Original Research Article

Educational Investment and Labor Market Outcomes: A Microeconomic Perspective on Skill Transformation

ABSTRACT

This research examines how educational investment and skill development affect labor market outcomes, including income, employment status, and job relevance, among educated individuals in Central Java. Additionally, the study examines how demographic factors such as gender, age, and residential location moderate these relationships. This is a quantitative research study employing a descriptive-inferential approach. It adopts a microeconomic perspective to understand individual-level variation in education-to-employment pathways. The study was conducted in Central Java Province, Indonesia, from July to October 2025. The region was selected due to its diverse socio-economic conditions and high rate of educated unemployment. Using stratified random sampling, data were collected from 400 respondents aged 18-45 who had completed at least secondary education. Data collection instruments included structured questionnaires and semi-structured interviews. The study applied multiple linear regression analysis using SmartPLS to test both direct and moderating effects among variables.

The findings indicate that educational investment has a significant impact on monthly earnings, formal job placement, and job alignment, although it does not notably affect job satisfaction. In contrast, skill transformation, particularly in digital and soft skills, shows a more substantial and consistent influence across all labor market outcomes. Demographic factors, particularly gender and urban-rural location, significantly moderate these relationships, indicating structural inequalities in access and impact.

Keywords: Educational Investment, Skill Transformation, Labor Market Outcomes, Job Relevance, Demographic Factors

1. INTRODUCTION

Human capital development is a key pillar for sustainable economic growth, particularly in developing regions. Among its critical components, educational investment plays a transformative role in shaping workforce quality and productivity. Grounded in (Prasetya and Prakarsa 2021) (Becker 1964) human capital theory, education is framed not just as a social good but as a long-term economic investment. (Psacharopoulos and Patrinos 2018) emphasized that returns to education, both social and private, remain significant across global

economies, particularly in labor-driven markets. More recently, (Aslam and Rawal 2020) reaffirm that well-targeted educational investments contribute significantly to individual income growth and national productivity, primarily when supported by equitable access.

Several studies show that each additional year of education is associated with income growth. For instance, (UNESCO 2023) highlights that in lower-middle-income countries, an extra year of schooling may increase individual earnings by approximately 10% on average. (Montenegro and Patrinos 2022) confirmed that the rate of return on tertiary education continues to grow globally, despite rising levels of degree saturation. However, these returns are not uniform across regions, as local educational quality, labor market structures, and economic sectors influence the conversion of education into income. The heterogeneity of these effects has not been adequately captured in Indonesia's subnational labor data.

In Central Java Province (Jawa Tengah), one of the most populous regions in Indonesia, with over 36 million residents (Statistik 2023), education and employment outcomes display a complex relationship. Although the gross enrollment ratio in secondary and tertiary education has increased, the open unemployment rate among educated youth remains relatively high, at 5.55% in 2023. Interestingly, BPS also reports that graduates of vocational high schools (SMK) face higher unemployment rates (8.18%) than general high school graduates, indicating a mismatch between educational output and market needs. This issue mirrors similar trends found in Vietnam and the Philippines, where technical and vocational education fails to align with labor demands (Nguyen and Taylor 2021).

These statistics illustrate a critical problem in the region: skill mismatch. (Reiskarts and Romele 2025) define this as the growing gap between the skills offered by educational institutions and those demanded by employers. In Central Java, the persistence of educated unemployment suggests that formal qualifications alone are insufficient to secure employment, particularly in a labor market being restructured by technology, automation, and platform-based work. (McGuinness, Pouliakas, and Redmond 2019) Highlight that the mismatch is highest in lower-income regions, where labor markets lack mechanisms for validating skills beyond formal degrees.

This brings attention to the concept of skill transformation, the process through which individuals acquire adaptive, soft, and digital competencies to remain competitive. (Dong, Li, and Chang 2025) argue that academic-to-vocational transitions are increasingly crucial in digital economies. Similarly, a report by the (Forum 2020) ranked problem-solving, digital literacy, and teamwork as essential competencies in the post-pandemic labor market. Yet, in Central Java, adult participation in non-formal skill training remains limited, and the infrastructure for lifelong learning, such as community-based technical education or micro-credentialing systems, is underdeveloped (Bank 2022).

The gap between formal education and actual employability underscores the importance of integrating skill transformation into the broader framework of educational investment. (Peña-Lang and Astigarraga 2025) Advocate for responsive education systems that adapt to rapid industrial and technological shifts. In Central Java, where a significant portion of the labor force is absorbed in agriculture and informal sectors, upskilling for digital readiness remains an uphill challenge. (Prasetya and Prakarsa 2021) and point out that despite national policies promoting Industry 4.0 readiness, regional disparities in digital training access persist across Indonesia.

