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**INDUSTRY 4.0 AS THE CHALLENGE  
FOR EMPLOYMENT CHANGE  
AND FOR RESTRUCTURING PROCESS**

**PRZEMYSŁ 4.0 WYZWANIEM DLA ZMIAN  
W ZATRUDNIENIU I DLA PROCESU  
RESTRUKTURYZACJI**

**Abstract:** Industry 4.0 is next big technological change. Technological changes always result in employment changes. Industry 4.0 is based on full automation of production and using industrial robots in the production. The publication is the beginning of the discussion on employment restructuring in the Industry 4.0 (I 4.0). The work was based on a study of literature, including industrial reports. The completed literature study was the basis for scientific disser-

tation about the place of employment restructuring in the Industry 4.0. The aim of this study is presentation of changes in employment and in the restructuring process in the Industry 4.0.

**Keywords:** Industry 4.0 (I 4.0), employment, restructuring

**Streszczenie:** Przemysł 4.0 to kolejna wielka zmiana technologiczna. Zmiany technologiczne zawsze skutkują zmianami kadrowymi. Przemysł 4.0 opiera się na pełnej automatyzacji i robotyzacji produkcji. Opracowanie jest początkiem dyskusji o restrukturyzacji zatrudnienia w przemyśle 4.0 (I 4.0). Powstało na podstawie studium literatury, w tym raportów przemysłowych. Zrealizowane studium literatury było podstawą do dysertacji naukowej o miejscu restrukturyzacji kadr w przemyśle 4.0. Celem niniejszego opracowania jest próba przedstawienia zmian w zatrudnieniu i w procesie restrukturyzacji zatrudnienia w przemyśle 4.0.

**Słowa kluczowe:** przemysł 4.0 (I 4.0), zatrudnienie, restrukturyzacja.

## Introduction

Modern enterprises need to quickly adapt to the Fourth Industrial Revolution to remain competitive. Industry 4.0 is the result of the Fourth Industrial Revolution. It is the new concept of the industrial development. Industry 4.0 creates new opportunities for business and the economy. There is no one universal definition of industry 4.0. Industry 4.0 is a general term for technology of the Fourth Industrial Revolution<sup>1</sup>. Production in I 4.0 is a combination of operational technology (OT) with IT technology (IT). The term "Industrie 4.0," shortened to I 4.0 or simply I 4, originated in 2011 from a project in the high-tech strategy of the German government, which promotes the computerization of manufacturing (BMBF)<sup>2</sup>. Also known as SMART manufacturing or Manufacturing 4.0. Industry 4.0 is marked by a shift toward a physical-to-digital-to-physical connection. Industry 4.0 is the trend towards automation and data exchange in manufacturing technologies and processes which include cyber-physical systems (CPS), cyber-physical production systems, the internet of things (IoT), industrial internet of things (IIOT), cloud computing, cognitive computing and artificial intelligence<sup>3</sup>.

Every industrial revolution requires a reduction in employment. New technol-

<sup>1</sup> M. Hermann, T. Pentek, B. Otto, *Design Principles for Industrie 4.0 Scenarios: A Literature Review*, Uniwersytet Techniczny w Dortmundzie, 2015.

<sup>2</sup> BMBF-Internetredaktion (21 January 2016). „Zukunftsprojekt Industrie 4.0 - BMBF“. Bmbf.de. Retrieved 30 November 2016, online <https://www.bmbf.de/de/zukunftsprojekt-industrie-4-0-848.html>.

