Published by University of Muhammadiyah Makassar

DOI: 10.26618

e-ISSN 2686-5467 | p-ISSN 1858-2192

Balance: Jurnal Ekonomi

journal homepage: https://journal.unismuh.ac.id/index.php/jeb

Analysis of Indonesian Employment Conditions 2020–2025: Challenges, Digital Transformation, and Labor Absorption Strategies

Citra Wulandari Manik[1], Hilkia Natasya Br Ginting[2], Mahlina Putri Manurung[3], Nadya Nafisha[4], Putri Andini Nasution[5], Salsabila[6], Dwi Nabila Putri[7], Aulia Putri Ramadhani[8], Noni Rozaini[9]

Economics Study Program, Faculty of Economics, Medan State University

Email: citrawulan289@gmail.com,hilkianatasyabrginting@gmail.com,mahlinaputrimanurung@gmail.com,ieanadyanafisha@gmail.com, putriandininasution19@gmail.com, salsa.bilaaa0702@gmail.com, dwinabillaputri04@gmail.com , aulianst0411@gmail.com, nonirozaini@gmail.com

ARTICLE INFO

Employment; Digital Transformation; Labor Absorption; Digital Skills; Indonesia.

Article History

- Received: 15 December 2025
- First Revision: 20 February 2026
- Second Revision: 05 April 2026
- Third Revision: 10 May 2026
- Accepted: 30 May 2026

ABSTRACT

This study examines the dynamics of Indonesia's employment conditions during the 2020–2025 period by analyzing post-pandemic labor market recovery, the impact of digital transformation, and strategies for improving labor absorption. A qualitative approach employing a Systematic Literature Review (SLR) and descriptive analysis of secondary data was adopted. Data were collected from Statistics Indonesia (BPS), the International Labour Organization (ILO), the World Bank, OECD reports, and recent peer-reviewed publications related to employment and digital transformation. The findings indicate that Indonesia experienced a substantial labor market recovery, as reflected by the decline in the Open Unemployment Rate from 7.07% in 2020 to 4.76% in early 2025, accompanied by an increase in total employment to 145.77 million workers. Nevertheless, structural challenges remain significant, particularly the dominance of informal employment (56.1%), persistent skills mismatches, and widening digital competency gaps. Digital transformation has generated new employment opportunities in technology-based industries, e-commerce, and digital services while simultaneously increasing the risk of job displacement through automation and artificial intelligence. The study identifies three strategic policy priorities for strengthening labor absorption: reforming vocational education and digital skills development, expanding inclusive digital infrastructure to support labor-intensive sectors and MSMEs, and establishing flexible yet protective labor market regulations. The study concludes that maximizing Indonesia's demographic dividend requires stronger collaboration among government, industry, and educational institutions to enhance workforce adaptability, improve labor productivity, and ensure that digital transformation contributes to inclusive employment and sustainable economic growth rather than widening socioeconomic inequalities.

1. Introduction

The COVID-19 pandemic generated an unprecedented shock to the Indonesian labor market beginning in 2020, resulting in widespread layoffs, reduced working hours, and a substantial shift toward temporary and informal employment. Although the economy has gradually recovered in subsequent years, the long-term consequences of the pandemic continue to shape labor market dynamics, employment structures, and workforce participation. Understanding these structural changes is essential for designing effective labor market policies that promote sustainable employment and inclusive economic growth (Maharani et al., 2024; Sagara et al., 2025).

Official statistics published by Indonesia's Central Bureau of Statistics (Badan Pusat Statistik, BPS) provide a comprehensive overview of labor market developments during the post-pandemic period. According to BPS (2023), approximately 145.77 million people

DOI: 10.26618

were employed in February 2025, while the Open Unemployment Rate (OUR) declined to 4.76%, indicating a considerable improvement from the peak of the pandemic. Despite this positive trend, the labor market continues to face persistent challenges related to the creation of quality employment opportunities, labor productivity, and workforce absorption, particularly among young workers and recent graduates (Arifin & Sani, 2019; Sukirno, 2011).

Figure 1. Trend of Indonesia's Open Unemployment Rate (OUR), 2020–2025

Source: Central Bureau of Statistics (BPS), National Labor Force Survey (Sakernas) and Indonesia Labor Force Situation Reports, 2020–2025.

One of the most significant structural transformations in Indonesia's labor market after the pandemic has been the acceleration of digitalization and the rapid expansion of platform-based employment, commonly referred to as the gig economy. Advances in digital technologies have created new employment opportunities through online platforms, e-commerce, and digital services, while simultaneously transforming conventional employment relationships (Westerman et al., 2014; Brennen & Kreiss, 2016). Previous studies suggest that digitalization presents both opportunities and challenges. On one hand, technological advancement contributes to job creation, business innovation, and productivity enhancement. On the other hand, it increases the prevalence of precarious employment characterized by income instability, limited social protection, weak labor rights, and regulatory uncertainty (OECD, 2020; Schwab, 2016). These impacts are highly heterogeneous across industries, enterprise sizes, and levels of technological adoption, implying that labor market policies should be sector-specific and evidence-based. Empirical studies conducted in Indonesia similarly report substantial growth in gig workers and informal employment in major metropolitan areas, where unstable earnings, inadequate social security coverage, and insufficient digital competencies remain critical concerns (Ferliana et al., 2025; Lianingsih & Irman, 2025; Kohesi, 2025).

This study utilizes official labor market statistics published by the Central Bureau of Statistics (BPS), particularly data from the National Labor Force Survey (Sakernas) and the Indonesia Labor Force Situation reports, to examine quantitative labor market developments between 2020 and 2025. The statistical analysis is complemented by a comprehensive review of recent literature concerning labor digitalization, platform-based employment, and the opportunities and risks associated with technological transformation (Kohesi, 2025; Universitas Swadharma, 2023). Combining official statistical evidence with

DOI: 10.26618

contemporary labor market literature enables a more comprehensive understanding of Indonesia's evolving employment landscape.

