

# Challenges of the Fourth Industrial Revolution in HRM

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## ABSTRACT

As a result of the changes caused by Industry 4.0 and Industry 5.0, unknown or less prominent challenges will be the focus of the operation of organizations and will essentially transform current human resource management (HRM) and its framework and tools. This research aims to identify Industry 4.0 solutions and expected changes in the field of human resources (HR) and for employees and to outline emerging trends of Industry 4.0 that impact HR based on interviews with surveyed companies and a review of the relevant literature. Structured interviews were conducted in this research. After individually processing the responses of each interviewee, the responses were formulated by considering all interviews. This research points out that in terms of HR, recruitment and training are being most affected by the fourth industrial revolution, and changes in competencies and their development processes have begun. Hopefully, the discovered connections will inspire further research and provide useful information on the fields of Industry 4.0 and HR.

## KEYWORDS

Change, Competency, Employee, Employer, Human Factors and Human Performance, Industry 4.0, Innovation

## INTRODUCTION

Industry 4.0 has promising prospects, thus companies and employees need to recognize them and adapt to the ongoing Fourth Industrial Revolution to take advantage. The rapid changes in the information technology field require innovativeness and willingness to learn but this also demands proper background from the companies (for example suitable employees, processes, tools, training, point of view).

The social-cyber-physical system has a significant effect not only on the work environment but also on society. As Industry 4.0 solutions affect people's daily life and wellbeing, these technologies need to be human-centered. "With Industry 4.0 posing disruptive challenges at different scales (i.e., business models, manufacturing processes, economy), it is necessary to upgrade the human force at different levels (i.e., technical, psychological, social) to meet those changes (Flores et al., 2020, p. 698)". Therefore, the HR field is changing. Innovativeness and dynamic adaptability are employee skills that promote effective responses to emerging economic and social challenges (Abonyi & Mislivetz, 2019).

Industry 4.0 is transforming the way we work; work done by humans will be performed by employee-controlled robots. Industry 4.0 technologies can increase operational efficiency and even the level of sustainability. (Gomes et al., 2020) Employees need to be trained to operate new applications, and top management is challenged to keep up with changing business paradigms (Rana & Sharma, 2019).

DOI: 10.4018/IJHCITP.300308

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Industry 4.0 can be briefly defined as a phenomenon involving information technology and automation that are increasingly intertwined with the real physical world. Thus, Industry 4.0 can be defined as a fusion of virtual and physical reality (Pató et al., 2020). "... advanced technologies would increase the innovation capacity of human resources (HR) and result in greater productivity (Rana & Sharma, 2019, p. 177)." According to this statement, HR professionals must select employees with complex knowledge and competencies that are suitable for each job, provide the necessary training for employees, and help the layer of employees who will not be able to find a suitable job in the changing labor market.

This paper is eager to explore the situation of industry 4.0 and HR based on a literature review and a research presented in this article. It is structured by the following: this introduction is followed by the literature review (fourth industrial revolution and expected changes in the Human Resources field). The materials and methods section consists of the research plan, the conceptual models, and the presentation of the research question and research methodology. After a detailed presentation of the results (the aspects: What kind of job changes can be observed? How is Industry 4.0 implemented in HR operations, and what are the related challenges? How do employees react to changes caused by Industry 4.0? How can HR prepare employees for changes caused by Industry 4.0?), the paper is summarized. (Misra, 2021)

By conducting interviews, this research seeks to answer a question: What kind of changes can be observed in HR as a result of Industry 4.0 among the interviewed companies located in Hungary? This paper aims to present innovative research on HR and human factors and human performance in the digital era.

