form. The logarithmic transformation is commonly used in economic studies because it reduces heteroscedasticity, minimizes the influence of extreme values, stabilizes variance, and facilitates the interpretation of regression coefficients. Consequently, the variables are represented as LogPOP and LogGRDP in the regression model.

Panel Data Structure

This study utilizes panel data, which combine cross-sectional and time-series observations. The cross-sectional dimension consists of seven districts/cities in the Greater Solo region, while the time-series dimension covers eleven years from 2014 to 2024. The combination of these two dimensions generates a balanced panel dataset containing 77 observations.

The use of panel data offers several advantages compared with pure cross-sectional or time-series analysis. First, panel data provide a larger number of observations, thereby increasing the degrees of freedom and improving estimation efficiency. Second, panel data enable the researcher to capture both temporal changes and regional differences simultaneously. Third, panel data help control for unobserved heterogeneity among districts and cities that may affect HDI but cannot be directly measured. Therefore, panel data analysis is considered particularly suitable for examining regional development issues and identifying the determinants of human development.

Model Specification

Table 1. Definition of Variables in the Panel Data Regression Model

Symbol	Variable	Measurement/Definition	Unit
(HDI_{it})	Human Development Index	Human Development Index of region i in year t	Index
(POV_{it})	Poverty Rate	Percentage of population living below the poverty line in region i in year t	Percent (%)
(UNEMP_{it})	Unemployment Rate	Open unemployment rate in region i in year t	Percent (%)
(LogPOP_{it})	Population Size	Natural logarithm of the total population in region i in year t	Logarithm
(LogGRDP_{it})	Gross Regional Domestic Product	Natural logarithm of GRDP at constant prices in region i in year t	Logarithm (Billion Rupiah)
(\beta_0)	Constant	Intercept of the regression model	-
(\beta_1)	Poverty Coefficient	Measures the effect of poverty rate on HDI	-
(\beta_2)	Unemployment Coefficient	Measures the effect of unemployment rate on HDI	-
(\beta_3)	Population Coefficient	Measures the effect of population size on HDI	-
(\beta_4)	GRDP Coefficient	Measures the effect of GRDP on HDI	-
(\varepsilon_{it})	Error Term	Represents unobserved factors affecting HDI	-
(i)	Cross-sectional Unit	Seven regencies/cities in Greater Solo	Region
(t)	Time Period	Observation period from 2014–2024	Year

The estimated coefficients indicate the magnitude and direction of the relationship between each independent variable and the Human Development Index. A positive coefficient suggests that an increase in the corresponding explanatory variable leads to an increase in HDI, whereas

a negative coefficient indicates an inverse relationship. The use of logarithmic transformations for population size and GRDP allows the model to reduce scale differences among variables, stabilize variance, and improve the interpretation of the estimated coefficients.

Estimation Technique and Model Selection

Panel data regression can be estimated using three alternative approaches: the Common Effects Model (CEM), Fixed Effects Model (FEM), and Random Effects Model (REM). The Common Effects Model assumes that all districts and cities share identical intercepts and slopes, ignoring regional heterogeneity. The Fixed Effects Model allows each district or city to have its own intercept, thereby capturing unobserved characteristics that remain constant over time. Meanwhile, the Random Effects Model assumes that regional-specific effects are random and uncorrelated with the explanatory variables.

To determine the most appropriate estimation model, model selection tests are conducted sequentially. The first stage involves the Chow Test, which compares the Common Effects Model and the Fixed Effects Model. If the probability value of the Chow Test is less than the significance level of 5 percent, the Fixed Effects Model is preferred over the Common Effects Model.

The second stage involves the Hausman Test, which compares the Fixed Effects Model and the Random Effects Model. If the probability value of the Hausman Test is below the 5 percent significance level, the Fixed Effects Model is considered more appropriate because the individual effects are correlated with the explanatory variables. Based on the results of these tests, the Fixed Effects Model (FEM) was selected as the most suitable model for this study. The FEM was chosen because it effectively controls for unobserved regional characteristics that differ across districts and cities but remain relatively constant over time, thereby producing more reliable and unbiased coefficient estimates.

Statistical Testing

After selecting the appropriate panel data model, several statistical tests are conducted to evaluate the regression results. First, the F-test is used to assess whether all independent variables jointly influence HDI. A significant F-statistic indicates that poverty, unemployment, population size, and GRDP collectively affect human development in the Greater Solo region.

