

The Impact of Industry 4.0 on Human Resource Management: Transitioning to HRM 4.0 in the Digital Era

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Abstract:

This study explores the impact of Industry 4.0 on Human Resource Management (HRM), focusing on the transformation of HR practices into HRM 4.0. Industry 4.0, characterized by the integration of advanced technologies such as cyber-physical systems, the Internet of Things (IoT), and artificial intelligence, is reshaping workplace dynamics and labor requirements. The research highlights how Industry 4.0 is driving the digitalization of HR functions, leading to the emergence of HRM 4.0, which emphasizes efficiency, cost reduction, and strategic alignment with technological advancements. The study identifies key changes in HR processes, including recruitment, training, performance management, and compensation, while also addressing challenges such as workforce reduction, skill gaps, and resistance to change. The findings suggest that while Industry 4.0 offers significant benefits in terms of productivity and innovation, it also poses risks related to unemployment and the need for upskilling. The paper concludes with recommendations for HR managers to adapt to these changes by fostering a culture of continuous learning and leveraging digital tools to enhance organizational performance.

Keywords: Industry 4.0, HRM 4.0, Digital Transformation, Workforce Automation, Human Resource Management.

JEL Classification: J24, M12, M15, O33, O15

Introduction

Mankind's relentless efforts over the centuries to improve production processes are truly admirable. The shift from shop floor production to assembly lines, and now the integration of information and technology into business processes, has reached a remarkable point. At this stage, the concept of Industry 4.0 is transforming and influencing all business processes across the board.

Industry 4.0, which originated as a technology project in Germany, aims to enable workplaces to perform tasks and operations with fewer human resources - or, ideally, without any human intervention at all. Given its aim of achieving more work with fewer humans through digitisation, it becomes clear that this project or concept could have a significant impact on human resource management (HRM). The aspiration to remove human labour entirely from processes and automate tasks will inevitably reshape all HRM functions, taking them in an entirely new direction.

In the existing literature, studies examining the impact of Industry 4.0 on human resources focus mainly on its technical and technological aspects. However, advancing the technological dimensions will not be enough to adapt to Industry 4.0. Including human resources in the solution process is essential for sustainable success.

The aim of this study is to reveal the impact of Industry 4.0 on human resources management. This research is important because it draws attention to the influence of Industry 4.0 on HRM. By highlighting this impact and raising awareness, the study contributes to the current body of literature. In response to the complexity observed in studies in this area, this work begins by explaining the concept of Industry 4.0, followed by a conceptual analysis of HRM. Next, the impact of Industry 4.0 on HRM is explored, leading to an in-depth analysis of the concept of HRM 4.0, which represents the digitalisation of HR activities resulting from the effect of Industry 4.0. The study therefore examines the concept of HRM 4.0 and its impact on HR functions and concludes with key findings and conclusions.

1- The Concept of Industry 4.0

Industry has evolved over several centuries, during which time there have been three major revolutions. The first industrial revolution, known as Industry 1.0, began with the invention of the steam engine in 1712. This marked the transition from manual, workshop-based production to machine-based industrial production. Industry 1.0 not only increased the welfare of society but also led to capital growth (Mrugalska & Wyrwicka, 2017, p. 470). With steam engines using coal as an energy source, disadvantages such as proximity to resources and toxic

gas emissions led to a switch to the use of electricity in the 1850s, marking the second industrial revolution, or Industry 2.0.

Industry 2.0 began with the invention of electricity and Henry Ford's adoption of the assembly line system, which led to mass production (Rojko, 2017, p. 114). This approach, also known as Fordism, introduced the standardisation of work and products, giving rise to concepts such as the division of labour, the definition of jobs and mass production in the workplace (Findikli & Rofcanin, 2016). While human labour was still required to operate machines during the first two industrial revolutions, the automation of production processes that emerged in the 1970s reduced the need for human intervention, marking the third industrial revolution, or Industry 3.0.

