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Transformasi Pengangguran Struktural di Era Digital: Perspektif Pelaku Pasar Tenaga Kerja

Transformation of Structural Unemployment in the Digital Era: Perspectives of Labor Market Actors

Rahman[1*]
[1]Postgraduate Program in Islamic Economics, State Islamic Institute (IAIN) of Parepare
Jl. Amal Bhakti No.8, Bukit Harapan, Kec. Soreang, Kota Parepare, Sulawesi Selatan, Indonesia

*Corresponding author: rahmandft113@gmail.com

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ABSTRAK

Penelitian ini mengeksplorasi dampak digitalisasi terhadap pasar tenaga kerja dan pengangguran struktural. Menggunakan pendekatan kualitatif, penelitian menganalisis kebutuhan keterampilan baru, kesenjangan yang muncul, serta perspektif pelaku pasar tenaga kerja seperti pengusaha dan pengambil kebijakan. Hasil penelitian menunjukkan bahwa digitalisasi menciptakan tuntutan keterampilan berbasis teknologi, memperparah pengangguran struktural terutama di daerah pedesaan dengan akses teknologi yang terbatas. Kolaborasi multisektor dan pengembangan program pelatihan digital berkelanjutan menjadi kunci untuk mengatasi kesenjangan tersebut dan memanfaatkan potensi penuh dari era digital. Rekomendasi ini bertujuan untuk merancang strategi efektif dalam merespons perubahan pasar tenaga kerja dan meningkatkan kesejahteraan masyarakat.

Kata Kunci: Penagangguran struktural, Era Digital, Pasar Tenaga Kerja

ABSTRACT

This research explores the impact of digitalization on the labor market and structural unemployment. Using a qualitative approach, the research analyzes the need for new skills, emerging gaps, as well as the perspectives of labor market actors such as employers and policy makers. The research results show that digitalization creates demands for technology-based skills, exacerbating structural unemployment, especially in rural areas with limited access to technology. Multisector collaboration and the development of sustainable digital training programs are the keys to overcoming these gaps and exploiting the full potential of the digital era. This recommendation aims to design effective strategies to respond to changes in the labor market and improve people's welfare.

Keywords: *Structural unemployment, Digital Era, Labor Market*

1. INTRODUCTION

Structural changes in the labor market as a result of advances in digital technology are increasingly evident across various parts of the world. The transformation of structural unemployment in the digital era not only affects how people work and the demand for specific skills but also poses new challenges in labor absorption. According to Wahyudi et al. (2023), technological developments such as artificial intelligence, automation, and digital platforms have altered traditional work patterns, driving the need for new skills focused on digital literacy and adaptability.

The digital era has brought significant impacts to the global labor market. According to Fonna (2019), these technologies create structural unemployment in several economic sectors, such as manufacturing and administration, while other sectors like information technology are experiencing increased labor demand. This creates a phenomenon where old jobs disappear and new ones emerge, though not necessarily with the same quality. This is reinforced by Adha (2020), who notes an imbalance between the number of workers absorbed and the number of jobs lost due to digitalization.

According to Kurniawan and Aruan (2021), the transformation of structural unemployment not only affects changes in the labor market but also influences social and economic patterns. The process of digitalization accelerates job shifts, creating instability in income and job quality. They also emphasize the importance of continuous education and retraining to prepare the workforce for these changes. This is increasingly relevant in developing countries, where access to digital education and training is often limited.

Furthermore, according to Putro et al. (2023), this transformation also contributes to social inequality. The digital era increases disparities in income and access to employment opportunities, as those with digital skills are more competitive in obtaining new, high-quality jobs. They also highlight the importance of government policies in supporting digital training and social programs to mitigate the negative effects of structural unemployment.

In addressing these challenges, experts agree that governments, educational institutions, and industries must collaborate to build an ecosystem that supports adaptation to structural changes in the labor market. This aligns with the view of Hasnida, Adrian, and Siagian (2024), who recommend increased investment in educational infrastructure and training programs that respond to digital transformation. Hasnida also emphasizes the importance of collaboration between the public and private sectors in providing relevant training for new jobs emerging in the digital era.

This introduction highlights the urgency of understanding the transformation of structural unemployment in the digital era and the importance of responsive and adaptive policies to rapid changes in the labor market. Through a multidisciplinary approach that incorporates insights from experts and recent research, this study seeks to formulate effective strategies for addressing these challenges and promoting sustainable employment in the future.

