

REVIEW

# A systematic review of the implementation of Industry 4.0 in human resources

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The advancement of both society and the economy may be traced back to the industrial sector. Businesses and academic institutions alike have shown considerable enthusiasm for the Industry 4.0 initiative. Although “Industry 4.0” as a concept has been explored in academic circles for some time, it is only recently that the term has become popular in both academic and industrial settings. Academic studies, on the other hand, aim to better the industrial sector by clarifying the meaning of the concept and developing relevant systems, business models, and methodologies. Businesses need a thorough understanding of the features and substance of Industry 4.0 in order to make the transition from machine-dominated to digital production. These data will be useful when they formulate a plan. Along this route, there have been many discussions and plans put forth. The rapid progress of industrial science is linked to this ailment. This paper conducts a literature review to investigate the relationship between Industry 4.0 and the development of industrial engineering science, the challenges that this field faces, and the impact that the industrial revolution had on human resources, all of which contributed to the emergence of Industry 4.0. To improve productivity, efficiency, and unemployment, the concept merges digital technologies, the Internet, and conventional industries. Moreover, some of the ramifications concern the detrimental effects of Industry 4.0 on human resources. The fundamental objective is to furnish labor forces with tools by expanding employment and spawning new avenues for business ownership across several industries and institutional configurations.

**Keywords:** Industry 4.0, human resource practices, manufacturing sector, economical impact, employment, entrepreneurship

## 1. Introduction

“Industrial Revolution 4.0” is no longer a catchphrase. Various technologies are being utilized to announce the start of the fourth industrial revolution. One example is artificial intelligence (AI), which is expanding. Outside of industry, AI was created to better human life. People’s relationships have been rapidly altered by technology. People’s social, economic, legal, political, cultural, and security relationships can be transformed by technological breakthroughs.

Face-to-screen, screen-to-screen, and virtual window decorations are examples of autonomous and robotic skin contact alterations. For positive outcomes, change must be managed effectively. The atmosphere requires community groups and organizations to change their ideas,

methods of operation, and behaviors in order to build harmonious connections.

Automation, data transfer, robotics, and AI in industrial technologies are all part of Industrial Revolution 4.0. The last step of the smart process module uses physical-cyber systems to keep an eye on physical processes, create digital replicas of the real world, and reach decentralized decisions. In social or commercial life, we cannot disregard technology. This change needs prompt and thorough business preparation. To maintain change, business processes and corporate relationships must be anticipated. To add value to the firm, the times must correctly adjust to business processes and market needs. Another top responsibility is human resource management. Changes in labor relations must also be coordinated in order to meet organizational goals.

Parallel business operations, human resource management, and information management are required. Because of the industrial revolution, 4.0 is inextricably linked to these three qualities.

As businesses adjust to industrial digitization, change management has become an essential component of human resources (HR). Industry 4.0 automates. It automates data collection, analysis, evaluation, education, performance enhancement, and decision making in HR (1). New employment opportunities are produced by Industry 4.0. It affects the growth of HR, the productivity of labor, the emergence of new industries, and the shift of jobs from humans to machines and robots. There are routine, repetitive, painful, or potentially hazardous tasks. Future enterprises are enabled by human potential and computer algorithms.

The worldwide change benefits several countries. Geography, underdevelopment, and other labor-market constraints are becoming less important. The essay examines the process of making changes in organizations from the perspective of the employees. It assesses how customers feel about a company's change process, communication, and overall satisfaction (2).

Without industrial engineering abilities, Industry 4.0, which is directly related to the manufacturing process, cannot exist. Since the industrial revolution, industrial engineering has advanced substantially. The once-limited research has expanded. This poses the question of whether Industry 4.0 is beneficial or detrimental to small dealers (3). To answer these problems, this article examines the literature and offers suggestions on industrial development 4.0.

### 1.1. After Industry 4.0, changing scenario

When it comes to Industry 4.0, adaptability is everything. Decentralization, individual empowerment, fewer formal rules, horizontal communication, and teamwork are characteristics of a more appropriate organizational structure, according to Lasi (2). Employees must undergo a transition and come to grips with Industry 4.0. It is not enough to just repeat what has been done in the past. This suggests a change in focus to the actual processes and persons involved. The management of the entire organization must overcome this obstacle. Targeted planning was necessary in terms of HR (4). The following information should be considered:

When it comes to hiring, HR professionals must understand what skills are required in the industry in which their firm works. It is also critical that they determine what kinds of new abilities the 4.0 age will provide (5).

