



Analysis of Job Types Suitable for Indonesian Workforce Based on Industry 4.0 Revolution in Accordance with Performance Indicators (Literature Review)

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ABSTRACT

This paper aims to identify the types of jobs that are available for Indonesian workers in the context of Industry 4.0 revolution and to analyse the performance indicators that are relevant for evaluating the quality of work of individuals and teams. The study is based on a review of relevant literature from academic journals and reports from government and non-governmental organizations. The findings suggest that there are several new job opportunities that are emerging in the fields of robotics, artificial intelligence, data analytics, and the Internet of Things, among others. To prepare for these new types of jobs, workers need to acquire new skills and competencies, such as digital literacy, critical thinking, and problem-solving skills. Furthermore, the paper identifies several performance indicators that are important for evaluating the quality of work in the context of Industry 4.0, including productivity, innovation, adaptability, and teamwork. The study concludes by highlighting the need for vocational education and training programs to adapt to the changing needs of the labour market and to ensure that workers are equipped with the necessary skills and competencies to succeed in the era of Industry 4.0.

Keywords: *Industry 4.0, Job Types, Performance Indicator, Workforce.*

1. INTRODUCTION

The Fourth Industrial Revolution is a phenomenon that is transforming all aspects of human life, including the way we work and produce. [1] The Fourth Industrial Revolution is marked by the emergence of new technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), Big Data, and Robotics that have the potential to transform entire industries. The Fourth Industrial Revolution, also known as Industry 4.0, has changed the global economy, including the job market. In Indonesia, the government has actively promoted the adoption of Industry 4.0 to increase productivity and competitiveness. As a result, the workforce of this country must be prepared to face the new challenges and opportunities brought by this revolution.

According to a study by [2], vocational education in Indonesia has an important role in preparing the

workforce for Industry 4.0. The study states that vocational education institutions have a mandate to produce graduates who are competent with relevant knowledge, skills, and attitudes to meet the needs of the industry, including Industry 4.0.

Furthermore, [3] argue that Industry 4.0 has created new job opportunities, but also requires workers to have new skills and competencies. They state that the integration of advanced technology in the workplace requires workers to have skills such as data analysis, problem-solving, and adaptability. In addition, [4] conducted a survey of vocational education graduates in Indonesia and found that graduates feel that their education has equipped them with relevant skills for Industry 4.0, such as communication, problem-solving, and digital literacy. However, the study also highlights the need for ongoing learning and skills improvement to remain adaptable to rapid changes in the job market.

According to a study conducted by the Indonesian Employers Association (Apindo) and the Indonesian Chamber of Commerce and Industry (Kadin), there are several types of jobs that are expected to be trending in the future, such as jobs in information technology, robotics, and automation. In addition, jobs in the creative field, such as graphic design, photography, and video production, are also expected to be in demand in the future [5], [6].

Not only the types of jobs, but also the workforce needs to have good performance indicators as individuals or as a team in the era of Industry 4.0. According to [7], individual performance indicators can be seen from work productivity, work quality, and work initiative. While team performance indicators include effectiveness, efficiency, and coordination among team members.

Based on these studies, it is clear that Industry 4.0 has significant implications for the types of jobs available to the Indonesian workforce and the skills and competencies needed to succeed in the new economy. Therefore, it is important to analyse relevant performance indicators to evaluate the quality of individual and team performance in this context, to ensure that the workforce is equipped with the skills and competencies needed to succeed in the era of Industry 4.0.

2. METHOD

In this article, a research method in the form of literature review is used. Literature review is a method aimed at identifying, evaluating, and understanding the findings that have been produced by previous research [8]. The implementation of literature review consists of 6 stages, namely (1) Determining the research topic, which is about the types of jobs in the era of the industrial revolution 4.0 in accordance with its indicators; (2) Identifying literature sources from various search engines such as Scencedirect, Springerlink, Google Scholar, DOAJ, and Garuda using keywords such as "industrial revolution 4.0", "types of jobs that can be entered by Indonesian workers", and "performance indicators"; (3) Selecting literature by limiting research published at a minimum in 2016 and in Indonesian, English, and other languages; (4) Reading and evaluating the literature sources that have been collected; (5) Drawing conclusions from the results of the study conducted; and (6) Discussing the results of the study that have been obtained. These stages can be seen this following figure 1.

