

THE INFLUENCE OF INDUSTRY 4.0 ON HUMAN RESOURCES MANAGEMENT

Mirjana Jokanović-Đajić¹ [0000-0002-8170-0601], Bojana Jokanović² [0000-0002-7862-1873]

Abstract

Although the term *industry 4.0* is represented worldwide, till today there is no generic and common understanding in terms of assessing the Industry 4.0 readiness for organization. It is a new concept, e.g. new reality of the modern economy, because innovation and technological development play crucial roles in each organization. Industry 4.0 significantly changes product and production systems, concerning the design, processes, operations and services. The purpose of this paper is to identify its influence on human resource management and is based on secondary data, because the implementation of this concept has further consequences for management and future jobs through creating new business models.

Key words: industry 4.0, digital transformation, human resource management

1. Introduction

The fourth industrial revolution differs from the previous ones with the fact that it relates to all fields of life (Slusarczyk, 2018). Industry 4.0 includes many technologies, which include Internet of Things (IoT), Internet of Service (IoS), cloud-based manufacturing, radio frequency identification (RFID), enterprise resource planning (ERP) and social product development (Fonseca, 2018; Georgakopoulos et al., 2016; Kube & Rinn, 2014; Lasi et al., 2014; Lin et al., 2016; Lom et al., 2016; Lu, 2017; Singer, 2015). In order to be productive and to meet the ever-changing customers' demands, manufacturers have to be innovative, agile, efficient, responsive and also cost effective by continuously reducing the operational costs. This is usually achieved by the higher level of digitization and automation within and external to the organization's supply chain. Transforming an organization to digitalization means changing the strategy of the overall organization, which is a big decision to undertake (Sony & Naik, 2020). Digital transformation has

¹ University of East Sarajevo, Production and Management Faculty Trebinje, Bosnia and Herzegovina, mirjana.jokanovic@fpm.ues.rs.ba

² University of Novi Sad, Faculty of Technical Sciences, Serbia, bojanajokanovic@uns.ac.rs

revolutionized the way companies relate to their customers, how companies run their operations, how they conceive of their business model and how they organize themselves (Fenech et al., 2019). It is about integrating digital technologies, such as social, mobile, analytics and cloud, in the service of transforming how businesses work (Kane et al., 2018). The integration of digital technology into business processes has become very important for the survival and competitive advantage of contemporary organizations (Bharadwaj, 2000).

The aim of this research is to clarify the state of opinion, expectation, and preparedness about how Industry 4.0 affects the processes of human resources. Investing in technology has become the most important condition of sustainable competitive power and advantage. By examining existing research, this study seeks to provide a comprehensive understanding of the benefits and challenges associated with these topic.

2. Industry 4.0

The concept of Industry 4.0, identified as the fourth Industrial Revolution, was initially introduced in Germany in 2011 (e.g. Lu, 2017; Sanders et al., 2016) referring to the integration of physical objects, human actors, intelligent machines, production lines and processes across organizational boundaries, meant to form a system in which all processes are integrated and share information in real time frame (Hozdić, 2015). The basic principles of Industry 4.0 are therefore the connection of machines, work pieces and systems, and businesses are creating intelligent networks along the entire value chain that can control each other autonomously (Basl, 2017). Besides it, the concept of Industry 4.0 assumes blurring the differences between the work of people and the work of machines. Like the first industrial revolution improved the operation of factories, the second one introduced electricity into the industry and the third one automated the uniform tasks of line workers, the fourth one improves information management and decision-making.

According to Lasi et al. (2014) "Industry 4.0 describes the increasing digitization and automation of the manufacturing environment, as well as the creation of digital value chains to enable communication between products, their environment and business partners". Hermann et al. (2016) define Industry 4.0 as "a collective term for technologies and concepts of value chain organization". Based on the papers in this research category, Lu (2017) claims that "Industry 4.0 can be summarized as an integrated, adapted, optimized, service-oriented, and interoperable manufacturing process which correlates with algorithms, big data, and high technologies". In addition to the definitions proposed by scientists, being so important for understanding the concept of Industry 4.0, it is also interesting to find out how this phenomenon is understood by manufacturers, who the industrial revolution will apply to. Table 1 shows their opinions.

Table 1: Manufacturers' Understanding the 4th Industrial Revolution (The 4th Industrial Revolution..., EEF The Manufacturers Organisation) (Slusarczyk, 2018)

"Not just about tech but how you join up the tech to work better – more productive, efficient, more insights and information"
"Communication and data analysis"
"Optimization for efficiency gains – smarter ways of working"
"Use data to provide answers more quickly"
"Next step in optimization and efficiency"
"Will become essential for competitive manufacturing"
"Real time data availability and information"
"Provide better solutions for customers"
"Information management from data – data on its own isn't helpful"
"Information flow and exchange"
"Help to integrate service and product"
"Connecting up 'buckets' of work areas – information flow"
"Managing data and systems to improve competitive edge"
"Product/process/supply chain – joining up and smarter ways of working between areas"
"Enhancing service provision"
"Information to help to optimize products"
"An enabler of ultimate ambition and goals"

The 4th Industrial Revolution is associated with three phenomena (Paprocki, 2016):

1. Common digitization and ensuring constant communication between people themselves, people and devices and between devices themselves,
2. More and more frequently implemented disruptive innovations, which allow for a stepwise increase in efficiency and effectiveness of the operation of the socioeconomic system,
3. The achievement of such development of machines is that they gain the ability for autonomous behavior through the use of artificial intelligence in the process of their control.

