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The Challenge of Human Resource Management Toward Industrial Revolution 4.0 for Manufacturing Sector in Indonesia: Literature Study

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Abstract
The Industrial Revolution 4.0 has significantly transformed the business landscape through the integration of digital technologies, automation, artificial intelligence and big data, posing substantial challenges for human resource management (HRM), particularly in the manufacturing sector in Indonesia. This article aims to analyze the key challenges faced by HRM in adapting to the demands of Industry 4.0 and to identify strategic responses required to enhance organizational competitiveness. Using a qualitative descriptive approach based on a review of relevant literature, policy documents, and industry reports, the study examines issues such as the digital skills gap, workforce reskilling and upskilling, changes in employment relationships, organizational culture transformation, and the readiness of HR systems to support digitalization. The findings indicate that many manufacturing sector organizations in Indonesia face limitations in human capital quality, unequal access to technology, and resistance to change, which hinder effective implementation of Industry 4.0 initiatives. Therefore, HRM is required to play a more strategic role by developing agile talent management, continuous learning systems, and adaptive leadership. This study concludes that the success of Indonesia's private sector in the era of Industrial Revolution 4.0 largely depends on the ability of human resource management to proactively manage technological change while maintaining employee engagement and productivity.
Keywords*: Human Resource Management Challenge, Industrial Revolution 4.0.*

1. Introduction

The advent of the Industrial Revolution 4.0 has fundamentally transformed economic and organizational environments globally, prompting a shift from traditional business models to digitally driven systems characterized by automation, connectivity, and data-centric operations. According to Klaus Schwab, Industry 4.0 not only transforms production systems but also fundamentally reshapes the nature of work, skills requirements, and workforce management, placing human resource management (HRM) at the center of organizational transformation (Schwab, 2016).This era, marked by technologies such as artificial intelligence (AI), the Internet of Things (IoT), and advanced analytics, has elevated the strategic importance of human resource management (HRM) as organizations seek to adapt and thrive amid rapid technological change (Tahar et al., 2022). In Indonesia, the manufacturing sector plays a vital role in national economic development and is a key focus of digital industrial transformation. The Indonesian government, through the Kementerian Perindustrian Republik Indonesia, has launched the *Making Indonesia 4.0* roadmap to accelerate the adoption of advanced manufacturing technologies and strengthen global competitiveness. However, the success of this initiative is highly dependent on the readiness of human resources, particularly in private manufacturing firms that dominate industrial output and employment.

Despite technological advancements, many private manufacturing companies in Indonesia face significant human resource challenges, including a shortage of digitally skilled workers, limited workforce adaptability, and gaps between existing

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competencies and Industry 4.0 requirements. Traditional HR practices, which focus primarily on administrative and operational functions, are increasingly inadequate in addressing the dynamic needs of smart manufacturing environments. As manufacturing systems become more automated and data-driven, HRM is required to evolve into a strategic function responsible for talent development, reskilling and upskilling, change management, and the cultivation of an innovation-oriented organizational culture. Many firms still rely on traditional HR practices that are not aligned with the dynamic and technology-driven nature of smart manufacturing (Bersin, 2018). This mismatch between technological advancement and human capital capability risks reducing productivity gains from Industry 4.0 investments (McKinsey Global Institute, 2017). Furthermore, the manufacturing sector presents unique HRM challenges compared to other industries, as it involves the integration of human labor with advanced machinery and intelligent systems (Sony & Naik, 2020). Managing this transition requires not only technological investment but also effective human capital strategies to ensure employee engagement, productivity, and long-term sustainability. Therefore, examining the challenges of human resource management in Indonesia's private manufacturing sector is essential to understanding how organizations can successfully navigate the transformation brought by Industrial Revolution 4.0.

This article examines the specific HRM challenges facing the Indonesian manufacturing sector, analyzing the friction between traditional labor models and the agile, data-driven requirements of smart factories, and proposes pathways for effective workforce transformation.

2. Method

This research uses a type of library research or literature review, namely a series of research relating to library or research data collection methods whose research objects are explored through a variety of library information, including books, encyclopedias, scientific journals, newspapers, magazines. , and documents (Sukmadinata, 2009). The reason the author uses the library research research method is because it suits the problem being researched, namely reviewing and discovering various theories, laws, postulates, principles or ideas contained in the body of academic-oriented literature which is used to analyze and solve questions The research formulated is in the form of human resource challenges in facing the industrial era 4.0. In analyzing the research results, the author used a descriptive analysis method approach. Descriptive research is research that attempts to describe symptoms, events and occurrences that are occurring at the present time where the author tries to photograph events and occurrences that are the center of attention and then describe them as they really are (Sudjana et al, 1989). The author chose the descriptive analysis method because this research analyzes and presents facts systematically, so that it is easier to understand and conclude events that are taking place and relate to current conditions.

