

THE IMPACT OF INDUSTRY 4.0 ASPECTS ON LOGISTIC SERVICE PROVIDERS

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Summary: At the time that begins using the benefits of the fourth industrial revolution and automation, it is not easy to keep the step on the labor market and it is necessary to continuously adapt to a changing surrounding. It can be said, that the situation is more difficult in transport and logistics, that companies concern another current problems that are needed to example: for high level of competition in the field of transport and logistics and least but not least problem is lack of labour. One of the most important elements in the company are its employees. The most important employees are in the field of transport and logistics when employees are the basic value of the service. Therefore in these papers I would like to focus on the current aspects of Industry 4.0 and their impact, in especially on the HR area in logistic companies.

Key words: Industry 4.0, Automation, Digitalization, Digital education, Machine Learning, Automated guided vehicle, Human

INTRODUCTION

Nowadays, when we start to enjoy the benefits of the fourth industrial revolution and automation, it is not easy to keep up with the labor market and it is necessary to constantly adapt to the rapidly changing environment.

We can say that the situation in the field of transport and logistics is even more complicated as companies have to deal with other current problems they face. For example, there is a very high competition in the field of transport and logistics, the current and very crucial problem is the shortage of skilled labor in the market and, last but not least, the absence of some work qualifications in the education system, e.g. warehouse operator, dispatcher, driver. In the Czech Republic, approximately 245,000 people are currently employed in the transport and logistics sector, of which 125,000 are professional drivers. According to the association of road transport operators Česmad, there is a shortage of 15,000 drivers in the market (ČESMAD, 2018).

The current specific challenges in the logistics sector include, in particular, the high requirements for upskilling of employees in the context of the introduction of new technological and information equipment. These are applied to warehouse technologies by introducing new warehouse pick-by-voice, pick-by-point, and pick-by-light techniques, operating automated equipment, working with autonomous equipment. The introduction of these elements is

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particularly difficult in the context of staff shortage and the need for further training, as this is essential for the implementation of Industry 4.0 technology.

These requirements parallel with customers' pressure to deliver goods as quickly as possible, especially in connection with the development of e-commerce.

The paper accentuates specific Industry 4.0 technologies and their impact on human resources in companies.

1. DEFINITION OF INDUSTRY 4.0

Generally, the term Industry 4.0, or the Fourth Industrial Revolution, can be defined as the implementation of artificial intelligence, with an emphasis on the development of automation and robotics across the industry.

