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# ANALYSIS OF ARTIFICIAL INTELLIGENCE AND AUTOMATION AND ROBOTISATION OF PROCESSES AS FACTORS INFLUENCING STRUCTURAL CHANGES IN EMPLOYMENT IN INDUSTRIAL PRODUCTION

Arkadiusz Sylpaczuk, Michał Żynda

## Abstract

**Objective** Determining impact which Artificial Intelligence, Robotization and Automation have and will continue to have on the labour market in the processing industry.
**Method** Literature review, statistical data and data from industry reports. Deduction and comparative analysis.
**Results** In the course of the work, a review of the literature on the subject was carried out and the issue of artificial intelligence, as well as robotization and automation of production was defined, and in addition, it has been demonstrated how important factor of production is labour. It presents examples of the use of artificial intelligence in the modern economy and presents the probability of replacing human work by artificial intelligence systems. Data from research reports and statistical analyses were used in the context of labour market analysis in industries and economies with the highest degree of automation and robotization. Conclusions were presented, which implement the set objective and are the basis for conducting research in the areas indicated by the authors.
In the course of work, we defined what the labour is, its productivity and measurement methods. Data from research reports were presented, showing the probability of changes in the labour market in relation to specific occupations, due to the use of artificial intelligence. The relationship between artificial intelligence and process automation and robotization is described. The above-mentioned studies allowed the authors to demonstrate some important relations between the described factors.

**Keywords**: labour productivity, artificial intelligence, robotization and automation

**JEL Classification**: J01, O12, O30

## Introduction

Human labour is one of the most important production factors, and generating GDP value depends on labour productivity. In the modern economy there are two factors that will have an impact on the labour market in the coming years, i.e. artificial intelligence and automation and robotization of processes. In the case of artificial intelligence, we remain in the sphere of determining the probability of impact on the labour market based on the analysis of changes that may occur. With regard to automation and robotization in the production area, this trend is already so widespread that its impact on employment levels in individual industries and economic areas can be assessed. The article raises issues from both the macro and microeconomic side. The definition of particular issues and the conclusion from research reports concerning the problems of artificial intelligence and automation and robotization of production were presented. The authors decided to choose only a part of the elements in order to present the relation in the context of the described issue.

## 1. Importance and Character of Labour in Economy

One of the most important factors influencing economic development, understood as the growth of real GDP, is labour. In economic terms, and more precisely in microeconomic terms, labour is one of the three production factors, other factors include capital and land (Kątowski, 2009). In informal terms, labour is defined in Adam Smith's work as a fund that a nation generates over the course of a year and that provides it with things necessary and useful for life that are consumed or exchanged for the products of other nations (Smith, 2007).

Labour is an asset present in the economy in a limited extent. This situation is mainly related to the fact that it is people who create the labour supply. In a given economy there is a certain number of people in the so-called working age, i.e. those who can take up employment. Of course, it is also possible to import labour, e.g. thanks to the migration of people from a region with lower labour demand to another economic region. This aspect has been omitted in further consideration, as the issue of people migration is linked to a greater number of determinants, both economic and non-economic. Returning to the definition of labour supply issues, the value of labour supply depends to a large extent on the level of wages offered by companies to job seekers. As wages increase, the labour supply increases as more people are willing to work. An important concept in the consideration of labour as a factor related to the generation of income of enterprises is the marginal product of labour. Assuming that the other factors of production are constant, the marginal product of labour is equal to the increase in output caused by the employment of an additional person. In general, as wages rise and the labour supply curve moves along, its slope relative to the axis representing the size of labour assets is becoming steeper and this indicates a decrease in the supply flexibility. In this case, even large increases of wages will not result in a significant increase in the supply of labour offered by employees. Of course, the simpler the work is done, the more flexible the curve is, the more specialised and knowledge-requiring the work is, the less resources are available in the economy and the flexibility of labour supply is decreasing (Begg *et al.*, 2003).

On the labour market during the prosperity period there is a constant search for the best employees. Especially, when the employee's market prevails over the employer's market, in such a situation there are tendencies related to an increased search for solutions aimed at eliminating the human factor from the production process, reducing human work or making changes in this area aimed at optimisation. As J.M. Keynes noted in one of his essays as early as the first half of the twentieth century, technical and technological progress affects the way work is done, and thus the pace and structural changes in the employment of the workforce (Keynes, 1930). Computerisation and technology have a constant influence on the change in behaviour of both consumers and producers, including structural changes in the labour market resulting, for example, from the repetitiveness of production work based on easy to remember movements or principles (Acemoglu *et al.*, 2011). Regardless of whether it is the production of interior furnishings or the production of software. In the first case, experience in the performance of specific tasks and the necessary presence in the production hall will be important. In the second one we will also find the element of necessary creativity. Currently, the human mind prevails over the capabilities of computers to a significant degree, which does not allow to eliminate the work of a person in this aspect.

