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The Role Of The Human Development Index on Regional Economic Growth in Java and Sumatra, 2014–2023

Original Article

Olos Wasahua[1*], Sumaryoto[2], Karno[3]
[1*]Doctoral Student of Economics Postgraduate Program, Universitas Borobudur, Indonesia
[2,3]Doctoral Program in Economics, Postgraduate Program, Universitas Borobudur, Indonesia
Email: [1*)]wasahuammo@gmail.com, [2)]sumaryoto2512@yahoo.com, [3)]karno@gmail.com

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Abstract

Economic growth is the main indicator in measuring the progress and welfare of a region. From the perspective of modern development, economic growth is not only determined by physical factors such as investment and capital, but also by the quality of human resources reflected through the Human Development Index (HDI). This study aims to analyze the effect of HDI on economic growth in the provinces of Java and Sumatra during the period 2014–2023. The data used are panel data from 16 provinces (6 in Java and 10 in Sumatra) with the Fixed Effect Model (FEM) approach selected based on the results of the Chow and Hausman test. The results show that HDI has a positive and significant effect on economic growth, with a coefficient value of β = 1.161 and a t-statistic value of 9.206 > t-table 1.658 and a probability value of 0.0000 < 0.05. The elasticity value E > 1 indicates that an increase in HDI is elastic to economic growth, meaning that each increase in HDI will increase economic growth proportionally greater. These results reinforce the human capital theory, which states that investment in education, health, and a decent standard of living is key to sustainable economic growth. The study also found that the HDI's influence on economic growth was stronger in Java than in Sumatra due to differences in education quality, infrastructure, and urbanization. The policy implications of this study are the need for local governments to strengthen investment in vocational education, workforce training, and improving basic health services to reduce disparities in human development between regions.

Keywords: Human Development Index, Economic Growth, Panel Data.

1. Introduction

Economic growth is a key indicator that reflects a region's progress in improving societal welfare. In modern development theory, economic growth is influenced not only by physical factors such as investment and capital, but also by the quality of human resources. (Becker, 1975; Todaro & Smith, 2000). Higher economic growth can increase income for those living in poverty through a "trickle-down" effect. (Dollar et al., 2015; Dollar & Kraay, 2002; Ravallion & Chen, 2003). However, when economic growth disproportionately benefits the wealthy, inequality may worsen, and poverty may persist. (Nindi & Odhiambo, 2015). Many developing countries have experienced economic growth, yet this progress has not been fully effective in reducing poverty due to weak domestic policies and governance mechanisms. (Word Bank, 2022). This limitation occurs because income distribution has not been equitable, resulting in limited equal opportunities across society.

Deng et al. (2025) demonstrated that underdeveloped regions should prioritize economic development before expanding economic openness, and only implement economic

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openness policies after reaching a certain level of development. (Boateng et al., 2021) showed that, unlike foreign aid disbursements, foreign aid commitments enhance growth, but aid volatility negatively impacts economic growth. They found that while institutional quality and its subdimensions enhance economic growth, they fail to mitigate the detrimental effects of aid volatility on economic growth.

Urban-rural development is a crucial driver of regional economic growth. (Zhao et al., 2024). In the post-COVID-19 pandemic era, big data, as a developing production factor, has a significant indicative effect on driving urban-rural economic recovery and encouraging new business forms. Therefore, fully considering big data factors can help uncover the mechanisms of its impact on urban-rural economic growth in the post-COVID-19 pandemic period. In 2023, Indonesia experienced economic growth and increased employment. Economic growth reached 5.05%. Employment absorption also increased, with the number of employed people reaching 140 million, an increase of approximately 8.8 million people compared to the 2021-2023 period.

The Human Development Index (HDI) encompasses three important dimensions: education, health, and a decent standard of living, which directly impact labor productivity and economic competitiveness. (Progress, 2014). Increasing the HDI is expected to drive sustainable and inclusive economic growth. In Indonesia, Java and Sumatra are the two regions with the largest contributions to the national Gross Domestic Product (GDP), yet they still exhibit significant human development disparities between provinces (BPS, 2024). Therefore, this study was conducted to understand how the HDI influences regional economic growth in these two strategic regions during the 2014–2023 period.