Another important aspect shaping Indonesia's labor market in 2025 is the adjustment of provincial minimum wages. The government increased the Provincial Minimum Wage (PMW) by approximately 6.5% to preserve workers' purchasing power and improve welfare amid inflationary pressures. Nevertheless, increases in minimum wages do not necessarily translate into higher employment levels. Previous empirical evidence indicates that minimum wage increases may reduce labor demand, particularly within formal urban sectors. Such evidence reflects the phenomenon of jobless growth, whereby economic expansion is driven primarily by capital-intensive investment rather than labor-intensive production (Mankiw, 2018; Todaro & Smith, 2015). Consequently, minimum wage policies should be implemented flexibly while simultaneously encouraging labor-intensive industries capable of generating substantial employment opportunities.

To reduce labor market mismatches, the Indonesian government has expanded vocational education and digital competency programs aimed at improving workforce skills. National initiatives such as the Digital Talent Scholarship and vocational apprenticeship programs seek to equip workers with competencies required by modern industries and the digital economy (Kementerian Komunikasi dan Informatika Republik Indonesia, 2022). Although these programs have contributed to human capital development, their effectiveness remains constrained by uneven regional implementation, curriculum-industry mismatches, limited institutional capacity, and relatively low private-sector participation. These challenges reduce the overall effectiveness of workforce upskilling and slow the transition toward a more competitive labor market (Wahyudi et al., 2023; Kohesi, 2025).

In parallel, the government has introduced several fiscal incentives to strengthen labor-intensive industries, which continue to play a crucial role in employment creation. These policy measures include government-borne income tax incentives (Article 21 Income Tax), subsidized investment credit interest for machinery modernization, and various industrial support programs targeting labor-intensive sectors such as food processing, textiles, footwear, and furniture manufacturing. These incentives are intended to enhance industrial competitiveness, stimulate business expansion, and maintain employment stability while supporting broader economic recovery (Mankiw, 2018; Todaro & Smith, 2015).

Indonesia is simultaneously experiencing a demographic bonus, with more than 190 million individuals of productive working age, representing the majority of the national population. This demographic structure presents a unique opportunity to accelerate economic growth through increased labor productivity and expanded employment. However, the demographic dividend can only be fully realized if accompanied by sufficient job creation, continuous human capital development, and education and training systems aligned with labor market demands. Otherwise, the demographic advantage may evolve into a demographic burden characterized by rising unemployment, underemployment, and widening socioeconomic disparities resulting from persistent skill mismatches (Lewis, 1954; Todaro & Smith, 2015).

These demographic challenges are further intensified by globalization and rapid technological change, which continue to reshape employment patterns worldwide. Informal employment, platform-based work, freelance occupations, and digital entrepreneurship are becoming increasingly dominant, while conventional labor protection systems remain inadequately adapted to these emerging forms of employment (Schwab, 2016; Westerman et al., 2014; Brennen & Kreiss,

DOI: 10.26618

2016). Consequently, regulatory reforms are required to establish a labor market framework capable of balancing employment flexibility with adequate social protection, ensuring both worker welfare and economic competitiveness in an increasingly digitalized global economy.

Overall, the interaction between minimum wage policies, structural economic transformation, demographic dynamics, digitalization, and workforce characteristics represents a critical determinant of employment absorption in Indonesia. Rigid wage policies implemented without corresponding improvements in labor productivity and industrial competitiveness may unintentionally constrain employment growth. Conversely, policies that integrate vocational education, digital skills development, industrial modernization, and incentives for labor-intensive sectors are expected to maximize the demographic dividend while fostering inclusive, resilient, and high-quality employment (Todaro & Smith, 2015; Sukirno, 2011; Sagara et al., 2025). Therefore, a comprehensive understanding of these interrelated factors is essential for developing evidence-based labor market policies capable of supporting Indonesia's sustainable economic development in the post-pandemic era.

2. Literature Review

2.1 Employment

Employment represents one of the fundamental pillars of economic development because it reflects the capacity of an economy to utilize its human resources productively. In development economics, employment refers to the participation of the working-age population (15 years and above) in economic activities that generate goods and services in exchange for income or profit (Todaro & Smith, 2021). Beyond serving as an indicator of labor market performance, employment also reflects the effectiveness of economic policies in promoting inclusive growth and improving social welfare.

According to Mankiw (2021), labor constitutes a primary factor of production that directly influences national output, productivity, and long-term economic growth. Consequently, employment expansion contributes not only to higher household income but also to poverty reduction and improved income distribution. Similarly, Sukirno (2019) argues that employment opportunities are largely determined by economic growth, investment, industrial expansion, and government policies that create a conducive business environment. Countries experiencing sustained economic growth generally demonstrate stronger labor demand and lower unemployment rates.

From a structural development perspective, employment dynamics are closely associated with demographic changes, technological advancement, and industrial transformation. Lewis' (1954) dual-sector model emphasizes the gradual movement of labor from low-productivity agricultural sectors to more productive industrial and service sectors as the foundation of sustainable economic development. More recently, rapid digitalization and automation have reshaped labor markets by altering occupational structures and skill requirements, creating both new employment opportunities and risks of technological displacement.

In Indonesia, labor market challenges remain substantial despite improvements following the COVID-19 pandemic. According to the Central Bureau of Statistics (BPS, 2025), persistent issues include skills mismatch, the dominance of informal employment, regional disparities in employment opportunities, and relatively low labor productivity. These structural challenges highlight the importance of integrating macroeconomic policy, educational reform, vocational training, and digital skill development to enhance workforce competitiveness. Consequently, contemporary employment theory increasingly emphasizes the development of adaptive human capital capable of responding to structural transformation driven by digitalization, automation, and the transition toward a green economy.

DOI: 10.26618

2.2 Digital Transformation

Digital transformation refers to the comprehensive integration of digital technologies into organizational processes, business models, and institutional structures, fundamentally changing how organizations operate and deliver value (Westerman, Bonnet, & McAfee, 2014). Rather than representing merely the adoption of new technologies, digital transformation encompasses organizational change, innovation capability, and the reconfiguration of governance systems to improve efficiency and competitiveness.

Brennen and Kreiss (2016) argue that digital transformation involves both technological innovation and institutional adaptation, requiring organizations to redesign operational processes, organizational culture, and decision-making mechanisms. Likewise, Schwab (2017), through the concept of the Fourth Industrial Revolution, explains that technological innovations—including artificial intelligence (AI), big data analytics, cloud computing, robotics, blockchain, and the Internet of Things (IoT)—have fundamentally transformed production systems, labor markets, and economic interactions. These technologies increase productivity and operational efficiency while simultaneously changing the demand for workforce competencies.