<sup>3</sup> M. Hermann, T. Pentek, B. Otto, *Design Principles for Industrie 4.0 Scenarios: A Literature Review*, Uniwersytet Techniczny w Dortmundzie, 2015; J. Jasperneite, *Was hinter Begriffen wie Industrie 4.0 steckt* in „Computer & Automation“, 19 December 2012, accessed on 23 December 2012; H. Kagermann, W. Wahlster and J. Helbig, (eds.), *Recommendations for implementing the strategic initiative Industrie 4.0*, Final report of the Industrie 4.0 Working Group, 2013; H. Lasi, H.G. Kemper, P. Fette, T. Feld, M. Hoffmann, *Industry 4.0*, „Business & Information Systems Engineering“ 2014, 4 (6), pp. 239-242.

ogy always replaces people (employees)<sup>4</sup>. The employment restructuring is a key part of the industrial revolution. It is radical and leads to a reduction in the number of employees in particular enterprises<sup>5</sup>. In addition to quantitative changes, the restructuring process includes qualitative changes<sup>6</sup>. The restructuring is a complex and timed process<sup>7</sup>. Production in the Industry 4.0 can be without, or with minimal, employee participation. The reasons for the restructuring are:

- reduced demand for simple work (production using industrial manipulators and robots and smart computers),
- rising employment costs (increase in workers' wages every years),
- new production tasks (high accuracy and speed required - robots communicate faster and more efficiently than workers).

The publication attempts to discuss about changes in employment and restructuring process in the Industry 4.0. This publication consists of two parts. Part One, *Human Resources in the Industry 4.0*, starts by showing the specifics of the Industry 4.0 and ends with the impact of this industry on changes in employment. Part Two, *Employment Restructuring in the Industry 4.0*, contains suggestions for the restructuring in I 4.0. The parts were created on the basis of the literature study. The literature review methodology was to search for common concepts on employment changes in the context of industrial 4.0 development. The research methodology consisted of three steps: Step 1: selection of articles on the analyzed topic. Step 2: analysis of the key problem: employment restructuring and development I 4.0. Step 3: synthesis of analysis, i.e. the place of employment restructuring in I 4.0.

The following research assumption was adopted in the paper (article) that, during development of Industry 4.0, employment restructuring will be carried out in terms of quantity of employees and quality of staff. The adopted research assumption was formulated on the basis of a review of published views of scientists and market researchers that I 4.0 will radically change HR, as well as based on the essence of technical progress that replaces human work by equipment (a new technique).

The scope of the work is to look for "arguments" (a synthesis of information based on a review of literature) for the restructuring of employment in Industry 4.0.

<sup>4</sup> I. Durlík, *Inżynieria zarządzania*, cz. I: *Strategie organizacji produkcji. Nowe koncepcje zarządzania*, Wydawnictwo Placet, Warszawa, 2007, p. 306.

<sup>5</sup> H. Dźwigół, *Zarządzanie przedsiębiorstwem w warunkach XXI wieku*, Wydawnictwo Politechniki Śląskiej, Gliwice 2013, s. 141.

<sup>6</sup> S. Krajewski, *Prywatyzacja, restrukturyzacja, konkurencyjność polskich przedsiębiorstw*, PWE, Warszawa 2009, s. 155; S. Lachiewicz, A. Zakrzewska-Bielawska, *Restrukturyzacja organizacji i zasobów kadrowych przedsiębiorstwa*, Oficyna Ekonomiczna, Kraków 2005, p. 116.

<sup>7</sup> R. Borowiecki, *Restrukturyzacja jako narzędzie strategii zarządzania we współczesnym przedsiębiorstwie. Dynamika zarządzania organizacjami. Paradygmaty – metody – zastosowania. Księga pamiątkowa wydana z okazji 50-lecia pracy naukowej profesora Jerzego Rokity*, Akademia Ekonomiczna, Katowice 2007, p. 253.

Adopted topic: *Industry 4.0 as the challenge for employment change and for restructuring process* is a new problem, because Industry 4.0 was initiated not so long ago (a decade ago) and human resources restructuring is currently being carried out in few enterprises that have adopted development based on the fourth revolution industry. At the current stage of changes in industry, there is an information gap as to the type and scope of employment restructuring in I 4.0.

## 1. Human resources in the Industry 4.0

Klaus Schwab, founder and the Executive Chairman of the World Economic Forum said: “we are at the beginning of a technical revolution that is fundamentally changing the way we live, work and relate to one another”<sup>8</sup>. The beginning of change is digitalisation and new using of Internet.