It is time for HR to pay greater attention to the digital world. HR professionals must stay current on evolving technology in order to remain competitive.

Interconnection and integration are crucial terms in this context. Internal and external client communication is being actively modified. There is concentration on new, cutting-edge, and time-saving communication methods.

Retraining the HR department will have to retrain personnel in other departments of the organization in addition to making their own modifications.

HR professionals face a number of challenges in the 4.0 business. Just a few examples are big data processing, rapid change, new business models, "intelligent services," and digital technologies. Managers who have profited from change are critical for effectively managing organizational change (6). Changes in the organization have an impact on how much change these managers implement. This collaboration has aided both organizations in making successful advances.

According to experts, the rise of Industry 4.0 will bring a host of challenges and threats. Employers must determine whether they are willing to risk losing their finest employees by failing to adapt to quickly changing environments and rapid technological advancement (7). Small- and medium-sized enterprises, according to Sommer, L. 6, face a higher risk of innovation failure due to their lower size. Part-time employment with flexible hours may increase as a result of the changes in several organizations at once. Workers will be assigned to specific jobs, and new internal structures will be formed to serve as the foundation for labor-law interactions.

McKinsey estimates that the advent of new technologies will threaten 800 million jobs. Because of this massive upheaval, automation and the removal of low-value-added employment will be pushed. Furthermore, the implementation of these technologies results in a shortage of personnel competence. Companies' HR departments must decide if it is more cost-effective to acquire new individuals with the necessary abilities or to retrain the workers they already have.

Humans are concerned about the growing use of robotics and AI, which have a number of restrictions and issues. There is anxiety over the future, both economically and professionally. Countries such as Japan and Germany, which lead the robotics revolution, have enjoyed the lowest unemployment rates in the last 25°years. Despite the fact that unemployment has decreased in Slovakia in recent years, it appears that the country is increasingly embracing digitization and robotization in this sector. We have concentrated on answering questions concerning how technology will affect business in the next few years. A total of 18,000 employees from 43 countries were the subject of this study. After reading "The Skills Generation," it became clear that the future of the workforce hinges on its capacity to learn quickly and adapt to new situations. Investing in internal training to keep skills "fresh" was mentioned by 60% of respondents as an important way to avoid creating a substantial skills gap between current employees and those who are in demand (8, 9). Automation of various procedures

and activities will put 45% of current occupations at risk in the next 2° years.

Industry 4.0 poses numerous difficulties for businesses. A company's first step in preparing for new developments is to educate its personnel about such changes. To remain competitive in the market, these modifications must be made to the organization. In an ever-expanding organization, changes are essential to its future viability (10). People's positive involvement in change is made easier by their increased sense of connection to the process of change. Organizations must engage their staff as soon as possible in the process of planned change to ensure a smooth transition. When faced with uncertainty, people have difficulty imagining what their lives would be like after the shift (11). As a result, it is important for the organization's management to be able to explain what the change means.

## 1.2. The challenges prior to the beginning of Industrial revolution 4.0

As a result of the fourth industrial revolution, the millennial generation will encounter both opportunities and challenges. The expansion of science and technology, which fueled the industrial revolution, was followed by a slew of other consequences, including rising unemployment, rivalry between humans and machines, and the demand for ever-higher levels of proficiency.

Karnawati (12) estimates that the fourth industrial revolution will eliminate 35% of jobs over the next 5° years.

Furthermore, over the following 10° years, the proportion of certain types of jobs lost will rise to 75%. This is because the work done by humans is gradually being replaced by the work done by technology that digitizes programs. As a result, production goes considerably more quickly, and it is much simpler to distribute on a large scale with less human involvement. For instance, the creation of an online banking system in the US has made the process of carrying out financial services transactions simpler. Because of the requirement to be more productive, 48,000 bank tellers' jobs were jeopardized.