Data collection techniques need to be carried out with the aim of obtaining valid data in research. The author uses bibliography and documentation techniques. Library techniques are a way of collecting data on various materials found in the library space, such as newspapers, books, magazines, manuscripts, documents, and so on that are relevant to research (Koentjaraningrat, 1983). Library techniques are very important in conducting research, this is because research cannot be separated from scientific literature (Sugiyono, 2012).

Documentation techniques are a method of collecting data by searching or digging up data from literature related to what is intended in the problem formulation. The data that has been obtained from various literature is collected as a single document that is used to answer the problems that have been formulated. After the data is collected, data analysis is carried out by organizing the data, breaking it down into units, synthesizing it, arranging it into patterns, choosing what is important and what will be studied, and making conclusions. The data analysis technique uses the content analysis model from Lasswell. Content analysis is a technique for making conclusions by identifying the characteristics of certain messages objectively and systematically (Holsti, 1969).

3. Result and Discussion

Industrial Revolution 4.0

Industrial Revolution as a whole can be described as a period in which the human economy moved worldwide to larger, more efficient, and more stable production processes (Joselia et al., 2023). The Industrial Revolution 4.0 represents a fundamental transformation of the manufacturing industry through the integration of digital technologies, cyber-physical systems, automation, and data exchange in production processes (Schwab, 2016). Industry 4.0 can be briefly defined as a phenomenon related to information technology and automation that are increasingly intertwined with the real physical world. Industry 4.0 can thus be defined as the fusion of virtual and physical reality. With Industry 4.0 technologies such as Big Data, Internet of Things, Cyber Security, Cloud and/or Augmented Reality, all members of an organization can quickly access information and make last minute notifications and changes, allowing businesses to achieve agility. Advanced technologies would increase human resource (HR) innovative capacity and increase productivity (Nova et al., 2020). The new industrial revolution creates conditions where industry is sustainable, where workers are skilled and advanced to support optimization in all industries. Based on this statement, HR professionals must select the right employees with complex and relevant knowledge and skills for each job, provide the necessary training for employees and help those employees who cannot find a suitable job in a changing labor market.

Human Resource Management

Human resource management (HRM) definition is two concepts in one concept and can be used interchangeably with human resource management (Babalola, 2011). It simply means the overall management of people in an organization. Personnel training, or management, includes functions related to personnel management of the organization. It is the use of human resources to achieve the goals of the organization as efficiently and effectively as possible. Other opinion by Hearthfield (2019) which stated that Human resource management definition is an organizational function that focuses on the recruitment, management and direction and leadership of the employee who works in a company or organization. Human resource management also includes the supervision of all matters related to the management of a company or organization (Noor et al., 2020).

Human resource management is the process of dealing with various problems, the field of employees, workers, employees, managers and other workers, to support the activities of an organization or company to achieve the set goals (Abdullah, 2019).

For a company, the role of human resource management is essential and must be properly considered, and it aims to achieve the goals of the company. If the HR manager is good, it will undoubtedly have an impact on the work habits or performance of the employees themselves (Budianto, 2020). Management of human resources includes all administrative decisions and practices that directly affect human labor. Human resource management is necessary to improve the efficiency of the organization's human resources. The goal is to provide the organization with a functional unit of work (Syamsurizal, 2020).

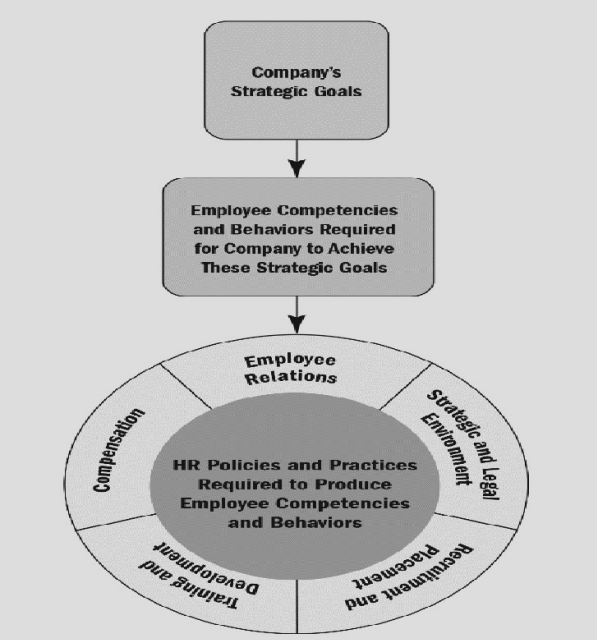

Figure 1. The Strategic Role of HRM (Gary Dessler, 2020)

From figure 1, we can interpret that HRM are important tools to align with business goals through employee competencies and behaviour. Employee competencies and behaviour can be managed and controlled by organizing HR policies and competencies in employee compensation and benefit, employee relation, training and development, recruitment and placement, and strategic and legal environment.