Prior research in Indonesia has predominantly focused on national-level statistics or urban labor centers, often neglecting microeconomic variation at the provincial level. For instance, (Suryahadi 2020) examine national employment shocks but do not address how education

and skills interact at the household or individual level. Studies in Java that adopt a micro-lens, such as (Trisnawati 2023), remain limited in scope and fail to incorporate demographic moderators, such as gender, age, and urban-rural disparities. This study, therefore, addresses a significant empirical gap in Indonesian labor economics.

Hence, this research aims to explore how educational investment and skill transformation affect labor-market outcomes, including employment status, income, and job relevance, among educated individuals in Central Java. It also examines how demographic variables such as gender, age, and place of residence moderate these relationships. The study applies a microeconomic perspective to understand how individual decision-making on education and skills translates into economic returns within a region-specific context.

The findings are expected to provide contextualized, evidence-based recommendations for policymakers, educational institutions, and local governments by elucidating how educational pathways and skill acquisition shape labor market entry and progression, especially in an increasingly digitized economy like Central Java. This study contributes to the development of adaptive, inclusive, and regionally responsive education-to-employment strategies.

2. MATERIAL AND METHODS

2.1 Research Location and Time

This study was conducted in Central Java Province, Indonesia, a region characterized by diverse socio-economic conditions and varying educational and employment profiles. The research period spanned from July to October 2025.

2.2 Research Type and Approach

This research adopted a quantitative method with a descriptive-inferential approach. The goal was to analyze the statistical relationship between educational investment, skill transformation, and labor market outcomes, while also examining how socio-demographic factors may moderate these relationships.

2.3 Population and Sample

The population targeted in this study comprised working-age individuals (18-45 years old) residing in Central Java who had completed at least secondary or tertiary education. The sampling technique used was stratified random sampling, ensuring representation across education levels and employment categories. A sample size of 400 respondents was determined to ensure statistical validity and generalizability of the results.

2.4 Research Variables and Operational Definitions

The variables and their indicators are summarized in Table 1.

2.5 Data Collection Techniques

Data were gathered through two main instruments:

Structured questionnaires: Distributed through both online (Google Forms) and offline (paper-based) formats, covering all variable indicators. Semi-structured interviews: Conducted with a selected sub-sample to capture contextual factors affecting skill transformation and employment quality.

2.6 Instrument Testing

To ensure the reliability and validity of the research instruments:

Validity testing was conducted using Pearson's Product-Moment Correlation, where items with a correlation coefficient (r) > 0.30 were considered valid. Reliability testing used Cronbach's Alpha, with $\alpha \geq 0.70$ indicating an acceptable level of internal consistency.

2.7 Data Analysis

Data were analyzed using multiple linear regression with the aid of Smart PLS software to test the partial and

simultaneous effects of the independent variables on teacher performance.

Table 1. Research variables and indicators

Variable Type	Variable Name	Indicators	Scale
Independent Variable	Educational Investment (X_1)	- Years of formal education - Total education cost - Highest qualification	Ratio / Ordinal
Independent Variable	Skill Transformation (X_2)	- Number of training programs - Mastery of digital skills - Soft skills (communication, teamwork, adaptability) - Skill-job match	Ordinal
Dependent Variable	Labor Market Outcomes (Y)	- Employment status (formal/informal) - Monthly income - Job type (aligned with education) - Job satisfaction	Ratio / Ordinal / Nominal
Moderating Variable	Demographic Factors (Z)	- Gender - Age - Residential location (Urban/Rural)	Nominal / Ratio

3. RESULTS AND DISCUSSION

3.1 Descriptive Statistics

From a total of 400 respondents across Central Java Province, the majority were high school graduates (45%) and university graduates (35%), while the remaining respondents consisted of vocational school (SMK) graduates (12%) and diploma holders (8%). The gender composition was relatively balanced, with 51% male and 49% female participants, and approximately 60% residing in urban areas. The respondents had an average of 13.2 years of formal education, with an average educational expenditure of IDR 23.5 million. Furthermore, 67% of participants had attended non-formal training programs; however, only 38% reported that such training was directly relevant to their current occupations.

3.2 Interpretation of Hypothesis Test Result

3.2.1 Educational Investment (X_1) → Labor Market Outcomes (Y)

Result: Significant ($p < 0.05$); $\beta = 0.32$
Interpretation: Educational investment exerts a positive and statistically significant influence on labor market outcomes. Each additional year of schooling or higher educational attainment is associated with improved monthly income, greater likelihood of formal job placement, and better job–education alignment. These findings align with (Psacharopoulos and Patrinos 2018) and reinforce (Becker 1964) human capital theory, which posits that education functions as a productive investment that enhances individual economic returns.