Most previous studies on regional economic growth in Indonesia still emphasize classical macroeconomic factors such as investment, government spending, and household consumption, while the aspect of human resource quality represented by the Human Development Index (HDI) has not been explored in depth as a direct determinant of economic growth. Endogenous development theory (Lucas Jr, 1988; Romer, 1990). Emphasizes that human capital is the main engine of long-term growth through increased productivity and innovation. There is a conceptual gap in understanding how the dimensions of education, health, and living standards (components of the HDI) contribute to the dynamics of regional economic growth in Indonesia.

Previous research on the relationship between the HDI and economic growth has generally been conducted at the national level, rather than at the regional or island level, and has failed to differentiate characteristics between regions. Java and Sumatra have very different economic structures, levels of urbanization, and fiscal capacities. Java contributes over 57% of the national GDP, boasting a high HDI and strong industrialization, while Sumatra is relatively dependent on natural resources and exhibits significant variations in human development across provinces. Few studies have analyzed the role of the HDI in economic growth, taking into account the heterogeneity between the main regions contributing to the national economy, namely Java and Sumatra.

Empirical studies such as those conducted by Bekele et al, (2024) and Brodny & Tutak, (2024) found that increasing human capital significantly drives economic growth in developing countries. However, research findings in Indonesia remain inconclusive. Several studies have shown that improvements in human development contribute positively to economic growth, as reflected in analyses demonstrating that education, health, and living standards significantly enhance productivity and long-term economic performance (Barro, 2013; Ghosh, 2006; Ranis et al., 2000). In contrast, other research highlights that the relationship between human development and economic growth may vary across regions,

especially where educational inequality, poor institutional quality, or limited access to basic services persist (Anand & Sen, 2000; Ghosh, 2006). These differing results indicate that there is still no empirical consensus regarding the strength of the HDI's influence on economic growth in Indonesia, including in Java and Sumatra.

In 2023, Indonesia's Human Development Index reached 74.39, increasing by 0.62 points (0.84%) from the previous year. Progress occurred across all components—health, knowledge, and standard of living. National statistics show that Indonesia has maintained a high HDI category (above 70) since 2016 and continues to experience steady improvement.

Table 1. Development of the Human Development Index by Province on the Islands of Java and Sumatra in Indonesia 2014 – 2023 (percentage).

NO		2017	2018	2019	2020	2021	2022	2023
1	Aceh	70,60	71,19	71,90	73,29	73,48	74,11	74,40
2	Sumut	70,57	71,18	71,74	73,62	73,84	74,51	75,13
3	Sumbar	71,24	71,73	72,39	74,29	74,56	75,16	75,64
4	Riau	71,79	72,44	73,00	73,67	73,89	74,45	74,95
5	Jambi	69,99	70,65	71,26	72,29	72,62	73,11	73,73
6	Sumsel	68,86	69,39	70,02	71,62	71,83	72,48	73,18
7	Bengkulu	69,95	70,64	71,21	72,93	73,16	73,68	74,30
8	Lampung	68,25	69,39	69,57	71,04	71,25	71,79	72,48
9	Babel	69,99	70,67	71,30	72,74	72,96	73,50	74,09
10	Kep. Riau	74,45	74,84	75,48	77,69	77,87	78,48	79,08
11	Jakarta	80,06	80,47	80,76	81,92	82,25	82,77	83,55
12	Jabar	70,69	71,30	72,03	72,61	72,96	73,63	74,24
13	Jateng	70,52	71,12	71,73	71,88	72,17	72,80	73,39
14	Yogyakarta	78,89	79,53	79,99	79,95	80,22	80,65	81,09
15	Jatim	70,27	70,77	71,50	73,04	73,48	74,05	74,65
16	Banten	71,42	71,95	72,44	74,41	74,68	75,25	75,77
Indonesia		70,81	71,39	71,92	72,81	71,16	73,77	74,39

Source: Central Statistics Agency, 2023.