Second, the t-test is employed to examine the partial effect of each independent variable on HDI. This test determines whether each explanatory variable has a statistically significant influence on human development while controlling for the effects of other variables in the model.

Finally, the coefficient of determination (R^2) is used to measure the explanatory power of the regression model. The R^2 value indicates the proportion of variation in HDI that can be explained by variations in poverty, unemployment, population size, and GRDP. A higher R^2 value suggests that the model has a stronger ability to explain differences in human development across regions and over time.

Result and Discussion

This section presents the results of the panel data regression analysis conducted to examine the effects of poverty, unemployment, population, and Gross Regional Domestic Product (GRDP) on the Human Development Index (HDI) in Solo Raya during the 2014–2024 period. Three estimation approaches were employed, namely the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM), to identify the most appropriate model for the data. The selection process involved the Chow Test and Hausman Test, which were used to evaluate the presence of regional heterogeneity and determine the consistency of the

estimated coefficients. After identifying the preferred model, the effects of each explanatory variable on HDI were analyzed to assess their statistical significance and substantive contribution to human development outcomes in the study area.

Table 2. CEM, FEM, and REM Regression Results

Variables	CEM	FEM	REM
Constant	-20.1520	-1.2447	0.9342
POV (Poverty Rate)	-0.4162	0.0982	0.0242
UNEMP (Unemployment Rate)	0.6580	-0.0169	0.0034
LogPOP (Population)	-0.1884	0.0350	0.0160
LogGRDP (Gross Regional Domestic Product)	9.4421	7.1631	7.0418
R ²	0.775	0.995	0.939
Prob(F-statistic)	0.0000	0.0000	0.0000

Source: Processed data from BPS (2025)

Table 2 presents the estimation results of the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). To identify the most appropriate model, the Chow Test and Hausman Test were conducted. The Chow Test produced a probability value of 0.0000, which is lower than the 5 percent significance level, indicating that FEM is more appropriate than CEM. Similarly, the Hausman Test generated a probability value of 0.0000, confirming that FEM is preferred over REM. The selection of FEM is not only statistically justified but also substantively relevant.

The districts and city within Solo Raya have different socioeconomic characteristics, including disparities in educational attainment, healthcare facilities, infrastructure development, and local government performance. These regional differences are relatively stable over time and can influence HDI. Therefore, FEM is considered the most appropriate model because it controls for these unobserved regional characteristics and produces more reliable coefficient estimates. Furthermore, the FEM model has the highest coefficient of determination ($R^2 = 0.995$), indicating that approximately 99.5 percent of the variation in HDI can be explained by poverty, unemployment, population, and GRDP. The remaining 0.5 percent is explained by other factors not included in the model.

Table 3. Panel Data Model Selection Test Results

Test	Statistic	Probability	Decision
Chow Test	Cross-section F = 580.0049	0.0000	FEM preferred over CEM
Hausman Test	Chi-square = 102.9077	0.0000	FEM preferred over REM

Table 3 presents the results of the panel data model selection tests. The Chow Test produced a Cross-section F probability value of 0.0000, which is lower than the significance level of 0.05. This result indicates that the null hypothesis, which assumes that the Common Effect Model (CEM) is the appropriate model, is rejected. Therefore, the Fixed Effect Model (FEM) is preferred over the Common Effect Model. This finding suggests that there are significant differences among the districts and city in Solo Raya that cannot be ignored in the estimation process. To further determine whether FEM or the Random Effect Model (REM) was more suitable, the Hausman Test was conducted.

The test generated a probability value of 0.0000, which is also below the 5 percent significance level. Consequently, the null hypothesis is rejected, indicating that FEM is more appropriate than REM. This result implies that the individual effects across regions are correlated with the explanatory variables included in the model. Under such circumstances, FEM provides consistent and unbiased parameter estimates. The selection of FEM is not only statistically

justified but also substantively relevant to the context of this study. The regencies and city within Solo Raya possess different socioeconomic characteristics, such as variations in educational attainment, healthcare facilities, infrastructure quality, local government performance, and economic development levels. These regional characteristics are relatively stable over time but differ across areas, making it necessary to control for region-specific effects. By accounting for these unobserved regional differences, the Fixed Effect Model is able to capture the true relationship between poverty, unemployment, population size, GRDP, and the Human Development Index (HDI). Therefore, FEM provides a more reliable framework for explaining the determinants of HDI in Solo Raya during the 2014–2024 period.