Industry 3.0 is often referred to as the computer age. The widespread use of computers in everyday life and business processes has led to a new revolution. During this period, customised and diversified production gained in importance, and manufacturing automation came to the fore. Thus, the first three industrial revolutions mechanised, electrified and digitalised human-centred production practices (Qin, Ying & Grosvenor, 2016, p. 175).

After Industry 3.0, Germany launched the Industry 4.0 project in the 21st century to secure the future position of its manufacturing industry. Because of its speed, breadth, depth and systemic impact, Industry 4.0 is not simply an extension of Industry 3.0, but represents a new industrial revolution (Yu & Schweisfurth, 2020, p. 78).

The concept of Industry 4.0 was first presented at the Hannover Messe in 2011 as Germany's technology project. Over time, it has attracted the interest of business and academia, evolving into a topic of global importance, capturing the attention not only of Germany, but also of countries seeking to establish a new industrial system (Mrugalska & Wyrwicka, 2017, p. 470).

Industry 4.0 refers to the integration of network-connected sensors and software into physical machines and devices to better predict, control and plan their business and social outcomes. It can also be defined as the organisation and management of a new value chain throughout a product's life cycle (Mrugalska & Wyrwicka, 2017, p. 470). Industry 4.0 represents the digital transformation taking place in workplaces and processes (Porter & Heppelmann, 2016, p. 22). It is also a new digital industrial technology enabling connectivity and interaction between components, machines and humans (Yu & Schweisfurth, 2020, p. 78). In other words, it is the process of integrating information and communication

technologies into production systems (Rojko, 2017, p. 114). Simply put, Industry 4.0 is the practice of smart manufacturing (Shamim et al., 2016, p. 26).

Defined as part of Germany's high-tech strategy, Industry 4.0 envisions a future where intelligent robots take over production, enabling better, more flexible, cheaper and faster manufacturing through cyber-physical systems, the internet of things and physical internet technologies based on information and communication. Although Industry 4.0 initially seems to concern only the industrial sector, it is expected to influence all sectors in the near future. In addition, it aims to promote competition on the basis of high value-added production.

Industry 4.0 smart factories comprise intelligent machines and systems that detect needs using sensors, communicate with each other via the internet and extract the necessary production data from cloud-based Big Data systems. The system is made up of three key elements: next-generation software and hardware, the Internet of Things and cyber-physical systems. Next-generation software and hardware are low-cost, space-saving, energy-efficient and highly reliable systems. The Internet of Things involves interconnected intelligent electronic systems, equipped with sensors and actuators that enable seamless communication between devices. Finally, cyber-physical systems (CPS) are 'intelligent factories' capable of coordinating themselves and optimising production with minimal human intervention.

Industry 4.0 offers many benefits to companies, including self-awareness of systems and components, sustainability, high efficiency, increased production flexibility, cost reduction and the development of new service and business models (Bauerhansl et al., 2016, p. 46; Bayraktar & Ataç, 2018, p. 34; Lydon, 2016, p. 79; Shamim et al., 2016, p. 24; Rojko, 2017, p. 64).

Despite these benefits, Industry 4.0 also has potential drawbacks for companies, such as conflicts between companies and risk-averse stakeholders, high costs of change, additional expenses due to potential problems, the need to maintain the integrity of the production process and the likelihood of increased unemployment as robots replace the existing workforce.

At its core, Industry 4.0 aims to reduce costs, increase efficiency and deliver competitive advantage. However, the transformations it is bringing about are not limited to the industrial sector alone. Technological advances have fundamentally altered the way industry has operated since its inception (Rana & Sharma, 2019,

p. 179). These developments have triggered technological, legal, economic and sociological changes worldwide. From an organisational perspective, this wave of change has impacted on all functions and operations. However, the function most affected by this transformation is human resources management (HRM), given its foundation on human capital.

