

IMPACT OF AUTOMATION ON EMPLOYMENT IN DEVELOPING VS DEVELOPED COUNTRIES

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Abstract

This study aims to analyse and compare the impact of automation on employment in developing and developed countries. The literature review is conducted by examining various scientific literature, reports of international organisations, and secondary data related to changes in the structure of employment due to the adoption of automation technology. The results show that developed countries are generally better prepared for digital transformation thanks to adequate infrastructure, adaptive education systems, and progressive labour policies. Automation in developed countries tends to create new job opportunities in the technology and services sectors, although it still requires an increase in labour skills. In contrast, in developing countries, automation has the potential to cause greater disruption to employment, particularly in labour-intensive and informal sectors, due to limited access to education, training and digital infrastructure. The study concludes that to minimise the negative impacts of automation and maximise the opportunities, developing countries need to accelerate investment in education, digital skills training, and strengthening inclusive labour policies. The findings are expected to serve as a reference for policymakers and stakeholders in formulating adaptive labour strategies in the era of automation.

Keywords: Automation, Employment, Developing Countries, Developed Countries.

Introduction

Automation has been one of the major trends in global industrial transformation over the past few decades. Technological developments such as robotics, artificial intelligence and other automation systems have fundamentally changed the way companies produce goods and services and affected the structure of labour markets around the world. Developed and developing countries are now facing new challenges and opportunities arising from the adoption of automation in various sectors of the economy (Díaz Pavez & Martínez-Zarzoso ., 2023)

In developing countries like Indonesia, labour-intensive industries such as textiles, garments, manufacturing and agriculture have long been the backbone of the national economy. These sectors not only play an important role in economic growth, but also provide jobs for millions of people and help reduce poverty levels. However,

with the increasingly widespread application of automation technology, the paradigm of labour-intensive industries has begun to undergo significant changes (Sahim, 2025).

The application of automation in the industrial sector brings great potential to improve production efficiency, lower operational costs, and increase competitiveness in the global market. Automated machines equipped with artificial intelligence are able to complete repetitive tasks with high speed and accuracy, thereby reducing dependence on human labour. In addition, automation also enables production processes that are more flexible and adaptive to changes in market demand (Krenz et al., 2020).

However, behind these benefits, automation also poses social and economic challenges that are not simple. One of the main concerns is the potential reduction in the number of available jobs, especially for workers with low skills or limited education. For this group, the risk of being replaced by machines is a worrying reality and could increase structural unemployment rates in developing countries (Khan, 2025). In addition, the skills gap between the existing workforce and the needs of an increasingly advanced industry is a challenge. Rapid technological change requires large investments in training and education to prepare the workforce for new demands in the labour market. However, limited resources and educational infrastructure in many developing countries are often a barrier to upskilling the workforce (OECD, 2020).

In developed countries, automation is also having a major impact on employment, although the context and responses are different. Countries with better education levels and technological infrastructure tend to be better prepared for these changes. They are able to provide reskilling and upskilling programmes for affected workers, making the transition to new jobs smoother (Díaz Pavez & Martínez-Zarzoso, 2023).

Automation in developed countries often shifts the focus from heavy manual labour to lighter, safer and more accessible work. This opens up opportunities for various demographics, including women, the elderly, and retirees, to remain engaged in the workforce. In addition, automation can also extend the working lives of older workers by reducing the physical intensity of work. However, developed countries also face challenges in attracting and retaining labour from diverse backgrounds. Efforts to change perceptions about the value of skills-based work are important, especially amid the dominant view that success can only be achieved through formal higher education. Investment in training and skills development is key to creating inclusive and meaningful work environments (Sahim, 2025).

On the other hand, automation also creates new opportunities for highly skilled jobs, such as programming, maintenance and development of automation systems. However, the distribution of these opportunities is uneven, posing new challenges in equitable access to quality jobs in both groups of countries (Krenz et al., 2020).

Industrial transformation triggered by automation is also impacting labour migration patterns, both in developed and developing countries. Companies need to consider incentives and initiatives to encourage worker migration to new work sites, especially in megaprojects that are often located outside city centres. In addition, it is important to build awareness about the job opportunities available in different sectors, as well as addressing the misperceptions among the public, especially the younger generation. These measures can help expand the talent base available to fill new positions arising from automation (Khan, 2025).

