

INDUSTRY 4.0 IMPACT ON LABOUR MARKET AND HR MANAGEMENT

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ABSTRACT

Each industrial revolution has caused changes in most parts of the world in its own way. However, the latest revolution, the so-called Industry 4.0, with its depth and breadth, absolutely changed the thinking and functioning of organizations, including human resources in companies. The aim of the paper is to theoretically summarize the main findings about the changes and effects from new technologies according to Industry 4.0 requirements that have been recorded in the Labour Market and in the Human Resource Management. New technologies are bringing a new era, new business, new approaches to functioning, as well as new jobs that require new competencies and promising skills. The findings show that HR professionals play a key role in developing their competencies to create opportunities and mitigate the challenges that Industry 4.0 brings to HR. Study also state that several authors began to deal with the various influences of Industry 4.0 on Human Resources and agree that the impact of Industry 4.0 on HR is understudied than in other areas. However, it is necessary in the future to determine the more precise changes that companies have to make in field of HR.

KEY WORDS

Industry 4.0, Human Resource Management, Labour Market, Competencies and Skills

1 INTRODUCTION

Nowadays we are living in a time of technological revolution that is fundamentally changing the way we live, work and communicate with each other. In its extent, scope and complexity, this transformation is the most fundamental for whole world in recent times. The speed of current discoveries and changes has no historical precedent, compared to previous industrial revolutions (Wojčák, et al., 2018).

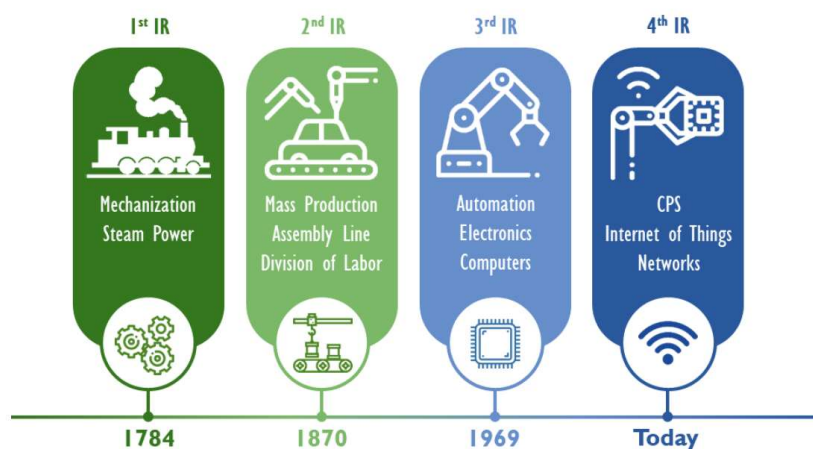


Figure 1: The Four Industrial Revolutions (Springer; Schnelzer, 2019)

The first industrial revolution used steam to mechanize production, the second used electricity and belt production to create series production, the third already used electronics and information technologies for production automation. The current fourth industrial revolution, the so-called Industry 4.0, also known as the digital revolution, is characterized by the fusion of technologies that blur the boundaries between the physical, digital and biological spheres (Springer; Schnelzer, 2019).

There is currently no precise definition of the term Industry 4.0 (Richnárík, 2019). We encounter various forms of its definition, the main idea is the digital connection of production machines, manufactured products, information systems, support activities and other parts of the manufacturing company. Thanks to the complete digitization of production elements, processes and control systems, it allows to create a virtual company that identifies with the real one, which allows continuous improvement of production structure, use of Smart data, communication and cooperation of intelligent elements, as well as learning and self-organization.

Industry 4.0 is evolving at an exponential rather than a linear pace and is affecting every industry in countries around the world (Schwab, 2016). Changes in this scope and depth predetermine the transformation of entire production and management systems. The possibilities of billions of people connected by mobile devices, with unprecedented computing power, data storage capacity and access to information and knowledge, are unlimited and are amplified by constantly emerging new technical discoveries in various areas such as artificial intelligence, robotics, internet of things, autonomous vehicles, 3D printing, nanotechnologies, biotechnologies, materials science, energy storage and quantum calculations.