## **REVIEW OF THE FOURTH INDUSTRIAL REVOLUTION AND THE DIGITAL ERA**

In recent years, manufacturing and service companies have focused their attention on Industry 4.0 (Salkin et al., 2018). The fourth industrial revolution, while providing a wealth of opportunities for companies, presents challenges due to ongoing automation and digitalization efforts (Shaw & Varghese, 2019). Industry 4.0 can be defined by several approaches because it has not been succinctly defined (Salkin et al., 2018). The Internet of Things is a kind of Industry 4.0 designation (Oláh, 2019). Industry 4.0 refers to the real-time digital integration of suppliers, manufacturers, and customers across value chains and business models (Lichtblau et al., 2015). "The new industrial revolution will create conditions where the industry is sustainable, where employees are qualified and are progressing in their education, so they are able to support the optimization in all segments of the industry. (Crnjac et al., 2017, p. 29)" The fourth industrial revolution focuses on the use of cyber-physical systems, smart products – and the growing amount of data thanks to their interconnection – (Némethy & Poór, 2018) and smart factories (Kagermann et al., 2013). Smart factories are based on networking, mobility, flexibility (Maczewska et al., 2019), and more efficient product manufacturing (Kagermann et al., 2013). In a smart factory, people, machines, and resources regularly communicate with each other (Kagermann et al., 2013); thus, a new era of industrialization has begun (Karacay, 2018). Operators can connect to various aspects of smart factories with, for example, smart sensors and wearable devices (Ruppert et al., 2018).

With the help of Industry 4.0 technologies, like Big Data, Internet of Things, cybersecurity, the cloud, and/or augmented reality, every member of the organization can have quick access to information and make last-minute notifications and modifications, thus companies can achieve flexibility (Flores et al., 2020).

It also shows the importance of Industry 4.0 and the digital transformation, that there can be found numerous articles about them which aim to focus on their presentation or encourage their application for example by emphasizing opportunities (e.g., Cunha et al., 2020). According to a Brazilian questionnaire among IT professionals (mostly from big-sized IT companies), the majority of them are aware of the Industry 4.0 concept and more than half of the companies handle it at a strategic level. Cloud Computing and Big Data technology usage can be highlighted from the mentioned survey (Cunha et al., 2020).

"IT organisations must continuously innovate in terms of product, process, market and business model to remain sustainable. (O'Sullivan & Dooley, 2010, p. 28)" One of a proposed Industry 4.0 implementation for IT companies is the following: "Understanding your organization; Defining in

which area of the business model the organization intends to make/have changes; Discovering tendencies and developments that will have influence over your organization when applying the concepts of Industry 4.0; Overcoming the major challenges and adhering to new technologies” (Cunha et al., 2020, pp. 756-757).

According to Crnjac et al. (2017) the main changes in the information technology (IT) are, among others, that it is linked to the product, not to the process; information-based decision making; the focus is on the infrastructure in case of the communication and cooperation, and this information systems are going to be more complex (smart platform) (Crnjac et al., 2017).

The rise of digitalization is expected to endanger individuals who are working in the fields of transportation and logistics, as well as those who are engaged in office activities and administrative support work (Frey & Osborne, 2017). In the era of Industry 4.0 and Logistics 4.0, the use of solutions based on process automation will become decisive. Automation, in addition to being expensive, has significant risks (Maczewska et al., 2019).

However, human intervention will still be needed, but it is important to recognize that simple and repetitive tasks can be automated (Becker & Stern, 2016) so that most of the errors that occur when humans work can be eliminated by using robots. Industrial robots are used in production, and collaborative robots ((CoBots) cage-free robotics) can work in common workplaces (for work processes) with employees because they detect obstacles by using a robotic arm (e.g., people) and allow humans to continue to work without being endangered (Oláh, 2019). CoBots allow for collaboration spaces and interaction with people without the need for traditional security barriers (Romero et al., 2016). Thanks to this close interaction with machines, a new term has arisen, Operator 4.0, which refers to “an industrial worker whose cognitive, sensorial, physical and interaction capabilities are enhanced by the close interplay with Industry 4.0 technologies (Gazzaneo, 2020, p. 221)”. According to another definition, an “Operator 4.0 must be smart and has the skills to cooperate with robots, and also work aided with machines whenever required, through human cyber-physical systems (H-CPS), advanced human-machine interaction technologies and adaptive automation (Fallaha et al., 2020, pp. 218-219)”. This definition implies that in addition to social skills, technical and digital skills are needed (Zarte et al., 2020).