This study is necessary to bridge the gap in understanding the impact of structural unemployment transformation in the digital era on the labor market. With the rapid advancement of digital technologies, many jobs are disappearing while new ones are being created—but not always of equivalent quality. The purpose of this study is to explore how these changes affect structural unemployment and the resulting socio-economic inequality. A deeper understanding of these dynamics is crucial for policymakers and stakeholders to formulate effective strategies that support labor absorption and minimize the negative impacts of structural unemployment in the digital age.

This research falls under the category of qualitative studies, focusing on the exploration and in-depth understanding of the impact of structural unemployment transformation in the digital era on the labor market. This qualitative study aims to reveal the subjective experiences of labor market participants and the dynamics of job structure changes resulting from digital technologies. The qualitative approach enables researchers to gain deeper insights into how these changes affect socio-economic inequality and workforce readiness. Through in-depth interviews with various informants such as HR managers, workers, and economists this study explores their perspectives on the challenges and relevant adaptation strategies in the digital era.

In analyzing this issue, the study employs content and thematic analysis methods. Content analysis is applied to explore and categorize interview data into main themes such as affected job types, new skill requirements, and socio-economic impacts. Subsequently, thematic analysis is used to link these themes to relevant theories, such as job structure and social inequality theories, to explain the relationship between digital technology and changes in the labor market. This process allows the researcher to identify general patterns and differences that emerge from the experiences and perceptions of labor market participants and to formulate policy recommendations that support adaptation to structural unemployment transformation in the digital era.

Based on this background, the research problem formulation focuses on how changes in job structure are caused by advancements in digital technology and how workers can adapt to newly emerging jobs. In addition, the study highlights the impact of automation and digitalization on the types and quality of available jobs. The problem formulation aims to offer clear, evidence-based solutions for policymakers and stakeholders in responding to these structural transformations.

Theory of Economic Transformation

The theory of economic transformation is a concept that describes structural changes in the economy from the agricultural sector toward industrial and service sectors, aiming to increase productivity and societal welfare. This theory was first introduced by Rosenstein-Rodan in 1943; however, its evolution has continued with contributions from various modern economists. According to Bukatja in Economic Development and Structural Transformation, the theory of economic transformation refers to a structural shift from the agricultural sector to the industrial sector as a crucial step in driving economic growth. According to Bukatja (2020), this transition involves not only physical changes in the economy but also institutional changes. Institutional strengthening is essential because effective institutions can support policies that promote investment, innovation, and competition within the industrial sector. This includes improving the quality of public services, ensuring good governance, and developing supportive regulatory frameworks.

Furthermore, the process of economic transformation also requires investment in physical and technological development. Bukatja emphasizes that such investment is vital for building infrastructure that supports the industrial sector, such as roads, ports, and energy networks. Adequate infrastructure facilitates the distribution of goods and services and supports the development of new industrial sectors. In addition, technological investment plays an important role in improving productivity and efficiency within the industrial sector.

Moreover, enhancing human resource capacity is a crucial factor in economic transformation. Bukatja explains that without skilled and competitive human resources, the industrial sector cannot develop optimally. Therefore, strengthening education and workforce training is essential to produce workers with skills relevant to modern industry demands. This includes developing educational curricula that align with technological advancements and implementing training programs that provide practical, industry-specific skills.

Lastly, economic policies that support sectoral diversification are also central to Bukatja's theory of economic transformation. According to him, a nation must implement policies that not only promote the growth of core industrial sectors but also encourage the development of emerging sectors with growth potential. Diversification is important to address global changes and potential economic uncertainties. With appropriate policies, a country can reduce dependency on certain sectors and enhance overall economic resilience. Thus, economic transformation not only drives economic growth but also creates long-term economic stability.

Structural Unemployment

According to Sukirno (2011), structural unemployment often arises due to changes in the economic structure that cause certain types of jobs to become obsolete. For example, the development of digital technology has replaced many manual jobs, such as conventional machine operators who are now substituted by automation technologies. This phenomenon is also evident in Indonesia, particularly with the emergence of technology-based industries that require specific skills not yet widely possessed by the local workforce. Meanwhile, Wahyudi (2023) explains that structural unemployment in the context of the modern economy is caused by a mismatch between the skills possessed by workers and the skills demanded by the labor market. Technological change and globalization have reduced traditional jobs while increasing the demand for new skills. This type of unemployment occurs when workers lack the necessary competencies for new types of employment.

