

THE ROLE OF HUMAN RESOURCES IN INDONESIA'S ECONOMIC GROWTH IN THE ERA OF STRUCTURAL AND TECHNOLOGICAL TRANSFORMATION

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Abstract

This article examines the strategic role of human resources (HR) in encouraging Indonesia's economic growth amid structural transformation and accelerating technological advances. This study identifies the main components of human resource quality that affect labor productivity and national competitiveness. These factors include education, motivation, organizational culture, digital infrastructure, and policy frameworks, and use a qualitative descriptive approach through a thorough literature review. The results show that the quality of human resources today is not only determined by technical ability. The ability to adapt to technology, lifelong learning, and the ability to interact with others in an increasingly integrated economy worldwide are other factors that determine the quality of human resources. This study shows how important it is to align vocational education with industry needs. This includes implementing digital-based training and providing an inclusive infrastructure. In addition, it has been proven that the main factor contributing to improving the quality of the workforce is policies that support skills development and encourage collaboration between government institutions, industry, and academia. By combining perspectives from various sources of the latest literature, this article contributes to academic discourse. In addition, it offers a robust framework for understanding how Indonesia can optimize its human resources to achieve inclusive and sustainable economic growth in the digital age.

Keywords: human capital, economic growth, structural transformation, digital skills, labor productivity

INTRODUCTION

Economic growth is one of the important indicators in assessing the progress of a country. This growth is not only influenced by physical factors such as capital, technology, and infrastructure, but also highly dependent on the quality of human resources (HR). Quality human resources are able to increase productivity, encourage innovation, and create added value in various sectors of the economy. According to Sadono Sukirno (2009), economic growth is the process of continuously changing the economic condition of a country towards a better state during a certain period.

In the era of globalization and the industrial revolution 4.0, the role of human resources is increasingly prominent because technological advances demand a workforce that is skilled, creative, and able to adapt quickly. Human resources are not only a factor of production but also as a major actor in the process of innovation, technology creation, and management of available resources. Quality economic growth cannot be achieved without adequate quality support of human resources. According to Todaro (2006), the components that affect the quality of human resources consist of education and health. This is because education and health are interconnected in having an impact on economic growth through the workforce that has the skills to carry out production activities. Countries that have succeeded in improving the quality of their education, health, and workforce skills have proven to be able to record sustainable economic growth.

Economic development is an effort to improve the standard of living of a nation which is often measured by per capita income. However, existing natural resources are not available just like that, human resources are needed to process these natural resources. Human resources have an important role, because if a country has skilled and quality human resources, it will be able to process natural resources well.

Indonesia as a developing country has great demographic potential. However, this potential can only be optimized if it is accompanied by investment in improving the quality of human resources through education, training, and capacity building. Therefore, the study of the role of human resources in economic growth is very relevant to understand how humans as the main production factor can push the economy in a better direction. This research aims to: 1) Identify factors that affect the quality of human resources in dealing with structural changes and technological developments. 2) Formulate a human resource development strategy in responding to the needs of the job market in the midst of Indonesia's economic transformation. With this research, it is hoped that it can provide benefits to the development of development economics studies, especially related to the role of human resources in economic growth and provide input to the government and stakeholders in formulating human resource development policies to encourage national economic growth in the era of structural and technological transformation.

LITERATURE REVIEW AND HYPOTHESIS FORMULATION

Human Resources Development

Human Resource Development related to the improvement of the aptitudes, expertise, proficiencies, competencies, and potentialities of individuals or collectives within a given populace (Harahap, Sutrisno, Fauzi, Jusman, et al., 2023). Human resources involves many aspects related to people and their potential. This includes their education, training, health, skills, work experience, and also their attitudes and values (Ausat, Widayani, et al., 2022). The concept of human resource development refers to efforts and activities aimed at improving the quality and skills of individuals or groups so they can reach their full potential (Muhamad et al., 2023). The goal of human resource development is to strengthen individuals' ability to adapt to and manage the changes and challenges they face in both the workplace and society. This development includes several key areas:

1. **Education:** Education can take place in formal settings like schools and universities, as well as through informal options such as training programs and short courses. It provides individuals with the knowledge and skills needed to succeed in various personal, social, and professional roles.
2. **Training:** Training focuses on specific learning experiences designed to build technical, managerial, or practical skills in a particular field. It can be delivered on the job, in training centers, or through professional development programs.
3. **Skills Development:** This involves improving an individual's ability to perform certain tasks effectively. Skills can be categorized into technical (like computer or mechanical skills), interpersonal (such as communication or leadership), or job-specific skills needed for particular roles.
4. **Health and Well-being:** Supporting both physical and mental health is a crucial part of developing people. Individuals in good health tend to perform better and contribute more effectively in all areas of life.
5. **Attitudes and Values:** Human resource development also includes fostering positive attitudes and core values like integrity, discipline, responsibility, a strong work ethic, and a commitment to lifelong learning and growth.

Human Resource Development (HRD) plays a vital role in driving a country's economic and social progress. Through effective HRD, individuals and groups can improve their productivity and creativity, contributing significantly to their own well-being as well as to the overall development of the nation (Wikansari et al., 2023).

Economic Growth

The term "economic growth" refers to an increase in the financial value of the total goods and services produced within an economy over a certain period of time (Ginting & Rasbin, 2010). The statement refers to a noticeable increase in economic activity within a country or region, typically measured by indicators like Gross Domestic Product (GDP) or Gross National Income (GNI). Economic growth signifies a positive change in the amount of goods and services produced and consumed within a nation (Aslan & Rimba, 2020). This metric, usually represented as a percentage, indicates the rate of change in the monetary value of economic output over a specific period—typically one year. Several key factors can contribute to economic growth, including:

1. **Resource Expansion:** Growth can result from an increase in the quantity and quality of available resources. This may include a growing labor force, more investment capital, or improved access to and quality of natural resources.
2. **Innovation and Technology:** Technological advancements and innovation are critical drivers of economic growth. They can enhance production efficiency, lead to the creation of new products and services, and open up new avenues for value creation.
3. **Investment:** Substantial investment in areas like infrastructure, education, and research and development can fuel long-term economic growth by expanding production capacity and improving productivity.
4. **International Trade:** Engaging in global trade supports growth by boosting exports, allowing access to a wider range of goods and services, and facilitating the exchange of technology and expertise with other nations.
5. **Economic Policy:** Effective government policies, including responsible fiscal management and sound monetary measures, play an essential role in supporting economic growth. Policies that manage budget deficits and control inflation help maintain a stable economic environment that encourages development.

Sustained economic growth is highly valued because it can bring a wide range of social and economic benefits. Strong economic growth can lead to the creation of new jobs, higher incomes, improved quality of life, better infrastructure, and expanded access to healthcare and education. However, it is essential to ensure that growth is inclusive and sustainable by taking into account social equity, environmental protection, and fair income distribution.

Labor

Labor, which refers to the effort put in by humans to perform work, has long been recognized as one of the key factors of production, along with land and capital. Classical economists like Adam Smith, David Ricardo, and Karl Marx argued that the value of a good is based on the amount of labour required to produce it. This idea, known as the Labour Theory of Value (LTV), was their way of explaining the reasons behind the different prices that goods and services hold in the market (Wolfstetter, E.1973). The belief was that, nations with large populations had a comparative advantage over less populated nations, as they possessed a larger labour force that could be used for the production of goods and services.

Sustained economic growth is largely driven by improvements in labour productivity, which is primarily influenced by human capital. Human capital refers to the collective knowledge, skills, and expertise that the average worker in an economy holds (Steven A. Greenlaw, 2022). As such, higher levels of education typically lead to greater human capital, which in turn boosts labour productivity. This suggests that achieving long-term economic growth depends significantly on raising educational attainment.