Industry 4.0 reaches other segments too, such as agriculture. “Agriculture 4.0 is the fourth industrial revolution in agriculture that involves digitizing the agricultural food production process through precision agriculture and the agri-food supply chain. (Oruma et al., 2021, p. 83623)” Agriculture 4.0 can also benefit from the technologies already mentioned, like IoT, big data, AI, robotics, etc. (Oruma et al., 2021)

As a result of technological development, the work structure of companies is changing, the range of routine tasks is narrowing and the number of tasks requiring complex skills is increasing, so cooperation between companies and higher education institutions will become even more important in the future (Kagermann et al., 2013). The success of Industry 4.0 and the digital economy depends not only on technical implementation but also on social acceptability (Kovács, 2017).

## **EXPECTED CHANGES IN THE HR FIELD**

It can be stated that the human factor is important in every area of life: “Human Factors represent one of the most important areas of improvement in Software Engineering (SE). (Colomo-Palacios et al., 2010, p. 31)”, “Human capital management is the basis to obtain comparative advantages and integral efficiency since human potentials are the most important resources nowadays. (Galinec, 2010, p. 44)”

Thus, the role of HRM in the development of Industry 4.0 is not neglectable. Although the fourth industrial revolution is based on the development of production and technology, it is driven by HRM, as change has been required in terms of people’s attitudes towards each other, business models, and technologies (Liboni et al., 2019). “HR creates value by increasing the performance and agility of the talent (human capital) and culture (organization capability) of the organization (Ulrich et al., 2012, p. 217).” The changes discussed earlier determine employees’ daily lives. Such aspects can be that “distances in and between organisations have become shortened (Bondarouk & Brewster, 2016, p. 2653)”, which means that with the use of technological advancements, new

kinds of working conditions can be achieved, like virtual teams or shared devices (Bondarouk & Brewster, 2016). “The diffusion of HRM tasks will occur with the acceptance of monitoring and steering new ‘non-observable’ data like work-life balance and work stress, selecting data to run and display analysis of the individual job performance, scheduling own work time, or steering training and career development (Bondarouk & Brewster, 2016, p. 2663).” Workforce readiness is required along some major dimensions, such as technological knowledge, flexibility, inter-agent interactions, interpersonal communication, innovation, digital competence, and 21st-century skills (Blayone & Oostveen, 2020). Technological innovations in the HRM field make it necessary to rethink and develop established HRM processes, as the development of automation and digital technologies can lead to the restructuring and expiration of jobs. To reduce the skills gap between jobs and employees in the era of Industry 4.0, it is necessary not only to attract and recruit new employees and talent but also to retrain current workers and redesign work processes (Karacay, 2018). During the digitalization of work processes, a work environment is being developed that supports highly qualified employees’ brainstorming and development activities (M. Wilkesmann & U. Wilkesmann, 2018). “For the less experienced or younger workers, organizations were expecting them to work properly in a collaborative environment, as well as having the ability to learn (Siddoo et al., 2019, p. 8).” The key to Industry 4.0 is innovation, but it depends on people’s abilities, which can be supported by learning (Shaw & Varghese, 2019). Education and training can effectively help employees move into a new, higher-skilled role (Ford, 2015) and adapt to current technologies (Krachtt, 2018).

The training strategy should involve analyzing the employees’ skills profiles and proposing training accordingly. Employees believe that interviewing them would reduce the problems they face during their work. Therefore, it is important to empower employees and involve the work community when developing solutions that affect them. However, it can be observed that most employees receive negative feedback, and positive feedback is not often provided (Kaasinen et al., 2020).

Companies can use the Smart HR 4.0 (SHR 4.0) strategy to stay up to date during the fourth industrial revolution. To do this, the HR department needs management support (both in terms of changing the organizational structure and management style). Implementation can be challenging because HR must be involved in activities such as overcoming the constraints of the existing organizational culture, selecting new technological tools, and managing the expectations of multi-generational employees. The benefits of SHR 4.0 include attracting, developing, and retaining ‘new age’ talent to the company and more efficient and faster HR operations. For onboarding, Y and Z generation employees can be reached through a mobile application, and with the help of big data and artificial intelligence, candidates with CVs that best match the job description can be selected. (Sivathanu & Pillai, 2018)

Social networking sites (SNSs) can also be used in the selection process. Large organizations tend to use SNSs more than smaller ones. For personnel selection, some SNSs use formal or informal policies. Some of the most used SNSs are LinkedIn and Facebook. (Melao & Reis, 2020)