Internet has a wide application. Internet is access to information. Without it, there would be no social networks or apps on mobile devices. In I 4.0, Internet is used in a broad sense, it is the network for Industry 4.0. Internet of Things (IoT) with the communication machine to machine (M2M) is building a new reality. In the Industry 4.0, there are not barriers to communication, there is access to information and to services and products. Production in I 4.0 is carried out by industrial robots (IR) and industrial manipulator (IM) with intelligent computers using the internet to control and communicate and to integrate all processes inside and outside the enterprise within the supply chain using all possible technical solutions to connect the virtual world and the real world<sup>9</sup>. Computers control production using data and digital product description. Industrial robots and industrial manipulators, form production strings, assisted by information systems (CAx). The new production technology is in the smart factory<sup>10</sup>.

Industry 4.0 will lead to potential deep changes in several domains that go beyond the industrial sector. Its impacts and influence can be categorized into six main areas: (1) Industry, (2) Products and services, (3) Business models and market, (4) Economy, (5) Work environment and (6) Skills development (Figure 1)<sup>11</sup>. The last two areas are linked to changes in employment and restructuring.

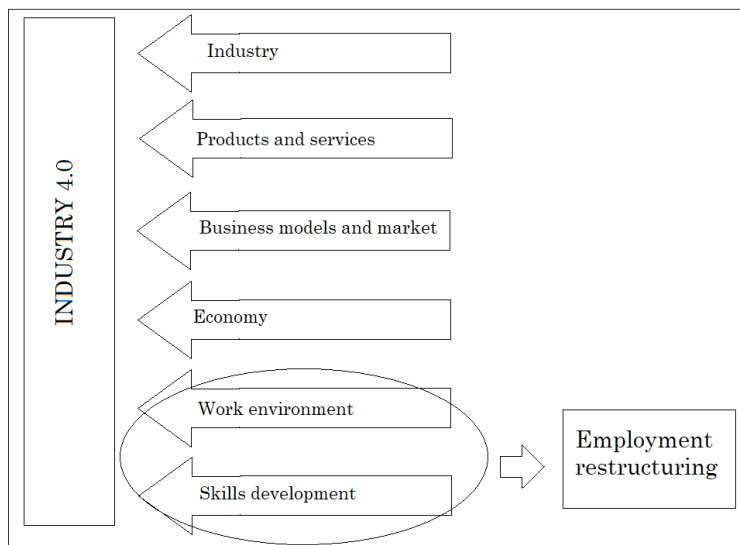
<sup>8</sup> K. Schwab, *The Fourth Industrial Revolution*, 2016, p. 12.

<sup>9</sup> H. Lasi, P. Fettke, T. Feld, M. Hoffmann, *Industry 4.0*, “Business & Information Systems Engineering” 2014, 6, 239-242.

<sup>10</sup> B. Gajdzik, S. Grabowska, A. Wyciśli, *Explanatory preview of directions of changes in development of industry 4.0*, “Polish Technical Review” 1, 5-9 2019. DOI 10.15199/180.2019.1.1.

<sup>11</sup> A.C. Pereira, F. Romero, *A review of the meanings and the implementations of the Industry 4.0 concept*, Manufacturing Engineering Society International Conference 2017, MESIC 2017, 28-30 June 2017, Vigo (Pontevedra), Spain, “Procedia Manufacturing” 13 (2017) 1206–1214, on the based of S. Erol, A. Jäger, P. Hold, K. Ott, and W. Sihn. *Procedia CIRP* 54 (2016) 13–18.

Figure 1. The main areas of Industry 4.0 and the place of employment restructuring  
 Rysunek 1. Główne obszary przemysłu 4.0 i miejsce restrukturyzacji zatrudnienia



Source: own processing based on: A.C. Pereira, F. Romero, *A review of the meanings and the implementations of the Industry 4.0 concept* Manufacturing Engineering Society International Conference 2017, MESIC 2017, 28-30 June 2017. 28-30 June 2017, Vigo (Pontevedra), Spain, "Procedia Manufacturing "13 (2017) 1206–1214, on the based of S. Erol, A. Jäger, P. Hold, K. Ott, and W. Sihn. *Procedia CIRP* 54 (2016) 13–18.