According to Boediono (2021), structural unemployment in Indonesia is largely influenced by the shift from the agricultural sector to the industrial and service sectors. This transition creates imbalances, especially among rural workers who tend to have limited access to new skill training. Furthermore, globalization exacerbates this condition because the influx of imported goods often suppresses local industries that employ a large number of unskilled workers. This indicates that structural unemployment is not only an individual issue but also a systemic one.

Schumpeter (2017), through his concept of creative destruction in Capitalism, Socialism, and Democracy, emphasizes that technological innovation often has a destructive effect on old types of jobs while simultaneously creating new ones. In Indonesia, this is evident in the transportation sector, where the rise of online transportation applications has replaced traditional models such as conventional motorcycle taxis (ojek pangkalan). However, Schumpeter also argues that this process is an inevitable part of economic progress; therefore, policies that promote worker retraining are crucial to mitigating its negative impacts.

In The Indonesian Economy: Challenges and Prospects, Tambunan (2022) suggests that one effective solution to address structural unemployment is improving access to skill-based education (vocational education). Tambunan stresses that formal education must be aligned with the demands of the

modern labor market so that workers can adapt to technological changes. In addition, he highlights the importance of collaboration among government, businesses, and educational institutions in providing reskilling and upskilling programs.

Swasono (2019), in Pancasila Economics and Social Welfare, offers a locally grounded perspective on addressing structural unemployment. He suggests that the principles of Pancasila can serve as a foundation for creating more inclusive economic policies. By prioritizing local empowerment, such as developing micro, small, and medium enterprises (MSMEs), the government can create jobs that align with the community's skill sets. This approach also helps reduce dependence on the formal sector, which often imposes higher entry requirements for workers.

At the regional level, the Central Bureau of Statistics (BPS, 2023) reported that open unemployment in Indonesia continues to be dominated by structural unemployment. This data shows that the shift from traditional jobs to technology-based employment requires stronger government policy support. For instance, regions that have long depended on the agricultural sector need intensive training programs to equip workers with skills relevant to the industrial or service sectors.

Moreover, the role of information technology can either alleviate or exacerbate structural unemployment. Rifkin (2020), in The Green New Deal, explains that green technologies can create new employment opportunities for those skilled in this field. However, on the other hand, if not accompanied by improvements in workforce competence, technological innovation may widen labor market inequalities, leaving many unskilled individuals behind.

Overall, addressing structural unemployment requires a multidimensional approach encompassing education, technology, and public policy. Collaboration among the government, private sector, and educational institutions must be strengthened to build a system capable of anticipating future structural economic changes. Thus, Indonesia's workforce can be better prepared to face the challenges of globalization and the continuously evolving industrial revolution.

Labor Market

The labor market is the meeting point between job seekers and employers, where the processes of labor supply and demand take place. In the context of Indonesia, the labor market exhibits complex dynamics influenced by various factors such as economic structure, education level, and technological development. According to Priyanto (2023b) in his book Employment in the Era of Globalization, Indonesia's labor market is still dominated by the informal sector, which absorbs more than 55% of the total workforce.

One of the main characteristics of the Indonesian labor market is the high proportion of workers in the informal sector. This is largely due to limited access to formal education and the scarcity of employment opportunities in the formal sector. According to data from the Central Bureau of Statistics (BPS) in 2023, the informal sector remains the primary absorber of labor in Indonesia, especially in rural areas. However, this condition also creates challenges in terms of labor protection, such as access to social security and decent wages.

On the other hand, Indonesia's formal labor market continues to develop, particularly in sectors supported by foreign investment, such as manufacturing and information technology. According to Santoso (2023) in Labor Transformation in Indonesia, the formal sector holds significant potential to create more stable and sustainable employment opportunities. However, workers' skills often serve as a major barrier for job applicants seeking to enter this sector.

The role of education and training is therefore crucial in improving the quality of Indonesia's workforce. The vocational education system, as described by Nasution (2023) in Vocational Education in the Digital Era, is designed to produce work-ready graduates capable of meeting labor market demands. However, the implementation of vocational education in Indonesia still faces challenges, including limited facilities and insufficient integration with industry needs.