Table 4. Fixed Effect Model (FEM) Estimation Results and Interpretation

Variable	Coefficient	Probability	Significance	Direction
POV (Poverty Rate)	0.0982	0.0937	Significant at 10%	Positive
UNEMP (Unemployment Rate)	-0.0169	0.5582	Not Significant	Negative
LogPOP (Population)	0.0350	0.0469	Significant at 5%	Positive
LogGRDP (Gross Regional Domestic Product)	7.1631	0.0000	Significant at 1%	Positive

Source: *Processed data (2025)*

The estimation results indicate that poverty has a positive and statistically significant relationship with HDI. Although this finding differs from conventional development theory, it may suggest that regions with relatively high poverty levels have benefited from targeted government interventions, such as social assistance programs, educational support, and healthcare subsidies, which contribute to improvements in human development outcomes. Unemployment exhibits a negative coefficient, indicating an inverse relationship with HDI. However, the effect is statistically insignificant, suggesting that unemployment does not directly influence HDI during the study period. This may reflect the important role of informal-sector activities that enable households to maintain income and access to basic services despite fluctuations in formal employment.

Population size has a positive and significant effect on HDI. This finding implies that population growth can contribute positively to human development when accompanied by adequate educational opportunities, healthcare services, and economic activities. A larger population may provide a broader labor force and stimulate regional economic development. GRDP demonstrates the strongest positive and statistically significant effect on HDI. This result highlights the importance of economic growth in improving human development outcomes. Higher regional income increases household purchasing power and enhances the capacity of local governments to invest in education, healthcare, and public infrastructure, thereby contributing to improvements in quality of life.

Understanding Human Development through Socioeconomic and Institutional Dynamics

The findings of this study contribute to an important debate in regional development and public management concerning the mechanisms through which socioeconomic conditions shape human development outcomes (Hansen & Eriksson, 2023; Ferreira et al., 2022). While the Human Development Index is often treated as a direct consequence of economic and social indicators, the results suggest that the relationship is more complex and mediated by institutional capacity, policy implementation, and local development governance. This is particularly relevant in the context of Solo Raya, where variations in administrative capability, public service delivery, and development priorities across districts create different pathways

through which socioeconomic resources are translated into improvements in human welfare. Consequently, understanding HDI requires moving beyond a purely economic perspective and recognizing the managerial role of local governments in converting resources into human development outcomes.

The poverty finding is particularly noteworthy because it challenges the conventional assumption that higher poverty levels automatically correspond to lower human development achievements (Cremin & Nakabugo, 2012). Rather than interpreting this result as evidence that poverty contributes positively to welfare, the finding draws attention to the capacity of public institutions to moderate the negative consequences of socioeconomic deprivation. From a management perspective, this suggests that development outcomes are not solely determined by the magnitude of social problems but also by how effectively governments design, target, and implement intervention programs. In regions where poverty remains relatively high, local administrations may allocate greater resources to education, healthcare, and social protection, thereby preserving or even improving human development indicators (Siregar, 2024; Hunter & Sugiyama, 2009). The implication is that managerial effectiveness, policy targeting, and program coordination may be equally important as economic conditions themselves. This perspective shifts the discussion from poverty as a static condition to poverty management as a strategic governance challenge.

The insignificant effect of unemployment further reinforces the argument that labor market indicators should not be interpreted in isolation from broader institutional and economic structures (Howell et al., 2013; Avdagic & Salardi, 2013). In many developing regions, including Solo Raya, formal employment statistics do not fully capture productive economic participation because a substantial proportion of economic activity occurs within the informal sector. As a result, conventional measures of unemployment may underestimate the adaptive capacity of households to secure income and maintain access to essential services. For development managers and policymakers, this finding highlights the limitations of focusing exclusively on employment quantity as a measure of welfare improvement. The more critical challenge lies in enhancing employment quality, productivity, income security, and opportunities for skills development. Human development is ultimately influenced by the capacity of individuals to accumulate capabilities and access opportunities, not merely by their employment status.