3.2.2 Skill Transformation (X_2) → Labor Market Outcomes (Y)

Result: Highly Significant ($p < 0.01$); $\beta = 0.45$
Interpretation: Skill transformation demonstrates the strongest effect among all predictors. Respondents who actively engaged in non-formal training—particularly in *digital literacy* and *soft skills*—reported higher earnings, improved job relevance, and greater job satisfaction. This supports the (World Economic Forum 2023) report emphasizing adaptive skills as key determinants of employability in the digital economy. The result suggests that in dynamic labor markets, continuous skill enhancement has become a more immediate driver of employment success than traditional educational credentials.

3.2.3 Moderating Effect of Demographic Factors (Z) on the Relationship between Educational Investment (X_1) and Labor Market Outcomes (Y)

Result: Partially Significant ($p < 0.05$ for gender and location)

Interpretation: Demographic variables such as gender and residential location partially moderate the relationship between education and labor outcomes. The positive impact of higher education is more pronounced among males in urban areas than among females in rural regions. This disparity reflects structural inequalities in access, quality, and labor market valuation of education. It also resonates with global findings on gendered returns to education in developing economies (*ILO, 2022*).

3.2.4 Moderating Effect of Demographic Factors (Z) on the Relationship between Skill Transformation (X_2) and Labor Market Outcomes (Y)

Result: Significant ($p < 0.01$ for all moderators)
Interpretation: The moderating role of demographics is more consistent in the skill transformation model. The effects are strongest among younger, productive-age respondents (25–35 years) and those living in urban areas. This indicates that digital and soft-skill training programs have not yet achieved equitable reach or effectiveness across all demographic segments. Rural participants and older respondents report lower perceived benefits, suggesting gaps in training accessibility and adaptability.

3.3 Discussion

The results provide substantial empirical support for the human capital framework. Investment continues to yield measurable labor market advantages, and the findings reveal that skill transformation now serves as a more dynamic and responsive predictor of labor success in the digital age. This shift indicates that static academic credentials are increasingly being supplanted by *transferable competencies*, particularly digital proficiency, communication, and problem-solving skills, as core drivers of employability.

Furthermore, the significant moderating effects of demographic factors underscore the persistence of inequality in educational and skill-based opportunities. The gender gap in returns to education and the rural–urban divide in skill access reflect both socio-economic and infrastructural disparities. As noted by (UNESCO 2023), digital learning ecosystems remain concentrated in urban centers, leaving peripheral regions underserved. This imbalance may hinder inclusive economic participation and widen income inequality if not addressed through policy reform.

The study's evidence also suggests that non-formal education and skill training programs, when aligned with local labor market demands, can bridge structural gaps that formal education alone cannot. Policymakers should thus prioritize flexible, regionally adaptive education frameworks integrating both formal and informal learning pathways. Such integration will enhance workforce agility, reduce structural unemployment, and promote inclusive labor participation, particularly among marginalized groups.

In summary, while education remains foundational, the synergy between educational investment and continuous skill transformation determines labor market competitiveness in the digital era. Equitable access to skill development opportunities across gender, geography, and socio-economic strata should therefore become a central agenda in Indonesia's human capital policy.

4. CONCLUSION

This study examined the influence of educational investment and skill transformation on labor market outcomes in Central Java Province, Indonesia, while considering demographic factors as moderating variables. Based on data analysis from 400 respondents of productive age, several key conclusions emerged:

Educational investment exerts a positive and significant effect on labor market outcomes, particularly in enhancing

monthly earnings, formal employment status, and the alignment between educational background and job type. This finding reinforces the principles of Human Capital Theory, confirming that education remains an essential and valuable economic asset.

Skill transformation demonstrates a stronger impact than formal education across all indicators of labor market success. Mastery of digital competencies, soft skills, and participation in non-formal training programs substantially contribute to higher productivity levels and greater job satisfaction.

Demographic factors, including gender, age, and residential location, significantly moderate the relationships between education, skills, and labor outcomes. Disparities in training access and educational quality in rural areas, as well as gender gaps in employment results, highlight the need for more inclusive and equitable policy interventions.

The mismatch between educational output and labor market demand remains a major challenge. The relatively high unemployment rate among vocational school (SMK) graduates indicates a persistent skills mismatch, underscoring the importance of curriculum reform and stronger industry–education partnerships to align competencies with market needs.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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