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Artificial Intelligence, Human Development, and Inequality: A Cross-Country Analysis Using Global Development Data from Our World in Data

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Abstract: The rapid advancement of artificial intelligence (AI) has emerged as a transformative force in global development; however, its implications for human development and national development trajectories remain contested. Variations in AI readiness across countries shape digital infrastructure, educational quality, and public policy capacity, which in turn influence the Human Development Index (HDI). This study aims to examine the interrelationships between AI readiness, human development, education, technology, and inequality across countries within the framework of Human Development Theory. The study adopts a qualitative approach based on thematic analysis of global data and documentary sources from Our World in Data, complemented by policy reviews, academic literature, as well as in-depth interviews and focus group discussions with experts in human development and technology. The data are analyzed comparatively across countries to identify patterns in the relationships between AI readiness, HDI, inequality indicators (IHDI and the Gini coefficient), and digital technology adoption. The findings indicate that countries with higher levels of AI readiness tend to exhibit stronger human development outcomes and greater capacity to manage demographic pressures and technological transformation. However, improvements in AI readiness do not automatically translate into inclusive human development. Social, digital, and educational inequalities are shown to be major barriers to converting AI potential into broader human capabilities. Education emerges as a key mediating factor in the relationship between AI readiness and human development. This study contributes to the literature by extending Human Development Theory into the context of AI, positioning AI as a conditional capability enhancer whose impacts are largely shaped by the quality of education and equity-oriented public policies. The main limitation of this study lies in its qualitative design and reliance on cross-national secondary data. Future research is encouraged to employ mixed-methods approaches and longitudinal analyses to deepen understanding of the causal relationships between AI, inequality, and human development.

Keywords: Artificial Intelligence, AI Readiness, Human Development Index, Digital Transformation, Cross-National Analysis

Introduction

The development of artificial intelligence (AI) has emerged as one of the most significant technological dynamics of the twenty first century digital era. AI is not merely a technological innovation, but also a powerful driver of structural transformation across economies, education systems, healthcare, and public services worldwide (Aldoseri et al., 2024). A country's readiness to harness AI technologies commonly measured through the AI Readiness Index reflects its digital infrastructure capacity, highly skilled human resources, and the adaptability of public policies to technological disruption (Uren & Edwards, 2023). This index, developed by Oxford Insights, integrates dimensions of governance, the technology sector, and data and infrastructure to assess how effectively countries can leverage AI for public welfare. Cross national variations in AI readiness scores indicate that access to technology, institutional capacity, and policy frameworks play a crucial role in preparing societies for both the opportunities and risks associated with AI, including inequalities in educational opportunities and human development (Jöhnk et al., 2021). These inequalities, in turn, influence key human development indicators such as the Human Development Index (HDI), which captures achievements in health, education, and standards of living.

The interconnections between AI readiness, HDI, technological inequality, and education thus reflect a complex relationship between global technological change and development across countries a relationship that forms the foundation of this study (Melina, 2024). Previous studies have highlighted various aspects of the relationship between technological readiness indicators and development outcomes across countries. Several studies emphasize that national AI readiness is strongly shaped by digital infrastructure, highly skilled human capital, and effective governance and policy frameworks factors that are also closely linked to education and innovation. For instance, empirical analyses show that human capital, data availability and quality, and innovation capacity are strong predictors of a country's AI readiness score (SSRN). Other studies argue that digital skills and education are critical determinants of readiness for digital transformation and automation, with countries that invest heavily in high-quality education being better positioned to manage the risks of job automation and technological disruption (MDPI).

In the education sector, global literature has identified substantial disparities in the integration of AI into education systems, where access, AI literacy, and the preparedness of teachers and students vary widely across countries and contribute to widening competency gaps in the digital era (Frontiers) (Al-Zahrani & Alasmari, 2025). Meanwhile, several review studies suggest that the use of AI in education has the potential to enhance access and quality and to reduce educational inequalities, while simultaneously warning that, without equitable access, such technologies may exacerbate disparities in education and human development (Apata et al., 2025). Despite the expansion of empirical research on AI readiness and education, several research gaps remain particularly salient in the context of cross national development.

First, most existing studies focus on individual countries or specific regional groupings, without quantitatively examining how AI readiness indicators correlate with human development (HDI), inequality, and educational quality at the global level. Second, studies that integrate large scale cross national datasets such as *Our World in Data* with analyses of technological development, education, and inequality remain limited. This has resulted in a fragmented understanding of how AI contributes to or shapes inequalities in human development across countries. Third, previous research often fails to simultaneously examine AI readiness, education, technology, and socio economic inequality within a unified cross-national analytical framework. These gaps underscore the need for comprehensive research capable of clarifying the quantitative relationships among these indicators (Insights, 2025).

This study offers significant scientific novelty relative to existing literature. First, it integrates the AI readiness index, HDI, socio economic inequality indicators, and education and technology variables into a single cross national analytical model. This approach aims not only to illustrate descriptive relationships among variables, but also to examine broader patterns and effects linking AI readiness and human development within the context of cross national inequality. Second, the use of global development data from *Our World in Data* provides a robust and standardized empirical foundation for longitudinal and cross-country quantitative comparisons. This data driven approach enables more comprehensive and large scale insights, while also offering empirical evidence to support policymakers in identifying more inclusive and sustainable technology driven development strategies. Accordingly, this study seeks to fill both conceptual and empirical gaps in the literature on AI and global human development (Rockall et al., 2025).