From a labor market perspective, digital transformation has generated significant structural changes. The Organisation for Economic Co-operation and Development (OECD, 2023) highlights that digitalization simultaneously creates new occupations while reducing demand for routine and repetitive jobs through automation. Consequently, labor markets increasingly require workers possessing digital literacy, analytical capabilities, adaptability, and continuous learning competencies. Individuals lacking these competencies are more vulnerable to technological displacement and long-term unemployment.

Within the Indonesian context, digital transformation has become a strategic priority for accelerating economic modernization and improving national competitiveness. Government initiatives—including digital infrastructure expansion, e-government implementation, digital entrepreneurship programs, and workforce upskilling initiatives such as the Digital Talent Scholarship—aim to strengthen the country's digital ecosystem and improve labor productivity (Ministry of Communication and Digital Affairs of the Republic of Indonesia, 2024). Nevertheless, disparities in digital infrastructure, unequal access to technology, and differences in digital literacy across regions continue to constrain the effectiveness of digital transformation. Therefore, successful digital transformation requires coordinated efforts involving technological innovation, human capital development, institutional reform, and supportive public policies to ensure inclusive and sustainable economic growth.

2.3 Employment Absorption

Employment absorption refers to the capacity of an economy to provide productive employment opportunities for the available labor force. It reflects the extent to which economic growth translates into job creation and constitutes a critical indicator of labor market performance (Sukirno, 2019). High employment absorption indicates that economic expansion is accompanied by increased labor demand, whereas low employment absorption often signals structural imbalances between labor supply and demand.

Development economists emphasize that employment absorption is primarily determined by economic growth, investment, industrial structure, and labor productivity. Todaro and Smith (2021) argue that labor-intensive industries generally create substantially more employment opportunities than capital-intensive industries, particularly in developing economies. Consequently, industrial diversification and productive investment play central roles in expanding employment opportunities and reducing unemployment.

DOI: 10.26618

Macroeconomic theories provide complementary explanations regarding employment creation. Classical economic theory suggests that labor demand increases as productivity and capital accumulation expand. Conversely, Keynesian theory argues that employment depends primarily on aggregate demand and government intervention through fiscal and monetary policies capable of stimulating economic activity (Mankiw, 2021). In addition, Lewis' (1954) structural transformation theory explains that economic development is characterized by labor migration from traditional agricultural sectors toward modern industrial and service sectors with higher productivity and wages.

In the era of digitalization, employment absorption has become increasingly influenced by technological innovation, automation, and changing industrial structures. While digital technologies improve efficiency and create new occupations in information technology, e-commerce, financial technology, and digital services, they may simultaneously reduce employment opportunities in routine occupations. Therefore, maximizing employment absorption requires not only sustained economic growth but also investments in human capital, vocational education, digital competencies, innovation, and industrial competitiveness.

In Indonesia, the Central Bureau of Statistics (BPS, 2025) reports that a considerable proportion of employment remains concentrated in the informal sector, indicating that improvements in employment quality remain an important policy priority. Accordingly, strengthening vocational education, expanding digital skills training, encouraging labor-intensive investment, and supporting technological innovation constitute essential policy instruments for increasing sustainable employment absorption and enhancing long-term economic resilience.

2.4. Previous Studies

The relationship between digital transformation and employment has received increasing scholarly attention, particularly in developing economies experiencing rapid technological change. Existing studies generally conclude that digitalization generates both employment opportunities and structural challenges; however, empirical findings remain heterogeneous depending on institutional settings, industrial characteristics, and policy responses.

Kohesi (2025) examined the impact of digitalization on Indonesia's labor market and found that digital transformation significantly improves productivity in the industrial and service sectors. Nevertheless, the study emphasizes that workforce adaptability depends largely on digital literacy and the availability of continuous skills development programs. Although these findings support the argument that human capital development is critical for labor market resilience, the study does not specifically examine national employment absorption strategies during the post-pandemic recovery period (2020–2025).

Similarly, Ferliana et al. (2025) investigated the effects of digital transformation on labor mobility and reported that digital technologies have expanded opportunities for remote work and flexible employment arrangements. However, unequal digital infrastructure remains a major obstacle limiting inclusive labor market participation. While their study contributes valuable insights into changing work patterns, it primarily focuses on labor mobility rather than the broader issue of employment absorption and labor market policy.

Swadharma (2023), in Analysis of Industrial Digitalization and Job Creation in Indonesia, concludes that technological advancement simultaneously creates new occupations and threatens conventional employment through automation. The study demonstrates that digitalization accelerates structural transformation within the labor market. Nevertheless, its analysis precedes the most recent post-pandemic labor market recovery and therefore does not capture the

DOI: 10.26618

latest employment dynamics observed between 2020 and 2025.

Lianingsih and Irman (2025) analyzed the influence of the digital economy on employment and workforce structure in Indonesia and reported that approximately 68% of respondents perceived increased employment opportunities resulting from digital economic activities. At the same time, respondents expressed concerns regarding employment displacement in conventional industries. Although their findings reinforce the dual nature of digital transformation, the study relies primarily on workers' perceptions and does not comprehensively evaluate government policies, labor market institutions, or national employment strategies.

Overall, previous studies consistently demonstrate that digital transformation has both positive and negative implications for employment by creating new economic opportunities while simultaneously increasing labor market uncertainty and skills mismatches. However, the existing literature has not comprehensively examined Indonesia's labor market during the 2020–2025 period by integrating post-pandemic recovery, digital transformation, demographic change, labor market policies, and employment absorption strategies within a unified analytical framework. This study addresses this research gap by combining official labor market statistics with recent empirical evidence to provide a comprehensive assessment of Indonesia's employment dynamics and policy responses in the post-pandemic digital economy.