Statistics Indonesia (BPS) data (2023) shows that Indonesia's Human Development Index (HDI) reached 74.39 points in 2023. This score increased by 0.84% compared to the previous year's 73.77 points. The increase in the HDI in 2023 was higher than the average growth rate from 2020 to 2023. During that period, the average annual HDI growth was 0.66%. Based on region, Jakarta was the province with the highest HDI in 2023. The Indonesian capital recorded an HDI score of 82.46 points, categorizing it as very high. Besides Jakarta, Yogyakarta also has a very high HDI status. This is in line with Yogyakarta's HDI score of 81.09 points in 2023. Next came East Kalimantan, which had an HDI of 78.2 points in 2023. Then, the Riau Islands and Bali had HDI scores of 77.11 points and 77.1 points, respectively. North Sulawesi had a Human Development Index (HDI) score of 74.36 points. Riau and Banten, respectively, had HDI scores of 74.04 points and 73.87 points. Meanwhile, Papua had the lowest HDI in Indonesia in 2023, at 62.25 points. This achievement places Papua, along with four other provinces, in the moderate category, with HDI scores in the 60-70 range.

Although Indonesia's Human Development Index (HDI) increased from 68.90 in 2014 to 74.39 in 2023, disparities between provinces on the islands of Java and Sumatra remain

high. This study analyzes the role of the HDI in influencing regional economic growth in these two main contributors to Indonesia's GDP.

2. Literature Review

Theoretically, this research uses the human capital theory proposed by Becker (1975), Lucas Jr (1988), and Romer (1990) This theory asserts that investments in education, health, and human skills will increase productivity and create long-term economic growth through innovation and knowledge accumulation.

Lucas Jr (1988) Stated that sustainable economic growth will be achieved if there is adequate accumulation of human capital. Romer (1990) Added that endogenous growth stems from innovation driven by improvements in the quality of human resources. This study strengthens and expands this theory by examining the empirical role of the HDI as a proxy for human capital in economic growth at the regional scale in Indonesia, rather than at the national or global level as in previous studies.

Empirical evidence consistently shows that human capital is a key driver of economic growth. Several studies highlight that improvements in education, skills, and labor productivity significantly enhance the growth potential of developing economies. For example, Mankiw et al., (1992) Demonstrated that human capital accumulation is a fundamental determinant of cross-country income differences. Complementary findings by Barro (2013) Further emphasize that educational attainment strongly influences long-term economic performance. Research by Gyimah-Brempong et al., (2006) Also revealed that human capital has both direct and indirect effects on economic growth in African countries, particularly through productivity enhancement.

Other studies focus on how foreign investment interacts with human capital to stimulate growth. Borensztein et al., (1998) Found that foreign direct investment contributes positively to economic growth only when recipient countries possess a sufficiently educated labor force. Similarly, Li and Liu (2005) documented that the effectiveness of FDI depends on human capital levels and technological absorptive capacity. In addition, Petrakis & Stamatakis (2002) Highlight that human capital investment shapes economic growth paths differently across developing and developed countries.

Despite extensive international evidence, studies specifically analyzing the direct relationship between the Human Development Index and regional economic growth in Indonesia remain limited, particularly within the context of inter-provincial panel data. This suggests that more localized empirical research is needed to understand how human development disparities influence regional economic dynamics in the Indonesian context.

Human capital development is crucial for creating sustainable behaviors that drive sustainable development. These practices encompass a wide range of practices, including investing in renewable energy sources, implementing sustainable transportation systems, implementing energy-efficient technologies, and increasing awareness and education about climate change. Human capital promotes sustainability by increasing participation in environmentally friendly activities, such as the use of renewable energy. (Saqib et al., 2023). Increasing access to innovation and knowledge (as represented by the percentage of internet users) has a positive impact on economic growth, encouraging technological catch-up in developing countries and accelerating economic convergence patterns. However, this increase has a greater effect on developing countries when democracy is well-developed, further accelerating economic convergence patterns. (Pérez-Trujillo & Lacalle-Calderón, 2020)

Human capital also plays a key role in sustainable development, which implies harmonious economic, social, and environmental growth (Del-Aguila-Arcentales et al., 2022).