The primary focus of this study is to examine how AI readiness relates to human development (HDI), cross national inequality, and educational and technological dimensions across countries. The objectives of the study are to map the empirical relationships among these indicators, identify emerging patterns of inequality, and provide strategic policy insights for balanced human development in the AI era. The main research questions addressed include: (1) How does the level of AI readiness affect HDI and cross-national inequality? (2) What role does education play in strengthening the impact of AI readiness on human development? and (3) To what extent do technological and digital readiness indicators explain variations in inequality in HDI? To address these questions, the study employs cross-national quantitative analysis using *Our World in Data* datasets, incorporating variables related to AI readiness, HDI, education, and inequality. The statistical techniques applied include panel regression and multivariate analysis, adapted to examine the relationships among variables within the broader context of global development.

Literature Review

Human Development Theory, developed by Amartya Sen and Mahbub ul Haq, emphasizes that development is not merely economic growth but the expansion of human capabilities to lead meaningful lives in accordance with individuals' values and choices. This theory emerged as a critique of income based measures of development, arguing that health, education, and a decent standard of living constitute the core dimensions of human development. Within this framework, individuals are viewed not simply as passive recipients of development outcomes but as active agents endowed with the freedom to choose and pursue the lives they value. These dimensions are empirically captured by the Human Development Index (HDI), one of the most prominent operational representations of the theory (Jannah et al., 2022).

The HDI is a composite index encompassing life expectancy, educational attainment, and normalized income per capita, and it is widely used as a comparative benchmark for assessing quality of life across countries. By focusing on the expansion of opportunities and freedoms, Human Development Theory provides a robust conceptual foundation for examining the relationships among technology (including artificial intelligence), education, social inequality, and human development across national contexts (UNDP, 2025). Recent international research has reaffirmed the relevance of Human Development Theory in cross-national development analysis. For instance, global studies examining the determinants of HDI demonstrate that factors such as per capita income, health expenditure, and years of schooling are statistically significant predictors of HDI, reinforcing the argument that human development requires a multidimensional approach that extends beyond purely economic considerations.

Cross country empirical analyses further indicate that nations with strong commitments to expanding educational and health capabilities tend to achieve higher HDI scores and more sustainable development trajectories. Recent bibliometric reviews have also identified global research trends on HDI that increasingly emphasize the integration of social, economic, and quality of life indicators as part of a comprehensive human development approach. These findings are consistent with Human Development Theory, which places human well being and freedom at the center of development objectives, while simultaneously reflecting persistent global challenges related to inequality in development outcomes across countries (Vodka Oleksii, 2021).

Beyond traditional determinants, international scholarship has increasingly explored the relationship between human development and technology, including digitalization and information technology transformation. Several global studies highlight that digital technologies can enhance educational attainment and access to information, which in turn contribute positively to improvements in HDI particularly in countries with robust digital infrastructure. However, other studies caution that technological advancement without equitable access may exacerbate social disparities, as marginalized groups often fail to benefit from technological innovations. Consequently, contemporary discourse on human development increasingly examines how technology including artificial intelligence can function both as a driver of development and as a potential amplifier of inequality, depending on policy contexts and the distribution of opportunities and resources. These findings underscore that technology does not automatically translate into enhanced human development without deliberate efforts to ensure inclusivity and equitable access to fundamental capabilities (Tsampazi et al., 2023).

In the Indonesian context, several empirical studies have documented recent dynamics in human development outcomes. Provincial level analyses indicate that access to information and communication technologies (ICT) and digital skills has a positive effect on HDI at the local level, suggesting that technology adoption plays a crucial role in community empowerment and improvements in quality of life. Additional studies emphasize that government expenditure on education and health significantly contributes to HDI enhancement across regions. These empirical findings reinforce the view that human development in Indonesia is shaped not only by economic growth but also by the population's capacity to utilize technology and by the quality of essential social services (Putri & Restikasari, 2025).

Moreover, other studies in Indonesia reveal significant relationships between HDI and socioeconomic variables such as income inequality and poverty. Panel analyses across Indonesian provinces demonstrate that improvements in HDI are associated with reductions in poverty, while inequality and unemployment remain major obstacles to achieving equitable human development. Predictive studies also highlight substantial regional variation in HDI, with some regions achieving higher performance due to stronger educational outcomes and life expectancy, while others lag behind. This pattern underscores the persistent challenge of achieving equitable human development in a geographically diverse archipelagic nation. Although Indonesia's HDI has improved over the past five years, ensuring an equitable distribution of human development gains remains a critical policy concern (Abdullah & Wibowo, 2024).

