Changes of human resource management in the context of impact of the fourth industrial revolution

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Abstract: Fourth industrial revolution also called Industry 4.0, is considered as the most discussed topics among experts nowadays. The excitement for the Industry 4.0 goes two ways. First says that the fourth industrial revolution deals with the question of “a priori” and not “ex-post”. Organizations and research institutions gain opportunities for active building and forming of the future. Secondly, it has significant economic impact, which promises much higher operational efficiency, as well as development of brand-new business models, services and products. At the moment, organizations are able to run without elements of the Industry 4.0, but only for a limited time. They have to look for a path of further development, and that is digitalization in each field of business. With help of human resource management, organizations are able to form skills, abilities, behaviour and attitude of employees in order to achieve the targets of organization. Human resources represent significant factor for competitive advantage in the knowledge economy. In the Industry 4.0 considering human resource management, managers have to mainly focus on supporting of innovation and learning in the organization. The main goal of this article is to identify changes in methods and techniques during realization of human resource management in the context of the impact of fourth industrial revolution in theory, based on research of available scientific literature. Attention is mainly focused on selected functions of human resource management like job design, staffing, training and performance appraisal.

Keywords: FOURTH INDUSTRIAL REVOLUTION, HUMAN RESOURCE MANAGEMENT, INNOVATION, AUTOMATIZATION, DIGITALIZATION

1. Introduction

The dynamic development of the fourth industry revolution is the result of several processes. It was mainly influenced by internationalization, the development of information technologies and also by hypercompetition. The fourth industrial revolution describes the growing digitization of the value chain and the resulting interconnection of subjects, objects and systems through real-time data exchange. [1] The term fourth industrial revolution is often referred to as Industry 4.0. This period expanded the possibilities of digital transformation, and also emphasized its importance for business. Industry 4.0 connects and combines digital and physical technologies - artificial intelligence, the internet of things, robotics, cloud computing and more, with a view of more flexible and efficient management, and the interconnection of companies, that are able to make decisions based on more detailed information. [2]

Nowadays, Industry 4.0 is considered as a heart of today's discussions of modern business. It is considered to be a socio-technical system that organizes the relationship among human capital, companies, technologies, production systems, production and consumption, thus creating a newly created relationship between industry and society in the process of digitalization. [3] The effects of Industry 4.0 are expected to reflect in all areas of scientific progress. Although, it is very difficult to predict certain facts, there are assumptions that human resource management theories will need to rely on building stronger environment, social responsibility and ethical dimensions, as communities and workers demand, that companies increasingly respond to these global challenges more strategically. In the evolving “light” for talent, companies that do not respond to a changing environment will have difficulty competing, because branding of employers becomes an essential part of selecting a young generation of workers. Human resource professionals will need to focus more intensively on proactive human resource planning, global and local environmental problem-solving, which will transfer many traditional functions to managers, external service providers using artificial intelligence and robotic technologies. The growing interest in "big data" and a more sophisticated human resource information management system will become an essential part of modern business, as well as greater responsibility for individual strategies, processes and results. [4]

The aim of this presented article is to identify, at a theoretical level, changes in human resource management in the context of the impact of the Fourth Industrial Revolution, through the available scientific literature.

2. The Fourth Industrial Revolution

The Fourth Industrial Revolution brings endless and unlimited opportunities for technological investment. Companies during the digital transformation should consider several questions: “What would they like to transform thanks to digitalisation?”; “Where to invest resources?”; “What advanced technologies to use to improve strategic needs?” During answering these questions, it is important to realize, that a real digital transformation has significant implications for companies. It influences the company's strategy, talents, business models, and even the way the company is organized. [2]

We share the view of PwC director Kumar Krishnamurthy, that while the Third Industrial Revolution focused on the automation of individual machines and processes, the Fourth Industrial Revolution focuses mainly on the digitalization of all physical assets and the integration of digital ecosystems with value chain partners. [5]

Industry 4.0 is thus surrounded by a diverse network of advanced technologies throughout the value chain. Services, automation, artificial intelligence, the Internet of Things and additive manufacturing bring a whole new era of production processes. The boundaries between the real world and virtual reality are blurring and causing a phenomenon known as cyber-physical production systems. [6]

