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The Impact of the Digital Economy on Employment and Workforce Structure in Indonesia

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Abstract

This study examines the impact of the digital economy on employment and workforce structure in Indonesia. The digital economy in Indonesia is growing rapidly, driven by e-commerce, digital financial services, app-based transportation, and artificial intelligence-based technology, with a projected contribution of more than USD 130 billion by 2025. Using a mixed-method approach, this study analyzed data from 200 respondents consisting of workers in the digital economy sector and traditional sectors affected by digitalization, as well as in-depth interviews with 15 representatives of workers, business actors, and policy makers. The results showed that 68% of respondents considered the digital economy to increase job opportunities, although 40% of respondents admitted that digitalization also caused job losses in certain sectors. Changes in the workforce structure are seen in the increasing need for technology skills (45%), digital marketing (35%), and digital business management (30%). The main challenges faced by workers include lack of digital skills (50%), uncertain income (40%), and lack of social security (35%). This study recommends strengthening digital skills training programs through collaboration between the government and the private sector, developing regulations for protecting digital workers, and increasing financial inclusion for digital economy workers. This study contributes to a more comprehensive understanding of workforce transformation in the digital era and provides strategic input for policymakers in managing the workforce transition towards an inclusive and sustainable digital economy.

Keywords: Digital economy, workforce structure, digital skills, gig economy, workforce transformation

1. Introduction

In recent decades, the development of digital technology has become one of the main drivers of global economic change, including in Indonesia. The digital revolution has changed the way people work, do business, and interact socially. The internet, artificial intelligence (AI), big data, and automation have driven the transformation of various industrial sectors, creating new opportunities as well as presenting challenges for the workforce. Indonesia, as a country with a population of more than 270 million people and an increasing internet penetration rate, is at the forefront of this change (Johnson et al., 2021; Mathew et al., 2023).

The digital economy in Indonesia has grown rapidly, driven by the e-commerce sector, digital financial services (fintech), application-based transportation, and artificial intelligence-based technology (Irfan et al., 2024). Based on a report from the Coordinating Ministry for Economic Affairs, the contribution of the digital economy to Indonesia's Gross Domestic Product (GDP) continues to increase, projected to reach more than USD 130 billion in 2025 (Santoso et al., 2024). This shows that digitalization is not just a trend, but has become an integral part of national economic growth.

The development of the digital economy has created new jobs in various sectors, ranging from the creative economy, digital platform-based jobs, to the high-tech industry (Szerb et al., 2022). For example, e-commerce platforms such as Tokopedia, Shopee, and Bukalapak have opened up business opportunities for millions of Micro, Small, and Medium Enterprises (MSMEs) to reach a wider market. In addition, application-based transportation platforms such as Gojek and Grab have absorbed a large number of workers, creating an increasingly growing gig economy-based economic ecosystem.

However, although the digital economy brings great benefits to job creation, this change also poses challenges for workers who are not yet ready to adapt to digital transformation. Many traditional jobs are being disrupted by automation and digitalization. The manufacturing, banking, and administration sectors, for example, have experienced

a decline in the need for human labor due to the adoption of robotics and artificial intelligence technology. This poses a risk of structural unemployment for workers whose skills are no longer relevant to the needs of the digital industry (Graham et al., 2017).

Changes in the structure of the workforce are also seen in the shift in the types of jobs needed in the digital era. If previously conventional jobs such as administrative staff and factory workers dominated the labor market, now skills in the fields of information technology, data analysis, and digital marketing are becoming more in demand. This phenomenon has given rise to a skills gap, where many workers do not yet have the competencies that match the demands of the digital industry (Shakina et al., 2021).

The Indonesian government has taken various steps to address these challenges, including through MSME digitalization programs, increasing access to technology-based education, and vocational training to improve workforce skills. Programs such as the Pre-Employment Card and coding training from various private institutions are part of efforts to accelerate the adaptation of the workforce to the digital economy (Nguyen et al., 2024). However, there are still many obstacles that need to be overcome, especially related to access to education and training for people in remote areas.