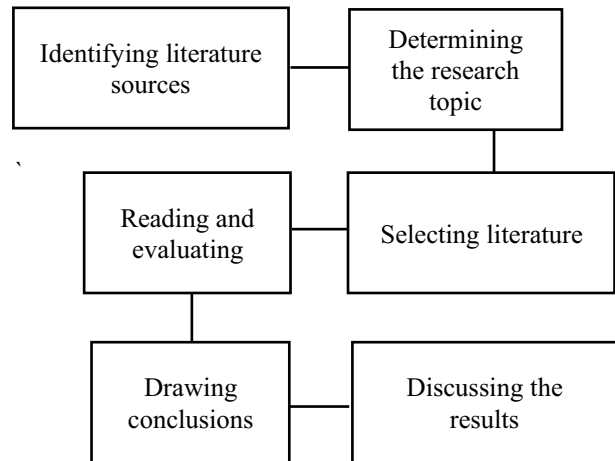


Figure 1 The Stages of Literature Review.

3. RESULT & DISCUSSION

3.1. Industry Revolution 4.0

The fourth industrial revolution is a technological development that enables the adoption and integration of information technology and physical technology in various aspects of industry. One of the main characteristics of the fourth industrial revolution is the connectivity between machines and other devices that allows real-time data collection and analysis. This has a significant impact on the workforce sector, as it causes changes in the types of jobs needed and the skills required by the workforce.

According to a study by [9], [10], the fourth industrial revolution has a significant impact on production systems and employment. The concept of the fourth industrial revolution creates new types of jobs and changes the demands for workforce skills, as mentioned by [11], [12] in their research.

According to [13], [14], the success of the workforce in the era of the fourth industrial revolution depends on their ability to utilize existing technology. This is supported by research by [15], [16], which states that in the era of the fourth industrial revolution, technology skills and workforce skill development will play a crucial role in improving productivity and performance.

The fourth industrial revolution impacts the types of jobs needed. This study suggests that some jobs currently performed by humans will be replaced by machines or robots, while new types of jobs that require special skills will emerge. This requires a change in workforce education and training to prepare them to face these changes.

[17], [18] state that core competencies such as critical thinking, creativity, and teamwork skills become more important in the era of the fourth industrial revolution. They emphasize that the workforce must be prepared to

adapt to rapidly changing technology and work environments and acquire new skills required in the era of the fourth industrial revolution. The fourth industrial revolution also affects the performance of individual and team workers. The technology used in Industry 4.0 enables real-time data collection, allowing for more accurate and effective decision-making. Additionally, this technology also enables workers to collaborate and communicate more effectively.

The workforce in the era of the fourth industrial revolution also needs to have the ability to work independently, take initiative, problem-solve, and communicate effectively [19]. This all indicates that the role of the workforce in the era of the fourth industrial revolution depends heavily on their ability to utilize technology and develop relevant skills.

3.2. Types of Jobs in the Fourth Industrial Revolution Era

In the era of the 4.0 industrial revolution, there are changes in the job market worldwide, including in Indonesia. Many types of jobs will experience changes in the required skills, and new types of jobs will also emerge. According to a study by the Central Statistics Agency (BPS), the industrial and service sectors most affected by the 4.0 industrial revolution are the manufacturing, trade, and information and communication services sectors.

For example, in the manufacturing sector, the adoption of technologies such as the internet of things (IoT) and big data requires new skills in the field of information technology. On the other hand, service sectors such as finance, retail, and tourism also require workers with skills in data processing, analysis, and the use of information technology. In addition, the creative sector such as graphic design, animation, and gaming is also growing and requires workers with creative and technical skills.

According to a study by [20], there are several jobs that are considered to be growing and require special skills in the era of the 4.0 industrial revolution, such as mobile application developers, data scientists, big data analysts, cybersecurity experts, and robotics experts. In addition, jobs in digital marketing, technology project management, and supply chain management are also considered to be more important in the future.

Furthermore, a journal published by Bina Nusantara University discusses the "impact of the 4.0 industrial revolution on job types in Indonesia." In the journal, it is explained that the adoption of technology in the manufacturing and service sectors will trigger changes in existing job types and encourage the emergence of new job types that rely more on technology.

Types of jobs that will survive in the future will require skills in critical thinking, problem-solving, creativity, and the ability to use technology [21], [22]. The following are some points related to the types of jobs that Indonesian workers can enter based on the 4.0 industrial revolution [2], [23] can be seen this following table 1.

Table 1. Types of jobs that Indonesian workers can enter based on the 4.0 industrial revolution.

