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The Impact of Educational Investment on Labor Productivity in Indonesia

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Abstract

This study aims to analyze in depth the impact of education investment on labor productivity in Indonesia over the past ten years. Education investment is viewed as a strategic element in human resource development, which ultimately contributes to national economic growth. This study uses secondary data obtained from the Central Statistics Agency (BPS) and the World Bank, which includes indicators of government spending on education and labor productivity levels. The analytical method used is linear regression to measure the relationship between these variables. The results show that increased investment in the education sector contributes significantly to increased labor productivity. Education not only plays a role in improving skills and technical competencies but also influences individual competitiveness in domestic and global labor markets. These findings strengthen the argument that effective and sustainable education policies are key to accelerating the transformation of a knowledge-based economy. Therefore, the government and stakeholders are expected to strengthen resource allocation and education programs that are more inclusive and relevant to current industry needs.

Keywords: education investment, labor productivity, human capital, economic development, Indonesia

INTRODUCTION

High-quality human resources are believed to be a crucial foundation for driving sustainable economic growth. In this context, education plays a vital role as an instrument for improving individual competency, across cognitive, affective, and psychomotor aspects. Education not only creates a skilled workforce but also enhances the ability to adapt to

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technological changes and industry needs.

Becker (1993) emphasized that investment in education is a form of human capital investment that can significantly increase individual productivity and income. This concept explains that individuals who obtain higher education tend to have greater work capacity, higher productivity, and better earning potential. Therefore, education is not only a means of achieving social welfare but also a long-term economic strategy.

As a developing country, Indonesia faces significant challenges in improving the quality of its workforce. Low levels of formal education and limited access to vocational training are major obstacles to creating a competent and competitive workforce. This has resulted in Indonesia's labor productivity lagging behind that of neighboring countries such as Malaysia, Thailand, and Vietnam (World Bank, 2022).

Furthermore, disparities in education quality between regions remain an unresolved issue. Areas outside Java often experience limited educational facilities, a shortage of qualified teachers, and low school enrollment. This disparity contributes to weakening national competitiveness and slowing equitable economic development.

Well-targeted investment in education can be a solution to address these issues. By increasing the education budget allocation, strengthening the curriculum based on industry needs, and providing relevant job training, the quality of the national workforce can be improved. The government has demonstrated its commitment to this through the 12-year compulsory education policy and increasing the education budget to over 20% of the state budget in recent years.

However, substantial investment alone is insufficient without effective implementation of educational programs. A comprehensive evaluation of learning quality, teacher competency, and the connection between education and the job market is key to achieving a tangible impact on labor productivity. Therefore, empirical studies are needed to determine the extent to which the relationship between educational investment and productivity can be statistically proven.

Based on this background, this study was conducted to analyze the impact of education investment on labor productivity in Indonesia. Using a quantitative approach and secondary data sourced from Statistics Indonesia (BPS) and the World Bank, this research is expected to contribute to the formulation of more effective and evidence-based human resource development policies.

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THEORETICAL BASIS

Human Capital Theory

Human capital theory views education as an investment that increases an individual's "stock" of skills, knowledge, and abilities, enabling them to work more productively. Schultz (1961) considered educational expenditures as important as physical investments, as they result in increased labor productivity and future earnings. Becker (1993) later developed this concept by emphasizing that human capital can be measured through earnings differences—individuals with higher education tend to earn higher earnings due to their ability to increase work output (Becker, 1993).

Signaling Theory

Spence (1973) proposed that education also serves as a "signal" to employers—graduates with certain qualifications signal cognitive ability and work discipline, even if the material learned is not always directly relevant to job tasks. Thus, educational signals can influence wage schemes and career opportunities, regardless of their real productivity contribution in the short run (Spence, 1973).

Endogenous Growth Theory

Within the endogenous growth framework, human capital accumulation is a key driver of long-term economic growth. Lucas (1988) emphasized that increased education strengthens the capacity for innovation and technology adoption, thus creating positive spillover effects for other sectors of the economy. Romer (1990) added that knowledge and human capital are non-rivalrous and can be capitalized on to accelerate growth through economies of scale in new ideas (Lucas, 1988; Romer, 1990).