Manufacturing

According to the Badan Pusat Statistik (2015), the manufacturing or processing industry refers to economic activities that involve transforming raw materials or basic inputs into finished or semi-finished products that possess greater economic value. According to **Nigel Slack** (2010), manufacturing can be understood as the process of producing tangible goods by converting inputs such as materials, energy, and information into products that satisfy customer demands. This process consists of a structured set of activities and operations that are systematically managed to ensure that goods are produced in an efficient and effective manner.According to **Jay Heizer** and **Barry Render** (2014), manufacturing is the process of converting raw materials, components, or parts into finished products through the utilization of labor, machinery, tools, and various chemical or biological methods. Through this process, manufacturing activities add economic value by transforming inputs into goods that are ready to be marketed and sold to consumers.

This transformation process may be conducted through mechanical or chemical methods, using machinery, or even through manual labor. Essentially, the manufacturing industry plays a role in increasing the value of raw materials by converting them into products that are more useful and have higher market value. Within the structure of Indonesia's national economy, several sectors serve as major contributors to Gross Domestic Product (GDP). Among these, the manufacturing industry, the agricultural sector, and the trade sector are recognized as the three primary sectors that significantly support economic growth. These sectors not only generate substantial economic output but also create employment opportunities and play an important role in maintaining the stability and sustainability of Indonesia's economic development

History Of Industrial Revolution

The first phase of industrial revolution started in the 18th century which is commonly called industrial revolution 1.0. In this timeline, introduction of new ways of production using water based machines or what we know as steam engines. This development and invention of machines opened the entryway to encourage changes in production effectiveness that gradually increase productivity (Ashwani, 2020). Within the rise in productivity and massive volume, little companies developed from serving a small extent of clients to huge organizations related to a bigger company size, larger size of administrators, and workers.

The second phase, industrial revolution 2.0, started in the 19th century after findings and innovation of assembly line production and electricity based production (Gormus et al., 2019). Around the same timeframe, new approaches to mass production are supported within the arrival of machines and production components that are more advanced like conveyor belts.

The next phase is industrial revolution 3.0, which started in the late 19th century. This phase began with a more advanced technology in machine program and computerized business process. The 4th industrial revolution is now in progress. The industrial revolution 4.0 emerged by the arrival of the cyber system, internet of things, and network. The 4th industrial revolution is generally about automation technology, data technology, robotic and artificial intelligence. In business, these inventions of such sophisticated technology in this stage of industrial revolution must be dealt with quickly with such careful preparation.

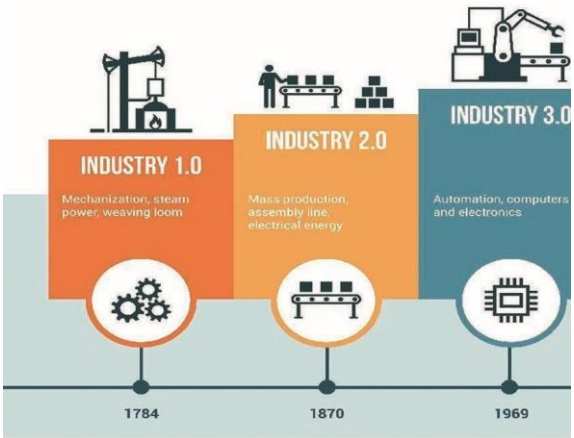

Figure 2. The Stage of Industrial Revolution (The Guardian, 2020)

From figure 2, we can visualize the stage of industrial revolution from the first phase until the fourth phase. Based on this figure, we know that in every stage industries must overcome different challenges and changes in business, especially on production technology and strategies to achieve the goals.

Industry 4.0

Industry 4.0 refers to the increasing digitization of the entire value chain and the resulting interconnection of people, devices and systems through real-time data exchange. The fourth industrial age was born when machines began to manage themselves and their processes without human intervention.