2- The Concept of Human Resource Management (HRM)

Human resources are defined as a factor of production distinguished by qualities such as coordination, integration, judgement and capacity for imagination (Armstrong, 2012, p. 148). The scientific foundations of HRM, in terms of human resource management, were first laid in the Hawthorne experiments conducted by Elton Mayo in 1927. These experiments revealed that to improve employee productivity, it was necessary to focus not only on physical factors, but also on psychological aspects.

HRM is a strategic, integrated and coherent approach to the employment, development and well-being of people working in organisations (Armstrong, 2012, p. 156). It is a management process that encompasses all activities related to the acquisition and effective use of human resources.

The first HRM practice appeared in the early 1800s in the form of a **welfare secretariat**. This was followed in the 1890s by the concept of **personnel management** (Armstrong, 2012, p. 171). Between 1911 and 1930, during the First World War, personnel departments were created for military personnel (Goswami, 2018, p. 129). In the 1950s, the modern concept of HRM began to take shape, eventually leading to the emergence of **strategic HRM** (Kaufman, 2009, p. 32). Today, due to the influence of Industry 4.0, the term **HRM 4.0** is increasingly used.

HRM encompasses a variety of functions, including human resource planning, job analysis, recruitment, industrial relations, occupational health and safety, job evaluation and compensation management, training and development, performance appraisal and career management, to name but a few.

The main characteristics of HRM can be summarised as follows: strategic, engagement-focused, treating people as intellectual capital, management-oriented and respectful of employee relations (Armstrong, 2012, p. 182). HRM principles include competence, which refers to an employee's ability to perform assigned tasks; career, which involves promoting employees based on their

abilities; equality, which ensures there is no discrimination; and efficiency, which maximises the use of human potential.

Factors such as globalisation, increased competition, technological advances, the rise of the knowledge-based workforce and changes in the demographic structure of the workforce mean that HRM needs to be developed and adapted to contemporary conditions. This is not just a necessity, but a requirement for the current system to reinvent itself.

Just as all previous industrial revolutions have had an impact on human resources, Industry 4.0, which represents the era we are living in today, also has significant implications for HRM.

2-1- The Impact of Industry 4.0 on Human Resource Management

In today's business environment, it is no longer enough for organisations to possess economic power and the latest technologies; they must also have access to skilled human resources. In the workplace, it has become clear that digitised HRM is playing an increasingly critical role in management. Indeed, a company's ability to sustain itself depends on the quality of its current human resources and their dynamic use (Tripathi & Singh, 2017, p. 5). Companies recognise the important role HRM plays in acquiring, training and managing staff to ensure maximum organisational performance (Goswami, 2018, p. 130). Considering both the objectives and implications of Industry 4.0, it is inevitable that it will have an impact on HRM. Although limited in number, studies examining the effects of Industry 4.0 on HRM have been conducted.

A review of studies in this area reveals common themes: a reduced need for human capital in production, more technology-driven companies, the emergence of new job roles, declining job satisfaction and increasing demand for skilled human resources (Fregnan et al., 2020). In addition, a study assessing business leaders' perceptions of Industry 4.0 and HRM identified challenges related to digital transformation during the transition to Industry 4.0 (Rojko, 2017, p. 114). Another study highlighted that with the advent of Industry 4.0 technology, some jobs may transform, others may disappear and new ones may emerge (Ermolaeva, 2017, p. 35). Overall, the literature reviews indicate that the impact of Industry 4.0 on HRM is mainly examined from a technical and technological perspective, although it is expected to influence all aspects of work and operations.

Industry 4.0 is expected to affect HRM in many ways, including changing the way employees perform their tasks, overall workplace experiences, work processes, types of relationships within and around the organisation, redefining job descriptions and skills required in existing occupations, the emergence of entirely new job categories and the automation of some activities without human intervention. Basically, while some argue that Industry 4.0 will diversify and increase the demand for human resources, others claim that it will lead to increased unemployment due to automation, resulting in dramatic societal changes.