Despite extensive international and national research on HDI determinants and the role of information technology in human development, several important research gaps remain. First, most existing studies focus on economic and basic social variables as determinants of HDI without explicitly incorporating AI readiness indicators, despite the growing relevance of advanced technologies in the global digital transformation era. Second, cross national analyses that integrate AI readiness, educational indicators, and social inequality into a comprehensive model for explaining HDI variation across countries particularly with regard to how these variables interact remain limited. Third, although regional studies in Indonesia have examined HDI, the systematic integration of advanced technology adoption, digital capacity, and their implications for inequality in human

development has not been adequately explored (Sibarani & Marpaung, 2025)

These gaps highlight the need for research that not only measures HDI but also explicitly links it to technological readiness and inequality dynamics within both global and national human development contexts. This study offers a novel contribution to the human development literature by integrating Human Development Theory with underexplored variables AI readiness, cross national inequality, education, and technology within a single comprehensive analytical framework. Unlike previous studies that predominantly emphasize traditional economic determinants, this research empirically examines both direct and indirect relationships between AI readiness and HDI, mediated through education and inequality (Sunita et al., 2019)

This approach provides new theoretical and empirical insights into how technology particularly artificial intelligence can either enhance or constrain human capabilities across countries. By utilizing cross-national data from Our World in Data, the study also establishes a strong global empirical foundation for understanding human development dynamics amid accelerating digital transformation. Based on the foregoing literature review, the proposed research framework integrates human development theory with key relevant variables, positioning AI readiness as an exogenous factor influencing HDI as the primary outcome, while education and social inequality function as mediating and moderating variables within the relational structure (Lengfelder et al., 2025).

This conceptual framework illustrates that a country's readiness to adopt AI technologies affects human development not only directly through HDI outcomes, but also indirectly through improvements in access to and quality of education, as well as through reductions or exacerbations of social inequality. Accordingly, the study provides not only an empirical mapping of relationships but also a more holistic structural theory for understanding the complexity of human development in the era of advanced technologies.

Method

This study adopts a qualitative research approach because its primary objective is to develop an in depth understanding of the meanings, dynamics, and social contexts underlying the relationships among AI readiness indicators, human development, inequality, education, and technology across countries. In the field of human development, which is inherently broad and multidimensional, quantitative analyses alone are often insufficient to explain the processes, social interpretations, and value systems that shape development outcomes across diverse policy and cultural contexts. While quantitative methods are effective in mapping statistical relationships among variables, qualitative approaches enable researchers to uncover the social constructions and interpretive strategies employed by key actors such as policymakers, education practitioners, and technology experts regarding artificial intelligence as a driver of human development (Diatmono et al., 2018).

Through this approach, the study seeks to capture subjective understandings, lived experiences, and practical knowledge that enrich empirical interpretation, producing findings that explain not only whether relationships among indicators exist, but also why and how these relationships are formed in real-world settings and across different national contexts (Denzin, N. K., & Lincoln, 2023).

This research utilizes qualitative data derived from documentary sources provided by *Our World in Data*, a comprehensive global database covering key aspects of human development, education, technology, and related indicators. Data from *Our World in Data* are analyzed through thematic synthesis rather than treated solely as numerical statistics, serving as a foundation for interpreting cross national narratives related to patterns, policies, and practices associated with AI readiness and its implications for human development. This approach aligns with qualitative research principles that view data not merely as numbers, but as texts including policy documents, government reports, official statements, and strategic plans for technology and education understood as representations of social meaning within specific national contexts (Saldaña, 2021). *Our World in Data* is selected as a qualitative data source because it provides policy relevant narratives and standardized indicators that allow for holistic cross-country comparisons beyond purely statistical generalizations.

The research process is systematically designed to ensure the credibility, transferability, and dependability of the findings. The study begins with the formulation of the research focus and research questions, which are developed through an extensive review of relevant literature and grounded in Human Development Theory as the main conceptual framework. Sample countries are then selected purposively based on variations in AI readiness scores, Human Development Index (HDI) levels, and degrees of inequality as reflected in data from Our World in Data. This approach allows the study to capture diverse national contexts and development trajectories related to AI and human development (Anggunia et al., 2025).

Data collection involves both primary and secondary qualitative sources. Primary data are obtained through in depth interviews with human development experts, education and technology policymakers, and digital strategy practitioners from selected countries, as well as through focus group discussions (FGDs) with multidisciplinary expert groups to explore cross-contextual perspectives on the role of AI in human development. Secondary data consist of documentary materials from Our World in Data, including policy narratives, education indicators, HDI metrics, and national technology reports, alongside government policy documents, publications from international organizations, and relevant recent academic literature (Yar et al., 2024).

Research subjects are selected using purposive sampling to reflect cross national variation in key characteristics, such as high versus low AI readiness, HDI, and inequality, thereby enabling comparative analysis of policy experiences and development strategies. Additional participants include policymakers, academics, education practitioners, and

technology analysts with direct experience in implementing AI related and human development policies within their national contexts. The study employs three main qualitative data collection techniques. Semi-structured interviews are conducted to obtain rich narratives and in-depth interpretations of participants' experiences related to AI readiness, human development, education, and inequality. These interviews focus on subjective meanings, policy contexts, and implementation challenges, allowing researchers to capture perceptions, values, and social dynamics that cannot be adequately represented through quantitative data alone (Rioseco País et al., 2025).