The impact of Industry 4.0 on changes in employment is under research of public and industrial organizations. Opinions on employment situations are extreme (analysis of published reports).

Industry 4.0 reduces the demand for workers employed in production and assembly. Demand for simple and low-skilled workers is declining<sup>12</sup>. This is a key trend in replacing human work by industrial robots and smart computers. Partial or complete automation and robotization of production lines results in a decrease in the number of employees.

According to Consulting Group Cognizant<sup>13</sup> projections, 47% of current occupations will disappear from the labour market by 2025. The reduction mainly applies to employees of assembly lines, warehouses, shops, logistics, finances, administration, accounting, training, etc. Examples of negative changes in employment:

- workers working directly on production facilities (fitters, welders, turners) are replaced by industrial manipulators and industrial robots<sup>14</sup>,

<sup>12</sup> *Inżynierowie Przemysłu 4.0 (Nie)gotowi do zmian?*, Astor Whitepaper, Kraków 2017, [https://www.astor.com.pl/images/Industry\\_4-0\\_Przemysl\\_4-0/ASTOR\\_Inzynierowie\\_4.0\\_whitepaper.pdf](https://www.astor.com.pl/images/Industry_4-0_Przemysl_4-0/ASTOR_Inzynierowie_4.0_whitepaper.pdf).

<sup>13</sup> Grupa Konsultacyjna Biznesu „Cognizant”, *What to do when machines do everything*, <https://www.cognizant.com/when-machines-do-everything>.

<sup>14</sup> B. Mejssner, *Komu grozi technologiczne bezrobocie*, „Computer World” 2015, <http://www.computer-world.pl/news/403361/Komu.grozi.technologiczne.bezrobocie.html> [access: 15.04.2016].

- warehouse workers and suppliers are replaced by industrial manipulators, autonomous vehicles and other transport equipment,
- IT employees who have been involved in entering data into systems are replaced by computers with access to cloud computing,
- direct sellers are displaced by online shopping,
- trainers (trainers) lose their jobs by e-learning.

The reduction in the employment of low-skilled workers mainly affects companies that introduce cyber-physical production systems (CPPS). Fitters, welders, turners, warehouse workers, retailers, etc. work in traditional enterprises. However, the question arises: how long will these enterprises be competitive in the market. Customers want online service, impact on the products and fast deliveries. The scope of the changes in individual enterprises depends on the form of ownership, the size of the enterprise and the sectoral activity. In such sectors (branches) as automotive, home appliances, clothes, it's easier to implement new smart technology than, for example in a steelworks or in a factory building ships.

Worries that automation is leading to major job losses are largely unfounded. Industry 4.0 can unfold its potential only by means of the practical knowledge, acumen and adaptability of employees. Employees' existing qualifications and experience thus have to be deployed in the introduction of Industry 4.0 and enabled to reflect on production processes and to bring about continuous improvements. Industry 4.0 requires a reallocation of tasks and new responsibilities that need to be underpinned by appropriate further training measures, as well as consensus-oriented concepts of data protection and mobile work, which have to be developed with the participation of workplace codetermination bodies<sup>15</sup>.

In smart factories, the number of robots and smart machines is increasing. The increasing relevance of human-machine interfaces will promote the interaction between both production elements and the required communication between smart machines, smart products and employees, enhanced by the vision of IoT and IoS that is enabled by CPS<sup>16</sup>. For that reason, the future systems should have a focus on workers and their importance<sup>17</sup>.

In the smart factory, a worker is at the center of an intelligent production system, where the new technology can support his cognitive and physical abilities. Employees learn quickly how to operate new equipment by visualization system and mobile control of operation of in real time. Working in the Industry 4.0 is easier and safer

<sup>15</sup> Ch.Schröder, *The Challenges of Industry 4.0 for Small and Medium-sized Enterprises*, Friedrich-Ebert-Stiftung, 2017 (report).

<sup>16</sup> K. Zhou, T. Liu, and L. Zhou, *Industry 4.0: Towards Future Industrial Opportunities and Challenges*, [in:] *International Conference on Fuzzy Systems and Knowledge Discovery*, 2016, pp. 2147–2152.