Industry 4.0 envisages a future in which factories operate autonomously without workers, so-called 'smart/dark factories'. This structural change is fundamentally based on the reduction of human labour. According to Liboni et al (2019, p. 125), the main challenge for modern HRM is not only to adapt to new technologies, but also to address the competitive dynamics between humans and machines in areas such as full automation, self-learning systems, algorithms and data analysis. The importance of attracting, selecting and developing educated and skilled human resources capable of meeting the demands of Industry 4.0 highlights the changing role of HRM (Qin, Ying & Grosvenor, 2016, p. 175).

Industry 4.0 has a significant impact on HRM, including reshaping the way employees perform their jobs, changing overall workplace experiences, transforming work processes, redefining job roles and skills, creating new professions and automating some activities without human involvement. With Industry 4.0, unskilled labour will become less relevant, while skilled labour - particularly in areas related to information and communication technologies - will become more important. Occupations such as data analysis, data mining, energy and the media sectors are expected to grow in importance. In 'dark factories', human resources are largely excluded from the production process, as intelligent robots can manage entire production lines with minimal human supervision. It is reasonable to assume that the need for human labour in production will diminish or disappear altogether, as tasks traditionally performed by humans in conventional factories are taken over by intelligent robots.

Robots are ideal workers for capitalists: they don't go hungry, they don't ask for time off, they don't complain, they don't need healthcare and they don't demand pay rises. In essence, they possess many desirable characteristics compared to human workers. In 'dark factories', problems such as wage payments, low productivity, absenteeism, transport costs, health expenses, seniority bonuses, collective agreements and other employer charges are eliminated.

For example, DeepMind is currently developing robots with emotional capabilities (Powles & Hodson, 2017, p. 357). In Amazon Go shops in Seattle, USA, purchases can be made using smartphones without encountering human staff, such as security guards, cashiers or floor staff (Wankhede, Wukkadada & Nadar, 2018, p. 78). Similarly, at the SEAT Martorell car plant, the transport of parts - previously handled by human resources - is now managed by robots, achieving a daily capacity of 23,800 parts. What's more, as intelligent robots reduce production time by 25%, they are favoured. L'Oréal uses MYA, an AI recruitment assistant, in its hiring process (Tawk, 2021, p. 1909).

The integration of robots into work processes is leading to several changes in work systems, including structured processes, remote working arrangements, the move away from functional career structures, an increased focus on software and hardware skills, and the emergence of new professions such as industrial data science, robot coordination, IT/IoT solutions architecture, industrial IT engineering/programming, cloud computing expertise, data security expertise and network development engineering. Conversely, concerns such as unemployment, negative changes in pay policy, downsizing of HR departments and transformations of HRM practices towards HRM 4.0 are expected.

The skills required of human resources in the Industry 4.0 era can be classified into three main groups: methodological skills, social skills and personal skills (Rana & Sharma, 2019, p. 177). **Methodological competencies** include creativity, entrepreneurial thinking, problem solving, conflict management, decision making, analytical skills, research skills and efficiency orientation. **Social** skills include intercultural competence, language skills, communication skills, networking skills, teamwork, negotiation and adaptability, knowledge sharing and leadership qualities. **Personal** skills involve flexibility, tolerance of uncertainty, motivation to learn, resistance to stress, alignment with sustainable thinking and adaptability.

Given these developments, companies wishing to integrate new technologies need to reassess their HRM practices in the context of HRM 4.0. In today's business landscape, HR specialists face the challenge of responding to increased competition, driven by rapid digitisation and advances in HR technology. It is essential to support the digital transformation of HR departments and integrate best practice into HR policies. The role of HR leaders has evolved, not least because organisations recognise the need for HRM to play a more strategic role in competitive market environments (Indermun, 2014, p. 128). The adoption of social media platforms for recruitment and hiring offers cost-effective alternatives

to traditional methods (Bhagat, 2020, p. 1010). Ultimately, with Industry 4.0, the concept of HRM 4.0 is gaining importance.