Theory of Regional Inequality and Disparity

The uneven distribution of human capital creates disparities in growth between regions. Jones and Olken (2008) found that differences in education investment lead to significant variations in labor quality and productivity between developed and underdeveloped regions. Nurokhim (2015) highlighted the Indonesian context, where budget allocation and distribution of qualified teachers concentrated on Java Island widened the regional productivity gap despite educational decentralization (Jones & Olken, 2008; Nurokhim, 2015).

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Theory of Education–Industry Linkages

The alignment between educational output and labor market needs influences the effectiveness of human capital. Psacharopoulos and Patrinos (2018) show that technical-vocational education delivers higher returns in the manufacturing and service sectors because its curriculum is designed to address practical skills needed by industry. This framework emphasizes the importance of partnerships between educational institutions and businesses to align curricula with market demand (Psacharopoulos & Patrinos, 2018).

Lifelong Learning Theory

Lifelong learning emphasizes that successful human capital development is determined not only by formal education, but also by lifelong learning opportunities—including non-formal training, online courses, and professional certification. UNESCO (2015) states that continuous learning mechanisms increase the adaptability of the workforce to technological changes and global market dynamics, and support continuous innovation within organizations (UNESCO, 2015).

Skill-Biased Technological Change (SBTC) Theory

Technological developments tend to increase the demand for skilled workers, thus affecting wage structures and productivity. Autor, Levy, & Murnane (2003) suggest that automation and computerization are increasingly replacing routine tasks, while increasing the value of workers with higher-level cognitive skills. Consequently, educational investments emphasizing analytical skills, problem-solving, and digital literacy are becoming increasingly important to boost productivity in the Industry 4.0 era (Autor, Levy, & Murnane, 2003).

RESEARCH METHODS

This research was conducted descriptively using a quantitative approach. The primary objective of this study was to provide a comprehensive overview of the relationship between increased education budget allocation and labor productivity growth in Indonesia. This approach was used because it is suitable for systematically uncovering and explaining data trends and their relationships in the form of numbers and trends.

The research was conducted based on secondary data obtained from official institutions such as the Central Statistics Agency (BPS) and the World Bank, covering the period from 2010 to 2020. The data reviewed included information related to the government budget in the education sector as well as measures of the economic performance of the workforce as seen

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through gross value added per worker.

The data collection process was conducted through documentation, namely tracing and recording publicly available historical data. The data was then analyzed using descriptive statistical techniques, including calculating averages, graphing annual trends, and simple correlation analysis to identify trends in the relationship between the two main aspects studied.

This approach does not aim to inferentially test hypotheses or predict change, but rather to provide a factual and empirical understanding of real conditions evolving over a specific time period. Therefore, the results of this analysis are expected to provide a baseline for policymakers in designing more targeted and effective human resource development strategies.

Data analysis techniques were conducted systematically using data processing software such as Microsoft Excel to create tables and graphs and visually display relationships between data. This research also considered the social and economic contexts that influence workforce and education dynamics, allowing for comprehensive interpretation of the results, not just numerically but also through an understanding of the underlying social realities.

By using this method, the research is expected to provide factual and relevant information regarding the importance of educational investment in supporting increased workforce productivity in Indonesia, particularly in supporting long-term economic development based on the quality of human resources.

RESULTS AND DISCUSSION

Based on the analysis of data collected from Statistics Indonesia (BPS) and the World Bank, it can be concluded that the Indonesian government's increased investment in education over the past decade has been accompanied by a positive trend in labor productivity growth. This increase reflects the government's strategic commitment to human resource development as the primary foundation for long-term economic growth. This demonstrates that education is viewed not only as a social aspect but also as a vital component in building a competitive national economy.

Quantitatively, the per capita education budget nearly doubled between 2010 and 2020. At the beginning of the decade, education spending was around Rp 1.2 million per capita, and it increased to over Rp 2.8 million by the end of the decade. This surge reflects consistent national budget priorities, in line with the constitutional mandate to allocate a minimum of 20% of the state budget to the education sector. Meanwhile, labor productivity, as measured by gross value added per worker, also showed a steady growth trend, from around Rp 89 million in 2010 to Rp 125 million in 2020, with a small decline in 2020 due to the COVID-19 pandemic.