These changes could promote the spread of Internet-based professions. The advantage of this is that it breaks down various constraints, for example, those between employees and employers. These transformations and changes in human resource motivation must be monitored and managed by HR. (Némethy & Poór, 2018)

As technology evolves and increasingly more workplaces become sensitive to automation (Kaasinen et al., 2020), new software and conferences focusing on them are emerging. There are several benefits of using a chatbot, which is software that can simulate human conversation, and more advanced chatbots can connect to multiple predefined databases at once (Tusnádi, 2017). By using an internal communication chatbot, a secure, direct, and interactive communication channel can be established between company management and all employees, and administrative tasks, for example, collecting and presenting the responses to a satisfaction questionnaire within a few hours, can be accomplished more quickly. HR professionals can deal with employees’ personal affairs (e.g., personal development, performance management, compensation issues) by using chatbots (Pál, 2019).

What are the dimensions of development? Robot Vera was the winner of a long-awaited element of the 2017 HR Tech World conference series, Unleash (a start-up phase for new, innovative companies

in the HR tech sector). Robot Vera is an artificial intelligence recruitment platform that selects candidates (based on their uploaded CVs) that fit the requirements. Robot Vera is time-effective for recruiters because it can tell candidates about the job, send them a job description, and conduct a video interview. Companies can also track their savings, as Robot Vera keeps a record of recruitment activity, costs, and time spent in interviews (Faragher, 2017).

## MATERIALS AND METHODS

Materials and methods contain the research plan to assess the impact of Industry 4.0 on HR; the conceptual models with different approaches (according to Porter’s value chain and the SCM aspect); the research question and how the research was conducted. Pató et al. (2020; 2021) also examined the changes in organizational structure and required competencies during the Industry 4.0 era, according to the hereby shown Materials and methods (Pató et al., 2020; Pató et al., 2021).

### The Research Plan

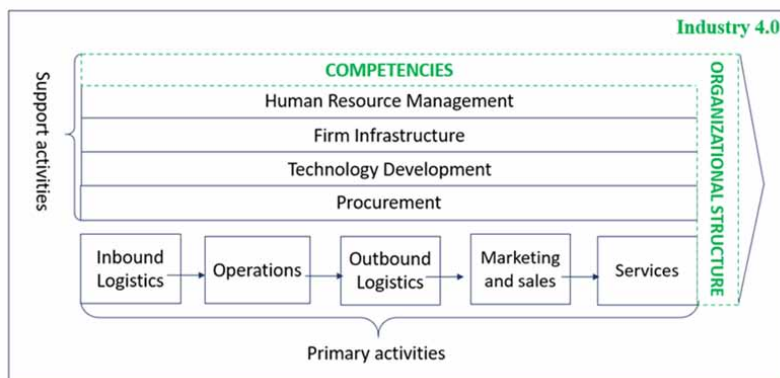
As a result of continuous development, processes can change and be simplified in all areas of life. In addition to organizational changes, the development and application of new technologies require the willingness of employees to adapt as well as learn and develop competencies. HR, as one of the functional areas of an organization, becomes even more complex as it has to adapt to digital solutions that support its work (e.g., using artificial intelligence or chatbots and working more closely with IT) and balance employees and the changes caused by Industry 4.0.

### The Conceptual Models of This Research

The conceptual model of this research was based on Porter’s value chain (Porter, 1985; Szegedi, 2012; Demeter et al., 2019). The elements of the model should be interpreted in the context of Industry 4.0. The success of a company is greatly influenced by how effectively it can mobilize its resources (Szegedi, 2012). Corporate operations can be divided into primary activities (which directly result in an increase in the value of outputs) and support activities (which do not directly produce value). HRM includes recruitment, training, developing payroll systems, etc. (Szegedi, 2012)