3- The Concept of HRM 4.0

Human Resource Management (HRM), as one of the fundamental elements of the management process, is directly influenced by all social, cultural, and technological changes. As a result, organizations must adapt to these changes by transforming their operations (Goswami, 2018, p. 129). With the widespread adoption of digital transformation, HRM practices have also become digitized, evolving into what is now known as **HRM 4.0** (Zhou et al., 2020, p. 1742). HRM 4.0 represents an innovative approach where competency management processes are conducted through digital platforms, operational processes are streamlined, mobility is accelerated, and a developmental environment is provided for employees to realize their aspirations. HRM 4.0 is defined as the optimization and implementation of relationships established between businesses, suppliers, customers, and service-providing employees via internet-based tools (Findikli & Rofcanin, 2016).

The goals of HRM 4.0 include enhancing the strategic orientation of digital HRM, reducing costs while increasing efficiency, improving employee and customer services, and simplifying employee management processes.

Initially referred to as e-HRM, this transition began with the use of personal computers in organizations. Later, Enterprise Resource Planning (ERP) software and its various derivatives were developed, enabling the centralized management of all organizational activities and aiding decision-making. This allowed employees easy access to the information they needed through files stored on computers (Berber et al., 2018, p. 30). In today's era of big data, significant changes have occurred in HRM processes. Technologies such as big data, 5G cellular technology, cyber-physical systems, the Internet of Things (IoT), 3D printers, simulations, autonomous robots, and artificial intelligence are expected to play key roles in HRM processes.

At this point, it is beneficial to discuss the types of management within HRM 4.0. HRM 4.0 has three types: **operational**, **relational**, and **transformational** (Berber et al., 2018, p. 30). **Operational HRM 4.0** refers to the digitization of basic HR activities in administrative areas such as payroll, timekeeping, and personnel databases. **Relational HRM 4.0** enables more advanced HR activities by digitizing processes such as recruitment, hiring, training, performance management, evaluation, and rewards or incentives. **Transformational HRM 4.0** involves

conducting strategic HR functions like strategic integration, data and information management, and similar high-level tasks in a digital environment. It is evident that HRM 4.0 will drive transformations in HR functions such as job analysis, planning, recruitment, performance management, career planning, compensation management, and industrial relations (Ermolaeva, 2017, p. 35).

Similar to traditional HRM practices, job analysis forms the foundation of HRM 4.0 applications. However, compared to conventional methods, observations, interviews, and surveys conducted in a digital environment are faster, yield more reliable results, and ensure secure storage of collected data (Findikli & Rofcanin, 2016). Following job analysis, the planning process is implemented.

In traditional human resource planning, the main objective is to determine the required number and quality of personnel. In HRM 4.0, however, it involves identifying new employees who can contribute to business development or training existing employees to acquire the necessary qualifications. Therefore, in HRM 4.0, it is necessary to consider both the machine and human components together during the planning process. Following the planning process comes the recruitment process.

In HRM 4.0 processes, the use of the internet in the recruitment phase enables its implementation more efficiently. Companies can post job advertisements through their own internet sites or corporate pages of professional firms, receive applications, access candidate information such as social media profiles, past data, and research resources easily, thereby allowing for faster evaluation of applications and swift communication of results via email (Findikli & Rofcanin, 2016). Focusing on identifying innovative behavior and openness to experience through psychometric tests during the selection process will be beneficial for companies. Digital recruitment includes job postings on employment databases, career portals, social network sites, corporate internet sites, intranets, and other online sources, covering e-recruitment systems, resume databases, and search engines (Holm, 2014, p. 436). The use of artificial intelligence in recruitment stages makes them both faster and less costly. The recruitment process is followed by the training and development process.