<sup>17</sup> A.C. Pereira, F. Romero, *A review of the meanings and the implementations of the Industry 4.0 concept*, Manufacturing Engineering Society International Conference 2017, MESIC 2017, 28-30 June 2017, Vigo (Pontevedra), Spain, "Procedia Manufacturing" 13, 2017, pp. 1206–1214.

(workers don't have to do dangerous operations because robots do the operations).

In intelligent automation, the focus is on increasing productivity by cooperation of machines and employees<sup>18</sup>. Greater automation displaces lower-skilled workers, but increases demand for higher-skilled workers.

Examples of positive changes in employment:

- increase in the number of employees: designers, trainers of machines and robots, IT professionals, sales consultants, engineers machines, robot coordinators, service engineers (instead of service technician) and extended operators (pick-up operators) in the production and service (maintenance)<sup>19</sup>,
- new jobs e.g. for professionals modeling and interpretation of production data in the management department<sup>20</sup> or in smart marketing and personalization of products<sup>21</sup>.

In conclusion, the new technology results in changes in employment, but the effects (effects) of these changes cannot be clearly established. A balanced view of the employment effects of Industry 4.0 is the most correct. Experts on new technologies often fail to take the cost-benefit aspect – in other words, the economic perspective – sufficiently into account. Workers' practical knowledge cannot be replaced by smart technologies in all enterprises<sup>22</sup>. Also to be considered is the fact that the rate of diffusion of new technologies partly depends on different obstacles, so that expectations of a high level of automation within one or two decades could easily be premature<sup>23</sup>.

## 2. Employment restructuring in the Industry 4.0

In the public consciousness, restructuring is associated with the rapid economic transformation of the early 1990s and in economic changes in 2002-2004, and during the global economic crisis in 2008-2009<sup>24</sup>. The employment restructuring is negatively associated with: unemployment, large layoffs, bankruptcy. However, ac-

<sup>18</sup> *Technology Vision. People First: The Primacy of People in a Digital Age*, Accenture 2016, dostęp: [https://www.accenture.com/t20160314T114937\\_\\_w\\_/us-en/\\_acnmedia/Accenture/Omobono/Technology-Vision/pdf/Technology-Trends-Technology-Vision-2016.PDF#zoom=50](https://www.accenture.com/t20160314T114937__w_/us-en/_acnmedia/Accenture/Omobono/Technology-Vision/pdf/Technology-Trends-Technology-Vision-2016.PDF#zoom=50) (15.04.2016).

<sup>19</sup> A.C. Pereira, F. Romero, *A review of the meanings and the implementations of the Industry 4.0 concept, Manufacturing Engineering Society International Conference 2017, MESIC 2017, 28-30 June 2017, Vigo (Pontevedra), Spain*, "Procedia Manufacturing" 13, 2017, 1206–1214.

<sup>20</sup> *Inżynierowie Przemysłu 4.0 (Nie)gotowi do zmian?*, Astor, 2017..., p. 20, p. 40-43.

<sup>21</sup> J. Wielki, *Elektroniczny marketing przez Internet*, PWE, Warszawa – Wrocław 2000, p. 58-59.

<sup>22</sup> S. Pfeiffer, A. Suphan, *Der AV-Index: Lebendiges Arbeitsvermögen und Erfahrung als Ressourcen auf dem Weg zu Industrie 4.0* [The AV index: Living work capacity and experiences as resources on the way to Industry 4.0], Working Paper 2015#1, University of Hohenheim.

<sup>23</sup> H. Bonin, T. Gregory, U. Zierahn, *Übertragung der Studie von Frey/Osborne (2013) auf Deutschland [Applying the study by Frey/Osborne (2013) to Germany]*, Final Report, Kurzexpertise No. 57 für das Bundesministerium für Arbeit und Soziales, Mannheim 2015.