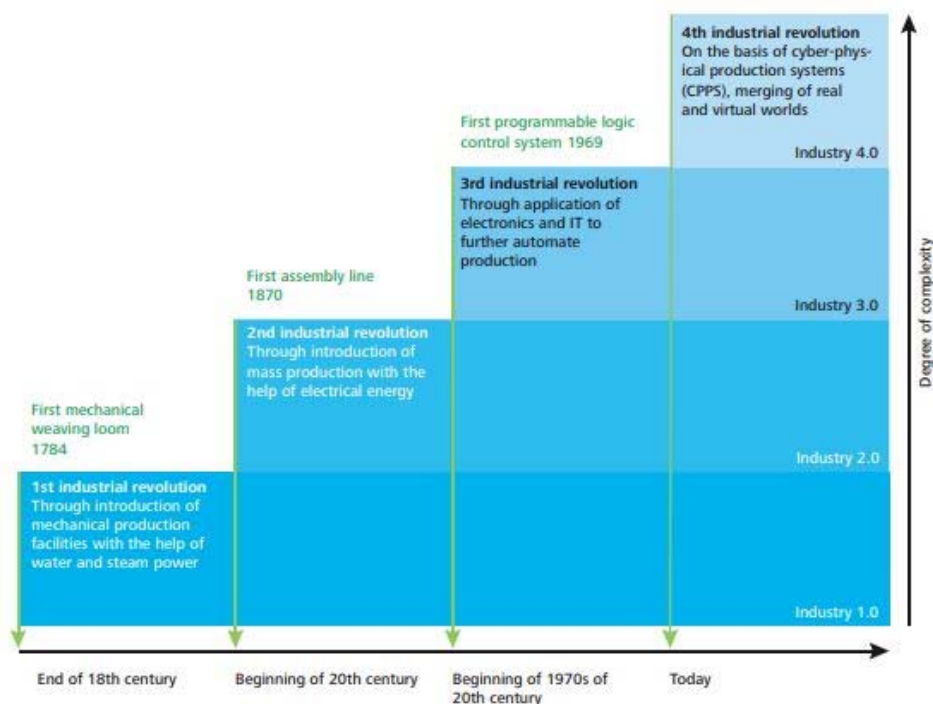


Fig. 1 - Timeline of industrial revolutions

Source: www.deloitt.com

The “Industry 4.0” concept was introduced at the 2013 Hannover Trade Fair in Germany. Since then, it has spread worldwide. It is currently joined by world powers. In addition to Germany and its Industrie 4.0, it was joined by France and its project “Industrie du Futur,” Italy with the project “Fabbrica Intelligente” or the American “Industrial Internet.” (Jenšíková, 2016)

Czech industry must prepare for the 4th Industrial Revolution not only because of the external pressure exerted on the economy, but mainly to increase its competitiveness through rapid adaptation to the new entry conditions of the European and world markets. The course of the whole development must be understood as a society-wide challenge, to which the Czech

Republic must respond in such a way that it does not lose its position on international markets and, on the contrary, strengthens it. (Mařík, 2015).

2. BASIC TECHNOLOGICAL FEATURES OF INDUSTRY 4.0

2.1 Ubiquitous intelligence

It conditions the development of technology and procedures in the field of data science.

Emphasis is placed on advanced machine learning and artificial intelligence, which enables the creation of intelligent physical and SW systems that are programmed to further learning such as robots, autonomous vehicles, consumer electronics, etc.

The application of Deep Learning (DL) shifts the text analysis towards the “understanding” of the meaning of the examined document. A database (corpus) of text documents with systematically described content must be created as large as possible (in the background, there is a vector description of the language indicating the most frequent occurrence of words and making it possible to estimate their order). A system that knows what is written in the text can then cope with the situation when the same or similar sentence appears in a completely different context.

Intelligent applications

VPA Application (Virtual Personal Assistants):

- manages some day-to-day tasks of assistants and secretaries (e.g. e-mail communication prioritizing),
- increases decision-making efficiency (highlighting the most important content and iterations),

VCA Application (Virtual Customer Assistants):

- specializes in business and customer service roles,
- sets priorities for decision-making.

Intelligent things

It is a designation of physical objects that can handle more than fixed programming models of usage through the use of applied artificial intelligence and machine learning, but respond more naturally in their environment and interact with people, such as drones, autonomous vehicles, smart appliances will move from isolated intelligent things to a collaborative model of intelligent things.

2.2 Interconnection of physical and digital technologies

Here are three key technologies:

1. Virtual and augmented reality:

- fundamentally changes the way people communicate with each other, with applications and software,

- the ability to connect to a digital network and create a comprehensive system of devices capable of storing and managing information flow to the user.

2. Digital twin

Is a dynamic SW model of a physical entity or a system that uses sensor data to understand its current state, manage responses to changes, improve responses and/or increase added value. It includes a combination of metadata (e.g. classification, composition and structure), status or conditions (e.g. location and temperature), event data (e.g. series), and analytics (e.g. algorithms and rules).

3. Blockchain and distributed records:

- these are distributed records in which the value exchange information (bitcoin – digital currency, token – symbolic currency) is sequentially sorted into blocks.

2.3 Interconnected platform and service networks

They are essential for the advent of the smart digital world. They include:

1. Conversation systems:

- chat bots (chat bot is a service that communicates with users and answers their questions; choice of answers is controlled by a set of programmed rules and/or artificial intelligence; communication is interactive and can be performed separately and/or in a chat tool environment (e.g. Facebook Messenger, Slack, WhatsApp, WeChat, etc.) and microphone equipped devices (e.g. smartphones, tablets, PCs, and cars).

2. Network of applications and service architecture

- mobile, web, traditional and Internet of Things applications connect to a wider network of services to create what a user perceives and sees as a single “application”.

3. Digital technology platforms

- provide basic building blocks for the digital business and are an important support element in transforming business into digital business;
- basic building blocks of digital business: IS; customer experience; analytics and intelligence; Internet of Things and business/commercial ecosystems.

4. Adaptive security architecture

- a smart digital network and related digital technology platforms and application architectures create an increasingly complex environment in terms of security. Established security technologies should be used as a basis for securing IoT platforms.
- user monitoring and entity behavior is a critical complement, especially in IoT. IoT’s edge area is a new frontier for most IT security experts and, therefore, a place where new weak points will be born and new tools and processes will need to be invented and integrated into IoT platforms.