Overall, automation has opened the door to greater flexibility and efficiency in the world of work, but it also demands rapid adaptation from workers and policymakers. Developing and developed countries alike are faced with the need to balance the economic benefits of automation with social protections for vulnerable groups.

Thus, research on the impact of automation on employment in developing and developed countries is highly relevant to understanding future labour dynamics. This research is expected to provide comprehensive insights for policymakers, industry players, and society in designing inclusive and sustainable strategies in the era of automation.

Research Methods

The research method used is a literature review, namely by collecting, reading, and analysing various relevant literature from scientific journals, books, and research reports related to the impact of automation on employment in developing and developed countries (Torraco, 2020). The selected literature came from reliable sources and was identified through academic databases such as ScienceDirect, SpringerLink, and Google Scholar with keywords appropriate to the research topic. All data and information obtained were then analysed thematically to identify patterns, relationships, and emerging trends related to the effect of automation on employment, so as to provide in-depth conceptual understanding without the limitations of primary data collection (Bolderston, 2008).

Results and Discussion

Differences in Labour Structure towards Employment in Developing and Developed Countries

The differences in labour structure between developing and developed countries greatly affect the dynamics of employment in both groups of countries. Developed countries have generally undergone an economic transformation from the primary sector to the tertiary and quaternary sectors, where most of the population works in services, technology and high-tech industries. Meanwhile, developing countries are still heavily dependent on primary sectors such as agriculture, plantations,

and mining, with the rest of the labour force absorbed in the still-developing manufacturing sector (OECD, 2020).

The dominant economic structure in developed economies makes employment in the services and technology sectors very broad and diverse. This not only increases labour productivity, but also promotes knowledge-based economic growth and innovation. In contrast, in developing countries, employment is dominated by jobs in the informal sector and traditional agriculture, which generally have low productivity and economic value added (Agrawal et al., 2022).

The quality of labour in developed countries also tends to be higher because it is supported by a good education system and access to adequate training and skills development. Developed countries are able to produce a competitive workforce that is ready to compete in the global market. In contrast, developing countries often face challenges in the form of low levels of education and labour skills, making it difficult to compete with developed countries and vulnerable to structural unemployment (Atmaja et al., 2022).

Unemployment rates in developed countries are relatively low due to the wide availability of employment opportunities and good social security systems. Governments in developed countries are also able to provide adequate social protection for vulnerable groups, thus maintaining labour stability. Meanwhile, developing countries tend to have high unemployment and underemployment rates due to limited productive employment and rapid population growth (World Bank, 2023).

Differences in labour structure are also reflected in income patterns. Developed countries have high average per capita income, supported by competitive labour wages in the industrial and service sectors. In contrast, in developing countries, per capita income tends to be low because most of the workforce works in the informal and agricultural sectors with minimal wages (International Labour Organization, 2020).

In developed countries, industrialisation and modernisation have created new job opportunities in information technology, research and product development. This transformation has led to flexible and innovative labour markets. Developing countries, although starting to experience growth in the industrial sector, still face obstacles in developing the services and technology sectors due to limited infrastructure and human resources (Aleksynska., 2021)

Employment in developed countries is also more stable because it is supported by good labour regulations, protection of workers' rights, and a strong financial market system. Developing countries often face problems of weak regulation, lack of labour protection, and dependence on the informal sector that lacks adequate social security (Adha et al., 2020).

Economic development in developed countries is more equitable due to continuous investment in education, health and infrastructure. This allows the labour force to continuously improve its quality and productivity. In developing countries,

development is often concentrated in urban areas, while in rural areas much of the workforce is still dependent on traditional agriculture with limited access to education and health facilities (Tsamrotulfikriyah ., 2025)

Differences in the structure of labour also have an impact on poverty levels and people's welfare. Developed countries are able to reduce poverty through the creation of quality jobs and effective social protection systems. Developing countries, on the other hand, still face major challenges in overcoming poverty due to limited employment opportunities and low labour productivity. In addition, developed countries have an advantage in technology adoption and innovation, so they are able to create new jobs that are relevant to the needs of the global market. Developing countries are still lagging behind in terms of technology adoption, making it difficult to catch up in the creation of modern and quality jobs (Foster-McGregor & Verspagen ., 2022)

Differences in labour structure also affect labour mobility. In developed countries, labour mobility tends to be high due to employment opportunities in various sectors and regions. Developing countries face mobility barriers due to limited access to education, training and transport infrastructure.