## 2. Labour Productivity and Automation and Robotization of Processes

Labour productivity is defined as the amount of output obtained from the unit of input used, which is labour. The simplest way to calculate this indicator is as a ratio of GDP (real or nominal, depending on the methodology adopted) to the total number of working hours in the economy. In such a system we get the value of production per worked hour (Hall and Taylor, 2000). On this basis, we can estimate the state of a given economy in comparison with other countries or the average in a given economic region. In addition, recording the labour productivity indicator helps to identify certain trends related to increasing or decreasing labour productivity. With the above data, it is also possible to confront the real increase in wages in relation to the increase in labour productivity. In economies where the main sectors are services and industry, the value of output in relation to the number of hours worked is highest. In the case of economies based on agriculture, forestry or fishing, labour productivity is much lower. This is related to the fact that processes in agriculture are the most labour-intensive and products sold in value terms are relatively cheaper than highly processed products. The most desirable economic model is one in which the economy produces highly processed products or services whose main value is knowledge and not the physical work of people or machines. In this way, it is possible to move smoothly to another factor determining the labour productivity in the economy, i.e. the level of technological advancement allowing for the production of specialist products or services. In the case of the so-called knowledge-based economies, the main element of the price consumers pay for goods is the knowledge contained in products. For example, by comparing the value of a ship used for building and surveying specialised maritime structures, showing its price per kilogram in relation to a less complex product such as galvanised steel bar, it is evident that there is a high added value in terms of the ship's economy. The price of an example ship produced in a Polish shipyard is about EUR 27.7 per kg [I], while the price of galvanised steel bar offered by a Polish company is slightly more than EUR 1.0 per kg [II]. It is clear that the more the product is processed, the higher its price. Moreover, according to OECD statistics, there are a number of so-called medium-high and high technology industries in which knowledge is the main element of the product price. It can be concluded that knowledge-based economies are those with the highest labour productivity.

Automation and robotization of production processes can be easily transformed into increased productivity, mainly due to more efficient use of employee working time, both in industry and in trade and services. An example of automation in industry can be the production related to mechanical processing of metals, where the revolution has become numerical control machines, the so-called machining centres controlled by means of a computer. In the 1970s and 1980s, the most popular method of production of turned metal parts was the so-called conventional machine tools, which at the turn of the 20th and 21st century began to be replaced by numerically controlled machines. In the case of conventionally controlled machine tools, each process required the full involvement of an employee. The main advantages that can be distinguished between manual machining on conventional automatic machines and machining on numerically controlled machines are increased efficiency of the manufacturing process and shortening of the production cycle, increased quality and repeatability of the workpieces and greater flexibility of production [III]. Many similar examples can be found in the chemical industry, electronics manufacturing and, above all, in the automotive industry, which is the most susceptible to automation. Turning to macro-economic aspects, the spread of the use of numerically controlled machines has contributed to the development of other industries. Shorter production cycles and quantities of manufactured components resulted in lower prices of semi-finished products, which translated into lower prices of end products consisting of many elements produced by robotic and automated production lines. The automotive industry is the best example. Japan, which is one of the leaders in robotization and process automation, produced more than 2 million cars between 660-2000 $cm^3$ between 1970 and 1980 and 1990, when the use of robots became more and more common, about 6 million similar models were developed (Menes, 2012). This directly demonstrates the enormous impact of automation and robotization of production processes on the automotive industry, which in 2014 produced around 90 million cars worth around EUR 2.7 billion. It is estimated that if the automotive industry were treated as a separate economic entity, it would be the sixth economy in terms of GDP [IV]. To sum up the positive aspects of automation, it is worth focusing on the fact that in the last 30 years the market for goods and services has undergone significant changes, in terms of increasing quality requirements, as well as the growing importance of the aspect related to the need to offer multi-variant products and shorten the life cycle of products. In addition, there were aspects related to the customer's participation in the product development process. In a modern economy, in order to accelerate its development, automation is necessary, which leads to an increase in labour productivity (Kost *et al.*, 2013). There is often a common opinion that the robotization of production leads to unemployment because it deprives people of jobs. This is an opinion which is not supported by any economic rationale. An example is the most automated sector of the manufacturing economy, i.e. the automotive industry. It is currently estimated that more than 12 million people work in the automotive industry. In addition, one employee working in the automotive industry provides about 5 jobs in industries such as chemicals, steel, textiles and rubber. The automotive industry itself has an indirect impact on the technical infrastructure of the economy and on the transport industry, the refinery industry and the entire automotive service industry. The most robotic industries are industries that generate jobs in other sectors thanks to their productivity. In addition, the robot manufacturing industry itself requires hundreds of people to be employed. In addition, process automation leads to lower final prices for advanced electronic products, which are developing further industries. The development of robotization makes it possible to apply discoveries in fields such as nanotechnology and biotechnology in open-access products. The best example of the fact that robotization has no impact on rising unemployment are the most automated economies in the world.