According to a study performed by McKinsey, a global management-consulting firm, digital technology has the potential to replace up to 52.6 million individuals in China in the near future. In other words, 52.6 million individuals, or 52% of the workforce, will be unemployed (13).

Wolter noted the following difficulties with Industry 4.0: Sung (2017) lists these five elements: (1) concerns with information technology security, (2) concerns with the dependability and stability of the production machine, (3) difficulties with a lack of sufficient skills, (4) issues with stakeholders' resistance to change, and (5) the loss of a sizable quantity of labor as a result of automation (14).

Irianto (15) makes it simpler to traverse the corporate world. 4.0 challenges, such as (1) industrial preparedness;

(2) a reliable workforce; (3) ease of sociocultural regulation; and (4) diversification, job development, and industry potential. 4.0 consists of the following: (1) ecosystem innovation, (2) a competitive industrial foundation, (3) technology investment, and (4) entrepreneurship and integration of small- and medium-sized companies (SMEs).

Unemployment is one of the numerous negative outcomes that can be avoided in people's lives because of mapping the promise and challenges posed by Industry 4.0 (15). The Work Employment and Social Outlook Trend 2017 report for 2017 predicts that there will be 204 million unemployed individuals worldwide in 2018, an increase of 2.7 million. Conditions in Indonesia are expected to be extremely similar to those in Western countries, which have already experienced the same thing. Furthermore, unemployment remains a problem, with the potential to become a risk. Indonesia had an open unemployment rate of 5.33% in February 2017, which corresponded to 7.01 million persons out of a total workforce of 131.55 million [Source: (BPS, 2017)].

According to BPS statistics from 2017, the number of persons unemployed after graduation from a vocational high school (SMK) was the greatest (9.27%). Following that, high-school graduates (SMA) account for 7.03%, Diploma III (D3) students account for 6.35%, and university students account for 4.98%. The poor level of both hard and soft skills that individuals possess has been cited as one of the factors leading to Indonesia's high rate of unemployment. Vocational education is a significant contributor to this issue.

## 1.3. Some suggestions toward the path of I 4.0 with regard to HR practices

When it comes to preparing for the fourth wave of the industrial revolution, the Indonesian government should be concerned about two things: the significance of improving both the amount and quality of the HR available and the significance of the 2013 Labor Law No. 13 Amendments. The government may specialize Indonesian workers through the use of vocational training courses and training, which will become a necessity for potential workers in order to meet future job needs, as one strategy to increase the abilities of Indonesian workers. One of the things the government can do is this.

The rewrite of Law 13 of 2003 needs to address at least four different areas of concern in order to be considered complete. To begin, we will discuss industrial relations; more specifically, the way in which the connection between employers and those who get employment (workers) is no longer one that is permanent and unchanging but rather one of friendship or partnership. Workers in this arrangement may perform their services for a number of different businesses at the same time. Therefore, in a working relationship such as this one, the location of employment

does not need to be in a building, and the hours can be adjusted as needed.

The cost of labor is the second component. Depending on the agreement, level of skill, and other factors, compensation may be determined on an hourly, daily, weekly, or monthly basis. In the context of workplace relations and payroll systems like this one, severance pay does not exist if an employee's job is terminated for any reason (16). The third point to highlight is if a case must be governed by the new law in order to decide what falls under the purview of industrial relations justice. Fourth, an agreement was made between the government and PT marketing parties to grant distribution in the form of a space around the minimarket and mall as a location for small business owners to launch their operations. This agreement was formed through collaboration between the government and PT marketing companies.

If the most important factor in ensuring the success of Industry 4.0—namely, the enhancement of the caliber of HR—is disregarded, Indonesia will be doomed to fail. Even while the unemployment rate in 2016 was lower than it had been since 1998, automation is still a significant danger to the unskilled worker, whose position will start to change in a more gradual fashion. Then, it is assumed that the second issue, which is the amendment of Law Number 13 of 2013 concerning manpower, is also disregarded, which would result in the law's inability to accommodate Industry 4.0. As a direct consequence of this, the deployment of Industry 4.0 will not function as smoothly as it could Pratomo (17).

A significant obstacle for Indonesia is the issue of unemployment as well as the issue of the competitiveness of HR. The demands of businesses and industries add another layer of complexity to the problems that Indonesia is currently facing. According to a report published by the World Bank (2017), the job market wants graduates with many talents. These graduates are made possible by educational units and systems, including secondary education and higher education.