Advanced digital technology has been used in industry for a long time, but thanks to Industry 4.0 it can transform the entire production. This will ensure greater efficiency and change the traditional relations in production among suppliers, manufacturers and customers. Technological trends, which form the building blocks of Industry 4.0, play an important role. [8] According to the mentioned technological trends, the Boston Consulting Group proposes following trends: simulation, autonomous robots, internet of things, cyber-physical systems, cloud computing, virtual reality, communication among machines and cyber security. [7]

Companies face major challenges in adopting and implementing these new technologies. In order to build and keep leading position, they need to broaden and deepen their practical knowledge about digital technologies and the way, how to use them. [7] Subsequently, they need to develop and implement customized digital production strategies. With the implementation of new technologies in companies, mechanical industries have been transformed into highly automated industries. These industries are sensitively adapting to changing environmental conditions, and customer requirements. When implementing Industry 4.0 techniques, it should be borne in mind, that companies may face several challenges [9], which are listed in the following table.
Table 1: Overview of Industry 4.0 challenges

<table>
<thead>
<tr>
<th>Number</th>
<th>Challenges</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Modernization of existing elements</td>
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<tr>
<td>2.</td>
<td>Capital requirements</td>
</tr>
<tr>
<td>3.</td>
<td>Errors in data processing</td>
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<td>4.</td>
<td>Compatibility of workers with new technology</td>
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<tr>
<td>5.</td>
<td>Cyber-attacks – data sensitivity</td>
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<tr>
<td>6.</td>
<td>Low availability of standard and comparison processes</td>
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<td>7.</td>
<td>High accuracy of data collected from systems without loss of quality</td>
</tr>
<tr>
<td>8.</td>
<td>Automation as a substitute for shortcomings cheap labor</td>
</tr>
<tr>
<td>9.</td>
<td>Impact of automation on faster depletion of non-renewable resources</td>
</tr>
<tr>
<td>10.</td>
<td>The need for new business models</td>
</tr>
</tbody>
</table>

Improving the quality of Industry 4.0 can be achieved by properly integrating existing new technologies. With more advanced technologies, such as cyber-physical systems and industrial information integration, it builds on the overall quality of Industry 4.0, as it is based on interdisciplinary and transdisciplinary integration, including industrial information integration. In recent years, there have been significant developments in technology, as well as actual and potential applications in various industries. However, the development of advanced methodologies, in particular formal methods and system approaches, must be aligned with rapid technological developments. [10] As Weber said, Industry 4.0 is primarily about the application of advanced manufacturing technologies. [5] The US National Science Foundation has noted, that significant advances have been made in cyber-physical systems, however, we still have insufficiently advanced science to support the system engineering of highly confidential cyber-physical systems. [11] Despite progress in Industry 4.0, new challenges are still emerging in academia and industry. Sufficient attention needs to be paid to them, in order to realize the full potential of the Fourth Industrial Revolution. [10]

We can come to the conclusion that today technological development and innovation play an important role in every company. This is reflected mainly in increasing the competitiveness of the business. It is the Fourth Industrial Revolution that seeks to lead to possible profound changes in a number of areas that go beyond the industrial sector. Industry 4.0 blurs the line among people and technology.

3. Human Resource Management

Human resources are a term used for employees, company managers, and possibly for some external collaborators. It is an awareness of the importance of the workforce compared to other resources (land, capital). In the scientific literature, we also meet the term human capital. Thus, human resources constitute significant assets for any business, or a significant loss. [12]

Recently, it has been pointed out that we consider human resources to be the basic and primary sources of a company’s competitive advantage. Based on them, the goals of the company are determined, the strategy is formulated and subsequently implemented. The challenge of recent years is to focus on key successful progress, meaning it focuses on the quality of human resource management. The intention of the newer view is to point out, that combining the efforts of both stakeholders (employee - company) into a compact unit is very important and significant. There is mutual satisfaction, under what we understand, that the company is a place to meet the needs of the employee, and the employee represents an effective benefit for the company. [13]

Given this fact, human resource management can be defined as a strategic and logically thought-out approach for managing the most valuable thing a company has - people who work in the company, who individually and collectively contribute in achieving business goals. [14]

We consider human resources management as a strategic and active integrated system approach in management, focused on achieving a match among personnel needs and the real potential of human resources. By personnel needs we understand the required number of employees of individual categories, that are characterized by the required skills, knowledge and competencies. The real potential of human resources can be activated in fulfilling the company’s goals. Employees must be adequately motivated and willing to do their job for the company. [15]