**Table 1:**Countries with the highest level of robotization and Poland in 2013

| Ref. | Country | Robotization Density (number of robots per 10 thousand inhabitants) | Unemployment Rate |
|---|---|---|---|
| 1 | South Korea | 437 | 3.10% |
| 2 | Japan | 323 | 4.00% |
| 3 | Germany | 282 | 5.20% |
| 4 | Sweden | 174 | 8.00% |
| 5 | Belgium | 169 | 8.40% |
| 6 | Denmark | 166 | 7.00% |
| 7 | Italy | 153 | 12.10% |
| 8 | USA | 152 | 7.40% |
| 9 | Taiwan | 142 | 4.20% |
| 10 | Spain | 141 | 26.10% |
| 11 | France | 122 | 10.30% |
| 12 | Finland | 125 | 8.10% |
| 13 | Austria | 118 | 5.30% |
| 14 | Canada | 116 | 7.10% |
| 15 | Holland | 93 | 7.30% |
| **16** | **Poland** | **19** | **10.3%** |

Source: own study based on estimates of the International Federation of Robotics and data from the International Monetary Fund, based on https://www.imf.org/external/datamapper [18.03.2019]

The table above shows the level of unemployment in the world's most robotic economies in 2013. It is worth noting that the average level of unemployment in the world in 2013 was 7.90%, while among the most robotic economies it was 8.24%. It should be noted that the result in the countries with the highest level of robotization is worse because the ranking includes 3 economies with significant fiscal problems, i.e. France, Spain and Italy, if these countries were excluded from the ranking, the average unemployment rate in the robotized countries would be 6.26%. The first three most robotized countries, i.e. South Korea, Germany and Japan, have an average unemployment rate, which is about half of the world average, and the level of robotization is also significantly different from other countries. It must be underlined that among the most robotic countries, 8 of them are the richest countries in the world (according to the level of nominal GDP generated). The above example clearly indicates that the increase in the level of robotization and automation of processes has an impact on the level of economic development and is not related to the increase in unemployment, and in the case of the most automated countries, one of the lowest unemployment levels among other economies can be said to exist.

## 3. Robotization in Industry

The most absorbent industries, if we are talking about robot absorption, are the automotive industry, rubber and plastic products, metal production, metal products, machinery industry, electrical and electronic equipment production and the food industry.