In the years 2030–2040, it is anticipated that Indonesia will benefit from a demographic dividend in the sense that the proportion of its population that is of working age will exceed that of its population that is not of working age. It is anticipated that 64% of Indonesia's entire population of 297 million people will be in the productive age range by the time the country reaches its demographic goal. As a result, the huge number of individuals of productive age needs to be followed by increases in quality, both in terms of education and skills and in terms of competitiveness in the labor market (18).

## 2. Literature review

Lin et al. (19) in his paper attempts to explain the holistic approach to HR management (HRM) in Industry 4.0. He emphasizes the increasing complexity of simple

manufacturing processes owing to ongoing automation, which requires extensive employee training and education. The author also stated that retaining individuals in changing work conditions is a challenge that requires a systematic approach to staff certification as smart production processes create the essential flexibility and employees must be able to do more strategic, creative, and collaborative work. Action is also required due to changing employee social standards and an ageing culture.

Bondarouk and Brewster (2016) in their paper investigate the impact of information technology (IT) on one of the most important domains of the 21st century: human resources (HRM). This study used the concepts from the literature on IT and HRM to help diverse stakeholders understand the benefits and drawbacks of HRM and technology. Rapid technological advancements have created a new, smart, digital context for HRM activities.

Shamim (2016) gave an overview of the best management practices for companies preparing for the fourth industrial revolution. Organizations can modify their employees' abilities, competences, behaviors, and attitudes by implementing HR. Building HR strategies around Industry 4.0 can stimulate employee innovation, knowledge management, and learning, says the author. Employers should teach multitasking abilities, not immediately tied to the employee's job, but rather broadening their skill set, combining logic and literature, automated production, embedded actuators and sensors, microcomputer networks, connecting machines to the value chain, digital product augmentation and reengineering, highly unique custom goods, a well-coordinated mix of products and services, value-added services, and so on.

Cerika (2017) in her thesis examines the impact of new technologies on HR and if Industry 4.0 is a necessary evil. A deductive qualitative analysis was used to study six Norwegian firms. The author concluded that new and upcoming technologies boost HR. Also, new and emergent technologies may cause future disruptions in jobs. Industry 4.0, according to the author, is still new. That means more research is needed in this context. The author also interviewed six companies from various industries. The findings showed that new emerging technologies may threaten future job opportunities. The author says that Industry 4.0 dynamics are still evolving and contradictory.

Liao (2017) in his study investigated academic development in Industry 4.0 to address a gap in the present. A comprehensive academic review of industry was conducted until June 2016. 4.0 was undertaken online. However, the results of general and specialized data analysis of papers were summarized and suggested shortcomings and future research directions. Based on this review, we can (1) make a list of important Industry 4.0 publications and conferences, (2) use Scimago to find Industry 4.0 subject areas, and (3) use keyword classification to show how important Industry 4.0 is.

Bhaskar (2017), in his paper, gave a look at HRM from the perspective of Industry 4.0. The author examines several prospective HR changes: sourcing and hiring using predictive analytics, AI, and NLP to locate qualified candidates across platforms. VR induction: A smartphone workplace tour would allow each employee to meet the coworkers and superiors, easing the acculturation process. There are no more PowerPoints or chasing speakers. Invoicing, accounts payable, and new member paperwork will all be automated with zero errors. AI is used to customize team training and create customized learning platforms for employees. Employee wellness applications use office parties, offsites, team building activities, and food competitions, which are no longer sufficient. People and corporations achieve real-time employee performance tracking with smart analytics apps.

According to Ghobakhloo (2018), the goal of this study was to analyze this research on Industry 4.0, identify its architectural design, and provide a strategic roadmap that can help manufacturers migrate to Industry 4.0. The author used a six-stage content-centric literature review to uncover important design concepts and technological trends of Industry 4.0. This study employed 178 publications related to Industry 4.0 as a secondary source of information and manually analyzed their content using IBM Watson's natural language processing. This analysis also discusses how a manufacturing organization might move to Industry 4.0. The report is one of the first to find, group, and describe design concepts and technological trends in Industry 4.0.