By combining information technology and operational technologies, companies are beginning to look for new ways to connect, and data collected from suppliers, customers and the company can be reconciled with detailed production information, enabling real-time connectivity. The digital and physical worlds are connected, all activities are irreversibly linked to machines, systems and people who are able to exchange information and adapt automatically (Wilkins, 2019). The ability to utilize the benefits that new technologies could bring will depend, among other challenges, on the labour market's ability to adapt (Kergroach, 2017). Currently technological change is one of the main factors influencing labour markets, skills demand and supply, and the structure of occupations.

1.1 INDUSTRY 4.0 AND LABOR MARKET

The labour market has undergone remarkable changes in terms of technological change. The influence of Industry 4.0 on the labour market has been researched by several authors with different views on the issue. According to Rotman (2013) the automation as a backbone of paradigm Industry 4.0, could be considered as a threat from one point of view. However, they could enhance the productivity of many workers, some occupations could be vulnerable and they are likely to be substituted, because of Artificial intelligence and Big data more human-like abilities. At the same time, skills problems can lead to the employment of the workforce in unsuitable jobs, which causes workers to be stressed, are constantly under pressure, which is reflected in the performance of work (Lloyd; Payne, 2009).

Industry 4.0 from labour market point of view is particularly beneficial in developed countries with strong emphasis on technology and R&D (Nafchi, M. Z. et al. 2018), which are gaining a new competitive advantage but also causing unemployment due to the transition to automation. According to Frey and Osborne (2013) there are areas where the risk of replacing human resources with robots is almost certain, or more than 90%, but there are professions where replacement is unsolvable, could be rather supportive, although artificial intelligence is becoming more advanced and its ability level also increases the threat of replacing human resources with robots. Current trends show that the employment of the workforce in routine operations is reduced, these activities can be well algorithmized and thus easily replaced by

intelligent machines (Autor, 2013). Structural changes in the labour market are increasingly visible. Workers are moving from middle-income jobs to lower-income professions and activities. These are essentially service professions that have the character of manual professional work, and are therefore less sensitive to computerization, as they require a greater degree of flexibility, creativity or physical adaptability. At the same time, the demand for a creative, workforce capable of skilfully solving problems is growing. Changes in labor market trends are also reflected in education, and there is a growing demand for institutions with high professional standards of education for professionals able to solve complex cognitive problems.

Progress in machine learning, big data, robotics, and artificial intelligence will inevitably prompt automation, changing labour demand and job description (McAfee, et al., 2011). However, technical progress and automation of processes will no longer be limited to physical or manual tasks, dirty, dangerous, boring or repetitive tasks without the need for reflection, but may jeopardize many intellectual, cognitive or analytical administrative tasks involving some common tasks, for example in areas such as transport, office support or consumer services (Arntz et al., 2016).

Because of new approach to business, new products and processes will new kinds of jobs appear. As an example, in field of digital transition and big data are increasing demand for data specialists and skills for data analysis that far exceeds current supply and as well current capacity of the education and learning and development systems. Although the occupational structure has already evolved in many countries, with job creation polarizing high- and low-skilled occupation groups and job losses concentrated in middle-skilled routine occupations, the areas, scope and scale of the occupation in field of creative work are still unknown (Autor; Dorn, 2013). Given the potentially significant implications and uncertainty in predicting technology R&D that current technological transformations could have on manufacturing systems and companies as a whole, policy makers need evidence and preliminary information to predict at least the approximate impact of technological change on job skills and working conditions, as well as for the design and evaluation of science, technology and innovation policy (Kergroach, 2017). Emerging jobs may differ from the original standard model of full-time employment and may take various forms such as part-time, temporary employment, on-call time, etc. Emerging technologies make it possible to divide existing jobs into smaller tasks to support global and digital production. Increasing and improving not only the manufacturing sector but also services in the economy further supports the fragmentation of employment into smaller units of self-employment. Work has already become more fragmented with a growing number of workers holding non-standard jobs or operating non-standard jobs as a subsidiary to supplement income from their normal work activities (Bögenhold, et. al. 2017).

1.2 COMPETENCES AND SKILLS IN INDUSTRY 4.0

New technologies are bringing a new era, a new business, new approaches to functioning, as well as new jobs that require new competencies and promising skills. While new jobs will require new knowledge and new skills, the right combination of skills needed to perform in modern societies is becoming increasingly complex and will continue to evolve with the development of a technologically advanced work environment, requiring future generations of workers to develop digital skills and competences for lifelong learning at an early age. More difficult automation tasks so far include problem-solving skills, intuition, creativity, and persuasion (Frey; Osborne, 2013).