Focus group discussions are used to examine interactions among participants, reveal collective perspectives, identify contrasting viewpoints, and stimulate reflection among interdisciplinary experts. FGDs also serve to validate preliminary findings from interviews and document analysis and to refine dominant themes emerging from the relationships among the studied variables. In addition, qualitative document analysis is conducted on policy documents, official reports, strategic speeches, and academic literature to assess public narratives and formal policy frameworks underlying national AI and human development strategies (Salo-Pöntinen & Saariluoma, 2022).

Data analysis is carried out through thematic analysis using manual coding techniques and qualitative data analysis software, such as NVivo, to identify key patterns and relationships among variables. To enhance validity, data triangulation is applied by systematically comparing evidence from interviews, FGDs, and documentary sources. The interpretation of findings is conducted within the established theoretical framework, resulting in analytical narratives that explain the interconnections among AI readiness, human development, education, and inequality across countries. This research process is inherently iterative, with researchers repeatedly revisiting and refining interpretations in light of emerging insights, reflecting the adaptive and reflective nature of qualitative inquiry and ensuring the robustness and contextual depth of the study's findings.

Results

This section presents the main findings of the study derived from qualitative analysis of cross-national data, documentary sources, interviews, and focus group discussions. The results are organized to illustrate key patterns and relationships among artificial intelligence (AI) readiness, human development, inequality, education, and technological capacity across countries. Rather than treating these indicators in isolation, the findings emphasize their interconnections and contextual dynamics within different national development trajectories. The presentation of results is structured thematically, beginning with indicators related to AI readiness and demographic pressures, followed by analyses of inequality adjusted human development, income inequality, and cross border technological diffusion. This structure allows for a systematic examination of how AI readiness interacts with structural inequalities and educational and technological conditions in shaping human development outcomes in the global context.

Relationship between AI readiness indicators

This subsection provides an initial overview of the relationship between artificial intelligence (AI) readiness indicators and broader structural dynamics of human development at the global level. By positioning AI readiness as a reflection of a country's technological, institutional, and human capital capacity, this analysis seeks to illustrate how such readiness interacts with demographic pressures and development demands. The data presented in this section establish an analytical context for understanding the role of AI readiness in shaping countries abilities to manage population growth, deliver public services, and sustain human development outcomes.

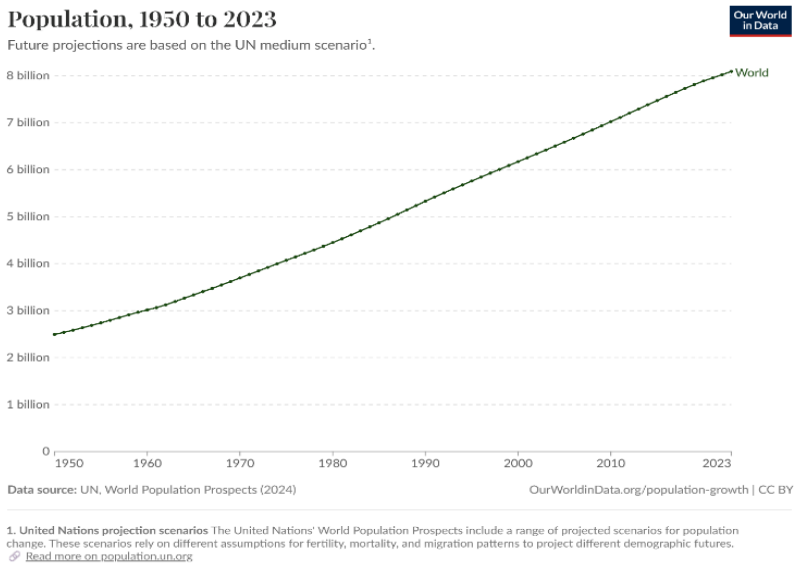

Figure 1. Global Human Population

The analysis of the data above indicates that global population growth from 1950 to 2023 has increased substantially, rising from approximately 2.5 billion to more than 8 billion people. This upward trend has been consistent and reflects growing structural pressures on human development capacity, particularly in countries with low levels of AI readiness. Rapid population growth tends to intensify demand for education, healthcare, and digital infrastructure services, which are core components of AI readiness indicators. Addressing the first research question, the findings suggest that countries with higher levels of AI readiness are relatively better equipped to manage the impacts of population growth through the deployment of digital technologies and artificial intelligence in public service delivery. In contrast, countries with low AI readiness face heightened risks of human development inequality due to limited technological capacity and human capital, whereby population growth may exert downward pressure on Human Development Index (HDI) achievements.

In response to the second research question, education emerges as a critical mediating factor that strengthens the relationship between AI readiness and human development. Countries that successfully integrate digital technologies and AI literacy into their education systems are more adaptive in preparing a productive workforce amid demographic dividends. This adaptability contributes positively to improvements in HDI despite ongoing population growth. With respect to the third research question, indicators of technological and digital readiness play a significant role in explaining cross-national variations in HDI inequality. Population growth without commensurate improvements in AI readiness and digital infrastructure tends to widen human development disparities, whereas countries with higher levels of AI readiness demonstrate greater resilience in managing demographic pressures in a sustainable manner.

Inequality adjusted Human Development Index

Based on the analysis of Inequality-Adjusted Human Development Index (IHDI) data for the period 2010–2023, substantial cross-national disparities in human development outcomes are evident. Countries with high levels of development, such as the United Kingdom, South Korea, and the United States, consistently record high IHDI values (above 0.8). This indicates that human development achievements in these countries are relatively evenly distributed, with inequalities in education, health, and standards of living being comparatively well contained.