The positive role of population size also warrants a more nuanced interpretation than the traditional view that population growth necessarily creates developmental pressure. The findings suggest that population can function as a productive asset when supported by appropriate investments in human capital. This perspective aligns with contemporary development management approaches that view people not as passive beneficiaries of development but as strategic resources capable of generating innovation, productivity, and economic dynamism. However, realizing this potential requires effective planning and resource allocation. According to Bykova et al. (2024) Population growth creates opportunities only when governments can provide sufficient educational facilities, healthcare services, infrastructure, and labor market opportunities. Otherwise, demographic expansion may generate fiscal pressures and increase inequalities. The managerial implication is clear: population policies should focus not merely on controlling demographic growth but on maximizing the productive contribution of human resources through long-term investments in capability development.

Among all explanatory variables, economic performance emerges as the most influential factor associated with HDI improvement. This finding reinforces the argument that economic growth remains a necessary condition for human development because it expands both household

resources and governmental fiscal capacity. However, the broader implication is not that growth alone is sufficient. A persistent challenge in development management is ensuring that economic gains are effectively transformed into social outcomes. Regions may experience strong economic growth without corresponding improvements in education, healthcare, or quality of life if institutional arrangements fail to distribute the benefits broadly across society. Therefore, the central policy question is not whether growth matters, but how growth is managed. Economic expansion becomes developmentally meaningful only when public institutions possess the strategic capacity to channel economic resources into investments that enhance human capabilities (Levy & Fukuyama, 2010; Teece, 2000).

Taken together, the findings suggest that HDI should be understood as an outcome of both economic conditions and governance quality. Variables such as poverty, unemployment, population, and GRDP do not operate independently; their effects are filtered through the capacity of public institutions to formulate policies, allocate resources, and deliver services effectively. This observation has important implications for the management literature because it highlights the significance of state capacity, strategic planning, and intergovernmental coordination in shaping development outcomes. The evidence from Solo Raya indicates that improvements in human development are not merely the product of favorable socioeconomic conditions but are also influenced by how local governments respond to those conditions through policy interventions and administrative action.

From a practical standpoint, the study suggests that development strategies should move beyond sectoral approaches that treat poverty reduction, employment creation, population management, and economic growth as separate policy domains. Human development is inherently multidimensional and requires integrated governance mechanisms capable of linking economic objectives with social outcomes. Local governments should therefore strengthen cross-sector coordination, improve data-driven decision making, and prioritize investments that simultaneously enhance productivity, educational attainment, health outcomes, and social inclusion (Mikhaylov et al., 2018; Ita, 2025). Such an integrated approach is likely to produce more sustainable improvements in HDI than isolated interventions focused on individual development indicators.

This study demonstrates that the determinants of human development are not simply economic variables but manifestations of broader managerial and institutional processes. The capacity of governments to convert economic resources into human capabilities remains the defining factor in achieving sustainable development outcomes. Future research should therefore pay greater attention to governance quality, public sector effectiveness, fiscal management, and institutional performance as potential mediating factors that explain why regions with similar socioeconomic conditions often achieve different levels of human development.

Conclusion

This study examined the determinants of the Human Development Index (HDI) in the Solo Raya region during the 2014–2024 period using panel data regression analysis. The model selection tests confirmed that the Fixed Effect Model (FEM) was the most appropriate estimation approach, indicating the presence of significant regional heterogeneity across districts and the city within Solo Raya. The findings reveal that poverty, population, and Gross Regional Domestic Product (GRDP) significantly influence HDI, while unemployment does not have a statistically significant effect. Among these variables, GRDP emerged as the most influential determinant, highlighting the critical role of economic performance in supporting human development. The positive effects of population and GRDP suggest that human development can be enhanced through productive demographic dynamics and sustained economic growth, provided that adequate investments in education, healthcare, and public

services are maintained. The unexpected positive relationship between poverty and HDI indicates that government interventions and social protection programs may have mitigated some of the adverse effects of poverty on human development outcomes. Overall, the findings emphasize that improvements in HDI are not solely driven by socioeconomic conditions but also depend on the capacity of local governments to effectively manage resources, implement development policies, and translate economic progress into broader welfare gains. Therefore, future development strategies in Solo Raya should prioritize inclusive economic growth, human capital development, and integrated governance approaches to achieve sustainable improvements in human development.

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