RESEARCH METHODS

In this study, the author uses a descriptive qualitative approach through a literature review to identify and examine the role of human resources in supporting economic growth in the context of the structural transformation of the Indonesian economy along with technological advances. This research does not conduct fieldwork or primary data collection but rather analyzes several published materials and relevant previous research from accredited national journals as well as leading international journals indexed by Scopus and WoS. This analysis draws on foundational works such as Becker's (1993) theory of human capital, as well as recent studies that address topics involving digital competence, an overhaul of vocational education and training (VET) systems, technological infrastructure, and the integration of human resource policies in the digital age (e.g., Verozia et al., 2023; Sulistyanto et al., 2021; Yusof et al., 2022).

In the development of instruments or study tools, this study does not use questionnaires or interviews, so the conceptual framework built from literature becomes the main instrument. The focus of the study is directed at the determinants of human resource quality which include education level, motivation, organizational culture, digital infrastructure, and its relationship with economic growth. The researcher conducts content analysis of articles that have been written by other researchers to find relationships between variables without collecting new data empirically.

The data analysis method used in this study is narrative qualitative, which links the main results of various studies into the framework of human resources-based economic development. Identification of key themes, mapping of arguments, and synthesis of important concepts discussed in the literature are all part of this process. In addition, the researcher conducted a conceptual comparative process by comparing the approach of human resources policy in Indonesia with global dynamics such as the globalization of the labor market, the advancement of Industry 4.0, the digitalization of the education system, and labor training.

RESULTS AND DISCUSSION

Factors Affecting the Quality of Human Resources in the Face of Structural Changes and Technological Developments

Economic structural changes and the acceleration of technological development require a significant improvement in the quality of human resources (HR). In this context, the quality of human resources is not only measured in terms of technical skills, but also includes the ability to adapt to technology, mental readiness, and mastery of *soft skills* that are relevant to the demands of the digital era. The challenges of globalization and technological advances such as artificial intelligence, *big data*, *the Internet of Things* (IoT), and work automation add to the complexity of the demands on the quality of human resources needed (Guruh Suksmono Aji & Iva Khoiril Mala, 2024).

Therefore, human resource development is no longer just oriented towards mastering narrow fields of expertise, but must be directed at the formation of the character of workers who are flexible, resilient, and have high innovation power. In line with *Human Capital* theory (Becker, 1993), increasing individual capacity through investment in education, training, and skill development is the main key to increasing productivity in the face of structural transformation. The investment not only increases individual competence, but also creates national human capital accumulation which ultimately contributes to macroeconomic growth, industrial competitiveness, and national economic resilience in the midst of increasingly fierce global competition (Arifin, 2023).

One of the main factors that affect the quality of human resources is the education factor. The level of formal education that is relevant to the needs of the industry greatly determines the ability of individuals to master basic and advanced skills needed by the world of work. Higher education that is adaptive to the development of competency-based curriculum, problem-based learning, and collaboration with the business world allows graduates to have the necessary technical skills (Artamevia et al., 2025).

In addition, education also plays an important role in shaping character, developing critical thinking logic, communication skills, and the ability to solve problems systematically. In research by Fitriatin & Yustini (2023), it was found that technical competencies obtained through formal education have a significant influence on employee work performance, especially in a technology-based work environment.

In addition to education, individual intrinsic motivational factors play a major role in improving the quality of human resources (Rismayanti & Rayhan, Muhammad Aththar, Qois Khairullah El Adzim, 2023). The spirit to continue learning, openness to change, high curiosity, and the courage to face new challenges are important psychological capital in facing disruptive technological transformation. Individuals who have a high motivation to learn will proactively seek opportunities to improve new skills, either independently or through training programs.