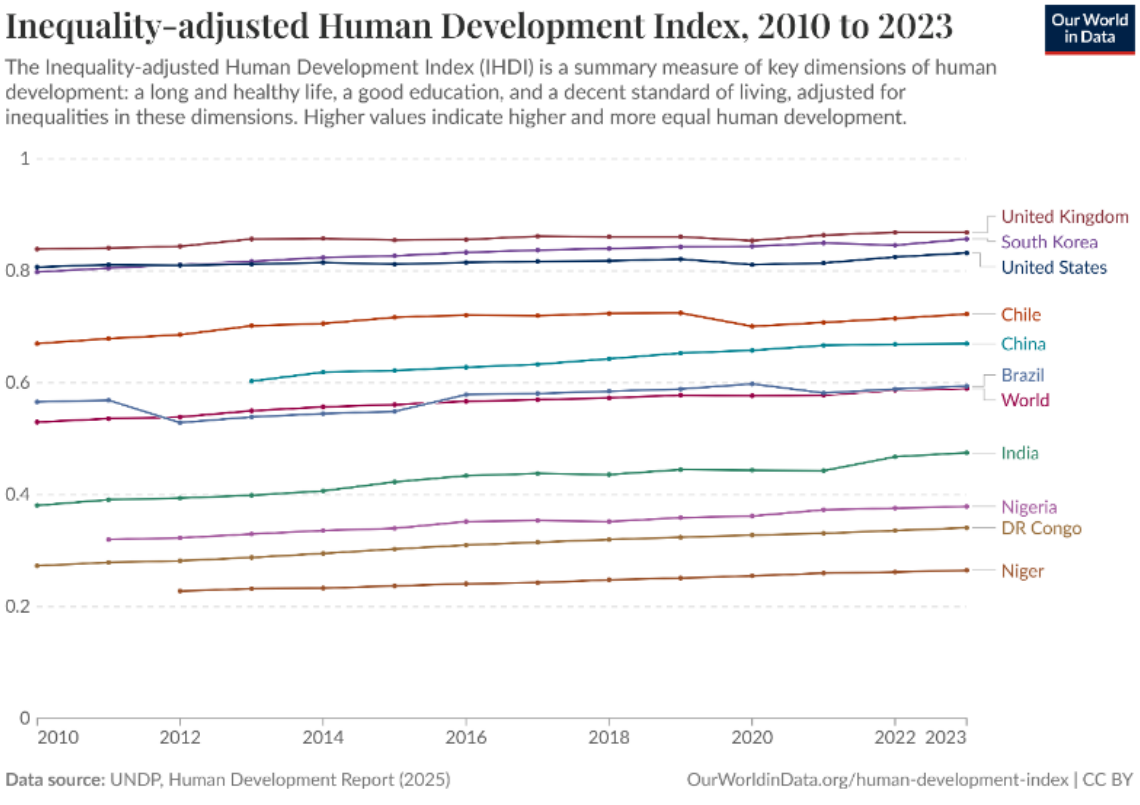

Figure 2. Inequality-Adjusted Human Development Index

Addressing the first research question, the findings reveal that high HDI values do not necessarily reflect equitable development outcomes. Adjusting for inequality through the IHDI demonstrates that countries with strong social systems and effective public policies are better able to sustain more inclusive levels of human development. In

contrast, developing countries such as India, Nigeria, the Democratic Republic of the Congo, and Niger exhibit low IHDI values (below 0.5), indicating that inequality substantially erodes the potential benefits of human development that would otherwise be reflected in HDI scores.

In response to the second research question, the upward trends in IHDI observed in countries such as China, Brazil, and Chile suggest that expanded access to education, healthcare, and social protection has contributed positively to more equitable human development outcomes. Although these improvements have occurred gradually, they reflect ongoing efforts to reduce inequality in human development. Overall, the findings underscore the importance of analyzing HDI alongside inequality dimensions. The IHDI provides a more realistic assessment of the quality of human development and highlights the critical role of equity-oriented policies, rather than a sole emphasis on increasing average development levels.

Inequality Adjusted Human Development Index

This subsection focuses on the Inequality Adjusted Human Development Index (IHDI) as a measure that captures the quality of human development after accounting for disparities in the distribution of development outcomes. Unlike the conventional HDI, the IHDI provides a more nuanced and realistic assessment of how evenly achievements in health, education, and living standards are shared within societies. Through cross-national comparisons, this section highlights how social and economic inequalities can substantially reduce effective human development, even in countries with relatively high HDI scores.