In addition to employment challenges, the issue of job uncertainty has also emerged due to the rise of flexible work systems in the digital era. The gig economy, which is based on freelance work and temporary projects, offers flexibility for workers but also presents challenges in terms of social security, income stability, and labor rights. Many gig workers, such as online motorcycle taxi drivers and digital freelancers, do not receive adequate labor protection, such as health insurance or pension funds. This requires appropriate policy interventions so that the digital economy can grow inclusively and sustainably (Bieber and Moggia, 2021; Mehta, 2023).

On the other hand, the digital economy also opens up opportunities for broader economic inclusion. Many groups that previously had difficulty accessing the conventional labor market, such as housewives and people with disabilities, can now work flexibly through digital platforms. This shows that if managed well, the digital economy can be a tool to strengthen the economic empowerment of the community. As the digital economy develops, it is important for all stakeholders government, private sector, academics, and the community to work together to create an inclusive employment ecosystem. Developing policies that support strengthening workforce skills, providing regulations that protect digital workers, and investing in technological infrastructure will be key factors in optimizing the benefits of the digital economy for Indonesia.

This study aims to examine in depth the impact of the digital economy on employment and workforce structure in Indonesia. By understanding the dynamics that occur, it is hoped that the results of this study can provide strategic recommendations for policy makers and industry players in managing digital transformation in the employment sector.

2. Literature Review

2.1. Digital economy concept

The digital economy refers to an economic system based on digital technology, especially the internet and data-driven software. According to the OECD (2019) in the journal Gomes et al. (2022), the digital economy encompasses a range of economic activities that use digital technology to improve efficiency, productivity, and innovation. These developments include e-commerce, digital financial services (fintech), platform-based economy, artificial intelligence (AI), and blockchain technology.

In Indonesia, the development of the digital economy is increasingly rapid along with increasing internet penetration and smartphone use (Muljono and Setiyawati, 2022). A report by Google, Temasek, and Bain dan Company (2023) estimates that Indonesia's digital economy will reach more than USD 130 billion by 2025, making it the largest digital economy market in Southeast Asia (Santoso et al., 2024). Therefore, understanding the digital economy and its impact on the workforce is very important in national economic planning.

2.2. Jobs in the digital economy

The digital economy is creating new jobs while eliminating some types of traditional jobs. Brynjolfsson and McAfee (2014) in their book The Second Machine Age explain that digital technology not only replaces manual work, but also repetitive cognitive-based work (Pinède, 2023).

Charles et al. (2021) found that digitalization has created more than 10 million new jobs globally, especially in the information technology, data analysis, and creative economy sectors. In Indonesia, e-commerce platforms such as Tokopedia and Shopee have created millions of jobs for MSMEs, while online transportation platforms such as Gojek and Grab provide a source of income for millions of drivers.

However, although the digital economy creates many new jobs, it also causes job losses in sectors affected by automation and digitalization. Frey (2021) in his research on The Future of Employment states that more than 40% of jobs in the administrative and manufacturing sectors are at risk of being replaced by automation in the coming decades.

2.3. Changes in workforce structure

Changes in the workforce structure due to the digital economy occur in several key aspects, including the shift from conventional jobs to digital platform-based jobs and the increasing demand for technological skills. Johnson et al. (2021) explain that digitalization creates high demand for jobs in information technology, data analysis, digital marketing, and artificial intelligence.

In Indonesia, a survey by the World Economic Forum (2020) showed that 54% of the total workforce needs to improve their digital skills to stay relevant in the labor market. Technology-based education and training are the main solutions to addressing this skills gap (Schwab and Zahidi, 2020). Programs such as Kartu Prakerja and various coding bootcamps have become important initiatives in preparing the workforce for the digital era.

In addition, the digital economy has also driven the rise of the gig economy or freelance-based economy. Ray (2024) highlights that the growth of the platform-based economy has increased the number of freelance workers in various sectors, from online motorcycle taxi drivers to creative workers and data analysts. Although it offers flexibility, this work system also poses challenges, such as lack of social protection and income instability.