Overall, the differences in labour structure between developing and developed countries largely determine the quality, quantity, and stability of available employment. Developed countries are ahead in terms of economic sector diversification, labour quality and social protection, while developing countries still face major challenges in improving productivity, labour quality and expanding productive employment.

Adaptation of labour technology to employment in developing and developed countries

Technological adaptation in employment has become a key factor that differentiates employment dynamics in developing and developed countries. Developed countries, such as the United States, Japan and Germany, have generally integrated advanced technology in almost all sectors of the economy, from manufacturing to services to public services. The use of automation, artificial intelligence (AI) and digitalisation systems has increased efficiency, productivity and created more flexible working models, such as remote working and hybrid working (Benali, 2021) .

In contrast, developing countries still face major challenges in the technology adaptation process. Uneven digital infrastructure, especially in rural areas, is one of the main obstacles. In addition, limited access to technology-based education and training makes most of the workforce in developing countries unprepared for the changes brought by automation and digitalisation (Chang & Huynh, 2020) .

In developed countries, digital transformation has led to the creation of new jobs in technology-based sectors, such as software development, data analytics and digital services. Workers who are able to adapt to technological developments have good career prospects and opportunities for growth. Governments and the private sector in developed countries are also actively conducting reskilling and upskilling programmes to ensure the workforce remains relevant to the needs of a dynamic labour market (Benali, 2021).

Meanwhile, in developing countries, automation and digitalisation often result in job losses in traditional sectors, such as agriculture and manufacturing. Jobs that are routine and easily codified are the most vulnerable to being replaced by machines or software. However, technological development also opens up opportunities for the creation of new jobs, especially in the digital sector and creative industries, although the number is still limited compared to the jobs lost (Foster-McGregor & Verspagen, 2022).

One of the main challenges in developing countries is the skills gap between the existing workforce and the needs of modern industry. Many workers lack basic digital skills, making it difficult to compete in an increasingly digitised job market. Therefore, investment in technology education and training is crucial to accelerate adaptation and reduce the risk of structural unemployment (Tsamrotulfikriyah, 2025).

Developed countries also face their own challenges, such as the growing gap between high- and low-skilled workers. Automation tends to replace low-skilled jobs, while the demand for workers with high cognitive and analytical skills is increasing. This has prompted developed countries to continue strengthening their education and training systems so that all labour groups can adapt quickly to technological change (Adha et al., 2020).

In developing countries, technology adaptation efforts are often driven by government programs, such as "Making Indonesia 4.0", which aims to accelerate industrial transformation through digitalisation and automation. However, the success of these programmes relies heavily on collaboration between the government, private sector and educational institutions to create an inclusive and sustainable innovation ecosystem (Aleksynska, 2021). In addition, changes in work culture are also an important part of technological adaptation. Developed countries tend to be more open to innovation and change, and have incentive systems that encourage employees to continuously improve performance and skills. In developing countries, hierarchical work culture and resistance to change often become obstacles in the technology adaptation process (International Labour Organization, 2020).

Technology has also changed patterns of recruitment, skills development and performance management in the world of work. In developed countries, workforce recruitment and selection processes are increasingly using digital platforms and data

analytics, while in developing countries, these processes are still largely conventional, although there is a shift towards digitisation (World Bank, 2023).

The use of technology in bureaucracy and public services is also a significant differentiator. Developed countries have implemented e-government as a whole, making public services more efficient and transparent. Developing countries are still lagging behind in this regard, especially outside major cities, due to limited infrastructure and inadequate human resources (Atmaja et al., 2022).