This motivation is also related to the level of job satisfaction and psychological well-being of employees. Research by Annisa Maharani et al., (2023) shows that effective mastery of technology encourages productivity while improving psychological well-being, as individuals feel competent, confident, and able to contribute optimally in the modern work environment.

The organizational environment is also an important determining factor in the formation of the quality of human resources. Organizations that implement a culture of innovation, openness to new learning, space for experimentation, and appreciation of creativity will encourage the sustainable growth of human resource competencies. A culture of innovation allows employees to continue to push the boundaries of their abilities through the exploration of new ideas, the development of creative projects, and learning from failures as part of the individual and collective capacity building process. When organizations provide flexibility to experiment, employees tend to have a sense of psychological security to propose new ideas without fear of failure or sanctions (Edmondson, 2019:27). This environment creates a culture *of learning agility*, which is the ability to learn quickly from new experiences, which is one of the characteristics of superior human resources in the era of digital transformation (De Meuse, 2017:114).

On the other hand, organizations that are rigid, hierarchical, and lack of innovation tend to create fear of technological change. Bureaucratic structures that are too *rigid*, centralized decision-making, and lack of employee participation in the innovation development process can cause feelings of stagnation, alienation, and even resistance to the development of new technologies (Schein, 2017:45). When employees feel that their ideas are not appreciated or that change is only forced from above, then the process of technology adaptation tends to be slow, ineffective, and even has the potential to create internal conflicts. An environment that resists innovation will lose the momentum to innovate sustainably, thus hindering human resource development that should be in line with technological developments.

The availability of technological infrastructure is also a very important determining factor in the development of human resources in the digital era. Access to a stable internet network, cutting-edge hardware and software, and supporting technology systems are the main prerequisites for the development of digital competence. Technology infrastructure is the basic foundation that allows individuals and organizations to make maximum use of the potential of information technology, both for the learning process, collaboration, and innovation development. Without adequate infrastructure support, the digital learning process and technology-based skill development will be difficult to achieve optimally, especially in areas that are still experiencing a digital divide. The digital *divide* not only widens disparities between regions, but also creates an inequality in the mastery of

technological skills between groups of people who have full access to and those who are limited to basic infrastructure (van Dijk, 2020:33).

Adequate technology infrastructure also determines the quality of the implementation of technology-based learning such as *e-learning*, virtual simulation-based training, and data science-based skill development. Without stable connectivity, compatible devices, and a strong cybersecurity system, digital-based human resource development efforts are at risk of stagnation and even implementation failure (Ramadhan Ridho Fadlulloh Iswandi, 2020). Technology infrastructure is not only limited to the availability of hardware, but also includes *bandwidth capacity*, data transfer speed, system interoperability, and the readiness of technical personnel to support the optimal operationalization of the technology.

No less important, government policy support and national regulations are macro factors that determine the acceleration of national human resource development. In the context of technology-based economic transformation, the government plays a central role in creating a conducive, adaptive, and proactive policy environment in the face of global changes. Policies that encourage collaboration between the world of education and the business world allow for alignment between the educational curriculum and the needs of the industry that continues to grow (Uli et al., 2024). The synergy between educational institutions, industry, and the government forms an adaptive learning ecosystem, where graduates not only master theory, but also have practical experience relevant to the demands of the job market (Munir, 2023:76). This collaboration accelerates technology transfer, updates curriculum based on the needs of the business world, and encourages more effective labor absorption.

Fiscal incentives for human resource investment are an important instrument in encouraging companies and training institutions to invest in employee skills development in a sustainable manner. Providing tax deductions for companies that allocate employee development funds, new skills training grants, and incentives for certified digital training are strategic steps that can accelerate the improvement of the quality of national human resources (World Bank, 2020:44). Thus, the government plays an active role in reducing the burden of financing human resource development while expanding the participation of the business world in building national workforce capacity.