The role of human resource management is to ensure that people in the company - human resources - are used in a way that brings the employer the greatest benefit from their abilities, and consequently, employees receive material and psychological rewards for their work. The importance of human resource management lies in addressing the consequences of organizational decisions for productivity and the conditions under which the company's employees work. We can therefore conclude, that the main importance and purpose of human resource management is to realize the potential of employees, and to state, that employees are not only necessary expenses and costs in business, but are the most important assets, a source of competitive advantage and thus an investment producing significant added value. [16]

The basic functions of human resource management include: personnel planning, job analysis and job design, recruitment, staff selection, staff adaptation, staff training, career management and planning, performance appraisal and management, employee remuneration, working conditions and employment relationships, redundancies employees and termination of employment. In the article we will focus only on selected functions, which will be mentioned in the next part of article.

From the above, we come to a conclusion, that human resources are an integral part of any business. They are a source of competitive advantage and contribute to the achievement of business goals.

4. Results and discussion

The Fourth Industrial Revolution obscures the boundaries between human capital and technology. The resulting changes affect people, as well as the value produced by companies, and redefine the future of work. An impetus is being created for transformation in human resource management. Thus, human resources are not immune to the situation, that has arisen, and they must also adapt to the modern phenomenon. The following part draws attention to the importance of intelligent human resource management, the so-called “Smart HR 4.0”. There is pressure on existing companies to align personnel processes with the changing technological environment.

Smart human resources 4.0 is a new concept that is evolving as part of the Fourth Industrial Revolution and features innovations in digital technologies such as the Internet of Things, big data, artificial intelligence and fast data networks such as 4G and 5G to effectively manage next-generation employees. [17]

Smart HR 4.0 has its own set of implementation challenges, and a set of benefits based on the customization of individual companies. Implementation challenges include:

- Choosing the right set of new technological tools;
- Transformation of the existing organizational structure;
- Managing the expectations of multiple generations of employees.

The implementation of Smart HR 4.0 brings many benefits. Among the most important we can include:

- Attracting, developing, retaining new talent;
- Slimmer human resources departments;
More efficient and faster processes within human resources.

The human resource department is responsible for managing all aspects related to the employee's life cycle, from recruitment to termination of employment. While the role of human resources is the key to organizational growth, most human resources departments in various companies perform mainly operational activities due to highly inefficient processes caused by insufficient and outdated technological infrastructure. However, it should be noted, that technology is undergoing rapid change. New technologies, such as the Internet of Things, allow physical things to connect to the digital world, causing a huge amount of "real-time" organizational data to be generated and stored on cloud technology. Not only major changes have happened in field of technology, but Industry 4.0 is also affecting generations of employees. In 2020, half of the workforce is expected to be made up of "millennials" or Generation Y (born among 1980 and 2000). Generations Y and Z (born after 2000) grew up and are growing up in the period of the Internet, social media, smartphones and are characterized by different expectations from employers. These include: cooperation, which is possible anytime and anywhere; immediate feedback, open culture and data-based decisions. Powered by new technologies and next-generation employees, Smart HR 4.0 has the potential to transform end-to-end human resource processes covering all aspects of emerging talent.

Recruitment of talents into the company

The spreading of smartphones has led to the development of intelligent applications. Generations Y and Z are increasingly being approached by job advertisements in their mobile applications based on the individual profile and preferences selected in the settings of these applications.

Big Data and artificial intelligence help automate the search for a candidate's resumes and job preferences. This is a high probability these applications. [18]

Application of augmented virtual reality (AR / VR) could help new employees to familiarize themselves with the company's structure and different departments and offices without the need to work in person. Training can be provided from the comfort of their own homes, and the employee can familiarize themselves with the company's structures and office setting from the comfort of their own home. The use of AR / VR technology also allows employees to participate in virtual reality training and observe the work environment in real time, which helps to reduce the number of days of incapacity for work. [18]

Evaluation of employee performance

A performance appraisal system that is appropriate for Industry 4.0 should focus on employee development. In particular, it is a results-based approach and a behavior-based approach, as these approaches support education and innovation. It is recommended that employees receive feedback on their performance. [19]

The goal-based approach (MBO) is becoming increasingly popular. The MBO is characterized by specific objectives, where the objectives are brief statements of expected results. Managers and employees set goals and ways to achieve them through mutual discussion and consensus. An integral part of the MBO is also feedback, which allows managers and employees to monitor activities and take corrective action accordingly. MBO is a suitable approach to performance evaluation, so that the company's compatibility with Industry 4.0 is again ensured. [19]