With HRM 4.0, the way training is conducted has also changed. The concept of distance learning has now found a place in our lives. Employees' success in this process will be directly proportional to their integration into the digitalization process. With technological infrastructure and internet usage, both asynchronous

and synchronous trainings can be provided together. Additionally, systems can be established to create diverse training pools where employees can define their own training needs, allocate time for training as they wish, and access defined training and teaching materials from their current locations (Gürbüz, 2020, p. 28). Alongside the changes, some modifications are also necessary. Considering new developments brought by Industry 4.0, it is necessary to redesign training programs for existing employees and new hires. This will allow human resource management to internalize gains related to robot management collaboration. At the same time, focusing on employees' problem-solving skills becomes necessary (Ermolaeva, 2017, p. 35). The training and development process is followed by the performance management process.

HRM 4.0 has facilitated the performance management process in two ways. The first is enabling the effective collection, processing, and utilization of employee data using advanced digital technologies. The second is allowing digital technologies to deeply analyze human resources data, making it possible to correctly and comprehensively evaluate employees' work attitudes, emotional tendencies, and behavioral characteristics. Digital performance management is the use of computer systems to collect, store, analyze, and report data for evaluating the performance of employees, groups, or organizations (Fındıklı & Rofcanin, 2016, p. 41). Thus, performance management applied in HRM 4.0 can increase employee motivation (Zhou et al., 2020, p. 1743). The performance management process is followed by the compensation management process.

In HRM 4.0, digital compensation management allows for many activities to be tracked for each employee regularly, including job evaluations, salary rates, social benefits, tax brackets, family status notifications, additional payment requests, leaves, overtime or under-time situations, advances or debt deductions if any, and salary payment methods—all managed from a single location, ensuring error-free, fast, and easy execution. One of the areas where innovation and digitization manifest in compensation terms is payroll systems. Payrolls calculated through programs based on legal parameters ensure that operations are performed with fewer errors, at lower costs, and faster. Even in companies with thousands of employees, salaries can be processed easily. Thanks to digital compensation, issues such as advances, social benefits, enforcement, and other deductions are resolved without problems. Employees can apply for advances like requests through the system and get approval from their department managers. Large companies with very high numbers of employees can make all payments quickly and easily thanks to digital payroll (Dessler, 2016, p. 92). Also, approved payrolls

should be archived digitally. The compensation management process is followed by the career planning process.

Digital career planning applications in HRM 4.0 allow employees to easily access external opportunities, stay informed about internal incentives, promotions, rewards, and other topics, take training in areas they need, develop themselves, and thus invest in their careers. Digital career planning will facilitate tracking advancement and progress (Berber et al., 2018, p. 30). The career planning process is followed by industrial relations.

From the managerial perspective, many activities can be carried out easily in HRM 4.0, such as tracking disciplinary records, fulfilling mandatory legal notifications, hiring and termination processes, preparing incapacity reports, issuing travel documents, etc. From the union perspective, HRM 4.0 facilitates conducting collective bargaining meetings via the internet, monitoring members' demands and complaints, and exchanging ideas with relevant parties. The industrial relations process is followed by occupational health and safety.

The digitization of the occupational health and safety process in HRM 4.0 allows for faster preparation of job descriptions and measurements, correct identification of accident risks, easy access to past accident data, timely detection of deficiencies related to occupational safety, continuous awareness of employees regarding these risks, and thus aims to prevent accidents or minimize them as much as possible (Berber et al., 2018, p. 30). Generally, HRM 4.0 is expected to differentiate all HR functions through digitization. These differences are expected to bring advantages to businesses and employees.

Businesses gain advantages with HRM 4.0 such as attracting, developing, and retaining young talent, efficient and faster HR operations, lean HR departments, cost-effectiveness, transparency, accessibility from anywhere, time efficiency, fast processes, reduced workforce, and minimized paperwork (Gürbüz, 2020, p. 28). The advantages HRM 4.0 provides to employees can be summarized as independent work from time and place, saving time and effort, reducing monotony, increasing productivity, providing opportunities for skill development, enabling active participation, and achieving higher job satisfaction (Berber et al., 2018, p. 30). Of course, HRM 4.0 has some disadvantages as well.