In the digital era, Indonesia's labor market has undergone significant changes. Automation and artificial intelligence have replaced several types of traditional jobs but have also created new opportunities in fields such as information technology, digital design, and online services. According to Rahayu (2023) in Digitalization and the Labor Market in Indonesia, this transformation requires workers to continuously enhance their digital skills to remain relevant in the labor market.

Another emerging phenomenon is the increasing number of freelancers in Indonesia. This work model has gained popularity due to its flexibility in terms of time and work location. According to a report by Freelancer.com Indonesia (2023), the freelance sector has experienced rapid growth, particularly among millennials and Generation Z. However, freelancers often lack adequate social security and legal protection, as highlighted by Putri (2023) in Freelancing and Worker Welfare in Indonesia.

Labor market dynamics in Indonesia are also influenced by labor mobility across regions. Many workers from rural areas migrate to major cities in search of employment. According to Hidayat (2023) in Urbanization and the Labor Market in Indonesia, this migration places pressure on urban infrastructure but also makes a significant contribution to urban economies.

One of the major challenges in Indonesia's labor market is gender inequality. Data from the Ministry of Manpower (2023) show that women's participation in the labor force remains lower than that of men, particularly in the formal sector. This gap is due to various factors, including domestic responsibilities still predominantly borne by women and gender discrimination in the workplace.

The labor market is also influenced by government regulations. Labor policies such as regional minimum wages (UMR) and worker protection play a crucial role in balancing employer needs with employee rights. According to Santoso (2023), adaptive and inclusive policies are required to ensure that the labor market continues to grow without compromising workers' welfare.

Furthermore, globalization has had a significant impact on Indonesia's labor market. In the era of globalization, competition occurs not only at the local but also at the global level. According to Priyanto (2023), Indonesia's labor market must adapt to international standards to remain competitive in the global market. International education and foreign language proficiency have become essential assets for Indonesian workers.

In the agricultural sector which remains the backbone of the economy in many regions the labor market faces challenges from modernization. Modern agricultural technologies reduce the need for manual labor but also create new opportunities for skilled workers capable of operating machinery and technology. Nasution (2023) notes that agricultural modernization must be accompanied by workforce training to prevent workers from being displaced by technology.

The labor market in the service sector also continues to grow, particularly in tourism and hospitality. According to a report by the Ministry of Tourism (2023), this sector employs a large number of workers, especially in tourist destinations such as Bali, Yogyakarta, and Lombok. However, service quality remains a major challenge that must be addressed to enhance the sector's competitiveness.

Environmental issues have also begun to affect the labor market. In her book Green Jobs in Indonesia, Putri (2023) notes that the trend of green jobs employment that supports environmental sustainability is emerging in Indonesia. These jobs include fields such as renewable energy, waste management, and organic agriculture.

Indonesia's labor market is also shaped by demographic factors. With its large youth population, Indonesia has significant potential to harness a demographic dividend. However, as highlighted by Rahayu (2023), this demographic advantage can only be realized if young workers receive sufficient education and training to meet labor market demands.

In conclusion, the labor market in Indonesia is a dynamic and complex entity influenced by various factors, including technology, education, regulation, and demographics. With appropriate policies and collaboration among the government, private sector, and society, Indonesia's labor market holds great potential to become more inclusive, competitive, and sustainable in the future.

2. RESEARCH METHOD

This study employs a qualitative approach. According to Sarwono (2006), the purpose of qualitative research is to deeply understand social phenomena through the interpretation of data collected from various sources. Qualitative research emphasizes the exploration of meaning and understanding of how individuals and groups perceive changes in the labor market resulting from digitalization. In this context, the study focuses on analyzing the challenges faced by workers and identifying opportunities that can be leveraged to reduce structural unemployment in the digital era.

The data collection method used in this research is library research, in which the researcher reviews various sources of literature such as books, journal articles, research reports, and official documents relevant to the phenomenon of structural unemployment and labor market transformation in the digital age. Data analysis is conducted using a descriptive-analytical approach, by identifying thematic patterns within the collected literature to understand how digital technology transforms labor structures and the employment opportunities that emerge.

In addition, this research also considers the perspectives of labor market participants—including workers, employers, and policymakers—through an in-depth analysis of documented case studies. The triangulation technique is applied to ensure data validity by comparing information from multiple literature sources. Thus, this research not only aims to explain the phenomenon but also provides practical

recommendations for the government and the private sector in formulating strategies to reduce structural unemployment in the digital era.