3. Methods

In this study, the approach used aims to provide a comprehensive understanding of the impact of the digital economy on employment and the structure of the workforce in Indonesia. For this reason, the method chosen includes a combination of qualitative and quantitative approaches. This approach was chosen so that the study can analyze not only the changes that occur in the structural aspects of the workforce, but also measure the direct impact of the digital economy on the number and types of jobs created. The steps in this study can be seen in Figure 1.

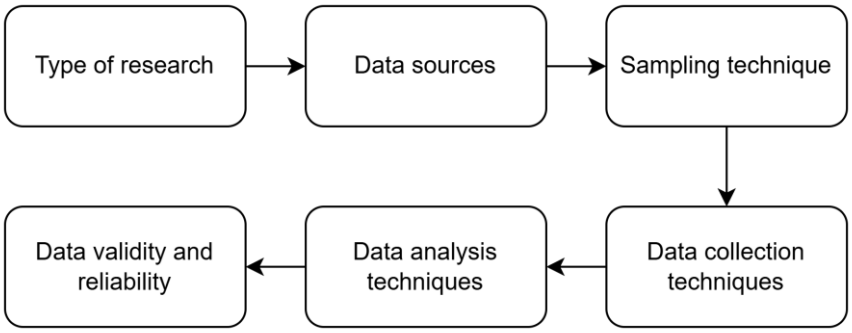

Figure 1: research flow

3.1. Type of research

This study uses a descriptive qualitative and quantitative approach (mixed-method) to understand the impact of the digital economy on employment and the structure of the workforce in Indonesia. The qualitative approach is used to explore how digitalization changes the dynamics of work, while the quantitative approach is used to measure changes in the number of jobs and factors that influence the transformation of the workforce in the digital era. With the combination of these two approaches, this study is expected to provide a more comprehensive understanding of the phenomena that occur.

3.2. Data sources

This study uses primary and secondary data to obtain accurate and relevant information. Primary data was obtained through surveys and direct interviews with various groups of workers, both those working in the digital sector and those affected by digitalization. Respondents consisted of workers in the e-commerce sector, online motorcycle taxi drivers, digital freelancers, and technology industry workers. In addition, in-depth interviews were also conducted with workers from traditional sectors who have been impacted by digitalization, such as manufacturing and administrative workers.

In addition, this study also uses secondary data sourced from various official reports and documents. Some of the data sources used include reports from the Central Statistics Agency (BPS), the Ministry of Manpower, and the Coordinating Ministry for Economic Affairs. In addition, this study also refers to various academic studies, scientific journals, and industry reports published by international institutions such as the World Economic Forum (WEF), McKinsey Global Institute, and OECD.

3.3. Sampling technique

To obtain representative data, this study uses a purposive sampling method by considering certain criteria in selecting respondents. The main respondents in this study are workers in the digital economy sector, such as online motorcycle taxi drivers, e-commerce workers, freelancers, and technology industry workers. In addition, this study also involves workers in traditional sectors affected by digitalization, such as administrative staff and manufacturing workers.

In addition, this study also involves government representatives and academics who have insight into policies and regulations related to the digital economy. The number of samples used is a minimum of 200 respondents for quantitative surveys and 15-20 sources for in-depth interviews. With this composition, the study is expected to provide a broader picture of the impact of the digital economy on employment in Indonesia.

3.4. Data collection techniques

Data collection in this study was carried out through three main methods, namely quantitative surveys, qualitative interviews, and documentation studies. The quantitative survey was conducted using a questionnaire designed with a Likert scale to measure workers' perceptions of the impact of the digital economy on employment and workforce structure. This questionnaire was distributed online and offline to respondents working in relevant sectors.

In addition, qualitative interviews were conducted with a semi-structured approach to dig up more in-depth information about the impact of digitalization on employment. These interviews were conducted with workers, business actors, and policy makers in the digital economy sector. With this method, it is hoped that a broader perspective can be obtained on the challenges and opportunities that arise due to the development of the digital economy. As a complement, this study also uses documentation studies to collect secondary data from various sources, such as government reports, academic journals, and industry reports related to digitalization and employment trends in Indonesia.