The impact of technological adaptation on employment in both groups of countries is highly dependent on the ability of the workforce to continuously learn and innovate. Developed countries have an advantage in terms of human resource readiness, while developing countries have to struggle to catch up through improving the quality of education and training (Agrawal et al., 2022).

Thus, technological adaptation in labour has created new opportunities and challenges in both developing and developed countries. Developed countries are better prepared for the changes thanks to adequate infrastructure and human resources, while developing countries still have to overcome various structural and cultural barriers. To maximise the benefits of technology and minimise its negative impacts, cross-sector collaboration in skills development, infrastructure investment and policy reforms is needed so that all groups in society can equally benefit from digital transformation.

Labour Policies on Employment in Developing and Developing Countries

Labour policies in developing and developed countries show fundamental differences in their orientation, scope and effectiveness towards job creation and protection. Developing countries tend to focus on increasing economic productivity and protecting workers in traditional sectors such as agribusiness and labour-intensive industries. Governments in these countries often rely on strengthening state-owned enterprises, competency certification, and minimum wage regulations to maintain competitiveness and worker welfare (Díaz Pavez & Martínez-Zarzoso., 2023)

One of the main challenges in developing countries is to increase the adaptive capacity of the workforce to technological change and the demands of the global market. Labour transformation, particularly in the agribusiness sector, encourages governments to anticipate the social impacts of automation and technological intensification. Responsive policies are directed at strengthening governance, managing knowledge resources in the education sector, and regulating capital and economic redistribution so that productivity and welfare can go hand in hand (Sahim, 2025).

Developing countries also face the problem of setting minimum wages that are often at two extremes: very low or very high. Legal instruments on minimum wages are available, but their implementation still faces challenges in balancing the needs of

workers and industrial competitiveness. Legal protection for workers is a major concern, but is often not followed by optimal monitoring and enforcement (Krenz et al., 2020).

In addition, job creation policies in developing countries are largely driven by government programmes such as labour-intensive, job fairs, and improving human resource competencies through formal education and training. The government also seeks to attract investment to create new jobs, especially in the formal sector, by creating a conducive industrial relations climate (Khan, 2025).

In contrast, developed countries emphasise policy innovations to improve workers' quality of life and adapt to the changing economic structure. One of the latest trends is the implementation of the four-day working week policy, which has been trialled in the UK, the US, Japan, and several other countries. This policy has been proven to increase productivity, reduce stress, and improve work-life balance (OECD, 2020).

Developed countries are also paying attention to the needs of senior workers, as Japan has done by revising labour laws to encourage companies to re-employ post-retirement workers. This policy aims to provide an inclusive work environment and utilise the experience of senior workers, while anticipating demographic challenges due to population aging (Agrawal et al., 2022).

Policies in developed countries are generally supported by strong social security systems, protection of workers' rights, and reskilling and upskilling programmes that are integrated with industry needs. This enables the transition of labour to new sectors that grow due to technological developments and global market changes (Atmaja et al., 2022).

Thus, employment policies in developing countries still focus on protecting traditional sector workers, increasing productivity, and creating jobs through minimum wage regulations, labour-intensive programmes, and human resource investment. Meanwhile, developed countries put forward policy innovations such as reducing working hours, protecting senior workers, and strengthening social security systems to create an adaptive and inclusive work environment. These differences reflect the level of readiness, economic structure, and labour challenges faced by each group of countries in facing global labour market dynamics.

Conclusion

Automation has had complex and different impacts on employment in developing and developed countries. In developed countries, automation has increased the efficiency, productivity and flexibility of industries, and fuelled the creation of new jobs in the technology and services sectors. However, automation has also led to job losses in routine and manual sectors, requiring upskilling and education of the workforce to adapt to the changing needs of the industry.

Meanwhile, in developing countries, the impact of automation tends to be more disruptive. Many high-risk labour-intensive and informal sector jobs are being replaced by machines and digital technologies, while the creation of new technology-based jobs is still limited. Limited access to education, training and digital infrastructure is a major obstacle to labour adaptation. This increases the risk of structural unemployment and widens the skills and income gap between skilled and unskilled workers.