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The correlation between the two indicators shows a strong and positive relationship. As education spending increases, economic output per worker also increases. While not all years show the same proportion of increases, the general pattern reflects that increased educational capacity contributes to increased labor efficiency and effectiveness. This aligns with human capital theory, which emphasizes that education is an investment that directly impacts productivity.

However, increased labor productivity is influenced not only by the amount of funds allocated, but also by how those funds are used. The quality of education spending, curriculum effectiveness, the availability of professional teaching staff, and adequate educational infrastructure are key factors determining the success of education investments. Regions that have managed their education budgets effectively, such as Jakarta and Yogyakarta, have demonstrated higher labor productivity compared to less developed regions.

In some regions with low levels of development, budget increases have not yet significantly impacted labor productivity. This is due to challenges in budget distribution, lack of oversight of education program implementation, and low community participation in the education process. For example, in regions like East Nusa Tenggara and Papua, many schools still lack basic facilities and adequate teaching staff, preventing them from maximizing the potential for increased productivity.

On the other hand, vocational training and vocational education programs are a highly strategic form of educational investment in accelerating productivity growth. Training programs at Vocational Training Centers (BLK), for example, have had a direct impact on workforce readiness to meet market demands. Workers who participate in technical skills-based training have been shown to be absorbed more quickly into the industrial sector and demonstrate better work performance.

However, another challenge that needs to be addressed is the digital divide and the need for 21st-century skills, such as technological literacy, critical thinking, and collaboration. In the digital era and Industry 4.0, workforce productivity is determined not only by formal education levels but also by the ability to adapt to new technologies and changing work patterns. Therefore, future education investments need to focus not only on quantitative aspects but also on the quality and relevance of educational content to current developments.

Overall, the findings of this study indicate that investment in education has a significant contribution to increasing labor productivity in Indonesia. However, for optimal and equitable impact, education policies need to be directed at improving quality, equitable access, and strengthening the link between education and the world of work. The government, private

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sector, and community need to collaborate to create an inclusive, adaptive education ecosystem that is oriented towards the real needs of the labor market.

Figure 1 *Education Budget Trends and Labor Productivity in Indonesia (2015–2020)*



Badan pusat statistik (BPS), Indonesia

Trends in education budgets and labor productivity in Indonesia between 2015 and 2020 show significant progress, although several challenges remain. The increase in the education budget allocated by the government during this period aims to improve the quality of education, particularly in creating a skilled and competent workforce. Data collected from the Statistics Indonesia (BPS) and the World Bank (2024) show a positive relationship between investment in education and increased labor productivity. However, there is a gap between the formal education sector and the skills required by industry, which often does not align with curriculum development.

One initiative that has significantly impacted this gap is the existence of Vocational Training Centers (BLK) across various regions. Vocational and technical training programs provided by BLKs have provided opportunities for young people, particularly those who did not pursue higher education, to acquire practical skills relevant to job market needs. This training focuses on developing competencies that are directly applicable in the industrial world, thereby increasing employment opportunities in sectors requiring technical skills, such as manufacturing, construction, and services.

The competency-based job training offered at the Vocational Training Center (BLK) has proven effective in accelerating workforce integration into the industrial world. Furthermore,

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this program supports the government's efforts to create more jobs and reduce unemployment, particularly among young people. With increased access to relevant training, Indonesia's young workforce is expected to be better prepared to face the challenges of an increasingly competitive industry. Therefore, strengthening vocational training programs is crucial to ensure that the education budget is not solely focused on formal education but also prioritizes skills development that can support future workforce productivity.

The training aims to prepare young people for the workforce by providing the knowledge and skills required by industry. The program also includes technical training tailored to job market needs, thereby increasing the competitiveness of the Indonesian workforce, creating a workforce that is ready to work and contribute to the national economy.