Devices and products and even semi- finished products are equipped with chips that store important information such as how they are handled, when they are handled, etc. Robotics, big data analysis, Internet of Things (IoT), cloud computing and additive manufacturing are the five key factors of Industrial Revolution 4.0 which helps to make industrial processes fully digitized and intelligent.

a. Robotics
   Sophisticated technology in industrial revolution 4.0, Robotic technologies, which enable goods and services to be produced and delivered with little or even zero human intervention. Robots are typically designed to perform repetitive tasks so that workers can focus on other essential activities. With robots, companies are able to save money on the health and safety of employee because fewer workers are involved in dangerous work, which would lead to fewer accidents at work. However, robots can also perform highly repetitive or mathematical tasks with much lower error or defect rates than human employee
b. Big Data Analytics
   Companies are now developing a concept on how big data has been around for years, and most companies now realize that if they collect all the data related to their operations, they can use analytics to achieve enormous value. Big data analytics is an advanced analytical technique for analyzing large data sets that contain structured, semi-structured and unstructured data and data from multiple sources and different sizes. Artificial intelligence (AI), mobile devices, social media and the Internet of Things are moving data sources into big data and are more complex than traditional data sources. Big data analytics is the often complex process of examining big data to find information (such as hidden patterns, correlations, market trends, and customer preferences) that can help organizations make informed business decisions. Data analytics technologies are at scale. and techniques enable organizations to analyze data sets and gather new insights. Business Intelligence (BI) questions answer fundamental business and performance questions.
c. Internet of Things (IoT)
   This term of IoT means a global network of interconnected things that communicate using protocols. The Internet of Things is sometimes called the Internet of Everything. For example, a person with a heart monitor implant, a pet with a biochip transmitter, a car with built-in sensors to alert the driver, or whatever can provide an IP address and send data over the network. Things People can use IoT to work smarter and make their lives easier. IoT offers smart devices for home automation. The IoT gives companies real-time insight into the performance of their systems, providing information on everything from machine performance to

logistics. Over the past few years, IoT has become one of the most important technologies of the 21st century. Now that we can connect everyday objects—kitchen appliances, cars, thermostats, baby monitors—to the internet via embedded devices, seamless communication is possible between people, processes, and things. By means of low-cost computing, the cloud, big data, analytics, and mobile technologies, physical things can share and collect data with minimal human intervention. In this hyperconnected world, digital systems can record, monitor, and adjust each interaction between connected things. The physical world meets the digital world—and they cooperate

d. Cloud computing

This term refers to the distribution of on-demand computing services such as applications, storage and processing power over the internet and on a per-use basis. Instead of owning their own computing devices or data centers, businesses can rent storage space, database connections, and processing power from a cloud provider. One advantage of cloud computing is that companies can avoid the high costs of building and maintaining their own servers, paying only for what they use. Despite its long history, cloud computing is still in its infancy. Many companies are still debating which applications should be moved to the cloud and when it should have happened. As companies become more comfortable with the idea of storing their data elsewhere than on a server in the basement, usage is expected to increase.

The overview of Industry 4.0 impact on human resource management is the shifting strategies in managing the labor force as the company's goals are adapting to industry revolution. Changes in the labor market must be harmoniously structured so that the company's goals are achieved together. Business processes, personnel management and labor market relations must be implemented in parallel. Because the effect of Industrial Revolution 4.0 is very closely related to these three aspects. From the explanation of Industry 4.0, which is closely related to the production process, its existence is inseparable from the effect of industrial technology knowledge. Technological advancements make automation possible in almost all fields. New technologies and approaches that combine the physical, digital and biological world will fundamentally change the pattern of life and human interaction (Tjandrawinata, 2020). Industry 4.0 as a phase of the technological revolution changes the way in which human activities take place in scale, scope, complexity, and transformation from previous life experiences. Humans will even live in global uncertainty, therefore humans must have the ability to predict the fast changing future. Each country must respond to these changes in an integrated and comprehensive manner. The response involved all global political stakeholders, ranging from the public sector, private sector, academia, to civil society so that industry challenges 4.0 can be managed into opportunities.

Impact Of Industrial Revolution 4.0 On Manufacturing Sector In Indonesia

Many manufacturing plants are already utilizing at least some of the principles and technologies of Industry 4.0, and you might be one of them. Here, we'll take a broader look at how Industry 4.0 impacts manufacturing businesses:

1. Monitoring and Data Collection Through Sensors

Sensor technology enables real-time monitoring and data collection in manufacturing environments. In Industry 4.0, these sensors are the backbone, enabling continuous and accurate data collection from various equipment and

production processes This collected data is used to analyze equipment performance, identify potential problems or maintenance needs, and support better decision- making in inventory and personnel management. This results in a deeper understanding of the overall performance of a manufacturing facility, enabling process improvements, cost savings, and increased operational efficiency.