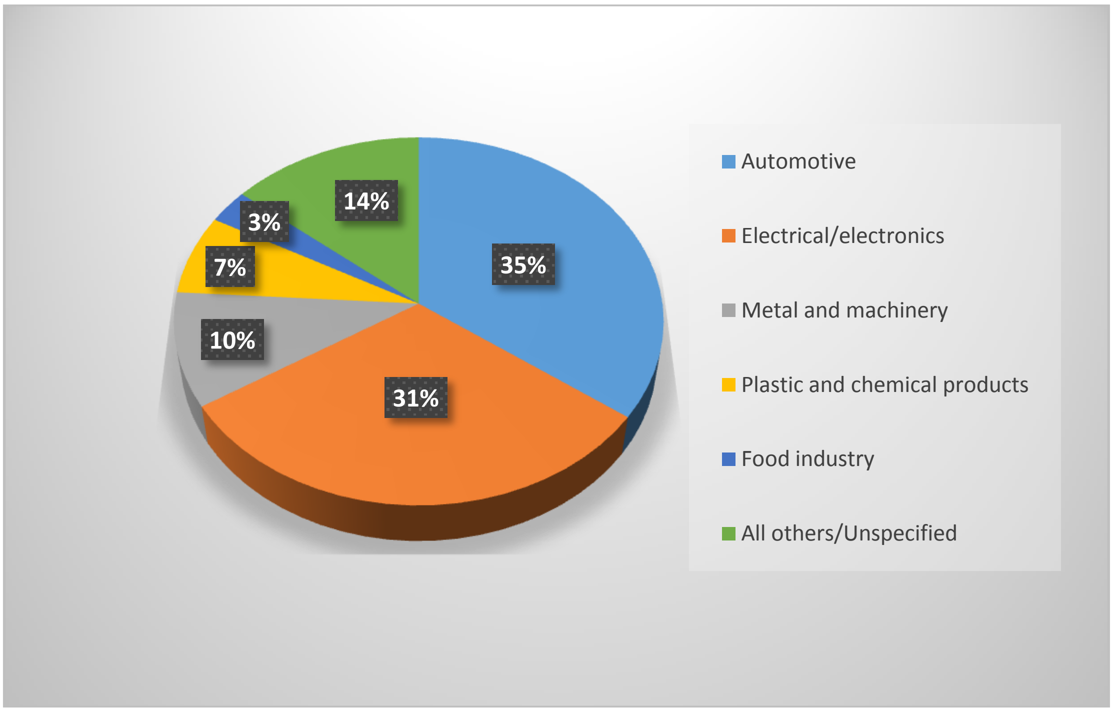


**Figure 1:**Worldwide sales of robots by sector in 2016

Source: own study based on http://przemysl-40.pl/index.php/2017/10/09/rynek-robotow-2017[18.03.2019]

The countries with the highest number of robots were Japan, North America, Germany, South Korea and China. The total number of robots working in these countries accounted for about 74% of all robots active in the world. The average global robot density in 2013 was 62 robots per 10,000 inhabitants. The average European robot density is about 82 robots per 10,000 inhabitants. Poland with a value of 19 is at the end of world and European rankings. The number of robots in other CEE countries is higher than in Poland, the Czech Republic has 72 robots per 10,000 inhabitants Slovakia 83 and Hungary 47. This is probably related to the automotive industry, which is an important element of development in these economies. Moreover, the population of Hungary, the Czech Republic and Slovakia is lower than that of Poland. In 2013, the number of robots working in Polish industrial plants was about 7751. This number has doubled since 2007. About half of all robots installed in Poland were robots working for the automotive industry - 3476, the next sector was the production of rubber and plastic products - 1550 robots, production of finished metal products - 861 robots. In 2013, the three sectors had 76% of all robots in the Polish economy. According to research conducted by the Institute for Market Economics in 2015, entrepreneurs in Poland intend to invest in robotization and automation of production processes. To a large extent this is due to rising production costs in the area of labour costs, moreover, the market places new quality requirements on the industry (Łapiński et al., 2015).

## 4. Defining Artificial Intelligence

When considering issues related to automation and robotics in industry, it should be noted that they are components of artificial intelligence. As an artificial intelligence we can distinguish a form of existence that can autonomously process information and transform it into cause and effect sequences on many levels. As these levels we understand verbal and non-verbal communication, handling of itself and other objects, or most importantly, independent decision making and subsequent actions. All these skills may coexist simultaneously within the unit or, which is currently much more common, partially, or may be used in part to a limited extent.

One of the factors necessary for the existence of artificial intelligence (AI) is, according to the study proposed by Alan Turing, a machine whose answers to the questions asked will be classified as human, assuming that the assessor (necessarily a human) did not know who or what answers these questions. Another element, according to the experiment of the so-called Chinese peace, conducted by philosopher John Searle, will be the ability to answer using methods considered creative, and not only logical. Creativity is understood as solving problems that go beyond the possibility of including answers in the dictionary of available options, but also as the ability to use part or all of the toolbox proposed by the researcher and the ability to deduct. As an example of artificial intelligence can be considered the computer AlphaGo by DeepMind, the winner of the duel with a man in the game Go, many times more complex than chess. What is important, both in one game, the number of potential solutions equals or exceeds $10^{123}$, which clearly excludes the possibility of using the dictionary method to describe available solutions (Walsh, 2018).