3. RESULT AND DISCUSSION

A. Result

Based on the research method employed, the findings of this study provide an in-depth understanding of the transformation of structural unemployment in the digital era. Through a qualitative approach, this research highlights how changes in digital technology have influenced the structure of the labor market. Literature analysis indicates that digitalization has created new demands for technology-based skills such as data analysis, programming, and adaptability to digital work environments. This shift not only opens new opportunities but also presents challenges, particularly for workers in traditional sectors who face skill gaps.

The study finds that the skill gap is the main factor exacerbating structural unemployment. Case studies from various literature sources reveal that low-skilled workers tend to be excluded from the labor market because they cannot keep up with technological developments. Conversely, some sectors are experiencing a shortage of workers with the appropriate skills to meet the demands of the digital era. This imbalance reflects an urgent need for targeted training and retraining programs designed to bridge the gap between existing skills and emerging job requirements.

Furthermore, perspectives from labor market stakeholders such as employers and policymakers—show considerable potential for cross-sector collaboration in mitigating the negative impacts of structural unemployment. For instance, many employers recognize the importance of investing in workforce training, while governments are expected to play a more active role in providing digital infrastructure. The triangulation analysis conducted in this research reinforces the finding that synergy between the public and private sectors can be key to creating a more inclusive labor market.

This study also highlights the social and economic impacts arising from structural unemployment in the digital era. The inability of many traditional sector workers to adapt to technological changes has widened social inequality, particularly in rural and underdeveloped areas. Unequal access to digital technology aggravates this situation, leaving many communities unprepared to participate in the digital economy. This not only reduces individual welfare but also hampers economic growth in affected regions. Therefore, investment in technological infrastructure and digital literacy programs is crucial to enhance public engagement in the ongoing labor market transformation.

Moreover, this research emphasizes the importance of an inclusive approach to addressing structural unemployment. Vulnerable groups such as elderly workers, women, and people in underdeveloped regions often face additional barriers to participating in the digital labor market. Thus, training and retraining programs should be designed to reach these groups, taking into account their specific needs. In this context, multisector collaboration among technology companies, educational institutions, and government agencies becomes critical. By fostering an ecosystem that supports inclusive digital transformation, this study provides a clear roadmap for reducing structural unemployment while leveraging the full potential of the digital era to improve overall societal well-being.

The study also identifies the need to enhance digital literacy across all levels of society as a fundamental step toward addressing structural unemployment. Improving digital skills should not be limited to the formal labor sector but must also extend to informal sectors and rural communities. In this regard, digital-based education in both formal and non-formal learning systems should be expanded to incorporate comprehensive digital literacy. The government needs to strengthen educational curricula with modules that teach digital skills from an early age and provide incentives to educational institutions that adopt technology in teaching. In this way, future generations will be better prepared to face technological changes, thereby reducing the skill gaps that drive structural unemployment in the digital era. Through this approach, structural unemployment can be addressed more effectively and inclusively, creating a society that is more resilient and adaptive to technological change in the future.

The practical recommendations derived from this study include the development of continuous digital skills training programs, the provision of technological access in remote areas, and the formulation of policies that support vulnerable workers. By integrating perspectives from various labor market stakeholders, this research makes a tangible contribution to designing effective strategies to reduce structural unemployment in the digital era while also harnessing the opportunities created by technological advancement.

B. Discussion

The transformation of structural unemployment in the digital era has created new dynamics within the labor market, leading to the emergence of job opportunities that did not previously exist. Advances in information and communication technology (ICT) have driven the growth of new sectors such as e-commerce, financial technology (fintech), and digital application development, which now serve as key engines of job creation. From the perspective of labor market participants—employers and workers alike—these changes present opportunities to adapt to new roles such as e-commerce specialists, cybersecurity experts, and mobile application developers. In addition, the creative sector has experienced rapid growth, enabling individuals to use digital platforms to showcase their talents in areas such as graphic design, content writing, and video production. For labor market actors, this flexibility represents a strategic opportunity to respond to increasingly dynamic market demands.