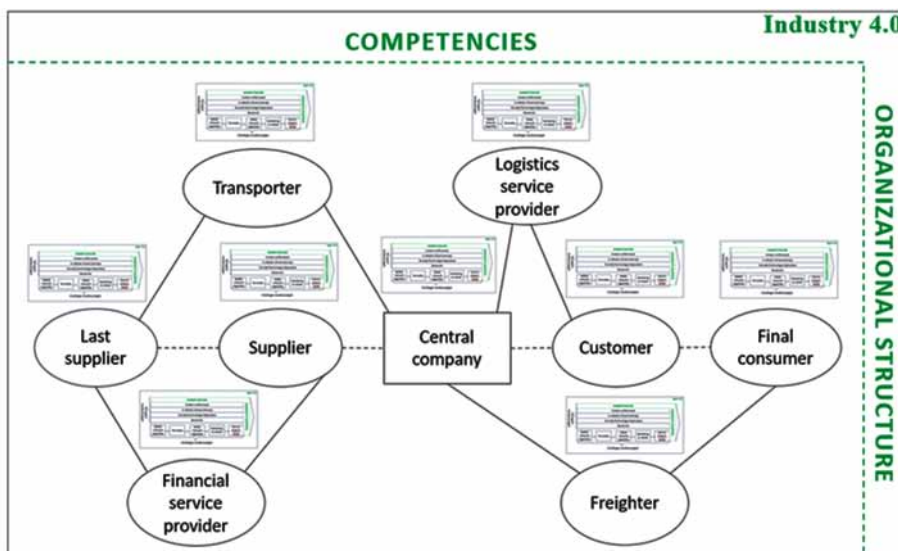
The HR factor, which is one of the supporting activities, is effective if the employees of the organization have appropriate competencies. Porter’s model has been expanded in this research to include the aspect of organizational structure because without its transparency and effective application, the goals of “supporting” and “primary activities” will not be successful (Figure 1).

Figure 1. Conceptual model of this research Source: Authors’ own model based on Porter (1985); Szegedi (2012); Demeter et al. (2019); Pató et al. (2020); Pató et al. (2021)



The conceptual model that serves as the basis of this research has been also used for a supply chain approach (Figure 2), as different types of Industry 4.0 often extend beyond organizational boundaries (Demeter et al., 2019). Often, an Industry 4.0 application is used to bridge or smooth the crossing of organizational boundaries, and this process is enhanced when frontier workers have an appropriate set of competencies that can help the organization meet the needs of final consumers within and outside the organization by producing the right output.

Figure 2. The conceptual model of this research for supply chain management (SCM) Source: Authors' own model (Pató et al., 2020; Pató et al., 2021)



## Presentation of the Research Question and Research Methodology

The research question (RQ-1) is “To what extent can Industry 4.0 be found in the HRM field among the surveyed companies, and what challenges does Industry 4.0 present to corporate HRM?”.

For this research, interviewing was chosen for data collection, as this method can best interpret people’s language, and it highlights the importance of the individual. By narrating experiences, one can understand human events, so the interview is a “basic mode of inquiry”. It takes time, and in some cases money, to complete an interview, as potential participants need to be contacted (initiative, networking, and planning skills are required). The relationships that exist between potential participants should be considered, as familiar, friendly, and hierarchical (e.g., subordinate, student) relationships can distort responses. The interviews should be carefully conducted, and then, the materials should be systematized, analyzed, and interpreted. The researcher needs to choose the right phrase when describing the interviewee (Seidman, 2002).

Structured interviews with seven companies were conducted, in person or by telephone, according to the preferences of the interviewees (to receive more comprehensive results, not just HR professionals were asked). After individually processing the responses of each interviewee, the responses were formulated by considering all company interviews. The paper aims to examine different segments and see the similarities and differences, thus the results do not represent the entire population; they can be applied only to the observed companies (which can be found in Hungary).

## RESULTS

For this research, structured interviews were conducted with individuals working at seven companies. Table 1 shows that the interviewees had different positions but were closely related to the HR field. The companies requested anonymity and are therefore referred to as C1, C2, C3, C4, C5, C6, and C7. The surveyed companies were founded in Germany, France, Hungary, Norway, and the United States. They have a location in Hungary (this research is based on them) and operate in the automotive, electronics, aluminum, ceramics, and food industries. Their products are exported globally to many countries. Table 2 provides detailed information on these companies.