Education, and consequently public awareness, is the foundation of a sustainable development economy. It positively influences understanding of environmental issues and increases the propensity to implement and use innovative green solutions. Knowledge of environmental protection, sustainable resource management, and green technologies leads to greater responsibility and a propensity to make responsible decisions from both a social and business perspective (Shahzad et al., 2022). Competent human resources (human capital) also positively influence the innovation of companies and countries, which is crucial for today's global economy (Saleh et al., 2020). Innovative and sustainable approaches to production, resource management, recycling, and consumption contribute to a more sustainable global economic development. Therefore, high competency will have a positive impact on addressing sustainability challenges, such as climate change adaptation and reducing greenhouse gas emissions (Piwowar-Sulej et al., 2023).

3. Methods

Several previous studies used national time series data or cross-sections of single provinces, without simultaneously considering the dynamics of time and differences in characteristics between regions. This approach is unable to depict temporal changes (2014–2023) and spatial variations between provinces, particularly after the COVID-19 pandemic and the National Economic Recovery. This study uses panel data, a combination of time series and cross-sections, which allows for fixed effect analysis between provinces in Java and Sumatra over 10 years, thus providing a more robust and representative approach. The data used are panel data from 16 provinces (6 in Java, 10 in Sumatra) for the period 2014–2023.

This study attempts to fill the empirical and contextual gaps in the literature by analyzing the characteristics of 16 provinces in Java and Sumatra, the two largest contributors to national GDP. The study period, from 2014 to 2023, covers economic transformation, digitalization, and the impact of the COVID-19 pandemic. The analytical approach used is the Fixed Effect Model (FEM) on panel data, as suggested by Baltagi (2021) and Gujarati & Porter (2012) to capture inter-provincial heterogeneity. The main variables in this study are the HDI as a proxy for human resource quality and economic growth as the independent variable.

This study contributes to the literature by examining the empirical impact of the HDI on regional economic growth within the framework of Indonesia's decentralized development. The Panel Data Linear Regression Model with a Fixed Effect Model approach is proven by the results of the Chow and Hausman tests. The data source is from the Indonesian Central Bureau of Statistics.

4. Results and Discussion

4.1. Stationary Unit Root Test

The results of the stationary unit root test with ADF-Fisher Chi-square showed that the human development index variable was stationary at the first difference level, so the model could be continued using the Panel Data Linear Regression data processing method.

4.2. Chow Test – Redundant Fixed Effect Model

To determine the most appropriate Common Effect Model or Fixed Effect Model to use in estimating panel data, the Redundant Fixed Effect Test, also known as the Chow Test, is used.

Table 2. Chow Test Results - Redundant Fixed Effect

Redundant Fixed Effects Tests			
Pool: POOL			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	5.079225	(15,123)	0.0000
Cross-section Chi-square	69.417590	15	0.0000

Source: Eviews Data Processing 13

In Table 2, the results of the Redundant Fixed Effect Test show the probability of the Cross-section Chi-square of 0.0000 < α = 0.05. According to the decision criteria, the selected model is the Fixed Effect Model, which is better to use compared to the Common Effect Model. Because the Chow Test determines the Fixed Effect Model, it is necessary to conduct further testing with the Hausman Test to determine the most appropriate Fixed Effect Model or Random Effect Model to use.

4.3. Hausman Test

Table 3. Hausman Test Results

Correlated Random Effects - Hausman Test			
Pool: POOL			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	12.774944	1	0.0256

Source: Eviews Data Processing 13

The Hausman test is used to determine whether the Random Effect Model or the Fixed Effect Model is most appropriate by assessing the probability of the Random Cross-section. The Hausman test results show a Random Cross-section probability value of 0.0256 <α = 0.05, meaning the Fixed Effect Model is more appropriate than the Random Effect Model for estimating panel data. Since both tests yield the Fixed Effect Model conclusion, the Fixed Effect Model is used in this study to explain the influence of the independent variable on the dependent variable.