No.	Job Field	Competency Needed
1	Information and Communication Technology (ICT)	<ul style="list-style-type: none"> - Software designer and developer - Mobile application designer and developer - Game designer and developer - Data analyst - Cybersecurity specialist
2	Production and Manufacturing	<ul style="list-style-type: none"> - Machine and robotic operator - Product designer and developer - Manufacturing specialist
3	Finance and Digital Economics	<ul style="list-style-type: none"> - Financial analyst - Fintech application developer - E-commerce specialist
4	Education	<ul style="list-style-type: none"> - Curriculum expert and technology-based education developer - E-learning content developer
5	Health	<ul style="list-style-type: none"> - Healthtech expert - Medtech application developer

3.3. Performance Indicator

Work performance is a crucial aspect of business and industry. There are various factors that influence work performance, one of which is performance indicators. According to [24], [25], performance indicators are variables used to measure the performance of individuals or organizations in achieving predetermined goals. In the context of the workforce, performance indicators can be used to assess work quality and quantity, productivity, effectiveness, efficiency, and job satisfaction. Performance indicators can help organizations gain an overview of how well employees are performing in achieving organizational goals [3], [25].

According to [26], performance indicators can be divided into two categories: individual performance indicators and team performance indicators. Individual performance indicators include technical ability, work quality, and productivity. Meanwhile, team performance indicators include cooperation, communication, and participation within the team. Research by [27] also shows that individual performance indicators are critical in assessing employee performance.

Based on research by [28], several performance indicators can be used to evaluate workforce performance as individuals, such as technical skills, interpersonal skills, communication, work ethics, responsibility, initiative, and creativity. On the other hand, to evaluate workforce performance as a team, there are indicators such as cooperation, trust, coordination, leadership, and problem-solving. [29] suggest that training and employee development are needed to improve individual and team performance. Training and employee development can help improve employee competency, enabling them to achieve performance indicators set by the organization.

According to [26], [28], the most important performance indicators for the workforce in the Industry 4.0 era are adaptability, creativity, innovation, self-learning ability, and information technology skills. This is because the industry 4.0 demands that the workforce be able to face rapid and continuous changes and effectively use technology.

Another study by [7], [30] shows a positive correlation between performance indicators such as motivation, competence, and job satisfaction, and individual workforce performance. This study suggests that improving motivation, competence, and job satisfaction can significantly improve workforce performance.

Moreover, research by [31] shows that the use of information technology can affect workforce performance. This study indicates that the use of information technology can increase work efficiency and effectiveness, as well as job satisfaction and workforce performance.

Here are some performance indicators compiled from various sources [26]–[28], [32] can be seen by following table 2:

Tabel 2. Performance Indicators.

No.	Indicator	Description
1	Technical and non-technical competencies	Technical competencies include the ability to perform specific tasks, while non-technical competencies include interpersonal skills, time management, and leadership.
2	Efficiency and productivity	Efficiency and productivity can be measured by the amount of work completed within a certain time frame or within a specific cost limit.
3	Work quality	Work quality includes product or service quality standards produced and compliance with applicable procedures and regulations.
4	Creativity and innovation	The ability to innovate and think creatively can be a

		performance indicator in a rapidly changing business environment.
5	Teamwork	Teamwork can be measured through the ability to collaborate with colleagues, support each other, and produce better performance than individual work.
6	Job satisfaction	Job satisfaction can be measured by the level of satisfaction of employees towards their job and work environment.
7	Attendance and Punctuality	This performance indicator includes the level of employee attendance and their punctuality in completing assigned tasks.
8	Self-Development	This performance indicator includes the employee's efforts to develop themselves through training, courses, and new work experiences.
9	Problem-Solving	The ability to solve problems and find creative solutions in complex situations can be an important performance indicator.
10	Customer Satisfaction	Customer satisfaction can be measured through customer surveys or evaluations conducted by company management.
11	Health and Safety	This performance indicator includes the health and safety of employees, including the number of workplace accidents and the number of sick days taken by employees.
12	Decision-Making	The ability to make appropriate and effective decisions in complex situations can be an important performance indicator.
13	Communication	The ability to communicate well and effectively with coworkers, supervisors, and clients can be an important performance indicator.

4. CONCLUSION

Based on the literature review and scientific journals that have been discussed, there are several conclusions that can be drawn. Here are the conclusions:

The types of jobs that have great potential for Indonesian workers to enter in the era of Industry 4.0 are related to information and communication technology, such as data scientists, big data analysts, software

engineers, and web developers. In addition, jobs related to design, manufacturing, and production technology also have bright prospects.

In entering jobs related to Industry 4.0, Indonesian workers need to strengthen their digital and information technology skills, as well as keep up with the ever-changing technology developments.

Important performance indicators for a worker, both as an individual and in a team, include productivity, creativity, adaptability to change, communication and collaboration skills, as well as work ethics and social responsibility.

The importance of developing relevant skills and knowledge for jobs in the era of Industry 4.0, both through formal education and continuous training and skill development.

AUTHORS' CONTRIBUTIONS

Author 1: conducted a literature review on the job types suitable for Indonesian workforce in Industry 4.0, and identified the relevant performance indicators.

[Author 2] contributed to the analysis and interpretation of the literature review, and provided inputs for the conclusion section.

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