This research focuses on the presence of Industry 4.0 in the surveyed companies (e.g., in job advertisements and job descriptions), the assessment of the job situations, the presence of Industry

**Table 1. Positions and number of interviewees**

Company	Position	Number of participants
C1	Site Supply Chain Manager	1
C2	Training Coordinator, Development Engineer, System Developer, and Quality Engineer	4
C3	HR Business Partner	1
C4	HR Manager	1
C5	Managing Director	1
C6	HR Manager	1
C7	Global AME Engineering and Automatization Senior Manager	1

Source: Authors' own table

**Table 2. Basic data on the companies**

	C1	C2	C3	C4	C5	C6	C7
<b>Main activity</b>	Manufacture of electrical and electronic equipment for vehicles	Forging, pressing, stamping, and roll-forming of metal; powder metallurgy	Manufacture of electronic components	Processing and preserving of poultry meat Poultry	Manufacture of technical ceramic products	Metal-working	Manu-facture of
<b>Turnover (2018., million €)</b>	523,1	338,4	100,4	60,1 33,4	6,8	15,7	682,8
<b>Manpower (03.2020)</b>	2279 people	1635 people	909 people	471 people 275 people	189 people	318 people	3456 people
<b>Settlement</b>	Veszprém	Székes-fehérvár	Veszprém	Sárvár Devecser	Veszprém	Veszprém	Székes-fehérvár
<b>Extent (countries)</b>	33	40	68	1 1	1	29	29
<b>Founded (globally)</b>	1923	1905	1921	1996 1991	1991	1952	1980
<b>Founded (Hungary)</b>	1998	2007	1989	1996 1991	1991	1995	1994

Source: Authors' own table

4.0 in work and the related challenges, how the employees respond to changes and what can be done to help these employees. The results obtained on these questions are presented below.

### **What Kind of Job Changes Can be Observed?**

Industry 4.0 has a complex impact, covering all areas of the organization (C7). The organization needs to be restructured, as all levels are involved (C2). In the medium term, the change at company C3 may mostly affect development engineering and production support engineering jobs and those who work in production. In production, the implementation of Industry 4.0 increases efficiency, reduces operator work, leads to more competent operating personnel and fewer operator jobs. For engineering, besides previous semi-automatic production lines, highly automated equipment with more “smart” devices has appeared, which increases quality. The approach used by management has changed in terms of prioritizing competence and territorial and financial optimization. For controlling, calculations (return on investment) are more accurate, while in HR, the recruitment of engineers with the appropriate competence for new positions means to change (C7). Industry 4.0 mostly affected trained workers, machine adjusters, and HR at company C4. The number of manual packers and the number of trained workers working on the line decreased significantly (-35%), while the number of professional engineers, production planners, machine adjusters, and electricians increased (+50%) (C4). For production, all physical work can be affected by Industry 4.0, where there are a large number of items and relatively simple operations that can be handled well by, for example, a robot (C5). New jobs were created in some companies (C2, C3, C5, C7), while in others, the jobs expanded, and Industry 4.0 activities were integrated into the work of each functional area. The following outlines the observed changes:

- A large amount of data (big data) is available; data are collected and organized, from which smart solutions can be created. This larger data set is also available when decisions need to be made, and faster decision-making leads to a reduction in the resources required. There has been a change, for example, in the tools used: some workers use tablets for production and to record data. (company C1)
- Due to organizational changes, employees are working in new, smaller groups in each area. (company C2)
- Lean engineering was established a few years ago to help improve manufacturing processes. An innovation group has also been set up within the development department to deal specifically with forward-looking changes. (company C3)
- New jobs have been created (CNC programmer) as there is new equipment that is so digitalized that a new position is required because the tasks can no longer be completed by employees with the old competencies. (company C5)
- The changes will affect engineering colleagues, whose time and capacity are already occupied by investment projects because they require intellectual capacity and will affect manual workers who work with machines. (company C6)
- A new position was created partly due to Industry 4.0, and this position was filled by one of the study participants (Global AME Engineering and Automatization Senior Manager). (company C7)

Overall, different jobs will be needed in the same way, but the emphasis will be on quantity, as it is not certain whether the same number of employees will be needed in the future. Simplifying business processes leads to change. Processes will be much faster and simpler, and problem-solving will also be faster and more systematic (C1).