2. Broader Communication Between Equipment and Systems
   In addition to sensors, network technology also plays a crucial role in the Industry 4.0 revolution. In particular, the widespread deployment of 5G access further supports this transformation. This network technology enables broader and faster connectivity between various equipment and systems in industrial environments. Before Industry 4.0, communication between equipment and systems was often separate or discrete. While this type of communication has existed for quite some time, Industry 4.0 brings significant integration. Today, entire facilities can be fully connected, enabling a seamless and continuous flow of data between equipment, production systems, and software. The result of this integration is a fully connected facility. Each piece of equipment can contribute by providing real-time data to a central software system. This data can include information about machine condition, production status, maintenance needs, and much more. The software system then automatically analyzes this data and provides insights that enable fast and informed decision-making, both at the macro (strategic) and micro (operational) levels. With more advanced networking technology, this collected information can be quickly accessed and used across the entire company network, even across multiple locations. This can help optimize performance and pave the way for innovation, enabling companies to better adapt to market changes and achieve higher operational efficiency.
3. More Advanced Automation
   While automation has long existed in the manufacturing industry, Industry 4.0 takes automation to a higher and more sophisticated level. The automation technologies in Industry 4.0 enable more intelligent, efficient, and adaptive system integration across the entire production chain. Industry 4.0 revolutionizes programming technology by making it more informative, allowing automation systems to use data collected through sensors and networks to gain a deeper understanding of production situations. Through a better understanding of the production context, automated systems can be configured and programmed to adapt to changing conditions more quickly and precisely. Industry 4.0 also introduces innovative ways for humans and robots to work together. Collaborative robotics is a concrete example of human-robot integration in the workplace. Workers and robots can work side by side safely in the same production area, with robots performing repetitive and demanding tasks, while workers focus on tasks that require creativity, judgment, and more complex human interaction. Adopting smarter and more connected technologies makes production more efficient by adapting to real-time market demand and conditions. Furthermore, production safety and security are also enhanced by the use of collaborative robotics, which can reduce the risk of workplace accidents.
4. Data Analysis and Action
   In Industry 4.0, process control becomes more effective thanks to the vast amounts of data collected in real time. With in-depth analysis of this data, control systems can adjust production processes more precisely and efficiently. For example, if a

machine experiences a decrease in efficiency, automated systems can quickly identify and make adjustments to maximize its performance. One of the key advantages of data analysis in Industry 4.0 is a more focused maintenance approach, particularly through predictive maintenance. By analyzing historical and real-time data, systems can predict potential equipment damage or failure. This may

HRM Challenge In Industrial Revolution 4.0

The Industrial Revolution 4.0 connects the physical, digital and biological worlds, removing the boundaries between people and technology. Technologies bring several benefits to companies, such as reducing production interruptions, increasing productivity through robotics, etc. The two examples above have been able to indicate how digitalization that was part of the 4.0 industrial revolution began to shift the conventional role in the market. Not only digitalization, in the future the use of robots in supporting autonomy in the realm of the manufacturing and service industries will be increasingly inevitable. This is driven by the company's desire to cut costs caused by human resources. The demand for wage increases that is not accompanied by productivity is one of the problems that are often experienced by companies related to human resources. However, technological advances have always led to other changes in the organizational environment, including how people work.