However, alongside these opportunities, the digital era also accentuates the challenges of structural unemployment. Automation and artificial intelligence (AI) have replaced many routine and repetitive tasks that previously sustained manual workers. In the manufacturing sector, for example, automated machines have taken over human labor in production processes, rendering many mechanical and low-skilled jobs obsolete. From the perspective of labor market participants—particularly workers—this situation creates an urgent need to adapt and acquire new skills that align with the demands of the digital economy. Workers who fail to keep pace with these developments will face significant difficulties in securing appropriate employment, thereby worsening structural unemployment.

Addressing these challenges requires collaboration among labor market stakeholders, policymakers, and educational institutions. Companies can invest in reskilling and upskilling programs for their employees to meet the evolving requirements of digital roles. Governments can support this process by providing equitable access to technological infrastructure, ensuring that all individuals have equal opportunities to participate in the digital labor market. From the workers' perspective, readiness to adapt and the ability to leverage emerging opportunities through digital platforms are essential. Through a collaborative and inclusive approach, the transformation of structural unemployment in the digital era can be turned into an opportunity to create a more sustainable and equitable employment ecosystem.

1) Transformation of the Labor Market Structure

This study reveals how the development of digital technology has significantly transformed the structure of the labor market. Digitalization has created new demands for technology-based skills such as data analysis and programming. Many traditional sectors are unable to adapt quickly to these changes, resulting in an increasingly wide skills gap. Consequently, workers in these sectors often face difficulties in securing suitable employment because they lack the competencies required by a labor market increasingly dominated by digital technologies. This highlights the need for continuous training programs that equip workers with new skills, enabling them to adapt to the ongoing transformations in the labor market.

Moreover, these structural changes also affect the dynamics among different sectors of the economy. Sectors that were previously less impacted by digital technology, such as manufacturing and agriculture, are now under pressure to enhance productivity through technology adoption. This adds challenges for workers in these sectors, who must acquire new skills to remain competitive. Therefore, not only individual workers but also entire sectors need to develop policies and strategies to support the necessary adjustments within their labor force.

Ultimately, this transformation of the labor market requires governments and educational institutions to take a more proactive role in providing training programs that align with market needs. Training programs focusing on digital skills development should be designed and implemented broadly so that all workers—including those in traditional sectors—have equal opportunities to improve their skills. This approach will accelerate adaptation processes and mitigate the negative impacts of structural changes in the labor market.

2) The Skills Gap as a Factor in Structural Unemployment

The skills gap has become one of the main factors aggravating structural unemployment in the digital era. Research shows that low-skilled workers are often marginalized from the labor market because they cannot keep up with the technological developments required. Traditional sectors such as agriculture, manufacturing, and services frequently face difficulties in finding workers with the necessary technical capabilities. This creates an imbalance between labor supply and demand, where workers lack the skills relevant to available jobs. The solution to this issue must include training and retraining programs specifically designed to help workers acquire the new skills required by the evolving labor market.

Furthermore, studies indicate that this skills gap continues to worsen as technology changes rapidly. Many workers in traditional sectors cannot keep pace with these developments due to limited access to training necessary to update their skills, leaving them continuously excluded from employment

opportunities. Therefore, collaboration among the government, private sector, and educational institutions is crucial to create training programs that can bridge this gap. Policies facilitating partnerships between industries and educational institutions can help prepare workers with the skills demanded by the job market.

The skills gap also has broader social implications. Workers lacking the necessary digital skills are often trapped in poor economic conditions and face difficulties finding decent jobs. This not only affects individual well-being but also exacerbates social inequality. Hence, it is essential to develop inclusive training programs that reach vulnerable groups such as women, older workers, and people in remote areas. In this way, the skills gap can be addressed comprehensively, enabling all groups in society to fully participate in the digital economy.

3) Social and Economic Impacts of Structural Unemployment in the Digital Era

This study highlights the social and economic impacts arising from structural unemployment in the digital era. The inability of many workers in traditional sectors to adapt to technological changes has widened social inequality. In rural and underdeveloped regions, unequal access to digital technology worsens this situation, leaving many communities unprepared to participate in the digital economy. This not only reduces individual welfare but also hinders economic growth in these regions. Therefore, investment in technological infrastructure—such as internet access and digital devices—is essential to enhance public participation in the transformation of the labor market.

The social impacts of structural unemployment also extend to other social dimensions. For example, increasing income inequality can exacerbate social injustice, as only certain groups are able to access the new opportunities created by digitalization. This threatens social stability and raises the risk of social conflict. Consequently, inclusive social policies—such as social assistance programs and equitable employment opportunities—must be integrated into strategies addressing structural unemployment. Multisector collaboration among technology companies, educational institutions, and governments can play a crucial role in building an ecosystem that supports inclusive digital transformation.