3. IMPACT OF INDUSTRY 4.0 ASPECTS ON HR

In particular, the new technologies introduced by the Industry 4.0 concept lead to the replacement of routine operations by machines. However, with the development of machine learning, manual non-routine activities are also being replaced.

It is therefore clear that the implementation of new technologies leads to the disappearance of some jobs and at the same time to the creation of jobs with the need of a specific qualification.

The calculations made so far on the termination and creation of jobs differ slightly according to the methodology used. Specifically for the Czech Republic, it is estimated that 14% of jobs are at high risk of automation and that 32% of jobs will experience significant changes in their activities in the next 20 years (OECD study, Employment Outlook 2019). According to this study, 10% of jobs were at high risk in 2016, stating that significant changes will occur in 35% of jobs (OECD Employment Outlook 2016, Figure 2).

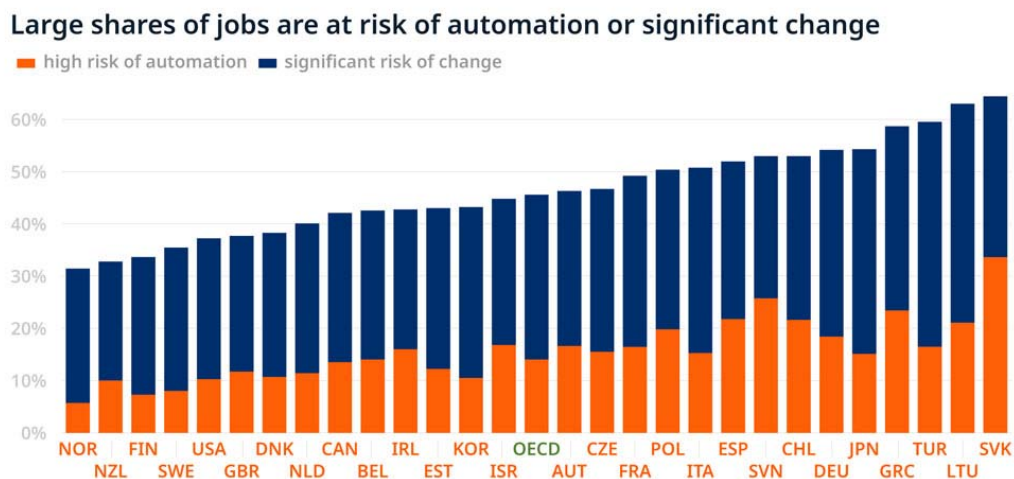


Fig. 2 – Large shares of jobs are at risk of automation or significant change

Source: <https://www.oecd.org/employment/outlook/>

The situation in the Czech Republic is significantly influenced by foreign trade as well as by the inflow of foreign investment into the Czech Republic. Employment in foreign-controlled enterprises accounts for 1/3 of total employment. These are mainly companies with German and American capital. (MLSA, Labor Initiative 4.0, 2016).

In general, the development of digitalization and robotization leads to a reduction in physical labor intensity, improved working conditions and higher demands on the “digital literacy” of employees.

The logistics sector, together with the automotive industry, is where automation and robotics occur most significantly.

The paper presents several examples of implementation of Industry 4.0 technologies, demonstrating the impact on job positions and qualification requirements for employees.

The automotive industry together with logistics plays a crucial role in the Czech economy and thus also in the employment area; therefore, we must not forget large companies operating in this field in the Czech Republic.

Below is a steep increase in the number of mobile robots used.