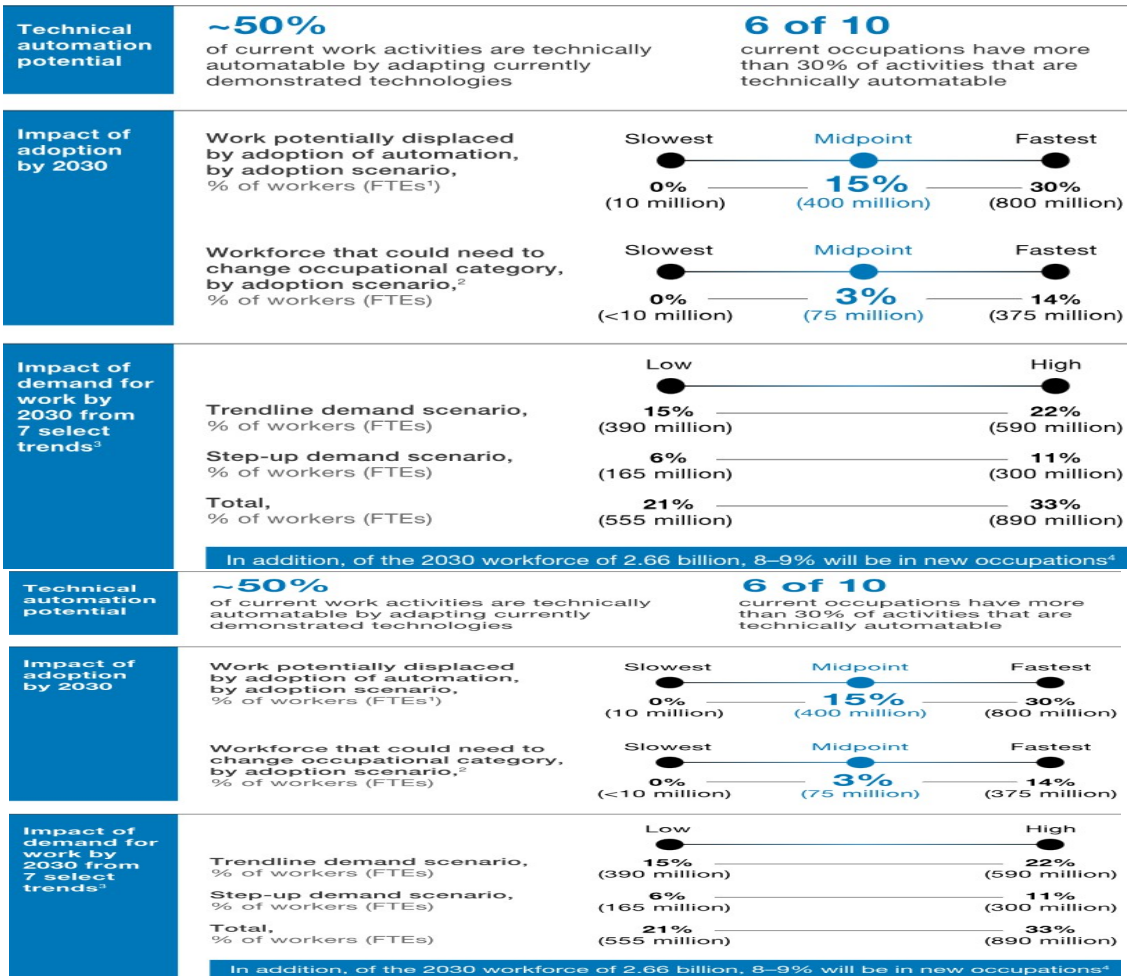

Figure 3. Impact of Automation Workforce (McKinsey, 2019)

Figure 3 shows the impact of automation and digitalization to company workforce composition. Thus, we can interpret that the adoption of technologies will replace jobs done by human labor and modify job responsibility. Moreover, hereby some impacts of industrial revolution that affecting human resource management (HRM):

a. Job Loss / Job Extinction

   The Industrial Revolution 4.0 will affect almost every industry and around 50% of jobs will be automated. Automation of production processes affects routine workers, leading to many job losses, especially among less skilled workers. Employees must acquire new skills to survive with this automation (Sung, 2018). Some industries will be automated more than others as robots evolve like humans. Many full-time jobs in industry and agriculture are disappearing due to increased automation, so the number of full- time workers in these fields will soon decrease. But bots have a problem. While robots are smart, fast and efficient at performing predetermined tasks, robots are not better at every job. Robots lack cognitive abilities unlike human labor. They know how to respond to customer problems but lack the empathy to support customers with good care. There will be possibilities in the future that robots have higher cognitive abilities than humans. When this happens, the need for human labor is unnecessary.

   Other factors that caused the job losses is when three jobs can be done with only one person by the help of technology. For example, the accounting department needs to input all balance payments and invoices manually but in the era of industrial revolution 4.0 the task can be done effectively and efficiently with computer programs or the help of big data.

b. Job Insecurity

   Since the possibilities of job losses are higher in the era of the fourth industrial revolution, employees have a higher chance of job insecurity. One of the common features of the definitions of job insecurity is the uncertainty about continuation of the previous work (Pato et al., 2020). Another common component is that it is involuntary. Job insecurity can also be defined as the subjectively experienced expectation of a fundamental and unwanted event related to job loss . Job insecurity may cause chaos among employees because they are afraid to lose their job. Regardless of losing the position or friends, most importantly afraid of not having a salary after the job losses. According to Prof. Dwikorita Karnawati (2023), the 4.0 industrial revolution in the next five years will erase 35 percent of jobs. And even in the next 10 years the type of work that will be lost increases to 75 percent. This is due to the work being played by humans step by step being replaced with program digitizing technology. As a result, the production process is faster and easier to distribute massively with minimal human involvement. In the United States, for example, the development of an online banking system has facilitated the transaction process for banking services. As a result, 48,000 bank tellers had to face termination due to efficiency reasons.