Furthermore, this research emphasizes the importance of an inclusive approach to addressing structural unemployment. Vulnerable groups—such as older workers, women, and communities in remote areas—often face additional barriers to participating in the digital labor market. Therefore, training and retraining programs must be designed to reach these groups while considering their specific needs. Strong multisector collaboration can ensure that all these groups gain equal access to training and employment opportunities. By creating an ecosystem that supports inclusive digital transformation, this study provides a clear roadmap for reducing structural unemployment while simultaneously leveraging the full potential of the digital era to enhance overall social welfare.

4) Solutions for Reducing the Impact of Unemployment

From the perspective of labor market actors, cross-sector collaboration can serve as a key strategy in mitigating the negative impacts of structural unemployment. Many employers recognize the importance of investing in workforce training to address the skills shortages resulting from digitalization. Companies need to work together with educational institutions to develop training programs that provide technical skills relevant to market needs. This creates synergy between the private sector and educational institutions, which not only helps workers adapt to technological changes but also ensures that corporate workforce demands are met. Such collaboration may also involve government participation by providing training subsidies and tax incentives for companies investing in workforce development.

On the other hand, the government is expected to play a more active role in providing the digital infrastructure that supports this transformation. Governments should invest in digital education and technology training programs that help workers acquire the necessary skills. In addition, policies that encourage innovation and the development of new sectors are also vital to creating more inclusive employment opportunities. With supportive policies in place, companies will be more willing to invest in improving their workforce's skills, knowing that the government will back their initiatives.

The triangulation analysis conducted in this research reinforces the finding that synergy between the public and private sectors is crucial to creating a more inclusive labor market. Such collaboration can help reduce imbalances in the labor market and address structural unemployment issues. By involving multiple stakeholders in the policy planning and implementation process, more comprehensive and sustainable solutions can be developed to address the challenges of the digital era.

4. CONCLUSION AND RECOMENDATIONS

A. Conclusion

The findings of this study affirm that digital transformation has brought significant changes to the structure of the labor market, creating both opportunities and challenges. The demand for technology-based skills—such as data analysis and programming—has become a top priority in the digital era. However, the skills gap remains a major obstacle for many workers in traditional sectors who struggle to adapt to these changes. The imbalance between labor demand and the availability of workers with relevant skills has led to an increase in structural unemployment, particularly in underdeveloped regions with limited access to digital technology.

To address these challenges, cross-sector collaboration among the government, educational institutions, and private companies is essential. Investments in digital infrastructure, inclusive skills training programs, and policies that support vulnerable workers—such as women and rural communities—are strategic measures that must be prioritized. Through a holistic and inclusive approach, the transformation of the labor market in the digital era can be leveraged to enhance social and economic welfare while reducing inequalities arising from structural unemployment.

B. Recommendations

Based on the research findings, several suggestions and recommendations can be proposed to address structural unemployment in the digital era. First, the government, companies, and educational institutions need to develop sustainable digital training programs that are relevant to labor market demands. These programs should focus on developing essential skills such as data analysis, programming, and technological adaptability, which have become the primary requirements in the modern digital workforce. Second, improving digital infrastructure is crucial, especially in rural and underdeveloped areas, to ensure more equitable access to technology. The provision of affordable internet access and technological devices will enable communities to participate in the digital economy and reduce regional disparities.

In addition, multisector collaboration among the government, private sector, and educational institutions must be strengthened in designing policies and curricula aligned with industry needs. This synergy may also involve the allocation of funding and resources for training and workforce retraining programs. An inclusive approach is equally essential to reach vulnerable groups such as women, elderly workers, and communities in remote areas. Training programs should be designed with consideration of the specific needs of these groups to ensure that digital transformation benefits not just a select few but has a broad positive impact on society as a whole. Finally, continuous evaluation and monitoring of implemented training programs and policies are necessary to assess their effectiveness and adjust them according to the evolving dynamics of the labor market. Such adaptive governance will ensure that workforce development strategies remain relevant, responsive, and inclusive in facing future technological changes.

REFERENCES

Adha, L. A. (2020). Digitalization Of Industry And Its Impact On Employment And Labor Relations In Indonesia. Jurnal Kompilasi Hukum, 5(2), 267–298.