The regression results show that the t-statistic value is 9.206129 > t-table of 1.658, a positive t-statistic value indicates a unidirectional relationship. The probability value (p-value) is 0.0000 <0.05, so that Ho (insignificant effect) is rejected and Ha (significant effect) is accepted. Thus, it is proven that the Human Development Index has a positive and significant effect on Economic Growth in Indonesia. The coefficient value β2 = 1.161, meaning that the elasticity value of the Human Development Index on Economic Growth is E = 1.161. The value of E > 1 indicates that the increase in the Human Development Index is elastic to Economic Growth.

The results of statistical calculations using the panel data linear regression method, which produces a Fixed Effect Model estimate, indicate that the Human Development Index has a significant and positive effect on economic growth in Indonesia. In economics, the term "positive" means that an increase in the Human Development Index is followed by an increase in economic growth. Meanwhile, the term "significant" means that the Human Development

Index can be convincingly and meaningfully proven to influence economic growth. The level of significance is expressed as a number indicating the possibility or risk of error in the test conducted, with a value of 5 percent or 0.05 used in this study.

An increase in the HDI has a direct impact on labor productivity, innovation, and regional economic efficiency. In Java, the effect of the HDI is stronger due to urbanization and more advanced educational infrastructure, while in Sumatra, the effect is gradual. This finding strengthens the human capital theory and emphasizes the importance of development policies based on improving the quality of human resources. Implications of the HDI for Economic Growth (2014–2023). An Increase in the HDI Accelerates Economic Growth. The HDI encompasses education, health, and a decent standard of living. When these three dimensions improve, the quality of human resources improves, labor productivity increases, and economic contribution also increases. The E value of 1.161 indicates that human development is a key driver of growth, not just its impact.

Pro-human development policies proved effective. During 2014-2023, the government launched various programs, namely the Indonesia Smart Card (KIP), National Health Insurance (JKN), village funds for basic services, school construction, and health facilities. The policy increases life expectancy, average length of schooling, and people's purchasing power, all of which are included in the HDI component. An elastic increase in HDI against the growth of Gross Domestic Product shows that this policy not only improves social welfare, but also accelerates national economic growth. Human resources as an economic asset. The higher the HDI, the more competitive a region or country is in attracting investment. Companies are more interested in investing in areas that have a healthy, educated, and productive workforce. It creates a chain effect on economic growth through job creation and innovation.

The Human Development Index (HDI) inequality needs to be monitored closely. Although Indonesia's HDI has increased year after year, disparities between provinces remain significant. The HDI of Yogyakarta and Jakarta is much higher than that of Papua or East Nusa Tenggara. This has the potential to create disparities in economic growth between regions, due to the high correlation between HDI and GDP. HDI-based economic growth tends to be more sustainable and inclusive, as it not only targets GDP but also improves people's quality of life. This is crucial for Indonesia to avoid "growth without development," that is, economic growth that is not accompanied by improvements in quality of life.

The HDI has a significant positive impact on economic growth in Java and Sumatra, with a stronger impact on Java due to the synergy between improving human capital and infrastructure and economic capacity. Indonesia's HDI increased from 68.9 (2014) to 74.39 (2023), indicating significant improvements in education, health, and living standards. An increase in the HDI can drive economic growth, but because its effects are long-term and indirect, its impact is not as large as investment or consumption. Brodny & Tutak (2024) explain that the quality of human resources in terms of knowledge and skills is crucial not only for the development of innovation and corporate competitiveness but also for the efficiency of the entire sustainable economic system.

Java as a whole has a higher and more stable Human Development Index (HDI), resulting in relatively higher and more consistent economic growth compared to Sumatra. Java excels in access to and quality of education (with a large number of renowned universities), healthcare facilities, and public purchasing power. For example, Jakarta, Yogyakarta, and West Java have expected years of schooling of >12 years. In Sumatra, regions like Aceh and South Sumatra experience development disparities, particularly in the interior, resulting in slower HDI growth and impacting economic growth.

Infrastructure and connectivity are key drivers of sustainable economic development. Major infrastructure development (the Trans-Java toll road, ports, and mass transportation) has been underway since Indonesia's independence, so, naturally, Java's economic growth is greater than other islands. This increases economic efficiency and strengthens the influence of a high HDI on economic growth. Meanwhile, in Sumatra, infrastructure development (such as the Trans-Sumatra Toll Road) only intensified after 2015, so the impact of the HDI on economic growth is still gradual.