The disadvantages of HRM 4.0 include difficulties in selecting appropriate technological tools, overcoming existing organizational culture, managing the expectations of employees from different generations. Issues such as

encountering problems during adaptation to the process, resistance to transformation, reduction in workforce due to digitization of processes, high investment cost of digital transformation and continuous maintenance cost due to frequent updates, reduction in teamwork and team spirit due to online rather than face-to-face communication, and low cybersecurity in virtual environments are among the initial negative effects (Berber et al., 2018, p. 30).

4. Conclusion

Fundamentally, all industrial revolutions have emerged with the aim of increasing efficiency and productivity, bringing about transformations in their wake. Industry 4.0 is expected to bring radical changes to work life and the workforce. In the context of Industry 4.0, working conditions and requirements have evolved, impacting the labor market. Industry 4.0 redefines roles for workers both in production processes and in everyday life, offering new opportunities by altering the interaction between labor and technology. On one hand, the rapid pace of technological change poses a significant challenge for employees who must quickly adapt to new conditions. On the other hand, human resources play a driving role in the transformation of production systems, making human creativity and skill essential for future production.

In the future, it is anticipated that workers will engage in tasks where they develop production strategies by following applications designed by intelligent processes. Employees capable of designing and controlling production processes will take center stage in manufacturing. Parallel to these changes in production, radical transformations in HRM practices are inevitable.

Human resource management has begun its digital transformation under the influence of Industry 4.0. This transition, which initially moved from traditional HRM to e-HRM through the use of the internet, is now evolving into HRM 4.0 with the integration of cyber-physical systems, 3D technology, the Internet of Things (IoT), big data, 5G, autonomous robots, simulations, and artificial intelligence into HR functions. This evolution is expected to bring significant changes—both positive and negative—to all HR processes.

Given the advancements and changes in technology, it is clear that Industry 4.0 will become increasingly crucial for businesses in the near future. Many organizations are expected to adopt HRM 4.0 practices shortly. The organizational structure, leadership style, and HR practices aligned with Industry 4.0 will contribute to enhancing the efficiency of businesses.

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This study evaluates how the applications introduced by Industry 4.0, which impact all areas of work, affect human resource management. The technological advancements that have enhanced production capabilities have gradually reduced the need for human labor. While technological innovations decrease the reliance on human resources, they also raise concerns about unemployment, emphasizing the need for the required workforce to align with new technologies.

To maximize the opportunities provided by Industry 4.0 applications, potential problems and possible solutions should be identified through interdisciplinary approaches by experts, and global strategies should be developed to implement necessary precautions. Human resource managers must prepare for the economic and psychological impacts of Industry 4.0 innovations on human resources. They should closely monitor global developments related to Industry 4.0 and generate solutions to help human resources adapt to these advancements.

Radical changes in work life and the workforce are anticipated due to Industry 4.0. In this context, developing new management styles within the field of human resource management is of great importance. This study is significant as it highlights the impact of Industry 4.0 on human resource management in terms of its applications and functions, contributing to raising awareness and enriching the existing literature.

The primary limitation of this study lies in the fact that the data and information used are based on previous research, which forms the foundation of this work. Within the scope of this study, the concepts examined have been detailed, and the impact of Industry 4.0 on human resource management has been analyzed. This study serves as a summary of key concepts related to the topic and can contribute to the literature by consolidating fundamental ideas. Future studies could empirically examine the concepts discussed here.

In conclusion, current technological advancements are driving digitization and a digital transformation in work life. Human resource management and practices are significantly influenced by this digital transformation. Almost all human resource management practices can now be carried out in digital environments using digital tools. By recognizing this change and transformation, business leaders who adapt their HR practices to this digital shift will gain a competitive advantage over their rivals.

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