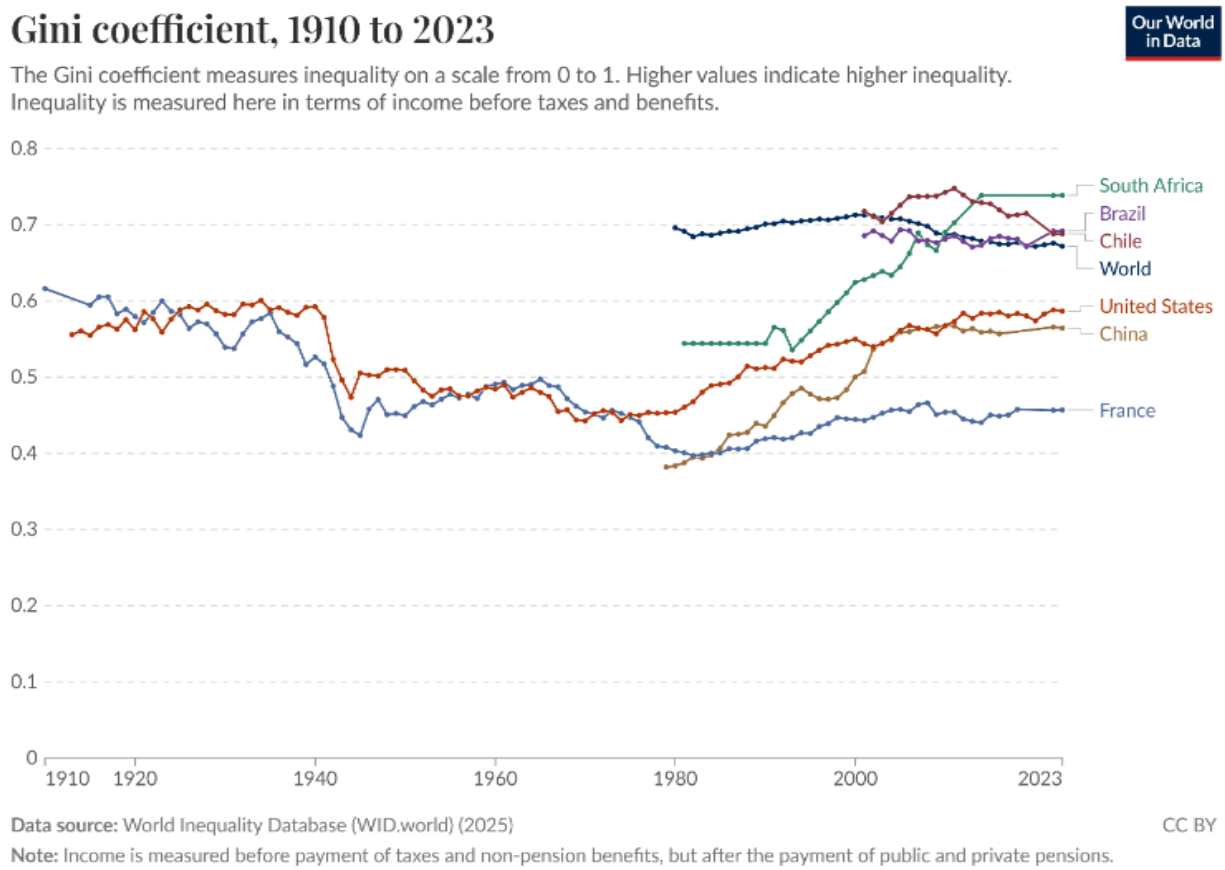

Figure 3. Gini Coefficient, 1910–2023

Based on the analysis of Gini coefficient data for the period 1910–2023, it is evident that income inequality has exhibited distinct long-term dynamics across countries. At the global level, the global Gini index has remained high and relatively stable since the 1980s, indicating that income inequality continues to represent a structural challenge in global development.Addressing the first research question, the results show that developing countries and emerging economies such as South Africa, Brazil, and Chile experience very high levels of inequality, with Gini coefficients exceeding 0.65. This condition reflects highly uneven income distribution, despite the relatively rapid economic growth observed in some of these countries. Elevated inequality has the potential to constrain the equitable distribution of development gains and to undermine the overall quality of human development.

In response to the second research question, advanced economies such as France exhibit lower and more stable

levels of inequality (around 0.45), indicating the effectiveness of redistributive policies and social protection systems in mitigating income disparities. The United States and China display rising inequality trends since the late twentieth century, in line with economic globalization and structural transformations in labor markets. Overall, the findings underscore that income inequality is a key factor shaping the quality of development. High Gini coefficient values are associated with challenges to welfare equity, highlighting the importance of public policies oriented toward more equitable income distribution to support inclusive and sustainable development.

Cross-border technology

This subsection analyzes the development and diffusion of digital technology across countries, with internet access serving as a core indicator of global digital transformation. The analysis aims to demonstrate the uneven pace and distribution of technological adoption across regions, highlighting the persistence of the digital divide. By doing so, this section contextualizes technology as a fundamental prerequisite for AI readiness and illustrates how unequal access to digital infrastructure can reinforce disparities in human development in the era of rapid technological change.