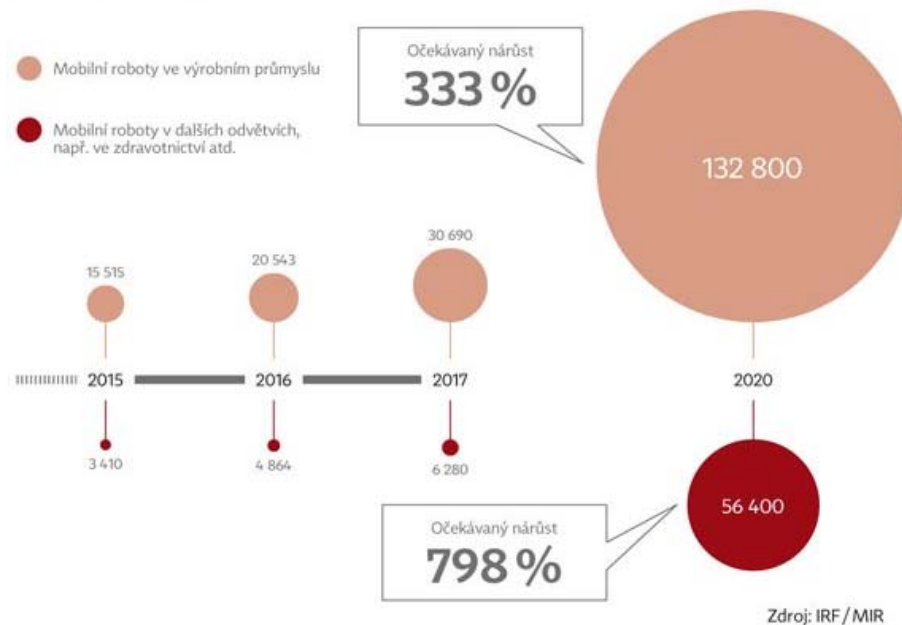


Fig 3 -The increase in the number of mobile robots used

4. SPECIFIC TECHNOLOGIES OF INDUSTRY 4.0 AND THEIR IMPACT ON HR

Generally, it can be stated that the development of digitalization and robotization leads to a reduction in physical labor intensity, improved working conditions and higher demands on the “digital literacy” of employees (MLSA, Labor Initiative 4.0).

As Hyun-Woong Jin states in his article (Economics and Management, 2018), the transport of single packages is one of the fastest growing industries in the world, so it is necessary to implement Industry 4.0 elements here.

In industrial plants, robots are already being used in mass production, replacing complex and physically demanding work, ensuring greater production efficiency. However, this technology will continue to evolve in the future and robots will become more autonomous, flexible and cooperative. (Rüßmann et al., 2015).

4.1 Automated guided vehicle (AGV)

It is a robotic vehicle that delivers parts for production in the production hall, loads consignments or carries goods for packaging. It helps to speed up and streamline the whole process and also reduce errors (e.g. picking process).

The autonomous vehicle is navigated and steered by a laser on the roof and two other sensors scan the environment to prevent the vehicle from hitting obstacles, so that the robot can move safely across the plant hall. Therefore, the vehicle does not need any guideways and is thus more flexible. The direction of travel can only be changed using software.

The use of this technology means new jobs for the company and recruiting qualified workers who will be able to service this equipment. On the other hand, there is no need for a vehicle driver.



Fig 4 – Automated guided vehicle

Source: <https://www.jungheinrich.cz/systemy/autonomni-voziky/automaticke-voziky/ezs-350a-492450>

4.2 Virtual reality

A Virtual reality program allows businesses to save costs on product manufacturing, employee training or simulation of various processes (Pick by Vision). Virtual reality is also being deployed in logistics centers during the picking process, which for the company means a change of requirements for the position of a warehouse worker. Of course, Virtual reality brings benefits in the form of picking speed and reduced error rates. However, it is necessary to adapt

qualification requirements for employees working with this technology (e.g. higher attention is paid to the eyesight, ICT literacy, etc.)

4.3 ProGlove

Or a “smart glove” designed to streamline all logistics operations. ProGlove includes a code scanner that significantly simplifies and speeds up the work of employees, who subsequently do not have to use a conventional handheld reader. Employees confirm the glove code reading by pressing the button on the glove index finger. The technology is applied in the field of mass production, where this area becomes more efficient.

The use of a “smart glove” means an increased qualification requirement for the user, the worker.



Fig 5 – ProGlove

CONCLUSION

It is important to create appropriate conditions for the implementation of the Industry 4.0 technologies in the Czech Republic to increase competitiveness.

With the implementation of new technologies, there are changes in HR as the requirements for the expertise of workers increase. It can be stated that the field of logistics together with the automotive industry are at the forefront in the implementation of new technologies in the Czech Republic.

The HR area must not only enforce requirements for workers with regard to the implementation of the Industry 4.0 concept, but also of concepts related to it such as Company 4.0, People 4.0 and Employees 4.0.

Without adequate retraining of employees with an emphasis on machine learning, the implementation of the Industry 4.0 platform cannot succeed. Similarly, without the development of digital literacy, new technologies cannot be successfully implemented, and consequently the anticipated outcome, i.e. economic benefits, cannot be expected.

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