3.5. Data analysis techniques

The collected data were analyzed using quantitative and qualitative methods. Data from the quantitative survey were analyzed using descriptive statistics to describe trends and distributions of workers' perceptions regarding the impact of the digital economy on employment. In addition, a simple regression test was used to see the relationship between digital economic growth and changes in the number of jobs.

Meanwhile, data from qualitative interviews were analyzed using thematic analysis methods, where information from interviews was categorized based on certain themes such as skill changes, workforce challenges, and needed policies. Coding techniques were used to identify patterns and trends in qualitative data so that deeper insights into the impact of digitalization on employment could be obtained.

3.6. Data validity and reliability

To ensure the accuracy and consistency of the data, this study applied several validity and reliability techniques. Data triangulation was used by comparing the results of surveys, interviews, and secondary documents to increase the validity of the study. In addition, the reliability test of the questionnaire was carried out using the Cronbach's Alpha method to measure the internal consistency of quantitative data.

The content validity of the research instrument was tested through a review by digital economy and employment experts before being used in field research. With this approach, the study is expected to produce valid and reliable data in analyzing the impact of the digital economy on employment in Indonesia.

3.7. Research limitations

Although this study was designed with a comprehensive approach, there are several limitations that need to be considered. One of the main limitations is the limited sample, where not all sectors in the digital economy can be reached comprehensively. This can affect the generalization of research findings to the entire workforce population in Indonesia.

In addition, this study also faces challenges in overcoming respondent bias, where workers' perceptions of the impact of the digital economy can vary depending on their personal experiences. Therefore, data triangulation techniques are used to minimize this bias. Another limitation that needs to be considered is the limited secondary data, where not all data needed is available in the form of the latest official reports. To overcome this limitation, this study relies on various data sources from international organizations and relevant academic research.

4. Results and Discussion

4.1. Respondent overview

This study was conducted by involving 200 respondents consisting of workers in the digital economy sector and traditional sectors affected by digitalization. Respondents came from various employment sectors, ranging from workers in e-commerce, online motorcycle taxi drivers, digital freelancers, technology industry workers, as well as workers in the manufacturing and administration sectors who have been impacted by changes in work patterns in the digital era.

Data collection was conducted through a survey of workers who are active in the digital economy sector and workers in the traditional sector affected by digitalization. In addition, in-depth interviews were conducted with 15 representatives of workers, business actors, and policy makers to gain a deeper understanding of the impact of the digital economy on the workforce in Indonesia. Based on the survey results, the distribution of respondents based on job categories can be seen in Table 1.

Table 1: Distribution of respondents based on job sectors

No	Job Sectors	Number of Respondents	Percentage (%)
1	E-commerce workers	50	25
2	Online motorcycle taxi drivers	40	20
3	Digital freelancers	30	15
4	Tech industry workers	25	12.5
5	Manufacturing workers	30	15
6	Administrative workers	25	12.5
Total	-	200	100

From table 1 above, it can be seen that the majority of respondents come from the e-commerce sector (25%), followed by online motorcycle taxi drivers (20%) and digital freelancers (15%). Meanwhile, the manufacturing and administration sectors affected by digitalization contributed 15% and 12.5% of the total respondents, respectively.

The results of interviews with worker representatives showed that the majority of workers in the digital sector felt that job opportunities in this sector were quite large, especially with the development of various digital platforms that offer work flexibility. However, on the other hand, many workers in the traditional sector are experiencing uncertainty due to digitalization replacing some conventional jobs with automation technology.

4.2. Impact of the digital economy on employment

The digital economy has created new job opportunities that were previously unavailable in the traditional economic model. The emergence of digital platforms such as e-commerce marketplaces, online transportation services, and various technology-based applications has changed the employment landscape in Indonesia. Many jobs that previously required physical interaction can now be done online, allowing more individuals to participate in the digital economy.

The survey results showed that 68% of respondents felt that there was an increase in job opportunities in the digital sector, although 32% of respondents admitted that they had difficulty adapting to changes caused by digitalization. The following are the results of the analysis regarding the impact of the digital economy on job opportunities, which can be seen in table 2.