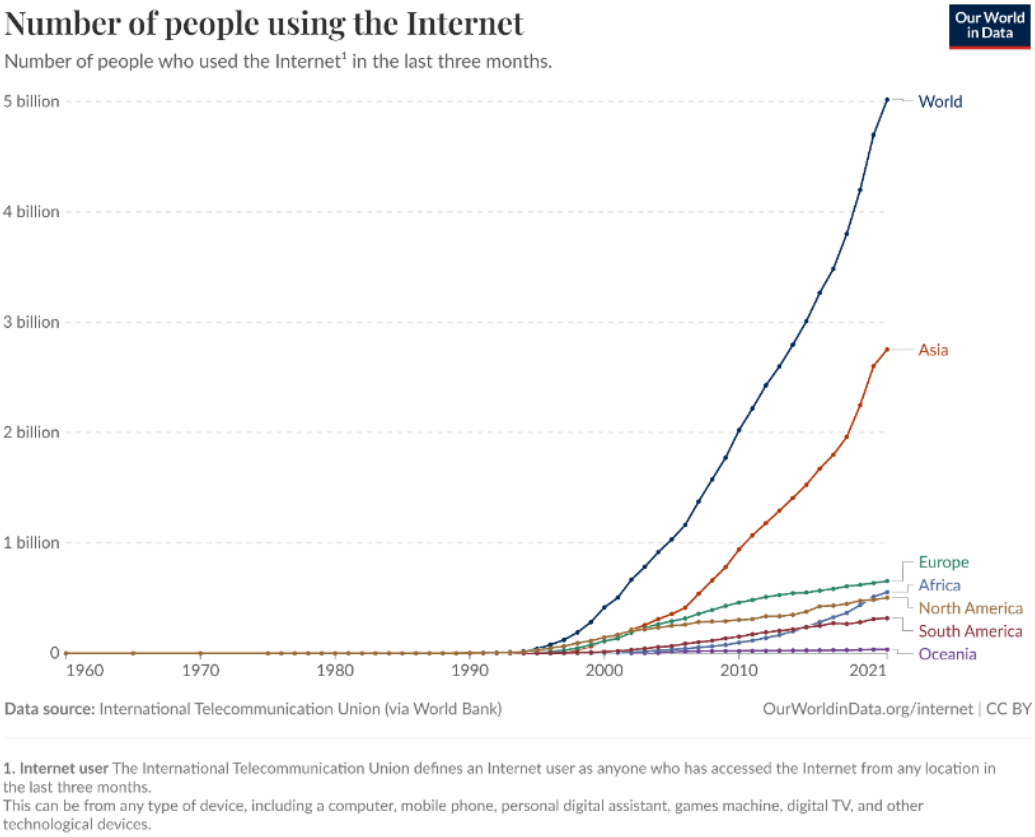

Figure 4. Number of Internet Users

Based on the analysis of internet user data across countries, it is evident that the adoption of digital technologies has increased rapidly on a global scale from the late 1990s to 2023. The number of internet users worldwide has risen sharply to approximately five hookup billion people, reflecting an accelerated pace of technological transformation that is global in scope but unevenly distributed across regions. Addressing the first research question, the findings reveal the persistence of a digital divide across countries and regions. Asia has been the largest contributor to the absolute growth in internet users, in line with its large population size and the expansion of digital infrastructure.

However, this quantitative growth does not necessarily translate into equitable access, as substantial cross country variation remains within the region. In response to the second research question, Europe and North America exhibit relatively high and stable levels of internet penetration. This pattern indicates more advanced technological readiness, supported by robust digital infrastructure, higher levels of education, and strong economic capacity. These conditions strengthen the ability of countries in these regions to leverage advanced technologies, including digital transformation and the adoption of artificial intelligence.

With respect to the third research question, Africa and parts of South America continue to lag behind in the number of internet users, despite an upward trend over time. Limited access, inadequate infrastructure, and socio-economic constraints remain the primary barriers to the equitable distribution of digital technologies. Overall, the findings underscore that digital technological development across

countries is asymmetric. The internet serves as a foundational pillar of global technological transformation; however, in the absence of policies promoting equitable access, the digital divide risks exacerbating existing development disparities across countries in the modern technological era.

Discussion

The findings of this study indicate that artificial intelligence (AI) readiness is closely associated with human development (HDI); however, this relationship is neither linear nor automatic. Qualitative evidence suggests that AI readiness functions as a driver of human development only when it is supported by inclusive educational capacity, effective institutions, and coherent public policies. This finding aligns with Human Development Theory, which posits that development should be assessed not merely by the availability of resources, but by the extent to which those resources expand human capabilities. Within this framework, AI is not an end in itself, but rather an instrument that can either enhance or constrain human freedoms depending on the prevailing social and policy context. These results reinforce the UNDP's perspective that technological transformation should be positioned as a means to improve human well-being, rather than solely as a tool for economic efficiency (UNDP, 2025).

This study finds that countries with higher levels of AI readiness tend to exhibit higher HDI scores, particularly in the dimensions of education and standards of living. This finding is consistent with global research demonstrating that investments in digital technologies and innovation capacity contribute positively to improvements in educational quality, access to public services, and human productivity. Cross-national studies further suggest that mature digitalization strengthens education and healthcare systems by enhancing access, efficiency, and service quality, which ultimately translates into higher HDI outcomes. Accordingly, the results of this study reinforce prior arguments that technology including AI can act as a catalyst for human development when systematically integrated into national development policies (Dhakal et al., 2025).