3. Research Method

3.1 Research Design

This study adopted a qualitative research approach employing a Systematic Literature Review (SLR) integrated with descriptive secondary data analysis. The qualitative approach was considered appropriate because the objective of this study was to obtain a comprehensive understanding of Indonesia's employment conditions during the 2020–2025 period, particularly concerning labor market challenges, digital transformation, and employment absorption strategies. Rather than examining causal relationships through statistical modeling, the study synthesized empirical findings and official labor market statistics to generate evidence-based policy recommendations.

The systematic literature review enabled the integration of previous empirical studies with official government reports, thereby providing a comprehensive understanding of labor market dynamics in the post-pandemic era. This methodological approach has been widely adopted in labor market and public policy research because it facilitates the identification of research trends, policy gaps, and emerging issues across multiple sources.

3.2 Data Sources

The study relied exclusively on secondary data obtained from both national and international institutions. Official statistical data were collected from the Central Bureau of Statistics (BPS), particularly the National Labor Force Survey (Sakernas) and the Indonesia Labor Force Situation Reports covering the period from 2020 to 2025.

To complement the national statistics, additional information was obtained from publications issued by the International Labour Organization (ILO), the World Bank, the Organisation for Economic Co-operation and Development (OECD), the Ministry of Manpower of the Republic of Indonesia, and the Ministry of Communication and Digital Affairs. Academic evidence was gathered from peer-reviewed journal articles indexed in Scopus, Web of Science, ScienceDirect, SpringerLink, Taylor & Francis, Emerald Insight, and Google Scholar. Priority was given to publications issued between 2020 and 2025 to ensure the relevance and currency of the evidence.

3.3 Literature Search Strategy

The literature identification process followed the general principles of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. Relevant

DOI: 10.26618

studies were identified using combinations of the following keywords:

- Employment
- Labor Market
- Employment Absorption
- Digital Transformation
- Digital Economy
- Indonesia
- COVID-19 Recovery
- Gig Economy
- Digital Skills
- Labor Policy

Boolean operators (AND and OR) were employed to refine the search process. The search focused on publications discussing employment dynamics, digital transformation, labor market policies, workforce development, and post-pandemic economic recovery in Indonesia and comparable emerging economies.

3.4 Inclusion and Exclusion Criteria

To ensure methodological rigor, the selected literature fulfilled several inclusion criteria. The inclusion criteria were:

1. Published between 2020 and 2025.
2. Published in peer-reviewed journals or official institutional reports.
3. Discussed employment, labor market transformation, digitalization, workforce development, or labor policies.
4. Provided empirical findings or policy analyses relevant to Indonesia or comparable developing countries.
5. Written in English or Indonesian.

Conversely, studies were excluded if they:

1. Were not directly related to employment issues.
2. Lacked methodological transparency.
3. Consisted only of opinion papers, editorials, conference abstracts, or unpublished manuscripts.
4. Contained duplicated findings from the same dataset.

3.5 Data Analysis

The collected literature and statistical reports were analyzed using thematic content analysis. This analytical technique allows researchers to identify recurring themes, compare findings across studies, and interpret labor market developments systematically. The analysis consisted of four stages.

First, data reduction, where irrelevant publications were excluded while key information related to the research objectives was extracted. Second, data classification, in which the findings were grouped into several themes, including employment conditions, labor market challenges, digital transformation, government intervention, labor absorption strategies, and policy implications.

Third, comparative synthesis, where evidence from previous studies was compared with official labor statistics published by BPS, ILO, OECD, and the World Bank to identify consistencies, discrepancies, and emerging trends. Finally, interpretation, through which the synthesized findings were used to formulate policy recommendations aimed at strengthening labor market resilience and improving employment quality in Indonesia.

3.6 Research Validity

To improve the credibility of the findings, this study employed data triangulation by comparing information from multiple authoritative sources. Official labor statistics published by BPS were cross-validated with reports from the ILO, World Bank, OECD, and relevant ministries, as well as findings from recent peer-reviewed studies. Methodological triangulation was also applied by integrating quantitative labor market indicators with qualitative evidence from previous empirical studies. This approach minimized potential bias arising from reliance on a single source while improving the reliability and consistency of the study's conclusions.

3.7 Research Framework

The analytical framework of this study consisted of four sequential stages. The first

DOI: 10.26618

stage involved collecting secondary data from official institutions and academic databases. The second stage focused on screening and selecting relevant literature based on predetermined inclusion and exclusion criteria. The third stage consisted of thematic analysis and comparative synthesis of statistical evidence and previous empirical findings. Finally, the study formulated evidence-based policy recommendations regarding employment conditions, digital transformation, and labor absorption strategies in Indonesia during the post-pandemic period.

4. Results and Discussion

4.1 General Overview of Indonesia's Labor Market (2020–2025)

According to data published by Statistics Indonesia (BPS) and reports from international organizations, including the International Labour Organization (ILO) and the World Bank, Indonesia's labor market demonstrated a significant recovery during the 2020–2025 period following the severe disruption caused by the COVID-19 pandemic. In 2020, the Open Unemployment Rate (OUR) increased sharply to 7.07% as a consequence of mobility restrictions and economic contraction. However, the unemployment rate gradually declined to approximately 4.8% in 2024 and further decreased to 4.7% in early 2025 (BPS, 2025). The total employed population exceeded 139 million people by February 2025, although employment remained heavily concentrated in the informal sector, which accounted for 56.1% of total employment (BPS, 2025).

Meanwhile, the Labor Force Participation Rate (LFPR) continued to recover steadily, remaining within the range of 69–70%. Employment growth was primarily concentrated in the manufacturing, trade, transportation, and information service sectors, reflecting the rapid expansion of Indonesia's digital economy. According to the World Bank's Indonesia Economic Prospects (2024), technology-based and digital service employment expanded by approximately 9% annually between 2020 and 2024.

Despite these encouraging developments, a substantial mismatch remains between workforce capabilities and industrial requirements. The ILO Decent Work Country Programme for Indonesia 2020–2025 (ILO, 2023) reported that approximately 35% of Indonesian workers remain employed in low-productivity sectors and lack basic digital competencies. Likewise, a McKinsey (2023) assessment estimated that approximately 23 million jobs in Indonesia could be displaced by automation by 2030, while nearly 27 million new jobs could emerge if digital transformation is effectively managed.