In the developing world, soft skills such as organization, management, teamwork or communication skills are also likely to grow in importance. Changing educational profiles will require renewed education and training policies and new ever-improving approaches to teacher training (Shamsi, 2017). Companies will build their human capital on the basis of new

skills, they will also implement organizational changes and adopt new management procedures in order to ensure the effective use of their intangible assets (Zavyalova, et. al. 2017). Overall, inequalities and social fragmentation, which could potentially arise from emerging technological change, are a matter of great concern, as inequalities will not only result from job losses and job polarization, but also from weaker social mobility and the persistent digital divide. The polarization of the work is likely to affect the middle class of the white collars. Social inequality is also likely to worsen in different industries, regions or occupations, as the digital divide between those who can and those unable to keep pace with widening technological changes (Kergroach, 2017). For example, women have historically been under-represented in science and technology, and digitalization is helping to bridge gender gaps in all labour markets. The economy of digital platforms could provide opportunities for greater work flexibility and at the same time a better work-life balance or to reduce cultural barriers and equal conditions for women and men. Of particular concern is the potential dismantling of the 20th century employment model, which has increased with mass production and links contract employment to salaries and the social system. Employment, pension, health care and social security systems are closely interlinked, with salary-based taxes accounting for a significant share of public resources and budgetary sustainability. Ensuring the resilience, adaptability and efficiency of labour markets is therefore not only a matter of focusing on the skills needed for the future production revolution, but also a prerequisite for social stability and cohesion.

Generally according to Feng and Richards (2018), the competencies required for Industry 4.0 are divided into three basic groups:

- **technical competences** refer to knowledge, skill or abilities needed to perform a specific task,
- **managerial competences** are defined as skills and abilities for general problem solving and decision-making,
- **social competences** are defined as maintaining interpersonal relationships in an organization, which in turn requires communication skills.

Under other conditions, Závadský and Závadská (2020) divided managerial competences that affect the deployment of the concept Industry 4.0 into two groups:

- first group of personnel management factors **apply to the employee** and have included general and professional competence, practical and application skills, social and professional maturity, ability to teach and the powers, responsibilities and duties of the staff member.
- second group **relate to the induced organizational innovation** and have included the following types of organizational innovations: innovation of management methods and tools, innovation of work places (not technological), innovation of organizational structure, innovation of internal and external communication, innovation of information system and innovation of organizational culture.

Most researches and studies are based on hypothesis that human resource represent a significant driving force and challenge for the Industry 4.0 enterprises. On the contrary, some authors point out that they do not see human resources as a driving force but rather as an obstacle to Industry 4.0 implementation when they lack necessary competences and skills (Herceg, et al. 2020). Digital transformation leads to more complex tasks and processes from HR point of view, which needs to be discussed more deeply.

1.3 INDUSTRY 4.0 AND HUMAN RESOURCE MANAGEMENT

All these turbulent changes and arrival of the new technologies point to the growing importance of readiness of human resources, which are the most important engine of companies (Koubek, 2007). HR preparedness is necessary not only in terms of connection of their knowledge management and the information technologies used in organizations (Bellanca, 2010) but also due to a change in the view to perform the work itself and the competencies that are necessary to perform the work.

The problem of changes in the competence framework presupposes a three-dimensional approach involving (Erol, et al., 2016):

- level of management of the company,
- areas of the production process,
- types of competencies.

According to Gan and Yusof (2019), there are six types of human resource activities that play key roles in organizations with respect to Industry 4.0, namely knowledge management, human resource policy making, training, recruitment, compensation and benefit system, job design. All these areas should improve the company's performance if they build on each other and ensure that the workforce has the necessary and key skills currently available. However, it is necessary to identify strategies for change while preparing for their responses to adaptation (Ahmad, 2020). An interesting change in the view of technology and effective exchange of information is the new model of the system of interconnection of key factors of business operation (Sima, et al., 2020). From the original model where the interconnection of information, knowledge and innovation dominated, Industry 4.0 brings a model where it focuses on the interconnection of human intelligence, new information technologies, information and innovation.