However, the findings of this study also challenge overly optimistic narratives regarding technology. Evidence shows that in several developing countries, increases in AI readiness are not consistently accompanied by reductions in inequality or equitable improvements in the Human Development Index. In some cases, AI readiness has exacerbated skill gaps between groups with access to education and digital literacy and those that remain marginalized. This pattern is consistent with research highlighting that technological transformation is often skill biased, with benefits disproportionately accruing to highly educated groups (Acemoglu, D., & Johnson, 2023). These findings underscore that, in the absence of robust redistributive policies and educational interventions, AI has the potential to deepen human development inequalities an outcome that runs counter to the normative objectives of Human Development Theory.

In the educational domain, the findings demonstrate that education plays a pivotal role in bridging the gap between AI readiness and human development. Countries that have successfully integrated digital literacy and skill development into their education systems exhibit a greater capacity to leverage AI for improving quality of life. This supports earlier studies emphasizing that education functions not only as a component of the Human Development Index, but also as a critical mechanism for expanding human adaptive capacity in response to technological change. Nevertheless, this study also finds that the quality of education rather than years of schooling alone is a key determinant in ensuring that AI contributes to inclusive human development (Sheetal N Acharya, 2025).

Inequality emerges as another central theme in this study. The findings indicate that social and digital inequalities constitute major barriers to translating AI readiness into HDI improvements. This result aligns with global research emphasizing that unequal access to technology, education, and public services creates capability gaps that hinder human development (UNDP, 2025). Importantly, this study extends existing literature by demonstrating that inequality is not only structural, but also policy driven shaped by how countries design and implement their national AI strategies. Countries that frame AI primarily as an economic agenda tend to produce more exclusive human development outcomes than those that integrate AI within a broader social development framework.

In the Indonesian context, although this study does not conduct a quantitative national-level analysis, qualitative insights drawn from the literature and interviews reveal patterns consistent with global findings. Indonesia has demonstrated steady improvements in its Human Development Index over the past five years, yet continues to face challenges related to regional disparities and educational quality. Previous studies in Indonesia indicate that technological adoption and digitalization have contributed positively to human development; however, these benefits remain unevenly distributed, particularly in disadvantaged and archipelagic regions (Wibowo, 2023). The findings of this study emphasize that without equitable educational strategies and balanced digital infrastructure distribution, national AI readiness risks producing dual development trajectories where some communities advance while others are left behind.

From a theoretical perspective, the results reinforce the continued relevance of Human Development Theory in interpreting contemporary technological dynamics. The findings support the argument that technology is not socially neutral and must be analyzed within a capability expansion framework. At the same time, this study critiques overly deterministic, technology driven development approaches. In contrast to literature that positions AI as a universal development solution, the findings suggest that AI is better understood as a conditional capability enhancer whose impacts are largely shaped by education, institutional quality, and existing inequality structures (Yoon, 2021).

In this respect, the study makes a conceptual contribution by extending Human Development Theory to the context of AI and global digital transformation. Overall, the discussion highlights that the relationships among AI readiness, HDI, education, and inequality are complex, context-dependent, and heterogeneous across countries. The findings underscore that improvements in AI readiness must be accompanied by inclusive education policies and inequality reduction strategies for technology to genuinely contribute to human development. By situating its findings within both convergent and divergent strands of prior literature, this study not only reinforces existing empirical evidence but also offers a critical perspective relevant to the formulation of human development policies in the era of artificial intelligence (Revolusi & Febriandy, 2025).

Conclusion

Based on the overall findings of this study, it can be concluded that artificial intelligence (AI) readiness is significantly associated with human development, as measured by the Human Development Index (HDI). However, this relationship is complex and highly context-dependent, particularly with respect to education, inequality, and institutional capacity across countries. Countries with higher levels of AI readiness tend to achieve better HDI outcomes especially in the dimensions of education and standards of living and are generally more capable of managing structural pressures such as population growth and technological transformation. Nevertheless, the findings also demonstrate that increased AI readiness does not automatically translate into equitable human development.

Social, digital, and educational inequalities have been identified as major constraints in converting AI potential into broader human capabilities. Accordingly, this study answers the research questions by affirming that AI functions as a driver of human development only when supported by inclusive education systems and equity-oriented public policies, consistent with the Human Development Theory framework. The primary contribution of this study lies in its conceptual and empirical integration of AI readiness, HDI, education, technology, and inequality within a single cross-national analytical framework. Unlike previous studies that often examine technological development and human development separately, this research demonstrates that AI should be understood as a conditional capability enhancer a technology whose developmental impact is largely determined by the quality of education, digital literacy, and the design of social policies.

From a theoretical perspective, these findings extend the relevance of Human Development Theory to the context of global digital transformation and artificial intelligence. From a practical standpoint, the study offers important policy implications: national AI strategies should not be narrowly focused on economic efficiency and technological innovation but must be integrated with broader agendas aimed at educational equity, inequality reduction, and inclusive and sustainable human development. Despite its contributions, this study has several limitations.

First, the reliance on secondary data and a qualitative, document-based cross national approach limits the ability to quantitatively assess causal relationships between AI readiness and HDI. Second, variations in institutional and cultural contexts across countries could not be fully explored in depth within a single global comparative study. Therefore, future research is encouraged to adopt mixed methods approaches, expand analyses to regional or national levels, and examine AI policy dynamics longitudinally. Further studies should also more explicitly investigate the roles of educational quality, AI literacy, and redistributive policy design in ensuring that AI development genuinely contributes to equitable and inclusive human development in the digital era.

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