Government interventions, particularly the Kartu Prakerja (Pre-Employment Card Program) launched in 2020, have played an important role in improving workforce competencies. An evaluation conducted by J-PAL (2023) found that participation in the program significantly enhanced digital training participation, increased employability, and improved participants' informal employment opportunities and earnings by approximately 10–15% compared with the control group.

At the macroeconomic level, labor has gradually resumed its contribution to economic growth following the pandemic. Labor productivity, measured as output per worker, increased by approximately 3.2% in 2024, representing a substantial improvement compared with the contraction experienced during 2020–2021 (World Bank, 2024). This trend indicates increasing labor efficiency, particularly within sectors undergoing digital transformation.

The findings indicate that although Indonesia has achieved a relatively strong quantitative recovery in labor market indicators, several structural challenges continue to constrain qualitative improvements. One of the most significant concerns is the persistently high proportion of informal employment, which still accounts for more than half of the national workforce. This suggests that post-pandemic employment recovery has been concentrated largely in low-productivity activities, limiting real income

DOI: 10.26618

growth and slowing improvements in national labor productivity (ILO, 2023).

Furthermore, the acceleration of digital transformation has widened the skills mismatch between labor supply and market demand. Workers employed in traditional industries have become increasingly vulnerable to automation and technological disruption, whereas younger workers possessing stronger digital competencies have experienced greater employment opportunities. Consequently, Indonesia's labor market has become increasingly polarized between workers capable of adapting to digital transformation and those left behind by technological change. These findings imply that employment policies should prioritize not only job creation but also comprehensive upskilling and reskilling initiatives for displaced workers.

Digital transformation offers considerable opportunities for creating high-quality employment, particularly in information technology, e-commerce, logistics, and digital services. Nevertheless, its impact remains inherently dualistic. On one hand, digitalization improves organizational efficiency and creates new employment opportunities; on the other hand, it disrupts conventional occupations while widening regional digital inequalities. McKinsey (2023) estimated that digital transformation could contribute approximately USD 150 billion to Indonesia's GDP by 2025. However, realizing this potential depends heavily on improving digital literacy and expanding supporting digital infrastructure nationwide.

The Kartu Prakerja program has emerged as one of the government's principal policy instruments for addressing labor market challenges in the digital era. Empirical evidence suggests that the program has successfully expanded access to vocational training and increased labor market participation, particularly among young workers and newly unemployed individuals (J-PAL, 2023). Nevertheless, its long-term contribution to improving employment quality remains limited unless accompanied by competency certification, stronger quality assurance mechanisms, and closer collaboration between training providers and industry.

From a productivity perspective, digital transformation has demonstrated a positive relationship with labor productivity growth. However, productivity gains remain unevenly distributed across sectors. Higher productivity continues to be concentrated among large corporations and capital-intensive industries, whereas micro, small, and medium-sized enterprises (MSMEs)—which employ more than 90% of Indonesia's workforce—have yet to fully capitalize on digital technologies. This finding highlights the necessity of policies that strengthen technological capabilities and innovation capacity among MSMEs while providing incentives for adopting affordable and scalable digital technologies appropriate to their operational capacities (World Bank, 2024).

Overall, the evidence suggests that Indonesia's future labor market policies should be structured around three strategic pillars. First, improving human capital quality through vocational education reform, digital skills development, and adaptive technological literacy. Second, fostering an inclusive labor market ecosystem by expanding digital infrastructure and strengthening support for MSMEs. Third, establishing a flexible yet protective labor market framework that balances labor market adaptability with adequate social protection for workers affected by technological disruption.

If these policy priorities are implemented consistently, Indonesia will be well positioned to leverage digital transformation as a catalyst for higher labor productivity, better employment quality, and more sustainable long-term economic growth in the post-2025 period.

4.2 Major Challenges in Indonesia's Labor Market

The review of the article entitled "Population Dynamics and Employment: Challenges and Sustainable Policies for

DOI: 10.26618

Indonesia" reveals that Indonesia's labor market continues to face several persistent structural challenges. These include the high proportion of workers employed in the informal sector, relatively low educational attainment and workforce competencies, and the persistent mismatch between labor market demand and the quality of available human resources. Furthermore, rapid urbanization has not been accompanied by an equitable distribution of employment opportunities, particularly in rural and underdeveloped regions.

The reviewed study further emphasizes that improvements in labor quality must be supported by education and training policies aligned with industrial requirements, particularly in response to the accelerating digital transformation. Both government institutions and educational providers are encouraged to strengthen vocational education and competency-based training systems to ensure that workers can effectively adapt to technological advancement and changing employment patterns. In addition, expanding social protection coverage and implementing sustainable labor market policies are identified as strategic measures for improving workers' welfare while enhancing the resilience of Indonesia's labor market.

When these findings are interpreted within the context of Indonesia's labor market during the 2020–2025 period, digital transformation clearly emerges as one of the principal drivers shaping employment dynamics. Rapid developments in information technology, automation, and artificial intelligence have fundamentally altered the structure of labor demand by changing both the types of occupations required and the competencies expected from workers. Consequently, the most pressing challenge is the widening digital skills gap, compounded by unequal access to digital technologies across different regions of Indonesia.

From this perspective, employment absorption strategies should prioritize improving human capital through comprehensive upskilling and reskilling programs focused on digital competencies. Vocational education, as highlighted in the reviewed article, provides an essential foundation for preparing workers capable of adapting to technological disruption. Equally important is facilitating the transition of workers from the informal to the formal sector in order to expand productive employment opportunities. Policies promoting digital entrepreneurship, the creative economy, and technology-based industries are therefore expected to become significant drivers of sustainable employment growth in the digital era.

Moreover, strengthening sustainable urbanization policies and expanding digital infrastructure should become integral components of Indonesia's employment strategy. Economic development has remained disproportionately concentrated in urban areas, creating considerable disparities in employment opportunities between metropolitan and rural regions. Rural communities continue to experience limited access to digital infrastructure, vocational training, and technological resources, thereby restricting their participation in the emerging digital economy. Accordingly, policies aimed at expanding digital connectivity and improving access to technology-based education should be fully integrated into the national labor market strategy. Simultaneously, inclusive social protection systems must be strengthened to safeguard workers affected by technological disruption and structural changes in employment patterns.