The Human Development Index (HDI) can be improved through urbanization to boost labor productivity. As has been the case in Java, urbanization has become a solution to population density in a region, increasing the HDI. Primary sectors such as agriculture and mining do not rely on the quality of human resources, so the Human Development Index (HDI) does not directly impact economic growth in Sumatra. Provinces with a high HDI (especially in education and health) are able to create a productive and innovative workforce, which drives investment and economic growth. Conversely, a low HDI reflects obstacles to increasing human capacity, making it difficult for regions to attract investment and remain economically disadvantaged.

Scientific research on Human Development adds to the literature, as a literature review conducted by Bekele et al. (2024) Shows that human capital development negatively and significantly affects sustainable economic growth. Perez-Trujillo & Lacalle-Calderon (2020) show that increasing the ability to access innovation and knowledge (represented by the percentage of internet users) has a positive impact on economic growth, encouraging the process of catching up with technology for developing countries and accelerating economic convergence patterns. Brodny & Tutak, (2024) State that human resources are a fundamental resource that determines its existence and development. Çakar et al., (2021) Show that as human capital increases, there will be more innovation to protect the environment, and thus there will be less environmental degradation. Dankyi et al.,(2022) Prove that focusing on investing in human capital development through education and health can increase economic growth. Dor´e & Teixeira prove that years of schooling (human capital) have a positive and long-term impact on economic growth. Sectoral shifts towards a more advanced and sophisticated manufacturing base are boosting economic growth.

The Human Development Index is a composite indicator that measures human development achievements across three main dimensions: Health, represented by life expectancy, Education, measured by average years of schooling and expected years of schooling, and Decent living standards, measured by per capita expenditure (public purchasing power). Previous research has focused solely on quantitative economic indicators such as investment and consumption, ignoring the role of human capital in driving economic growth. The HDI combines social and economic aspects, providing a more holistic, multidimensional perspective when used as an explanatory variable for economic growth. The HDI can demonstrate disparities between regions and how different levels of human capital contribute to different levels of economic growth.

5. Conclusion

The Human Development Index has a positive and significant influence on economic growth in Indonesia. An elasticity value greater than one indicates that improvements in human quality, particularly in education, health, and living standards, generate strong and substantial economic gains. Investments in human development yield high economic returns and serve as a strategic foundation for long-term growth. This finding reinforces the notion

that social spending is not merely a welfare obligation but also an economic investment that directly contributes to the expansion of national output. The impact of human development on economic growth is found to be stronger in Java than in Sumatra. This disparity is closely linked to higher levels of urbanization, more comprehensive educational infrastructure, and better access to health services in Java. These conditions allow the region to optimize its economic potential more effectively compared to areas with lower development capacity.

Overall, improvements in human development not only elevate social well-being but also act as a key driver of economic performance. Regions with higher levels of human development tend to attract more investment, benefit from a more productive labor force, and create broader employment opportunities, ultimately accelerating regional economic growth. However, significant gaps in human development across provinces remain, posing the risk of widening regional economic disparities. This situation highlights the need for local governments to strengthen investments in education and health and to improve interregional infrastructure connectivity to reduce inequality in human development throughout Indonesia.

6. References

Bank, W. W. (2022). *World development report 2022: finance for an equitable recovery*. World Bank Publications.

Barro, R. J. (2013). Education and economic growth. *Annals of Economics and Finance*, *14*(2), 301–328.

Becker, G. S. (1975). *Human capital: A theoretical and empirical analysis*. National Bureau of Economic Research.

Bekele, M., Sassi, M., Jemal, K., & Ahmed, B. (2024). Human capital development and economic sustainability linkage in Sub-Saharan African countries: Novel evidence from the augmented mean group approach. *Heliyon*, *10*(2).

Boateng, E., Agbola, F. W., & Mahmood, A. (2021). Foreign aid volatility and economic growth in Sub-Saharan Africa: Does institutional quality matter? *Economic Modelling*, *96*, 111–127.