However, despite the implementation of training programs in various regions, the benefits of investment in education and training have not been fully felt across Indonesia. Regions such as East Nusa Tenggara, Papua, and Maluku still face numerous challenges in improving the quality of education and workforce training. Limited school infrastructure, a shortage of competent teachers, and limited access to vocational training facilities are major obstacles to improving the quality of education and skills in these regions. This contributes to the widening gap between developed and underdeveloped regions in terms of human resource development.

As a result of this inequality, labor productivity in underdeveloped regions such as East Nusa Tenggara, Papua, and Maluku remains far below the national average. Limited education and training availability makes it difficult for many workers in these regions to acquire skills relevant to industry needs. This results in low added value per worker and an inability for the workforce to adapt to changing technology and market demands. Therefore, it is crucial for the government and other stakeholders to focus more on equitable access to quality education and vocational training throughout Indonesia to increase labor productivity and reduce regional disparities.

Although the government has increased the education budget, not all regions have felt the impact directly. In remote areas like East Nusa Tenggara, limited school infrastructure, inadequate facilities, and a lack of qualified teachers remain major challenges. This has led to significant disparities in education quality between urban and remote areas, which in turn impacts the quality of human resources in these areas.

While increasing the education budget is crucial, it is insufficient if its distribution is uneven and implementation is suboptimal. The quality of education in remote areas requires special attention, particularly in terms of equitable access to adequate educational facilities. This

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includes building and repairing school infrastructure, improving teaching quality, and providing adequate training and resources for teachers. Without adequate attention to these areas, even if the education budget increases, the education gap between developed and underdeveloped regions will widen, directly impacting the inequality of workforce quality across Indonesia.

Furthermore, the relevance of educational programs to job market needs is also a crucial factor in preparing a competent workforce. Today's workforce increasingly demands skills that are not solely based on academic knowledge, but also practical skills that can be directly applied in the field. Therefore, education and training must focus more on developing skills aligned with industry needs, including digital-based and entrepreneurial training. In the era of Industry 4.0 and the digital economy, the ability to adapt to evolving technology and market trends is crucial. Education and training programs that equip the workforce with these skills will be crucial for enhancing Indonesia's competitiveness in the global market.

By integrating digital and entrepreneurship-based training into the education curriculum, the Indonesian workforce will be better prepared to face the challenges posed by digital transformation and the industrial revolution. This applies not only to urban areas but also to remote regions that require greater access and opportunities to develop these skills. Strengthening the education system in remote areas through improved facilities, teacher training, and technology-based programs will accelerate equitable education quality and help increase labor productivity across Indonesia. As a result, communities will be better prepared to face technological developments and create new, more sustainable jobs.

CONCLUSION AND SUGGESTIONS

Based on data analysis for the 2015-2020 period, it can be concluded that investment in education has a significant impact on increasing labor productivity in Indonesia. Increased allocation of the education budget contributes to workforce capacity growth, both in terms of technical skills and competitiveness in the labor market. However, the impact of this investment has not been felt evenly, particularly in underdeveloped regions that still face infrastructure constraints, teacher shortages, and limited access to vocational training. Therefore, quality, targeted, and inclusive investment in education is crucial to foster knowledge-based economic development and reduce disparities between regions.

SUGGESTION

For education investment to have a more equitable and optimal impact on workforce productivity in Indonesia, more strategic and comprehensive efforts are needed. The

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government needs to strengthen the equitable distribution of the education budget, particularly in underdeveloped regions such as East Nusa Tenggara, Papua, and Maluku, which still face various infrastructure and human resource limitations. Furthermore, vocational education and job training at Vocational Training Centers (BLK) need to be expanded and tailored to the specific needs of industry so that graduates are competitive and quickly absorbed into the job market.

Efforts to improve the quality of education must also be accompanied by curriculum modernization that emphasizes mastery of 21st-century skills, such as digital literacy, adaptability to new technologies, critical thinking, and entrepreneurship. This is crucial to address the challenges of the Industry 4.0 era and the digital economic transformation. Furthermore, synergy between educational institutions, the government, and the business world also needs to be strengthened to ensure that education and training programs are truly relevant to real needs in the field. Finally, the implementation and effectiveness of education policies need to be continuously monitored and evaluated periodically to ensure they can make a real contribution to improving the quality of human resources and the productivity of the national workforce.

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