<sup>24</sup> B. Gajdzik, *Przedsiębiorstwo hutnicze po restrukturyzacji*, Politechnika Śląska, Gliwice 2012; B. Gajdzik, *Restrukturyzacja przedsiębiorstw w warunkach destabilizacji otoczenia na przykładzie branży hutniczej*, Difin, Warszawa 2012.



According to many definitions, the restructuring process is intended to have a positive impact on enterprises and employees.

Job cuts are part of changes of enterprises but are not always a result of restructuring. The process of restructuring must be planned and implemented in the long term, e.g. in the case of a 2-5 years<sup>25</sup>. The employment restructuring is part of the resources restructuring in enterprises<sup>26</sup>.

When we considering the process of restructuring from the legal side, it refers particularly strongly to the regulation of collective reduction in employment. The law provides two instruments of employment controls: collective and monitored reduction of employment<sup>27</sup>. Collective redundancies are negotiated with trade unions (redundancy conditions and severance packages). During the period of transformation of enterprises to Industry 4.0. employers' representatives may support outplacement, including labour mobility programmes (e.g. retraining) or participation in the virtualization of the company's processes and creation of the IT service. The future work vision will demand for new competencies and it is necessary to create opportunities for the acquisition of the required skills through high quality training. State and local government institutions should be involved in the restructuring process in Industry 4.0 not only through the co-financing for the dismissed persons and the participation of institutions in social dialogue, but by preparing offers for retraining of employees. In the restructuring, labour market institutions (including non-public) organising new training courses are important because now they can decrease the gap between old and new technology.

Employment restructuring must be an initiative of enterprises that will join radical technological changes. The employers are the first link in changes. Their economic problems cause job cuts in enterprises. Particular enterprises should consult the restructuring programme with trade union organisations or other employee representatives and other organizations involved in the restructuring process. In the Industry 4.0, restructuring is a process of systemic construction of CPPS in enterprises. The restructuring is an important process for enterprises in cyber space. Employment restructuring is one of the areas of restructuring in the Industry 4.0. The scope of the restructuring is very wide. The main reasons for the restructuring in the Industry 4.0 is the low level of modernity of the used technologies (companies are undergoing changes at the level of the Fourth Industrial Revolution). Other reasons for restructuring are: overemployment, high wage costs, inadequate (to new reality) qualifications of employees.

Work environment is quickly changing due to technological advancements and

<sup>25</sup> A. Strabryła, *Zarządzanie strategiczne w teorii i praktyce firmy*, PWN, Warszawa – Kraków 2000, p.251; R.Borowiecki (ed.), *Zarządzanie restrukturyzacją przedsiębiorstw i gospodarki*, Fundacja Uniwersytetu Ekonomicznego w Krakowie, Kraków 2014, p. 17-18.

<sup>26</sup> P. Cabała, K. Bartusik, *Restrukturyzacja w jednostkach gospodarczych*, Akademia Ekonomiczna w Krakowie, Kraków 2006, p. 19.

<sup>27</sup> M. Korsak, *Restrukturyzacja zatrudnienia*, „Biuletyn” 2009, 4, Fundacja Inicjatyw Społeczno-Ekonomicznych, Warszawa, grudzień 2009, p. 1-14.



Industry 4.0 is transforming jobs and required skills. The most significant change regards human-machine interface, which embraces the interaction between workers and a set of new ways of collaborative work. The number of robots and smart machines is increasing and the number of employees is decreasing.

This is not to say that there are not legitimate economic rationales behind restructuring the Industry 4.0. The employment restructuring has already started regardless of whether it is referred to as restructuring or not. The changes will progress faster and faster<sup>28</sup>. Employees learn how to operate new technologies. Industry 4.0 means for employees the need to continuously improve their qualifications (life-long learning) and change jobs.

For labour market organisations, this may mean integrating into the restructuring processes at the level of lifelong learning and developing skills, such as problem solving, communication or cooperation. In Poland, there is a discussion on level 5 of education – short specialized, technical studies<sup>29</sup>. This level can be particularly useful during the enterprises transition to Industry 4.0. Two key features of a level 5 study are: short time of education and technical knowledge – engineering education, e.g. operation of modern machines, machine control, human cooperation with computer systems<sup>30</sup>. Level 5 of the study – technical and academic - is for high school graduates and for employees who want to get new qualifications quickly.