Depending on the source, there are slight differences in defining the areas of AI understanding, but in terms of the assessment criteria they can be regarded as convergent, and so according to I. Belda we distinguish five main elements that are the basis for understanding the field, namely search, learning, planning, automatic reasoning and processing of natural language (Belda, 2012). The areas qualified as an AI domain presented by A. Cawsey are planning, observation and registration of the environment (vision), movement and interaction with the environment, let's call it physical presence (robotics), and the use of human language (Cawsey, 1998). In order to better understand and achieve the objectives of this article, some elements appearing simultaneously in both authors will be discussed.

Planning an intelligent solution to problems, understood as achieving a predetermined goal by taking a sequence of steps. Before a solution is undertaken, the steps are unknown or difficult to predict. It is required to describe the problem in any form by analysing individual elements. As a form of description, any kind of graphical representation of the algorithm, e.g. a graph or a mind map, can be considered. It could be any other type of tool that illustrates the elements, taking into account the relations between them. In the case of automatic planning, a solution is searched for which Artificial Intelligence considers the most optimal of the available [V]. Planning can be understood as a correlation between logical thinking and the ability to reason on the basis of facts [VI].

As an observation and registration of the environment (Vision) according to the artificial intelligence dictionary, we understand, among other things, the use of cameras to receive visual signals by a computer system in order to identify objects and shadows and distortions, as well as to record differences resulting from changes during movement (Smith, 1990). From this description it is likely to conclude that this AI functionality is understood for human as the ability to see, of course with a number of other conditions, such as reasoning, planning, etc., assuming that the robot is able to diagnose what kind of object it sees can pass such information to the module dealing with its further processing. Here we move on to automatic inference based on the information obtained. In the analysed case it will be such an element of logical reasoning as deduction allowing to solve simple mathematical problems. If the machine encounters an obstacle, it must perform a bypassing manoeuvre, i.e. find a path around, above or below it depending on mobility. Similarly, in the case of a freight warehouse, reducing the number of items below a certain quantity requires a response, e.g. placing an order (Walsh, 2018). The described action may be planned earlier on the basis of a logical condition, but it may also be an autonomous decision. Automated reasoning also applies in the planning discussed in the previous paragraph. "When a Mars rover has to perform an experiment on the top of a nearby hill, it must have a plan. You cannot control it from the Earth. Within fifteen minutes, which takes the transmission of a radio signal between the planets can happen a lot of bad. Until now, most space missions have used plans prepared earlier. They are created on Earth, using people and computers as tools, and saved earlier in the ship. But in 1999 the ship Deep Space One from NASA flew quite autonomously, finding and implementing ship control plans without any human intervention. All this happened at a distance of 600 million miles from Earth. A similar automated planning technology is now routinely used to plan robot movements in factories and hospitals as well as to operate robotized bending and cutting stations for metal sheets...." (Walsh, 2018). It is worth noting that in the case of the Mars rover described above no deep learning based on neural networks or any other form of self-learning system was used (Walsh, 2018).

Another element, in automated machines, for the complexity of the considerations discussed in this article, will be physical presence (robotics). In the context of industrial machinery, this issue can be described as the ability to grab, reposition or align in relation to directions. English "robotics" understood here as the ability to manipulate objects in connection with their perception by the machine in order to perform a specific action in a changing environment, in order for it to take place at the right moment also requires the previously described skills (Smith, 1990).

The use of natural (human) language as one of the most visible symptoms of "humanisation" of technology, not necessarily the most visible ad hoc. The aspect should be divided into separate tasks. The first one will be the reception and understanding of human speech and its further analysis, while the feedback will be a response message in an analogous form. To sum up, we are dealing here on the one hand with understanding and on the other hand with the use of human language to communicate with the environment. Examples include tools created by giants of the economic world, such as Apple Inc. offering a solution called Siri, or derived from the speech synthesizer Ivona (Ivo Software) [VII] created in Poland. These are virtual assistants with extensive functions, but the basis of their experience on the human-machine interface is the voice and the ability to talk.