Table 2: Respondents' perceptions of the impact of the digital economy on employment

No	Statement	Agree (%)	Don't agree (%)
1	Digital economy increases job opportunities	68	32
2	Digitalization causes job losses	40	60
3	I experienced an increase in income after switching to digital-based work	55	45
4	I had difficulty adapting to changes due to digitalization	32	68

From table 2, it can be seen that the majority of respondents (68%) consider the digital economy to create more job opportunities than eliminate old jobs. However, 40% of respondents stated that digitalization causes job losses, especially for workers in the administrative and manufacturing sectors.

4.3. Changes in the workforce structure due to digitalization

The digital economy is not only creating new jobs but also changing the structure of the workforce in Indonesia. The most striking shift is seen in the types of skills needed in the workforce. Many companies are now looking for workers with expertise in technology, digital marketing, and data analysis. Based on the survey results, the following are the skills most needed in the digital economy, as seen in table 3.

Table 3: Skills most needed in the digital economy

No	Skills	Percentage (%)
1	Technology skills (coding, data analysis)	45
2	Digital marketing	35
3	Digital business management	30
4	Online communication skills	25
5	Quick adaptability	20

The results in table 3 show that workers who are able to adapt to the demands of technology have a greater chance of remaining relevant in the labor market. Those who do not have digital skills face the risk of losing their jobs due to shifts in industry needs.

4.4. Challenges faced by workers in the digital economy

While the digital economy offers many opportunities, workers also face various challenges. One of the biggest challenges is the lack of digital skills, which makes it difficult for some individuals to enter the sector. In addition, income uncertainty is a major problem for freelancers and online transportation drivers. The following are the main challenges faced by workers in the digital economy based on the survey results, which can be seen in table 4.

Table 4: Challenges faced by workers in the digital economy

No	Key Challenges	Percentage (%)
1	Lack of digital skills	50
2	Uncertain income	40
3	No social security	35
4	Lack of regulations protecting workers	30

4.5. Policy implications for supporting the workforce in the digital era

Based on the results of this study, there are several policy recommendations that can be implemented to improve the readiness of the workforce in facing the digital economy:

1. Strengthening digital skills training programs: The government and the private sector need to collaborate in providing training that is relevant to the needs of the digital industry.
2. Regulation on digital workforce protection: There needs to be a policy that provides social protection for workers in the digital sector, including insurance and social security.
3. Financial inclusion for digital economy workers: The government can encourage policies that ensure income stability for freelancers and informal workers in the digital sector.

5. Conclusion

This study shows that the digital economy has had a significant impact on employment and the structure of the workforce in Indonesia. Based on the results of a survey and in-depth interviews with 200 respondents from various sectors, it was found that the digital economy has created new job opportunities that were previously unavailable in the traditional economic model. As many as 68% of respondents considered that the digital economy increased job opportunities, although 40% of respondents admitted that digitalization also caused job losses in certain sectors, especially administration and manufacturing.

Changes in the structure of the workforce due to digitalization can be seen from the shift in the types of skills needed. Technology skills (coding, data analysis) are the most needed (45%), followed by digital marketing skills (35%), digital business management (30%), and online communication skills (25%). This shows that workers who are able to adapt to the demands of technology have a greater chance of remaining relevant in the labor market.

Although the digital economy offers many opportunities, workers also face various challenges. The main challenges faced are the lack of digital skills (50%), uncertain income (40%), lack of social security (35%), and lack of regulations that protect workers (30%). These findings underscore the importance of policies that support the improvement of workforce skills and social protection for workers in the digital era.

Based on the research findings, there are several policy implications that can be implemented to improve workforce readiness in facing the digital economy, namely: (1) strengthening digital skills training programs through collaboration between the government and the private sector, (2) regulations for digital workforce protection including insurance and social security, and (3) financial inclusion for digital economy workers to ensure income stability, especially for freelancers and informal workers.

This research provides an important contribution to understanding the dynamics of employment changes due to the development of the digital economy in Indonesia. However, further research is needed with a wider sample coverage to obtain a more comprehensive picture of the impact of the digital economy on the employment sector in Indonesia.

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