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Digital industry and manufacturing automation: impact on employment

Цифровая промышленность и автоматизация производства: влияние на занятость

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Abstract

The aim of article. The digital industry (Industry 4.0, the fourth-generation industry) is developing - based on the digital transformation of the production sector. Countries must create a workforce ready for future infrastructure. This requires the cooperation of universities, government and industry, including initiatives aimed at training workers for the transforming productive sector. The pandemic has COVID-19 exacerbated the problem of employment. Methodology: it is necessary to study the problem of employment at the systemic level, with an analysis of the structural complexity and development of digital transformations. This article explores this problem for manufacturing enterprises, in particular the automotive industry. The Results and Conclusions present the results of the analysis and make forecasts.

Key words: employment, unemployment, digital transformations, industry, automation.

Аннотация

Цель статьи. Цифровая индустрия (Индустрия 4.0, индустрия четвертого поколения) развивается на основе цифровой трансформации производственного сектора. Страны должны создать рабочую силу, готовую к будущей инфраструктуре. Это требует взаимодействия университетов, правительства и промышленности, включая инициативы, направленные на подготовку работников для трансформирующегося производственного сектора. Пандемия COVID-19 обострила проблему занятости. Методология: необходимо изучить проблему занятости на системном уровне, проанализировав структурные сложности и развитие цифровых преобразований. В данной статье исследуется данная проблема для производственных предприятий, в частности автомобильной промышленности. В Результатах и Заключениях представлены результаты проведенного анализа и сделаны прогнозы.

Ключевые слова: занятость, безработица, цифровые преобразования, промышленность, автоматизация.

Introduction

A recent Deloitte/Manufacturing Institute study suggests that industries in the US industry are entering a period of severe long-term labor shortages, and the manufacturing deficit is expected to be 2.4 million unfilled jobs by 2028,

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leading to a negative impact on the US economy of $2.5 trillion (Deloitte, 2018). Germany and Japan, the other two advanced economies, are expected to have even worse results in terms of this projected labor shortage.

Economic theory does not provide a clear answer on the impact of automation on the evolution of workplaces. Nobel laureate Christopher Pissarides argues that the increase in productivity during automation will replace the rapid growth in demand for competent workers. Automation of production has transformed production areas, employment patterns and business processes in many manufacturing sectors. This is also facilitated by the growing popularity of KPI (Kaziev et al, 2018).

Today we are on the verge of rapid advances in robotics, deep machine learning and the creation of systems that can even surpass people in a number of activities, including those that require cognitive abilities. In some US states, according to CNBC, there is already a sharp increase in robotic displacement. In the United States, workplaces are very susceptible to automation - everywhere jobs, lines, robots perform a routine quickly (Greenhouse, 2017).

Many concerns are reducing states. For example, Mercedes-Benz will reduce at least 10,000 jobs worldwide due to consumers' desire for electric vehicles. The manufacturer decided to take this step a few days after a competitor (Audi) announced a reduction in the staff of German workers (9,500 seats out of 61,000). The auto industry is not going through the best changes in its history. Developing in the direction of CO2 emissions will require huge investments, so Daimler is launching an innovation program, striving for investment attractiveness, part of which is a reduction in personnel costs by 1.4 billion euros by 2023, as well as a reduction in the staff of executives by 10%.

Methodology

For the preparation of the article, we used new researches, which were published in last four years, in specialized journals (Annunziata, 2019; Eremin; 2019; Greenhouse, 2017; Kaziev et al, 2018; Deloitte, 2018). To study the problem of employment at the systemic level, it is necessary to analyze the structural complexity and development of digital transformations. This article examines the problem of manufacturing enterprises, in particular the automotive industry.

With the increase in data distribution, the level of critical computing power, the industrial Internet of Things is becoming more accessible, and its methodology is becoming more and more popular. However, 2/3 of the pilot projects based on digital manufacturing solutions methods and technologies cannot move to large-scale implementation. For the following main reasons, expert assessments (Annunziata, 2019):

1) lack of technological skills, which prevents to benefit from investments (36%);
2) data security, confidentiality problems (27%);
3) lack of interoperability of components, systems and protocols (23%);
4) security threats, including emerging vulnerabilities (22%);
5) complexity of data management and processing (18%).

For example, the growing importance of digital skills needed to navigate and achieve success in a digital environment leads 83% of companies to plan intellectual and financial investments in production technologies and methods.

Robots show a negative attitude of workers, where there are several robots per 1000 people. Young manufacturing workers (under 24) who did not attend college saw a decline in job opportunities due to the use of robots. Is robotics a delayed threat? (Eremin, 2019)

Results

Our systematic analysis of structural complexity and system diversity suggests that the most important skills and characteristics mentioned for digital transformations are not usually central and emphasized in industry training programs or policymakers.

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These projects do not form important competencies of personnel and production workers, especially non-specialists in IT and programming. We are talking about system and production system analysts, cognitologists, managers, "operationalists" and "functionalists" in real time, direct operating environments.

To support digital transformations, you will need:

1) awareness of the benefits of software and industrial software development;
2) flexibility and stability of systems;
3) analysis-synthesis of data, information flows and solutions;
4) technologies of distributed and cloud connection of industrial environment;
5) information technology and industrial safety.

The introduction of robotics is likely to continue due to the improvement of the working environment for others. It is possible that "fired" or "displaced" workers will be able to go to another industry where they will pay more. In general, the increase in the number of working robots does not have a significant impact on employment in the industry. The impact on employment may not be entirely favourable for people, depending on the type of work they do.

Conclusion

Production competencies have already fallen to 4 positions in the ranking of competencies of the future from the second position. Operational adaptive strategic impacts are needed, otherwise the evolutionary trajectory can be "drawn" to the vicinity of the bifurcation point.

There are many innovations in industry: there are own options, package solutions with advanced capabilities. In addition to the quality of materials and production, service capabilities are added. Large-scale factories are found in many countries affected by the COVID-19 pandemic. This undoubtedly complicates the problem of employment.

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