c. Skills Disruption

   During the fourth industrial revolution, softwares, programs, robotics technology and data analysis are widely used by many industries. Therefore, the demand for skilled workers in IT technologies is increasing. Current employees must change their skills to meet new IT integrations. As the entire ecosystem of human life is changing, rapid adaptation to revolution industry 4.0 requires a joint response from

government, educational institutions and companies. Each party must collaborate to provide training to the workforce in new IT skills. There is no place for a traditional workforce and resistance to change will result in any party falling out of Industry 4.0 without benefiting from it. There is a visible risk of the elderly losing their jobs, as it is difficult for them to quickly adapt to new information technologies. Skills Disruption refers to the need for workers to learn new skills when their jobs change in some way. Skills Disruption Index by Kane, which ranges from 0 to 100 and analyzes how much jobs have changed over the past five years. A score of 100 is the job that has changed the most, while a score of 0 is the job that has changed the least. For example, the basic skills required to be a mystery shopper or a lifeguard have not changed significantly, and both were low ratings. in the skill deterioration index. In contrast, the skills needed for web developers and IT roles have changed significantly, placing them at the opposite end.

d. Long-Adapted Employees
   An important factor in employee adaptation is the ability of employees to deal with crises or unexpected situations. Employees in the company are from different backgrounds, education, gender and ages. These differences also bring different responses to revolution in the industry. Some are highly adaptive to the changing in the working environment and some are slower even become resistant to change. Human resource management in this case are responsible to help and support employees' ability to adapt and be more flexible and rigid towards transformation and transition in the era of the fourth industrial revolution. This trend towards work intensification has made the adaptability of workers indispensable. Proactively dealing with organizational change requires energetic resources from employees to adapt successfully. Continuous technological development and digital work have led to changes in work processes.

Hrm Recommendation To Survive Industrial Revolution 4.0

Companies need to adapt to the new developments in society, the business world, and the external environment. Because the latest technological developments will change the way companies operate and especially how people engage in work. Therefore, it is essential to identify new strategies that will arise during the Fourth Industrial Revolution. According to the white paper published by the World Economic Forum in collaboration with Saudi Aramco, Unilever, and Willis Towers Watson has identified six essential aspects that need to be given attention and implemented by the business leaders, partnering with their human resource departments. Based on several challenges HR must overcome to survive the industrial revolution 4.0, hereby is some solutions or recommendations HR can possibly do,

a. Reskilling, Redeployment, and Job Reinvention
   Reskilling or retraining means finding employees with "adjacent skills" or skills that are similar to the new skills the company needs. This provides employees an opportunity for lateral learning. The World Economic Forum estimates that later in 2025, 50 % of workers will need retraining due to the introduction of new technology. Later in five years, more than 60 % of the skills essential to current job demand will have changed (Raimi et al., 2012) . In 2025, a third of key skills will be technological expertise, which is not yet considered crucial in today's job requirements. Providing employees the opportunity to develop the skills they need to participate fully in the working life of the future, we should create a more

inclusive and sustainable economy and society where nobody is left behind. The goal of Industry 4.0 is to create a unique lifelong education system that ensures a future workforce.

Reed Employment is when companies try to find current employees another position in the company to avoid layoffs (Shwetha, 2022). The presence of technology will invent a new job or position and HR should utilize this opportunity to create redemployment. Redeployment can help with job insecurity and job losses issues. Despite creating new positions, HR must also upskill their employees. Skills important to employees in the fourth industrial revolution era are entrepreneurial thinking, conflict resolution, creativity, problem solving, decision making, research skills, analytical skills, efficiency orientation

Job reinvention can be defined as restructuration of one job. It includes a change in a job which requires taking on a completely new role and task . Moreover, the main responsibility of HR management is to align the interests of companies and organizations.

b. Develop New Capabilities Through Training and Development

HR management which task to manage human labor is responsible for the displacement of labor due to industrial revolution 4.0. Manager must equip himself with knowledge of the opportunities and risks that the introduction of new technology entails, so that the transition of the workforce continues smoothly. Management should use the opportunities and power of technology to shape and drive the Industrial Revolution to organizational values and success. To achieve maximum results, leaders must adopt the right technology and create a new innovative people strategy for future work, focusing on a new vision of the organizational culture. Leaders must lead with purpose. As mentioned before, they must be technological people, technology-oriented, because the willingness of employees to accept changes in technology depends on the ability of managers to use this knowledge. But today's leaders are trapped in old traditional, linear thinking or too busy with multiple crises competing for their attention. To overcome the above limitations, managers must think strategically, develop new leadership skills and shape the future of the organization by leading from the edge.