Overall, the reviewed evidence demonstrates strong consistency with the broader theme of digital transformation and labor market absorption in Indonesia during the 2020–2025 period. The findings collectively indicate that sustainable labor market development requires an integrated policy framework that simultaneously enhances workforce quality, promotes equitable employment opportunities, and accelerates workforce adaptation to technological change.

DOI: 10.26618

Discussion

The findings highlight that Indonesia's labor market challenges extend beyond the issue of unemployment alone and increasingly involve structural constraints related to workforce quality and labor market inclusiveness. While employment recovery has been relatively strong following the COVID-19 pandemic, persistent structural weaknesses continue to limit productivity growth and reduce the economy's capacity to fully benefit from digital transformation.

One of the most critical challenges is the coexistence of rapid technological progress and uneven human capital development. As firms increasingly adopt digital technologies, demand has shifted toward workers possessing digital literacy, analytical capabilities, and adaptive skills. However, the existing education and training systems have not yet produced a workforce capable of meeting these emerging industrial requirements. This mismatch reduces labor market efficiency and slows the transition toward a knowledge-based economy.

Another important finding concerns regional inequality. The concentration of digital infrastructure and employment opportunities in urban centers has widened disparities between developed and less-developed regions. Consequently, national employment strategies should incorporate place-based policies that expand digital infrastructure, improve internet accessibility, and strengthen regional vocational institutions. Such interventions would facilitate broader participation in the digital economy while reducing regional labor market disparities.

Finally, the analysis suggests that effective labor market policies should combine human capital development, digital infrastructure investment, and inclusive social protection within a coherent policy framework. Rather than treating education, employment, and digital transformation as separate policy domains, Indonesia should adopt an integrated strategy that simultaneously enhances workforce competitiveness, promotes productive employment, and supports sustainable economic growth. Such an approach is expected to improve labor market resilience while enabling Indonesia to maximize the opportunities created by digital transformation.

4.3 The Impact and Role of Digital Transformation on Employment

The synthesis of evidence from the article "The Impact of the Digital Transformation Era on Human Resource Management" and the findings of this study regarding Indonesia's labor market conditions during 2020–2025 identifies several important themes concerning the interaction between digital transformation and employment.

4.3.1 Results

a. The Shift in Human Resource Management Paradigm

The reviewed literature indicates that digital transformation has fundamentally shifted human resource management (HRM) from a predominantly administrative function toward a strategic organizational capability. Organizations increasingly emphasize digital competency development, data-driven decision-making, and technology-enabled workforce management. This paradigm shift requires HR departments to move beyond conventional personnel administration toward strategic talent development and organizational innovation.

The findings of the present study support this perspective. Indonesian firms have experienced growing pressure to adopt digital technologies in order to remain competitive, thereby increasing the demand for employees equipped with digital competencies. Consequently, workforce adaptability has become a critical determinant of employability within Indonesia's evolving labor market.

b. Increasing Demand for Digital Skills

The reviewed article highlights that digital literacy, technological proficiency, data analytics, and digital communication skills have become essential competencies in the modern workplace. Similarly, the findings of this study

DOI: 10.26618

indicate that Indonesia's digital transformation has reduced demand for several traditional occupations while simultaneously increasing employment opportunities in sectors requiring advanced digital expertise, including information technology, e-commerce, financial technology, and data analytics.

These findings demonstrate a significant structural shift in labor demand, where occupational competitiveness increasingly depends on workers' ability to acquire and continuously update digital competencies.

c. Technology-Driven Human Resource Management

The literature further demonstrates that digital technologies have improved the objectivity and efficiency of HR decision-making processes through the adoption of Human Resource Information Systems (HRIS), predictive analytics, digital recruitment platforms, online learning systems, and performance management technologies.

Consistent with these findings, Indonesian companies have increasingly implemented HRIS platforms, e-learning systems, and workforce analytics to improve recruitment efficiency, employee development, and organizational productivity. These technologies enable organizations to optimize talent management while responding more effectively to changing labor market conditions.

d. Organizational Readiness and Digital Transformation Challenges

Despite these advancements, the reviewed article emphasizes that successful digital transformation requires adaptive leadership, organizational innovation, and cultural change. Digital transformation is not merely a technological process but also an organizational transformation requiring substantial investment in human capital.

Similarly, this study finds that many Indonesian firms—particularly micro, small, and medium-sized enterprises (MSMEs)—continue to experience considerable barriers to digital adoption. These include limited technological infrastructure, insufficient investment capacity, inadequate digital skills, and organizational resistance to change.

4.3.2 Discussion

The findings suggest that digital transformation functions simultaneously as a disruptive force and a catalyst for employment creation within Indonesia's labor market. Rather than simply replacing conventional occupations, digitalization fundamentally alters the composition of labor demand by increasing the importance of digital literacy, analytical capabilities, technological adaptability, and lifelong learning. Consequently, labor market competitiveness increasingly depends on workers' ability to continuously upgrade their skills in response to technological advancement.

One of the most significant implications of these findings is the widening digital skills gap. Although demand for digitally skilled workers has expanded rapidly, labor supply has not kept pace with technological change. This mismatch reduces labor market efficiency and limits employment absorption within emerging digital industries. Without comprehensive investments in upskilling, reskilling, and continuous professional development, a substantial proportion of Indonesia's workforce may remain excluded from high-productivity employment opportunities.

Furthermore, digital HR technologies present substantial opportunities for improving labor market governance. The adoption of HRIS, artificial intelligence-assisted recruitment, predictive workforce analytics, and digital competency assessment can support more efficient matching between labor supply and industrial demand. At the national level, government institutions could leverage integrated digital employment platforms to connect job seekers with employment opportunities based on verified competencies, thereby improving labor market efficiency and reducing structural unemployment.

The findings also emphasize that digital transformation should not be concentrated solely among large corporations. Since MSMEs

DOI: 10.26618

account for the overwhelming majority of employment in Indonesia, accelerating their digital transformation is essential for ensuring inclusive labor market development. Policy interventions may therefore include fiscal incentives for digital investment, shared digital training initiatives, technology adoption grants, and stronger public-private partnerships designed to facilitate large-scale workforce reskilling.