3. Digital Transformation and Human Resource Management

The enlarging digitalization of economies has focused attention on the importance of digital transformation and how it can help businesses stay competitive in the market. Rapid and continuous changes occur not only at the company level; they also have environmental, societal, and institutional implications. This is the reason why for the time of the past two decades the research on digital transformation has received growing attention, with a wide range of topics investigated in the literature (Kraus et al., 2021).

At a human resource level, Industry 4.0 propagates the idea of workers that increasingly will focus on creative, innovative and communicative activities (Erol et al., 2016). Indeed, all the challenges that I4.0 poses require continuous innovation and learning, which is dependent on people capabilities (Shamim et al., 2016). Therefore, the role of employees during Industrial Revolutions is very important (Sirotek & Firlus, 2016) and Industry 4.0 requires a labour force with high skill

levels. This includes developing and establishing training and workshops for the employees, with the focus on new core tasks such as how to manage and control digitized systems. Therefore training and continued professional development of employees are of major importance to succeed in early stages of the transition towards digitalization (Kagermann, 2013). The areas of skill requirements will be IT infrastructure, automation technology, data analytics, data security/communications security, development or application of assistance systems, collaboration software, non-technical skills such as systems thinking or process understanding (Benešová & Tupa, 2017; Lichtblau et al., 2015). Employee performance in the workplace was characterized as a single global indicator reflecting the characteristics of professional success or meeting the set of objectives (Charbonnier-Voirin & Roussel, 2012). In their research the authors Zhang and Chen (2024) emphasize that digital human resource management processes refer to the implementation of selection, training and development, and assessment functions leveraging state-of-the-art digital technologies.

Beyond skills, individuals are embedded in a social context, which requires the ability to communicate, cooperate and to establish social connections and structures with other individuals and groups. The full digital integration and automation of whole manufacturing processes in the vertical and horizontal dimensions imply that workers will be responsible for a broader process scope and will need the ability to understand relations between processes, the information flows, and to cooperate ad-hoc in finding appropriate solutions for particular problems (Erol et al., 2016).

The possibility for employees to benefit from more responsibility and personal development thanks to the implementation of Industry 4.0 needs to be stimulated by managers. Managers must be able to build or act as mediators that enable social processes and decision processes. Therefore, managers' support to employees, which reduces distance between the workers and the managers of the plant through the reduction of hierarchical levels, higher autonomy of teams and workers, wider distribution of decision authority can facilitate organizational learning and innovations by increasing employee participation (Agostini & Filippini, 2019). The following Table 2 shows common characteristics of the human resource management in the digital transformation.

Table 2: Common characteristics of the human resource management in the digital

Characteristics	Reference
creative activities	
innovative activities	Erol et al., 2016
communicative activities	
continuous innovation	
learning	Shamim et al., 2016
high skill levels	
training	Sirotek and Firlus, 2016
continuous professional development of employees	Kagermann, 2013

When talking about digitalization and human resources, organizations should focus on (Agostini, & Filippini, 2019):

1. Employee skills (possibility to develop innovations, skilled for digital technologies, widely considered as the best in industry),
2. Training for employees (trainings and development are received on regular basis, continual training and upgrading of employee skills is important, trainings are received to improve skills),
3. Internal social capital (skilled for collaboration with each other to diagnose and solve problems, skilled for sharing information and receiving knowledge from one another, skilled for interaction and exchange of the ideas with people from different areas of the company),
4. Organizational support (skilled to devote considerable effort to developing subordinates, skilled for pushing decisions down to the lowest appropriate level, skilled for issuing creative challenges to their people instead of narrowly defining tasks).

4. Conclusions

Staying behind the global economy will make competition almost impossible. The country, the companies, the machines, and the employees have to increase their capabilities in line with Industry 4.0. Industry 4.0 will change the relationships between organization and environment, organization and communities, organization and value chains, organization and humans. Therefore, future studies can be directed as to what components of organizational strategy must be designed for considering these changing relationships. On the other hand, Industry 5.0, the next big step, is still in development. It is expected to focus on collaboration between humans and machines to empower people to fully utilize their skills and make work safer, more efficient, and more meaningful. Regarding this, future research should include qualitative comparative analysis of Industry 4.0 and Industry 5.0 and their impact on human resource management.

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