## **How is Industry 4.0 Implemented in HR Operations, and What Are the Related Challenges?**

The fourth industrial revolution has affected the examined companies in terms of recruitment (C3, C4, C7) and training (C1, C2, C3, C6), among other areas. Both internal and external training is available for employees (C1, C2, C3, C6). In the HR department, the hours worked are collected electronically, which is a great help to the payroll department. Payroll accounting data are supported using a card during check-in and check-out, and working hours are calculated using this process (C1). By simplifying the processes and using digital processes, solutions can be implemented that reduce the possibility of human error (poka-yoke) and increase employees' efficiency and accuracy in their work (C1). For recruitment, a cloud-based candidate database can be used while training that improves digital competencies must be developed and organized (C3). In company C4, the direction and quality of recruitment have changed, as for the workforce, it is not quantity that matters but rather quality. It will be even more important to apply the principle of "the right employee in the right place" because it is not possible to find a job that matches the qualifications and experience of all applicants. The data records of company C5 are digitized, and the analyses, various reports, and their evaluation are also done digitally. The same can be said for records and the access control system (the electronic access control system is connected to the payroll program). Industry 4.0 can help with the preparation of statistics and statements, among other things, but in HR, human work cannot be replaced because this department depends on interactions and relationships. One of the main functions of HR is motivation, and we can still rely on people and their experiences to increase motivation. (C5)

The challenges the surveyed companies must face, and in their opinion, the challenges of the future are outlined in the following:

- Although company C1 has processes that cannot be robotized because they require many manual assembly activities, this is not the case for all jobs. Thus, a question arises: What happens to the workforce that is eliminated because of automation. Certainly, competency development will be a major challenge for HR professionals and the HR department due to the need for more complex knowledge.
- New organizational structures are also needed to support corporate strategies. Furthermore, cooperation with higher education institutions within the framework of the dual training system is a challenge, as compiling annual training plans to promote the corporate strategic goal, a survey of the usefulness of the training, and the opinion of the managers on the practical applicability of the skills developed in the training. Shortly, HR will be challenged to develop a system that can more accurately predict the skills that future employees must have (universities should invite company managers and professionals to their training, if possible) (company C2).
- The HR field will be put to a test as the training program must pay special attention to possible changes and the acquisition of skills due to Industry 4.0. The availability of HR systems can be considered a challenge, their applicability, e.g., from a technical and General Data Protection Regulation (GDPR) point of view, and the suitably qualified employees' employment (recruitment) and retention (due to labor market competition) (company C3).
- It is a challenge to select the right employees while not holding HR responsible for the success rate because selecting the wrong person increases turnover if the employee is not able to perform the tasks (company C4).
- The business plan of the C5 company includes quality assurance and quality management procedures that comply with the ISO 9001 standard, where the procedure deals specifically with information technology (including data management). The larger the data set is, the more detailed and sensitive the information the company handles, and more attention needs to be paid to security issues. Data security is currently one of the biggest challenges, especially in HR, as companies work with very sensitive data. Much attention should be paid to the GDPR, for example, considering how data are protected. Some of the greatest challenges are that HR will

have difficulties in acquiring and retaining a young, well-skilled workforce and upgrading good professionals to a possibly higher technological level through internal or external training, and HR will need to focus on its motivating role.

- Training is a constant challenge because failing to keep an employee who has already been trained at the company has a cost. It is difficult to find an engineer with Industry 4.0-related competencies. The average age at company C6 is 46, and most employees do not have the same digital skills as the younger age group. For the time being, the difficulty is finding employees who are not only open but also able to take on new tasks, motivated, and interested in further training.
- Applicants with special competencies must be hired, and companies will face challenges in finding high-level engineering employees, taking into account the price value and return ratio (company C7).

### **How Do Employees React to Changes Caused by Industry 4.0?**

Adaptation is needed not only at the employer level but also at the employee level. Information collected during the interviews indicates that the employees of the surveyed companies reacted to the changes in a mixed way.

In the majority, openness characterizes the attitude (C1, C2, C3, C4, C5, C6, C7) if the work becomes easier (C5). Typically, direct workers were positive about the changes, in which case the economic benefits come to the fore (C2, C7). The development (C3) and engineering departments and management see this change as a challenge in terms of the potential changes to development and the vision of the organization (C7). The indirect workers reacted to the changes in a more distributed way. They were supportive if their income was positively affected (allowances) (C6) and if their work became easier (C5); they also provided ideas for improvement (C1). However, some of them accepted the ongoing processes with resistance (C1), fear that “the robot will take their job” or that they would not be able to keep up with the training (C2, C4).