Finally, these findings underscore the critical role of government regulation in supporting equitable digital transformation. National digital competency standards, professional certification systems, digital employment platforms, and coordinated workforce development policies are essential for ensuring that technological progress translates into broad-based employment opportunities rather than increasing labor market inequality. Without an integrated regulatory framework, digital transformation is likely to remain fragmented, focusing primarily on technological adoption while neglecting the equally important dimensions of workforce capability, organizational culture, and institutional readiness.

Overall, the evidence demonstrates that digital transformation should be viewed not only as a technological phenomenon but also as a comprehensive labor market transition. Sustainable employment growth in Indonesia will therefore depend on the country's ability to integrate technological innovation with human capital development, institutional reform, and inclusive labor market policies capable of supporting long-term economic competitiveness.

4.4 Employment Absorption Strategies and Policy Implications

4.4.1 Results

The employment absorption strategy implemented in Indonesia during the 2020–2025 period has focused on three major policy priorities: expanding employment opportunities, improving workforce competencies, and reforming labor market institutions. These priorities have been designed to accelerate post-pandemic labor market recovery while preparing the workforce for increasing digitalization and technological disruption.

One of the government's principal strategies has been promoting investment in labor-intensive sectors, including manufacturing, modern agriculture, and digital service industries. This objective has been supported through regulatory simplification, investment incentives, and industrial development policies intended to stimulate employment creation while strengthening national economic competitiveness (Coordinating Ministry for Economic Affairs, 2025).

Another important policy initiative has been the implementation of the Kartu Prakerja (Pre-Employment Card Program) as a national workforce development instrument. Beyond serving as a social assistance program during the COVID-19 pandemic, the initiative has evolved into a large-scale reskilling and upskilling platform that equips workers with competencies required in the digital economy. Evidence from the J-PAL (2023) evaluation indicates that participation in the program significantly increased informal employment opportunities and participants' earnings by approximately 10–15%, while also encouraging greater engagement in digital training programs.

In addition, labor market reforms introduced through the Job Creation Law (Omnibus Law No. 11 of 2020) sought to increase labor market flexibility by simplifying employment regulations and encouraging private-sector investment. Although these reforms remain subject to public debate regarding worker protection and employment security, they represent an important institutional effort to improve labor market efficiency and attract productive investment (ILO, 2023).

Policy coordination between the central and regional governments has also become increasingly important. The National

DOI: 10.26618

Employment Plan (RTKN) 2025–2029 emphasizes aligning workforce competencies with regional industrial development priorities through collaboration among government agencies, educational institutions, and industry stakeholders (Ministry of Manpower, 2024). This approach aims to reduce structural unemployment while strengthening regional labor market competitiveness.

Overall, these findings indicate that Indonesia's labor market strategy has gradually shifted from emphasizing employment quantity toward improving employment quality, workforce adaptability, and the alignment between labor supply and the evolving demands of a digital economy.

4.4.2 Discussion

The findings suggest that employment policies in Indonesia have become increasingly oriented toward developing a more adaptive and resilient labor market rather than merely reducing unemployment rates. While job creation remains an important policy objective, the rapid pace of digital transformation requires employment strategies that simultaneously improve workforce quality, technological readiness, and institutional capacity.

The expansion of labor-intensive investment remains essential for generating employment opportunities, particularly in sectors capable of absorbing large numbers of workers. However, relying exclusively on labor-intensive industries may not provide sustainable long-term competitiveness. Future employment growth will increasingly depend on productivity improvements, technological innovation, and the development of knowledge-intensive industries capable of generating higher value-added employment.

The Kartu Prakerja program represents an important policy innovation because it combines labor market intervention with human capital development. Nevertheless, its long-term effectiveness depends on several complementary measures, including stronger competency certification systems, continuous curriculum updates based on industrial needs, and closer partnerships between training providers and employers. Without these improvements, training outcomes may remain disconnected from actual labor market demand.

Similarly, labor market regulatory reforms should balance economic flexibility with adequate worker protection. While greater labor market flexibility can stimulate investment and employment creation, insufficient social protection may increase labor market vulnerability, particularly among workers displaced by technological change. Consequently, labor market reforms should be accompanied by comprehensive unemployment insurance, lifelong learning opportunities, and active labor market policies that facilitate workforce transitions.

Another important implication concerns the need for stronger policy coordination across institutions. Effective employment absorption cannot be achieved solely through labor market policies but requires integration with education policy, industrial development strategies, digital infrastructure expansion, and regional economic planning. Such coordination would improve the alignment between workforce competencies and future industrial requirements while reducing regional disparities in employment opportunities.

Overall, the evidence indicates that Indonesia's future employment strategy should adopt a human capital-centered approach, where employment policies are integrated with digital transformation, industrial modernization, and inclusive economic development. This integrated framework would not only increase employment absorption but also enhance labor productivity, strengthen economic resilience, and support sustainable long-term growth in the digital era.

5. Conclusion

5.1 Main Findings

This study demonstrates that Indonesia's labor market experienced a substantial recovery during the 2020–2025 period following the COVID-19 pandemic. The Open

DOI: 10.26618

Unemployment Rate (OUR) declined from 7.07% in 2020 to approximately 4.76% in early 2025, while total employment increased to 145.77 million workers. Nevertheless, the labor market continues to exhibit structural weaknesses, particularly the dominance of informal employment, which accounts for approximately 56.1% of total employment and is generally characterized by relatively low productivity. These findings indicate that improvements in employment quantity have not yet been accompanied by equivalent improvements in employment quality.

The study further identifies digital transformation as a critical factor reshaping Indonesia's employment landscape. While technological advancement has generated new employment opportunities in information technology, e-commerce, logistics, and digital services, it has simultaneously widened the digital skills gap and increased the risk of job displacement caused by automation. Consequently, workforce adaptability has become an increasingly important determinant of labor market competitiveness in the digital economy.

5.2 Theoretical Implications

The findings contribute to the growing literature on labor market transformation by demonstrating that digitalization should be viewed not merely as a technological phenomenon but as a multidimensional process involving labor market restructuring, human capital development, and institutional adaptation. The study highlights that employment recovery in the post-pandemic period depends not only on macroeconomic expansion but also on the ability of workers and organizations to adapt to rapidly evolving technological environments. Therefore, sustainable employment growth requires an integrated framework linking digital transformation, workforce competencies, and inclusive labor market policies.