Sivathanu and Pillai (20) in his paper summarized the impact of Smart HR (SHR) on Industry 4.0 advancement. The author goes on to clarify that each organization's adoption of SHR will have its own unique set of problems and rewards. Managing multigenerational employee expectations was identified as a key for SHR 4.0 implementation problems in this article. The author also mentions the advantages of SHR 4.0: (1) attracting, developing, and retaining young people and (2) improving HR operations and reducing HR departments. The author also looks at the changes caused by SHR 4.0 from the point of view of an HR function to show how to deal with the problems and get the benefits (20).

Talerngsri (21): The author of this e-article discusses the impact of Industry 4.0 on HR. Earlier, there was focus on personnel functions: recruitment, payroll, training and development plans, and so on. The author expects the following changes in HR professionals: First, HR must be able to determine the talents required for the industry. They must also identify the skill sets lacking in the workforce and organizations they serve. Second, HR must adopt a digital mindset. To stay ahead of their competition, HR professionals must also keep up with technological advances. Third, HR must rethink networking and interaction. HR professionals must adapt to their client communication style and consider other new and successful communication strategies based on technology. HR departments will not only

have to deal with internal changes but also have to retrain other business units on how to work in the new world.

Aymen et al. (22) with the advent of Industry 4.0, a fresh perspective on management is that HR must be proactive in updating skills and adopting new technologies. The paper emphasizes HRM in Industry 4.0. The author's method: The framework discussed HR 4.0's revolutionary role in a disruptive economy. HR can enhance engagement by rewarding individuals, trusting teams, and fostering collaboration and personal growth. Nowadays, people can ensure an organization's success and longevity. According to the author, HR should train personnel in data skills and develop a data-driven work culture. Employees can use SHR 4.0 to discuss and address data-related issues.

## 2.1. Summary of the review of literature

After going through a substantial quantity of the relevant material from an earlier study that was centered on the evolution of industrial ideas, we are now going to concentrate on our research gap. The research that we are planning to concentrate on will cover a variety of topics pertaining to HR, including recruiting, selection, training, development, and career paths. Following the completion of a literature study, we concluded that an original piece of research investigating the relationship between natural catastrophes, occupational characteristics, the influence of technological advancements, and shifting job roles has not yet been carried out. Also, the goal of this study is to find out how the new roles and parts of HRM affect production, the emotional health of employees, and the best way to balance work and personal life.

## 3. Conclusion

Already, Industry 4.0 is in full swing. Automated work methods are becoming more commonplace in a variety of industries. To maintain productivity development and allow firms to respond swiftly to environmental demands, it is essential to adapt to this trend. Many companies are already developing new implementation techniques and preparing for the 4.0-related changes in a systematic manner. The ability to adapt to change is critical to the success of the entire organization. Personnel procedures, including recruitment, everyday operations, and communication and remuneration, are all affected by it (23). Questions arise about how these changes will affect us both professionally and personally. There are many possible answers to this question, but the role and responsibilities of the HR department in a company will change in the future. When it comes to Industry 4.0, employees are an integral aspect. The paper's goal was to identify this new trend. The smooth adoption of new changes depends on the focused attention of personnel. Employees' perceptions of the situation, expectations, and concerns must

be taken into consideration. Strategy 4.0 should include a plan to communicate with employees in a certain way (24).

The countless breakthroughs brought forward by Industry 4.0 (25) will forever impact human existence. The introduction of Industry 4.0 has radically impacted the world of work, having a substantial impact on how people execute their daily responsibilities. Despite having a detrimental impact on employment, Industry 4.0 has a positive influence on resource efficiency and effectiveness, as well as production costs. Employees must be digital, technological, and human literate in order for Industry 4.0 to succeed. The government must be able to create economic opportunities in a range of franchise and retail locations, including Alfamart, Indomart, Alfamidi, 212 Mart, and others. The entrepreneurship community has been challenged by the government to keep researching and expanding the topic. Intermediate and lower-level entrepreneurs should be able to keep their attention on assessing human interactions with other components in the sector's integrated systems, despite the effects of changing times and other scientific developments (26). Industrial engineering is projected to play a significant role in ensuring that progress in the Industrial 4.0 era is beneficial to humans in the future.

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