However, Dohale and Kumar (2018) in their review of the literature on industry 4.0 point out that only a small and thus insufficient part of the research deals with the connection of industry 4.0 with human resource management and therefore consider this area suitable for research in future studies. According to Wojčák, Copuš and Majtánová (2018) an appropriate source for the analysis and definition of HR requirements for these days could be a theoretical analysis and summarization of changes related to human resources during previous industrial revolutions, as well as outlining current trends in management in terms of knowledge under the influence of technological developments in IT. In connection with the issue of human resources and their knowledge in the context of industry 4.0, there are several unexplored areas. One of the most important tasks within HR management is to define the requirements that will be placed on human resources in terms of their knowledge in the context of Industry 4.0 (Šajgalíková; Copuš, 2018).

The study of HR competencies by Ulrich, Younger, Brockbank and Ulrich (2012) narrows this broad overview and identifies several basic domains of competencies. The first is the **strategic positioner** and will include the ability to interpret external trends focused mainly on technological progress, integrate them into internal actions and clearly communicate their impact on their workforce. In addition, the **capability builder** should have the ability to build critical organizational skills. With the many changes that are taking place as a result of Industry 4.0 (Jesuthasan, 2017), being a **champion of change** is a crucial competence - the ability to implement organizational change and implement change processes at the same pace as happening externally. Finally, **technology proponents** are very important because of the fact that we are in the digital age.

In addition to the above competencies, total reward stewards, analytics and compliance managers are also essential. The total reward manager is concerned with implementing a scheme that is meaningful and exciting for existing employees while attracting potential employees (Prikshat, et. al., 2018). The competence of the analyst and interpreter describes the skill of the HR specialist in using analytics to improve decision-making. Finally, the

compliance manager refers to the ability to use regulatory guidelines to manage compliance processes.

As the deployment of automation is accelerated, the required number of employees performing redundant process-based tasks is reduced, whether in a production or office environment. Industry 4.0 is supported by technology and development, but HR remains a cornerstone of all this (Liboni, et al., 2019), encompassing the way people interact, the technology and inventions evolving in the industry and the way they relate to new business model. Companies urgently need to align their human resources practices and plans with Industry 4.0, including areas such as skills development and workforce employment (Sivathanu; Pillai, 2018). The role of the HR department in the organization is to manage all aspects related to the employee cycle, from the recruitment to the exit phase. Although the role of HR is important for organizational development, recently, human resources departments have been perceived as operational departments with unproductive practices that are exacerbated by outdated technology. Therefore, the HR department itself should consider a major organizational change in all procedures for solving everyday tasks. HR professionals are forced to evaluate the functions and roles they play in Industry 4.0, because they need to be the first to navigate their direction in this technologically driven revolution (Łupicka; Grzybowska, 2018).

On the other hand, several authors agree that the role of top management, leadership style, competence and skills is an area where more input, analyses, hypotheses and studies are needed, together with the role of human resource management in Industry 4.0, which is still an understudied topic with not enough results useful for companies (Chang; Yeh, 2018).

2 CONCLUSION

This study set out to understand the influence of Industry 4.0 on Human Resources as well as role of HR professionals in Industry 4.0. The study makes an important, practical and scientific contribution to the understanding of labour market and Human Resources Management with regard to the requirements of Industry 4.0. The findings show that HR professionals play a key role in developing their competencies to create opportunities and mitigate the challenges that Industry 4.0 brings to HR. Industry 4.0 presents uncertainties such as job loss, making it necessary for HR professionals to put human capital at ease and equip them with the skills needed to navigate industry 4.0. Study also state that several authors began to deal with the various influences of Industry 4.0 on Human Resources, though the analyses by Dohale and Kumar, and Chang and Yeh agree that the impact of Industry 4.0 on HR is understudied than in other areas. Since these are Human Resources, which are often unpredictable and at the same time new technological changes, which are also more difficult to predict, it is not easy to research and assume what affects and does not affect the commitment of Industry 4.0 to society. However, it is necessary in the future to determine the more precise changes that companies have to make with regard to human resources. In this regard, space is being created to create a so-called HR 4.0 strategy, which will determine how companies should behave when implementing Industry 4.0, how they should approach HR properly in these turbulent times and what to look out for. The HR 4.0 strategy should be focused on existing employees, the possibilities of how to digitize their positions and at the same time train them as needed, or on retraining for a new position or termination of employment. In the case of new potential employees, new plans and procedures should be defined as part of the HR 4.0 strategy on how to acquire interesting talent, or if the labour market does not provide sufficiently qualified employees, such as created training plans for new employees to be able to perform work under Industry 4.0 requirements.

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