5.3 Policy and Practical Implications

The findings suggest that Indonesia's future employment strategy should be built upon three strategic policy pillars. First, vocational education and workforce training should be comprehensively reformed to emphasize digital competencies, lifelong learning, and industry-oriented skill development. Second, an inclusive employment ecosystem should be strengthened through the expansion of digital infrastructure, particularly for micro, small, and medium-sized enterprises (MSMEs), thereby enabling broader participation in the digital economy. Third, labor market regulations should achieve an appropriate balance between flexibility and worker protection by providing adequate social security and transition assistance for workers affected by automation and technological disruption.

Government initiatives, including the Kartu Prakerja program and incentives for labor-intensive industries, have demonstrated positive contributions to improving workforce competencies and employment opportunities. However, their long-term effectiveness depends on stronger coordination among government institutions, educational providers, and industry stakeholders to ensure that workforce development programs remain aligned with evolving labor market demands.

5.4 Limitations and Future Research

This study has several limitations. First, the analysis primarily relies on secondary data and policy documents covering the period 2020–2025, limiting the ability to capture firm-level or individual-level behavioral responses to digital transformation. Second, the study focuses on Indonesia as a whole and does not explicitly examine regional disparities in digital readiness or labor market outcomes.

Future studies are therefore encouraged to employ primary data, longitudinal designs, or regional comparative analyses to investigate the heterogeneous impacts of digital transformation across sectors and provinces. Further research may also

DOI: 10.26618

examine the effectiveness of digital workforce development programs, the adoption of artificial intelligence in human resource management, and the role of public-private partnerships in promoting inclusive employment in emerging digital economies.

5.5 Concluding Remarks

Indonesia is entering a critical phase in which its demographic dividend, supported by more than 190 million people of productive age, presents significant opportunities for sustainable economic growth. However, realizing this potential requires continuous investment in human capital, technological capabilities, and inclusive labor market institutions. Digital transformation should therefore be positioned not merely as an instrument for economic modernization but as a strategic driver of productive employment, higher labor productivity, and sustainable economic development. Through effective collaboration among government, industry, educational institutions, and civil society, Indonesia can transform digital disruption into an opportunity for achieving inclusive and resilient long-term growth rather than experiencing jobless growth that exacerbates socioeconomic inequality.

References

Arifin, A., & Sani, N. M. (2019). Analisis data jumlah pasar tenaga kerja di Indonesia tahun 2015–2018. Kinerja: Jurnal Ekonomi dan Manajemen, 16(2), 108–117.

Badan Pusat Statistik. (2023). Keadaan ketenagakerjaan Indonesia Agustus 2023. Badan Pusat Statistik.

Brennen, J. S., & Kreiss, D. (2016). Digitalization. In K. B. Jensen, R. T. Craig, J. D. Pooley, & E. W. Rothenbuhler (Eds.), The International Encyclopedia of Communication Theory and Philosophy. Wiley-Blackwell.

Ferliana, N., Rahmadia, N., Amelia, N., Shinta, F., & Wijanani, R. S. (2025). Transformasi digital dan dampaknya terhadap mobilitas tenaga kerja di Indonesia. Jurnal Inovasi Makro Ekonomi (IME).

Kementerian Komunikasi dan Informatika Republik Indonesia. (2022). Strategi nasional transformasi digital Indonesia 2021–2024. Kementerian Komunikasi dan Informatika Republik Indonesia.

Kohesi. (2025). Pengaruh digitalisasi terhadap produktivitas dan adaptasi tenaga kerja di Indonesia. E-Journal Cahaya Ilmu Bangsa.

Lewis, W. A. (1954). Economic development with unlimited supplies of labour. The Manchester School, 22(2), 139–191.

Lianingsih, N., & Irman, D. (2025). The impact of the digital economy on employment and workforce structure in Indonesia. International Journal of Business Economics and Social Development.

Maharani, A., Rafli, A., Y. L., A. N., Masturi, M., Rudiansyah, & Ulum, B. (2024). Ketenagakerjaan di Indonesia: Tantangan dan peluang di era globalisasi. Jurnal Manajemen, Akuntansi dan Pendidikan (JAMAPEDIK), 1(2).

Mankiw, N. G. (2018). Macroeconomics (10th ed.). Worth Publishers.

OECD. (2020). Digital economy outlook 2020. OECD Publishing.

Rahayu, R., Aulia, R., Atriani, E., Nurhayati, N., Arni, A., & Arsal, M. (2024). Transformasi digital terhadap peran akuntan sebagai konsultan digital: Dampak sosial dan ekonomi terhadap pengembangan industri dan ekonomi digital. IJMA (Indonesian Journal of Management and Accounting), 5(2).

Sagara, R., Setiawan, A. H., Almuzafir, & Purnawan, E. (2025). Dinamika kependudukan dan ketenagakerjaan: Tantangan dan kebijakan berkelanjutan untuk Indonesia. Jurnal Alwatzikhoebillah: Kajian Islam, Pendidikan, Ekonomi, Humaniora.

DOI: 10.26618
Schwab, K. (2016). The Fourth Industrial Revolution. World Economic Forum.

Sukirno, S. (2011). Makroekonomi: Teori pengantar. Rajawali Pers.

Todaro, M. P. (2011). Pembangunan ekonomi di dunia ketiga. Erlangga.

Todaro, M. P., & Smith, S. C. (2015). Economic development (12th ed.). Pearson.

Universitas Swadharma. (2023). Analisis digitalisasi industri dan penciptaan kesempatan kerja di Indonesia. Jurnal Kompleksitas.

Wahyudi, A., Thoifurqoni Assyamiri, M. B., Al Aluf, W., Fadhillah, M. R., Yolanda, S., & Anshori, M. I. (2023). Dampak transformasi era digital terhadap manajemen sumber daya manusia. Jurnal Bintang Manajemen (JUBIMA), 1(4), 99–111.

Westerman, G., Bonnet, D., & McAfee, A. (2014). Leading digital: Turning technology into business transformation. Harvard Business Review Press.