c. Improving Employee Engagement

Digitalization and automation in business have a great impact on employee engagement, because it forces companies to manage work in an agile way with optimal numbers of employees, non-employees and technology. Therefore, companies should always ensure that all employees are constantly connected to technology. According to several studies on employees, engagement continues to increase with changes in the level of employee engagement as a result of changes in the world of work (Bakker and Albrecht, 2019). Changes in the use of technology can lead to changes in the work environment. According to Sumer , the widespread use of technology can have an impact on the labor market, skills and employment. Some of the occupations affected are technicians, clerks, maintenance, sales and factory operators.

d. Building Agile Value and Adaptation as the Working Culture

Industrial revolution is a series of events which is endless. It is predicted that the fourth industrial revolution can still continue to the fifth and so on. This means companies and organizations must be able to be agile and adapt to every change and transformation in the business environment. Technology is constantly

changing and companies need to keep up with the latest developments to ensure their employees are as productive as possible. As markets and industries moved with technology, the organization could not stand still. Therefore, companies must modernize their learning processes to meet changing business needs (Silvia & Gueseppe, 2022). The concept of agile learning is a training and development method that emphasizes the speed, collaboration and flexibility of employee learning.

e. Creating Metrics To Assess Human Capital
   Human capital is becoming increasingly important as the industrial world moves into a knowledge-based economy with the Fourth Industrial Revolution (Suwandi,2022). Even companies that invest heavily in machinery still see human capital as an asset that can create value and improve business performance; Therefore, there is a demand for strategies that combine human capital practices to support performance. Organizations often use a number of metrics to measure the effectiveness and efficiency of organizational performance. In general, these measurements can be used as a benchmark to evaluate different parts of a business. Benchmarking is quickly becoming a must-have tool for HR professionals. In addition to initiating internal standards, it is a system for benchmarking processes, practices and results against competitors to improve performance. Typically, human resources in an organization are integrated with almost all functions of a business, including operations, finance, marketing, etc. Therefore, even managers can use metrics from business strategies, finance and operations to evaluate human resources. In a mix of machines and people, it is critical that we have the right mechanism to value human capital. Insights Manager and HR Data Scientist are examples of emerging HR roles designed to analyze, measure and report on data.
f. Embedding Diversity
   The conversation about overcoming racism, inequality and injustice continues around the world. A diverse and inclusive culture brings innovative results in the business world as well. In addition, a more diverse workforce can help increase the productivity of companies. Different perspectives encourage creativity and idea generation, and team members can benefit from each other's experiences. Organizations can create and grow more creatively with more diverse skills, life experiences and ideas. Most companies now recognize the value of a diverse workforce and are fully committed to a range of inclusion programs such as addressing gender imbalances, increasing ethnic representation and supporting people with disabilities. However, existing stereotypes that have long influenced internal talent acquisition and management are major barriers to creating an inclusive climate. Changing the hiring process alone will not lead to business success. Therefore, managers can promote diversity in the workplace, encourage employees to take more control over demanding workplace improvements, and promote transparency throughout the company to create a more accepting diverse environment. To promote diversity and inclusion in the workplace, companies need leaders who exemplify the same ideals. A company cannot assume a friendly company culture if it hires executives and managers who do not care about providing a safe environment for people of all backgrounds. External influences such as globalization, technology and major changes in society, including laws and changes in values and beliefs, have accelerated this major change in management, especially in HRM. Since it is completely impossible to control the external forces of

companies, the influence, motivation and commitment of people have become even more important distinguishing factors of competitive success and business sustainability. As governments update education and employment legislation, support education and skills and strengthen social protection, businesses must invest in the workforce through education, lifelong learning and diversity and inclusion. Therefore, Ślusarczyk (2023) emphasized the role of HR professionals in industry, keeping their organizations in transition during the fourth industrial revolution, so that they can meet future challenges and exploit future opportunities to improve HR management.

4. Conclusion

Industry 4.0 brings many changes in human life. Industry 4.0 has fundamentally changed the way people do activities and has a big influence on the world of work. The positive influence of industry 4.0 is in the form of the effectiveness and efficiency of resources and production costs despite the impact on reducing employment. Industry 4.0 needs a workforce that has skills in digital literacy, technological literacy, and human literacy. The effect of the industrial revolution is inevitable. Companies and organizations must be aware and adapt to the changing environment. HR as one of the keys to successfully adapt, must survive and overcome the challenge in the fourth industrial revolution. Human resource challenge against industrial revolution 4.0 is on employee relation, recruitment, training and development, and employee retention. HR must overcome the challenge in order to survive the transition to industrial revolution 4.0. Few recommendations for HR as a result of the literature review are through job restructuration (reskilling, redemployment, job reinvention), training and development, employee engagement, and company culture.

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