On the other hand, the development of job market globalization has also created increasingly competitive competency standards. The openness of cross-border labor flows encourages international certification standards, multilingual skills, global cultural literacy, and readiness to work in multicultural teams as part of the basic competencies of future human resources. Globalization is creating a job market that is no longer limited to geographical barriers, where multinational corporations, international organizations, and cross-border collaborations are becoming an increasingly common sight. Therefore, individuals are required to have *cross-cultural competence* to be able to interact effectively in a multicultural work environment that is full of differences in values, norms, and communication patterns (Spitzberg & Changnon, 2009:26). Multilingual skills are also an inseparable strategic capital from individual readiness to face cross-border interactions, where mastery of international languages such as English, Chinese, and other regional languages is a competitive advantage that is highly taken into account in global labor recruitment (Kim & Slater, 2021:55).

Furthermore, international competency certification in various fields of information technology, digital finance, logistics, project management, and cybersecurity is a new standard that is required by many global corporations (Rahman, 2024:97). Without strengthening these competency certifications, Indonesia's workforce is at risk of falling behind in *the global talent competition* which is now moving very fast in line with the growth of the international digital economy. This phenomenon is evident in regional market dynamics such as the ASEAN Economic Community (AEC), where the liberalization of the labor sector in the Southeast Asian region allows for legal and open cross-border professional mobility (ASEAN Secretariat, 2020:18). Indonesian workers are required not only to excel in the domestic market, but also to be able to meet

professional standards that apply in neighboring countries that have high human resource competitiveness.

Furthermore, social and demographic factors also affect the quality of human resources. Indonesia's demographic structure, which is dominated by demographic bonuses, is a strategic opportunity as well as a challenge. If the productive young generation is not prepared with relevant competencies, then this demographic potential can turn into a social burden. Therefore, strengthening early childhood education, developing digital skills from elementary school, and building lifelong learner character must be an integral part of strengthening the foundation of Indonesian human resources from an early age.

Finally, the factor of individual mastery of information technology also determines the acceleration of human resource quality development. The ability to utilize technology is not just operational skills, but includes data literacy, algorithm understanding, cybersecurity mastery, and data-based decision-making skills. In an era where data is the "new oil", deep mastery of information technology is an important differentiation in improving the competitiveness of individuals and organizations in a sustainable manner.

Human Resources Development Strategy in Responding to Job Market Needs in the Midst of Indonesia's Economic Transformation

Indonesia's economic transformation driven by globalization, the development of digital technology, and the industrial revolution 4.0 has brought serious implications for the needs of human resource development (HR). This new era demands a workforce that not only masters technical skills, but is also able to adapt quickly to the dynamics of industrial change. In their study, Quatro Thirtabrata et al., (2022) stated that the competency needs of human resources today no longer only dwell on technical skills, but also include cognitive, social, and emotional skills. Therefore, the application of a learning model that integrates vocational education with the business world and the industrial world, such as *teaching factories* and apprenticeships, is one of the important strategies in reducing the gap between educational *output* and job market needs (Quatro Thirtabrata et al., 2022).

In addition, the rapid development of information technology has encouraged organizations to transform digital-based human resource development. Iswandi and Kuswinarmo (2023:5) revealed that the use of *e-learning*, *big data analytics*, and *artificial intelligence* in HR management opens up great opportunities for companies to increase the effectiveness of employee competency development in a more flexible and personalized manner. This transformation not only impacts the efficiency of resource management, but also contributes to building an organizational culture that is adaptive to technological changes. The integration of technology into HR management practices is in line with the thinking of Orlikowski (2000), who emphasized the importance of the mutual relationship between the social structure of the organization and technological developments.

Not only in terms of organizational management, human resource development in Indonesia is also enriched by innovative training approaches based on digital technology. Nikmah et al., (2023) identified that strengthening *digital-based* learning organizations through *virtual mentoring*, the use of virtual reality-based simulations, and the use of *learning analytics* are strategic solutions in building a culture of sustainable learning. This learning model allows for the development of digital skills more quickly, relevantly, and in line with industry demands. This *learning organization approach* reflects the idea of Senge (1990) that organizations must be able to become learning entities that continue to develop in the face of the uncertainty of the business environment.