Boediono. (2021). The Indonesian Economy In A Macro Perspective. Yogyakarta: BPFE.

BPS. (2023). Indonesian Labor Statistics. Jakarta: Badan Pusat Statistik.

Bukatja. (2020). Development Economics And Structural Transformation. Yogyakarta: UPP STIM YKPN.

Fonna, N. (2019). The Development Of The Industrial Revolution 4.0 In Various Fields. Guepedia.

Hasnida, S. S., Adrian, R., & Siagian, N. A. (2024). Transformation Of Education In The Digital Era. Jurnal Bintang Pendidikan Indonesia, 2(1), 110–116.

Hidayat, A. (2022). Digital Culture: Opportunities And Challenges. Jakarta: Gramedia Pustaka Utama.

Hidayat, A. (2023). Urbanization And The Labor Market In Indonesia. Yogyakarta: Deepublish.

Kominfo. (2023). Indonesia's Digital Transformation Report. Jakarta: Ministry Of Communication And Information Technology.

Kurniawan, F. E., & Aruan, N. L. (2021). Digitalization And New Work Patterns: Impacts On Industrialization And Labor Policy Responses. Jurnal Sosioteknologi, 20(3), 395–409.

Mulyono, T. (2023). Digitalization Of Education In The 5.0 Era. Bandung: Alfabeta.

Nasution, A. (2022). Vocational Education In The Digital Era. Jakarta: Prenada Media.

Nasution, A. (2023). Vocational Education In The Digital Era. Jambi: Prenada Media.

Priyanto, H. (2023a). Employment In The Digital Era. Yogyakarta: Deepublish.

Priyanto, H. (2023b). Employment In The Era Of Globalization. Bandung: Alfabeta.

Putri, E. (2023a). Freelance And Worker Welfare In Indonesia. Surabaya: Laksana.

Putri, E. (2023b). Green Jobs In Indonesia. Surabaya: Laksana.

Putri, E. (2023c). Green Technology In The Digital Era. Surabaya: Laksana.

Putro, A. N. S., Wajdi, M., Siyono, S., Perdana, A. N. C., Saptono, S., Fallo, D. Y. A., Khoirotunnisa, A. U., Ningtyas, K. W. A., Leuwol, F. S., & Pationa, S. B. (2023). Learning Revolution In The Digital Era. PT Kodogu Trainer Indonesia.

Rahayu, E. (2023a). Digitalization And The Labor Market In Indonesia. Surabaya: Laksana.

Rahayu, E. (2023b). Digitalization Of Msmes In Indonesia. Surabaya: Laksana.

Rifkin, J. (2020). The Green New Deal: Why The Fossil Fuel Civilization Will Collapse By 2028, And The Bold Economic Plan To Save Life On Earth. New York: St. Martin's Press.

Santoso, D. (2023a). Indonesia's Digital Policy. Malang: UB Press.

Santoso, D. (2023b). Labor Transformation In Indonesia. Malang: UB Press.

Sarwono, J. (2006). Qualitative And Quantitative Research Methods. Yogyakarta: Graha Ilmu.

Schumpeter, J. (2017). Capitalism, Socialism, And Democracy. New York: Harper & Row.

Sukirno, S. (2011). Macroeconomics: An Introduction To Theory. Jakarta: PT Rajagrafindo Persada.

Swasono, S. E. (2019). Pancasila Economics And Social Welfare. Jakarta: Kompas Gramedia.

Tambunan, T. T. (2022). The Indonesian Economy: Challenges And Hopes. Jakarta: Ghalia Indonesia.

UKM. (2023). Digital Transformation Of Msmes In Indonesia. Jakarta: Ministry Of Cooperatives And Smes.

Wahyudi, A. (2023). Employment Management And Unemployment In Islam: Causes, Impacts, And Solutions. Jurnal Masharif Al-Syariah: Jurnal Ekonomi Dan Perbankan Syariah, 8(3).

Wahyudi, A., Assyamiri, M. B. T., Al Aluf, W., Fadhillah, M. R., Yolanda, S., & Anshori, M. I. (2023). The Impact Of Digital Era Transformation On Human Resource Management. Jurnal Bintang Manajemen, 1(4), 99–111.

World Health Organization (WHO). (2023). Digital Health Strategies For Developing Countries. Geneva: WHO Press.