Employment restructuring in EU countries is the result of a continuous process of moving the European economy towards information and knowledge economy. This process was initiated in the first decade of this century, and its strength will be of increasing importance. The employment changes in enterprises introducing technological changes will be stronger in the future<sup>31</sup>. The more companies turn into smart factories, the greater the extent of the restructuring. Micro restructuring (in enterprises or companies) will gradually increase and will turn into restructuring mezo (sectoral). Not all sectors will immediately start employment restructuring. It will start (and even have already started) in the automotive, clothing, banking, transport, energy sectors. Industry 4.0 increases the industrial potential of the economy (new investment, new products and new value, new services, etc.). It can be assumed that the restructuring process in the perspective of Industry 4.0 will cover the entire economy because more and more companies started to build a market advantage by new technologies of Industry 4.0<sup>32</sup>.

<sup>28</sup> K. Hoffman, *Driving force: the global restructuring of technology, labor, and investment in the automobile and components industry*, 2019, books.google.com.

<sup>29</sup> E. Chmielecka, N. Kraśniewska (ed.), *Poziom 5 – brakujące ogniwo* (Level 5 – lacking element), Fundacja Rektorów Polskich, Instytut Społeczeństwa Wiedzy, Warszawa 2017.

<sup>30</sup> J. Kuczmarszewski, *Kształcenie kadr dla przemysłu 4.0*, [in:] R. Knosala (ed.), *Innowacje w zarządzaniu i inżynierii produkcji*, t. II, PTZP, Opole 2018, p. 149-155.

<sup>31</sup> *Restructuring in Europe, A review of EU action to anticipate and manage employment change*, European Commission, Directorate-General for Employment, Social Affairs and Equal Opportunities, Chapter IV, Luxembourg 2008.

<sup>32</sup> More information in reports: Berger, Roland, *Industry 4.0, The New Industrial Revolution: How Europe Will Succeed*, Munich 2014, [http://www.rolandberger.com/media/pdf/Roland\\_Berger\\_TAB\\_Indus](http://www.rolandberger.com/media/pdf/Roland_Berger_TAB_Indus)

## Summary

New industrial environment – Industry 4.0 – have a massive impact on labour market. A qualified workforce is indispensable for the development of Industry 4.0. Industry 4.0 transforms jobs and skills. New job profiles that bring information and production technologies closer together are required in Industry 4.0. Industry 4.0 leads to an increased automation of tasks, which means that workers should be prepared for performing new tasks. “The most significant change regards human-machine interface, which embraces the interaction between workers and a set of new ways of collaborative work. Machine intelligence plays an important role in supporting human-machine collaboration, since machines will be providing assistance with every job, every role, and anything that is done in manufacturing sites where dynamic situations are present”<sup>33</sup>. Restructuring in employment is involved with reduction of the number of employees and engineering education of workers. On the present level of development of the Industry 4.0 there are different opinions about employment in enterprises. A balanced view of the employment effects of Industry 4.0 is required.

By synthesizing information based on the literature review (study), significant changes in employment in Industry 4.0 were confirmed. Employment restructuring will be analyzed and described along with the development of Industry 4.0, the more enterprises introduce changes typical of the fourth industrial revolution, the more often information about reduction of employment and radical changes in employee competences will appear in literature.

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BITKOM, Fraunhofer IAO, *Industrie 4.0 – Volkswirtschaftliches Potenzial für Deutschland*, Berlin 2014 [Industry 4.0 – macroeconomic potential for Germany], [http://www.its-owl.de/fileadmin/PDF/Industrie\\_4.0/2014-04-07-Studie\\_Bitcom\\_Wirtschaftliches\\_Potential\\_fuer\\_Industrie\\_4.0.pdf](http://www.its-owl.de/fileadmin/PDF/Industrie_4.0/2014-04-07-Studie_Bitcom_Wirtschaftliches_Potential_fuer_Industrie_4.0.pdf) [access: 13.10.2015].

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