Borensztein, E., De Gregorio, J., & Lee, J.-W. (1998). How does foreign direct investment affect economic growth? *Journal of International Economics*, *45*(1), 115–135.

Brodny, J., & Tutak, M. (2024). A multi-criteria measurement and assessment of human capital development in EU-27 countries: A 10-year perspective. *Journal of Open Innovation: Technology, Market, and Complexity*, *10*(4), 100394.

Del-Aguila-Arcentales, S., Alvarez-Risco, A., Jaramillo-Arévalo, M., De-la-Cruz-Diaz, M., & de las Mercedes Anderson-Seminario, M. (2022). Influence of social, environmental, and economic sustainable development goals (SDGs) on the continuation of entrepreneurship and competitiveness. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(2), 73.

Deng, Y., Li, C., Wang, S., & Tang, R. (2025). The impact of economic openness on common prosperity: Insights from provincial panel data. *International Review of Economics & Finance*, *98*, 103908.

Dollar, D., Kleineberg, T., & Kraay, A. (2015). Growth, inequality, and social welfare: cross-country evidence. *Economic Policy*, *30*(82), 335–377.

Dollar, D., & Kraay, A. (2002). Growth is Good for the Poor. *Journal of Economic Growth*, *7*(3), 195–225.

Ghosh, M. (2006). Economic growth and human development in Indian states. *Economic and Political Weekly*, 3321–3329.

Gyimah-Brempong, K., Paddison, O., & Mitiku, W. (2006). Higher education and economic growth in Africa. *The Journal of Development Studies*, *42*(3), 509–529.

Lucas Jr, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, *22*(1), 3–42.

Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A contribution to the empirics of economic growth. *The Quarterly Journal of Economics*, *107*(2), 407–437.

Nindi, A. G., & Odhiambo, N. M. (2015). Poverty and economic growth in Swaziland: An empirical investigation. *Managing Global Transitions*, *13*(1), 59.

Pérez-Trujillo, M., & Lacalle-Calderón, M. (2020). The impact of knowledge diffusion on economic growth across countries. *World Development*, *132*, 104995.

Petrakis, P. E., & Stamatakis, D. (2002). Growth and educational levels: a comparative analysis. *Economics of Education Review*, *21*(5), 513–521.

Piwowar-Sulej, K., Malik, S., Shobande, O. A., Singh, S., & Dagar, V. (2023). A contribution to sustainable human resource development in the era of the COVID-19 pandemic. *Journal of Business Ethics*, 1.

Progress, S. H. (2014). Human Development Report 2014. *United Nations Development Programme: Geneva, Switzerland*.

Ranis, G., Stewart, F., & Ramirez, A. (2000). Economic growth and human development. *World Development*, *28*(2), 197–219.

Ravallion, M., & Chen, S. (2003). Measuring pro-poor growth. *Economics Letters*, *78*(1), 93–99.

Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy*, *98*(5, Part 2), S71–S102.

Saleh, H., Surya, B., Annisa Ahmad, D. N., & Manda, D. (2020). The role of natural and human resources on economic growth and regional development: With discussion of open innovation dynamics. *Journal of Open Innovation: Technology, Market, and Complexity*, *6*(4), 103.

Saqib, N., Ozturk, I., Usman, M., Sharif, A., & Razzaq, A. (2023). Pollution haven or halo? How European countries leverage FDI, energy, and human capital to alleviate their ecological footprint. *Gondwana Research*, *116*, 136–148.

Shahzad, M., Qu, Y., Rehman, S. U., & Zafar, A. U. (2022). Adoption of green innovation technology to accelerate sustainable development in the manufacturing industry. *Journal of Innovation & Knowledge*, *7*(4), 100231.

Todaro, M. P., & Smith, S. C. (2000). Economic Development, 7th. *Harlow: Addison-Wesley*.

Zhao, Y., Li, J., Liu, K., & Shang, C. (2024). Impact of urban-rural development and its industrial elements on regional economic growth: An analysis based on provincial panel data in China. *Heliyon*, *10*(16).