Termination of employment

The employee's intention to leave the organization can be predicted by analyzing the employee's profile. The human resources department might take proactive steps to prevent high-performing employees from leaving the company by providing better internal opportunities. [18]

Low-performing employees can be identified on the basis of ongoing annual evaluations instead of evaluations from their supervisors. Programs designed to enhance employee performance are recommended to be automatically adjusted to employee deficiencies within abilities, skills, knowledge. [18]

Although the prospects for implementing the Smart HR 4.0 concept seem to be optimal, HR departments should also pay sufficient attention to changes in organizational structures and management styles. [18]

Organizational structure and leadership styles

The flat agile organizational structure creates a suitable environment for the implementation of Smart HR 4.0. A flat hierarchy will reduce communication levels and speed up decision-making. Decentralization of power will force project teams to work more autonomously and will have to adapt immediately to project requirements. [20]

Leadership styles need to be more open, help manage education and innovation culture, focus on improving knowledge and reward innovative thinking. Leadership is expected to have to initiate changes in organizational culture in such a way as to avoid conflicts among different generational groups. [20]

Smart HR 4.0 is required to modernize technology in line with the company's long-term goals, in order to attract the most talented human capital of the Y and Z generations. Automation of many human resources processes is expected to reduce HR team size and give HR departments more time to perform tasks in the company. [20]

New concept - SMART HR 4.0

Emerging technologies such as the Internet of Things, big data analytics, artificial intelligence and augmented reality, together with changes in the generations of employees, where especially in generations Y and Z dominates IT and the priority is "only me", affect the new concept of SMART HR 4.0.

According to the previous statements, we can summarize the basic facts, that create the new concept of SMART HR 4.0:

- Recruitment of talents to the company:
  - Intelligent job search applications
  - Automatic search for CVs using AI
  - Automated and customized testing
  - Interview via video chat
  - Induction programs via AR / VR

- Talent development in the company
- More efficient and faster processes within human resources.
- The human resource department is responsible for managing all aspects related to the employee's life cycle, from recruitment to termination of employment. While the role of human resources is the key to organizational growth, most human resources departments in various companies perform mainly operational activities due to highly inefficient processes caused by insufficient and outdated technological infrastructure. However, it should be noted, that technology is undergoing rapid change. New technologies, such as the Internet of Things, allow physical things to connect to the digital world, causing a huge amount of "real-time" organizational data to be generated and stored on cloud technology. Not only major changes have happened in field of technology, but Industry 4.0 is also affecting generations of employees. In 2020, half of the workforce is expected to be made up of "millennials" or Generation Y (born among 1980 and 2000). Generations Y and Z (born after 2000) grew up and are growing up in the period of the Internet, social media, smartphones and are characterized by different expectations from employers. These include: cooperation, which is possible anytime and anywhere; immediate feedback, open culture and data-based decisions. Powered by new technologies and next-generation employees, Smart HR 4.0 has the potential to transform end-to-end human resource processes covering all aspects of emerging talent.

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5. Conclusion

With digital conversion, all processes and customer expectations change. With the widespread introduction of robots, technological unemployment will emerge. Technological developments will change the structure of the workforce in the short term and partly cause unemployment. In the long run, the quantity and quality of the workforce will increase. The strong hand of past decisions will be replaced by thinking. Intelligence will increase the level and quality of education. In the long run, highly qualified individuals will be employed. Humans and robots will work together in harmony. [21] It is up to each business to deal with the situation. It has two options: either it will adapt to the reality and move forward with time, in order to gain a competitive advantage in its business, or it will succumb to situations, and sooner or later it will disappear.

From the individual statements of this article, we can conclude, that in order for companies to be able to cope with the transformational challenges of Industry 4.0, it is essential, that they develop a successful Smart HR 4.0 strategy. New technologies such as Big Data and artificial intelligence will automate most processes in the human resources department, leading to more efficient and leaner HR teams. Intelligent mobile applications, along with virtual and augmented reality will attract the next generation of talent to businesses, and enable distance interactions between them. Changes in organizational structures and leadership styles will be necessary for the effective implementation of Smart HR 4.0, which will allow it to play a more strategic role in the overall growth of the company. [18]

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