Meanwhile, the paradigm shift in HR management is also reflected in the shift in the role of HR managers from administrative to strategic functions based on digital competencies. Nikmah et al., (2023) stated that mastery of digital technology, data analysis skills, and digital-based decision-making are now mandatory competencies that must be possessed by modern HR practitioners. This transformation is closely related to Becker's (1993) idea in *human capital theory*, which states that

investment in the development of new skills will provide returns in the form of increased productivity, competitiveness, and organizational innovation.

In the context of vocational education, Ratna Sari et al. (2023:67) stated that the application of *cooperative learning and contextual teaching and learning* (CTL) methods can improve collaboration, communication skills, and critical thinking skills of vocational school students. With the application of project-based learning that involves real problems from the industry, students can better understand the real needs of the world of work, thus better preparing them to enter the job market.

Several other training models, such as ADDIE and *blended learning*, also play an important role in the development of digital competencies. Munandar et al., (2022) explain that the flexibility of *blended learning* facilitates the development of skills in new fields such as *the Internet of Things* (IoT), artificial intelligence, and *big data*, which are integral parts of the industrial revolution 4.0. Through this model, training can be accessed more widely without geographical or time restrictions, thus accelerating the improvement of workforce competencies.

Digital transformation in vocational education institutions is also inseparable from strengthening the capacity of institutions, including teachers and school management. Yusuf, (2024) stated that strengthening the capacity of vocational school teachers in mastering digital technology, data-based learning planning, and digital learning evaluation are the keys to ensuring the quality of graduates. In addition, the digitization of data-based school management systems allows *real-time monitoring of student and educator performance*, accelerating decision-making in improving the quality of learning.

However, digital transformation in human resource development in Indonesia does not always run smoothly. Organizational cultural resistance to technological change is still a major obstacle in the adoption of new technologies. They emphasized the importance of instilling a culture of *lifelong learning*, strengthening digital literacy from an early age, and forming a culture of innovation as a strategy in overcoming this resistance.

On the other hand, the revolution in the role of digital HR management creates new competency needs for HR professionals. Mastery of data analytics technology, digital devices, and strategic information management is an important capital for HR practitioners today. These competencies not only determine the effectiveness of human resource management, but also become a differentiating factor in encouraging organizational competitiveness.

Finally, the importance of digital-based human resource development was also emphasized by Quatro Thirtabrata et al., (2022) who showed that sustainable digital training programs are able to increase workforce adaptation flexibility, organizational productivity, and the effectiveness of achieving company goals. Through strengthening technology-based training, companies are better prepared to face fast-moving business challenges and full of uncertainty.

CONCLUSION

This study concludes that human resources (HR) play a central role in driving Indonesia's economic growth, especially in the era of structural transformation and acceleration of digital technology. The high quality of human resources supported by education, intrinsic motivation, innovative organizational culture, and infrastructure support and government policies contribute directly to increasing national productivity and competitiveness. The practical implications of these findings are the importance of cross-sector collaboration in building an adaptive HR development ecosystem. The government needs to strengthen policies that support the integration of vocational education and industry, expand access to digital training, and provide fiscal incentives for companies that invest in workforce competency development.

However, this study has limitations because it only uses a qualitative approach based on a literature review, without primary data collection or empirical tests. This causes the results of the study to not be able to describe specifically the differences between certain regions, sectors, or

demographic groups in human resource development. Therefore, the suggestion for further research is to conduct empirical studies with a quantitative approach or mixed methods to test the relationship between the quality of human resources and economic growth in a more measurable manner. In addition, the follow-up study is expected to explore the effectiveness of digital training policies in various sectors and develop a model of strategic collaboration between the government, industry, and educational institutions in strengthening the capacity of national human resources.

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