## 5. Replaceability of Human Labour by Artificial Intelligence

In the long term, it is expected that the vast majority of the jobs currently performed by people will be covered by robotic machines (Grace *et al.*, 2017). Thinking, in this respect, can boil down to the imagination of androids replacing the people working there so far in factories, offices and other places. This conclusion, however, seems to be wrong in its very essence if we take into account the fact that human is not predestined for all works performed, either physically, mentally or anatomically. Naturally, the greatest concern may be aroused by the performance of works previously considered to be strictly "human". However, even here it is not difficult to obtain an example illustrating at least a partial usefulness of such a solution. Already today we can find places where cafe guests are served by humanoid robots controlled by disabled people, who so far have not been able to perform this type of duties [VIII]. This example clearly shows a trend that has been taking place since we can talk about the labour market, namely shifts and changes in the structure of employment. Change is a natural concern, as has already been mentioned, but it is a permanent element both in the world of technology and beyond its borders. In economic processes, companies create change management procedures in a sustainable and reliable manner in order to maximise long-term benefits.

Discussing the context of artificial intelligence requires clarification of the expected achievements in this area. Namely, the time needed for AI to be able to overtake the capabilities of the human brain is predicted. The oscillations range from 42 years for the probability of this scenario materialising in 50% to 6 years with an assumed 10% probability. Predictions as to the full automation of the workforce, depending on the researcher, predict the elimination of human involvement in as early as 20 years with a 10% probability of occurrence. If, on the other hand, we assumed a 50% probability of the described situation occurring, it may take up to 119 years, starting the counter in 2019 (Grace *et al.*, 2017). An important assumption in this case is the fact that the effect occurring after the presented time is understood as an artificial intelligence which, while performing work at a given position, is able to perform exactly the same work as a person, at the same time cheaper (price index) and better (quality index) than the person dealing with it (Grace *et al.*, 2017). Research carried out in the field of artificial intelligence substitutability of humans focuses on various aspects of this process. In the above case, the time needed to change the employment structure was assessed, which clearly shows that the research was probably derived from the hypothesis assuming when this reality will come, and not whether it is actually possible at all.

Other studies carried out in this area (Frey and Osborne, 2013) illustrating the probability of substitutability at a particular position depending on various requirements, such as emotional intelligence or creativity, but also manual skills. They shall not place emphasis on the time needed to obtain the effect of human replacement, but shall examine to what extent such substitutability would be possible. In this chapter we focus on those elements that could point the way to production processes. These, in turn, are partly related to the above-mentioned manual skills.

**Table 2:**Likelihood of replacing human work with autonomous computerised systems.

| Likelihood of substitution | Name and characteristics of the workplace* |
|---|---|
| **0.011** | **Mechanical Engineers**<br>Perform engineering duties in planning and designing tools, engines, machines, and other mechanically functioning equipment. Oversee installation, operation, maintenance, and repair of equipment such as centralized heat, gas, water, and steam systems.<br>Illustrative examples: Combustion Engineer, Engine Designer, Heating and Cooling Systems Engineer, Tool and Die Engineer |
| **0.03** | **Industrial Engineering Technicians**<br>Apply engineering theory and principles to problems of industrial layout or manufacturing production, usually under the direction of engineering staff. May perform time and motion studies on worker operations in a variety of industries for purposes such as establishing standard production rates or improving efficiency.<br>Illustrative examples: Motion Study Technician, Production Control Technologist, Time Study Technician |
| **0.1** | **Electrical Engineers**<br>Research, design, develop, test, or supervise the manufacturing and installation of electrical equipment, components, or systems for commercial, industrial, military, or scientific use. Excludes "Computer Hardware Engineers" (17-2061).<br>Illustrative examples: Electrical Systems Engineer, Illuminating Engineer, Power Distribution Engineer |
| **0.88** | **Construction Laborers**<br>Perform tasks involving physical labour at construction sites. May operate hand and power tools of all types: air hammers, earth tampers, cement mixers, small mechanical hoists, surveying and measuring equipment, and a variety of other equipment and instruments. May clean and prepare sites, dig trenches, set braces to support the sides of excavations, |

* Names and descriptions of professions according to United States Department of Labor, Bureau of Labor Statistics, 2010 Standard Occupational Classification System

| | |
|---|---|
| | erect scaffolding, and clean up rubble, debris and other waste materials. May assist other craft workers. Construction laborers who primarily assist a particular craft worker are classified under "Helpers, Construction Trades" (47-3010). Excludes "Hazardous Materials Removal Workers" (47-4041). |
| **0.93** | **Machine Feeders and Offbearers**<br>Feed materials into or remove materials from machines or equipment that is automatic or tended by other workers.<br>Illustrative examples: Hopper Filler, Spinning Doffer |
| **0.97** | **Grinding and Polishing Workers, Hand**<br>Grind, sand, or polish, using hand tools or hand-held power tools, a variety of metal, wood, stone, clay, plastic, or glass objects. Includes chippers, buffers, and finishers.<br>Illustrative examples: Hand Buffer, Hand Sander, Jewellery Polisher, Knife Grinder |