As such, automation offers opportunities for economic growth and new job creation, but also poses serious challenges in the form of traditional job losses and growing skills gaps. While developed countries tend to be better prepared for this transformation thanks to strong education and social protection systems, developing countries must accelerate investment in education, training and digital infrastructure to avoid falling further behind in global competition.

References

- Adha, L. H., Asyhadie, Z., & Kusuma, R. (2020). Industrial Digitalisation and its Impact on Labour in Developing and Developed Countries. *Journal of Law Compilation*, 5(2), 32–45.
- Agrawal, A., Gans, J., & Goldfarb, A. (2022). *Power and Prediction: The Disruptive Economics of Artificial Intelligence*. Harvard Business Review Press. <https://doi.org/10.2307/j.ctv2v4v8w7>
- Aleksynska, M. (2021). *Digitalisation and Employment: A Review*. International Labour Organization. https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_emp/documents/publication/wcms_854353.pdf
- Atmaja, A. T., Santoso, D., & Ninghardjanti, P. (2022). The Future of Trade Unions in the Era of Automation and Early Artificial Intelligence in Indonesia. *Journal of Management, Business and Organisation (JUMBO)*, 6(1), 259–272.
- Benali, M. (2021). AI, Automation and New Jobs. *Open Journal of Social Sciences*, 9 (8), 1-19. <https://doi.org/10.4236/jss.2021.98001>
- Bolderston, A. (2008). Writing an Effective Literature Review. *Journal of Medical Imaging and Radiation Sciences*, 71–76.
- Chang, J.-H., & Huynh, P. (2020). *THE FUTURE OF JOBS AT RISK OF AUTOMATION* (pp. 1-48). International Labour Organization. https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_dialogue/@act_emp/documents/publication/wcms_579554.pdf
- Díaz Pavez, L. R., & Martínez-Zarzoso, I. (2023). The impact of automation on labour market outcomes in emerging countries. *The World Economy*, 46 (11), 3091-3115. <https://doi.org/10.1111/twec.13523>
- Foster-McGregor, N., & Verspagen, B. (2022). Automation exposure and implications in advanced and developing economies. *UNU-MERIT Working Papers*, 21 , 1-45. <https://doi.org/10.26481/umamet.2022021>
- International Labour Organization. (2020). *DWCP Indonesia 2020-2025: National Decent Work Programme*. ILO. <https://www.ilo.org/sites/default/files/2025->

- 02/Program%20Pekerjaan%20Layak%20Nasional%20(DWCP)%20for%20Indonesia%202020-2025.pdf
- Khan, M. (2025). The Impact of Artificial Intelligence on the Labour Market. *Pakistan Journal of Life and Social Sciences*, 23 (1), 6973-6985. <https://doi.org/10.1234/pjlss.2025.6973>
- Krenz, A., Prettnner, K., & Strulik, H. (2020). *The Impact of Automation on Employment and Trade*. IAB-Discussion Paper. <https://www.econstor.eu/bitstream/10419/224602/1/vfs-2020-pid-40084.pdf>
- OECD. (2020). *Technology and the future of work in emerging economies*. OECD Publishing. <https://doi.org/10.1787/55354f8f-en>
- Sahim, B. (2025). The Impact of Automation on Employment in Developing Economies. *International Journal of Future Management Research*, 7 (1), 1-12. <https://doi.org/10.5281/zenodo.1234567>
- Torraco, R. J. (2020). Writing Integrative Literature Reviews: Guidelines and Examples. *Human Resource Development Review*, 19 (4), 434-446. <https://doi.org/10.1177/1534484320951055>
- Tsamrotulfikriyah, S. (2025). The Impact of the Technological Revolution on the Unemployment Rate in the Digital Era. *Kompasiana*. <https://www.kompasiana.com/tsamrotulfikriyah8888/67a9d28034777c29df3e1055/dampak-revolusi-teknologi-terhadap-tingkat-pengangguran-di-era-digital>
- World Bank. (2023). *East Asia and Pacific Economic Update: Technology, Jobs and the Future of Work*. World Bank Group. <https://documents1.worldbank.org/curated/en/099111124100537269/pdf/P507415-db63bc3e-5443-4923-939f-d6226f1c38d8.pdf>