Employees can be prepared for changes caused by Industry 4.0 through education, training (C4, C6, C7), and communication. If employees are aware of the expected benefits for their work and assured that their lives will not change negatively, the acceptance rate can be greatly improved (C1, C5). Data can be collected during personal interviews (C1, C2, C6), exit interviews (C5), and the HR department can collect and provide feedback (C5). In one multinational company, the Hungarian employees found it more difficult to change than foreign employees (C1), and the more difficult change can even be reconciled with generation differences (C1, C6).

### **How Can HR Prepare Employees for Changes Caused by Industry 4.0?**

According to the surveyed companies, the most obvious way to support employees is to continuously hold training (external and internal) (C1, C2, C3, C4, C5, C6, C7). Employees participating in the training are not necessarily selected by the HR department, which may only organize the time and place of the training (C4, C6). In company C2, training is preceded by a preliminary needs assessment and is composed based on an annual training plan. A training plan may be developed for each employee separately (C1). The HR department includes a training specialist and training team leader, and company C1 has production trainers in all production areas who hold Industry 4.0 training. Company C3 defined newly updated competencies and continuously communicates these changes and expectations to its employees. The emphasis is on information (C2), motivation (C5), and explaining “why” (C3).

### **Findings Based on the Case Studies and Limitation of Work**

The research question (RQ-1) focused on the extent to which Industry 4.0 is embedded in HRM among the surveyed companies and the challenges that Industry 4.0 poses for corporate HRM.

According to the interviews, the fourth industrial revolution has the largest impact on recruitment and training in the field of HRM. A reference to the fourth industrial revolution appeared in job

advertisements and, in some cases, in job descriptions. The fourth industrial revolution shapes the structure of jobs through job expansion and, in special cases, the creation of a new job. Cloud-based solutions provide great support for increasing the rate at which work can be completed, for example, using candidate databases and attendance sheets. The main areas that require attention are hiring and retaining employees with the right qualifications and willingness to learn, providing appropriate training, protecting and properly managing a large amount of data (occasionally sensitive data) that are stored. The picture of employee attitudes is mixed, but with proper motivation and communication, they can be guided. In Table 3, some HRM-related challenges are summarized.

The authors would like to express that these results refer to the companies surveyed.

**Table 3. Challenges in HRM**

Some of the challenges in HRM
recruiting and selecting candidates
learning and development
employee retention
managing and storing data
predicting the skills that future employees must have
cooperating with higher education institutions (e.g., dual training system)

Source: Authors' own table

## CONCLUSION AND FUTURE WORK

Industry 4.0 is generating many changes in the world of work, including Information Technology and HRM. Our work environments, the tasks to be performed, the technologies and tools to be used and the quality requirements are about to change. Regardless of their age, individuals, professionals will be faced with improvements and different challenges. However, both working people and organizations are challenged by Industry 4.0 and must be open to change, new investments, and the use of different technologies. In organizations, the work of HRM is becoming even more complex, as it has to adapt to digital solutions that support its work (e.g., using artificial intelligence and chatbots and working more closely with IT) and develop a balance between employees and the changes caused by Industry 4.0. HR specialists must select employees with complex knowledge and competencies that are appropriate for their jobs and provide employees with the necessary training. However, HR must also help the layer of employees who will not be able to find a suitable job in the changing labor market.

Based on the results of the research, it can be concluded that some jobs or work equipment will not be needed in the future, and employees are expected to accomplish more complex tasks. Among the surveyed companies, in terms of HR, recruitment and training are most significantly affected by the fourth industrial revolution.

The results of this study are useful as they point out that change is inevitable, but with proper communication, the effective application of Industry 4.0, and the ability to exploit its potential, Industry 4.0 can be used for the benefit of the company and employees.

The research can be continued by following up the companies surveyed and/or increasing the number of the participating companies and a new aspect, the Fifth Industrial Revolution can be added and examined.

## FUNDING AGENCY

Publisher has waived the Open Access publishing fee.

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