Source: own study based on Frey C. A., Osborne M.A. (2013), *The future of employment: how susceptible are jobs to computerisation?* DOI: 10.1016/j.techfore.2016.08.019 and https://www.bls.gov/soc/2010/2010_major_groups.htm[20.12.2018]. Numbers in brackets indicate the position of the United States Department of Labor, Bureau of Labor Statistics, *2010 Standard Occupational Classification System*

The table below shows the extreme values showing a reference to the complexity of the processes occurring at a given workstation. It should not come as a surprise that works requiring more thought processes and relativity were assessed as having a significantly lower degree of substitutability. In the case of activities involving a significant amount of manual work, a probability of a strong commitment to 100% reliability is evident. It is also no surprise that some of the presented activities may already be autonomous under certain conditions. This obviously depends on the priority not only on the company's production line, but also in the financial sphere, but when both the quality and low-cost factors are met, there is at least partial autonomy of the production lines. An example of this type of project is the so-called Tesla brand's giant factory, in which, despite employing people to service, an integral element are robotic arms and self-propelled vehicles with a look reminiscent of the heroes of the Star Wars sagas. The task of machines is what is problematic for people, i.e. carrying heavy or tedious objects, like repeating the same activity all the time. Robots can carry out their duties more quickly, more precisely and for a longer time. It is important to remember about the condition, which does not dictate that each of the machines should be an independent entity, but only in a limited range of movements and actions autonomous and does not require human intervention, while at the same time being able to communicate some of the problems on its own. Robots in the Tesla factory cannot be considered as artificial intelligence within the meaning of the article, they are autonomous vehicles performing pre-programmed functions, without learning capabilities [IX].

## Conclusion

One of the basic elements related to increasing production efficiency and highly specialized services are investments in the development of artificial intelligence systems and robotization and automation of processes. Until now, labour productivity has been the factor whose value has been attempted to maximise through employment growth or the implementation of systems supporting work. Increasing employment also resulted in an increase in costs, and in the case of fluctuations in the economy, companies with a high employment/revenue ratio were the most difficult to cope with due to the inflexible nature of the cost structure. The remedy for these work-related problems will be the implementation of automation and robotization of production in the areas of repetitive activities that do not require complicated work. Tasks that until now could only be done by people, due to their complexity, are sometimes replaced by robots using artificial intelligence systems. At present, it is difficult to determine clearly what impact artificial intelligence will have on the labour market, due to the lack of data for analysis (artificial intelligence is only present in areas of high technology, such as the NASA activities mentioned above, or is in the early stages of technology development). Automation and robotization processes are a trend that is the first step towards the future implementation of Artificial Intelligence systems. The *sine qua non* of artificial intelligence functioning in industrial production processes is the existence of physical systems (robots) on the basis of which it will be possible to perform tasks that will result from inferences carried out by artificial intelligence systems. The main area of artificial intelligence, robotization and process automation is industrial production. The paper presents that it is not possible to state unequivocally that there is a statistically significant correlation which allows to believe that automation and robotization of production have a negative impact on the labour market. Theoretically, two mutually exclusive trends, i.e. automation and robotization of production and decrease in unemployment, occur in many countries. Perhaps the same will happen in the case of artificial intelligence. The assumption that many professions will disappear due to the introduction of artificial intelligence seems methodologically correct. Whether this will have a negative impact on employment levels is no longer so certain. The presented data and analyses require in-depth and detailed research on the subject, however, they show a trend which is important from the point of view of economic development and which will result in significant economic changes in the future. It is worth noting that given the breadth of the field, it is not possible to collect all or even a small part of the elements within a single scientific article, therefore the choice should be considered a certain interpretation of the materials available at a given moment and based on the context, as well as an introduction to further deliberations and analyses in the subject matter.

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Arkadiusz Sylpaczuk
PhD Student
Faculty of Economics, University of Gdansk
Armii Krajowej 119/121, 81-824 Sopot, Poland
Arkadiusz.Sylpaczuk@phdstud.ug.edu.pl

Michał Żynda
Faculty of Economics, University of Gdansk
Institute of Maritime Transport and Seaborne Trade
Armii Krajowej 119/121, 81-824 Sopot, Poland
m.zynda@ug.edu.pl