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THE IMPACT OF THE COVID-19 PANDEMIC ON INDUSTRY 4.0
IN THE CONTEXT OF GLOBAL ECONOMIC DEVELOPMENT

Abstract. The paper analyzes the role of Industry 4.0 in the process of overcoming the global economy from the crisis situation associated with the total Covid-19 pandemic. The aspect of economic profitability of using the technologies of the fourth industrial revolution to improve world economic development in the context of the Covid-19 pandemic was also identified. The author identified the positive and negative consequences of the involvement of technology Industry 4.0, on the basis of which a number of recommendations for small and medium-sized businesses were formed in order to quickly overcome the negative effects of the crisis. Based on the work, the author formulated a number of trends and prospects for global economic development, taking into account the current conditions of the Covid-19 pandemic.

Keywords. Covid-19 pandemic, Industry 4.0, global economic development, trends, impact.

Nowadays, the whole world is talking about the Covid-19 pandemic. The world economy has slowed down, large and small businesses are trying to survive. That is why, studying the trends affecting the development of Industry 4.0, it is impossible not to say about 2020. Total quarantine restrictions have caused downtime in most sectors of the economy, with the service sector particularly affected, including tourism, the beauty industry and others. That is, 2020 in some way changed the economic system of the world which affected the development of Industry 4.0. That is why it is extremely important to identify trends that emerged in 2020 and continue in 2021 and assess their impact on Industry 4.0. Prior to the covid-19 crisis, I4.0 business leaders focused on gaining competitive advantage, increasing productivity, reducing costs, and developing innovations. The main goal was to improve the functioning of the business. Many manufacturers are now focusing primarily on
surviving and reducing the damage caused by the pandemic. The financial crisis for producers is already leading to significant reductions in insignificant costs and less necessary investments. Many of the planned investments in Industry 4.0 are currently being canceled, classified as unnecessary investments. Therefore, it is extremely important to answer the question of what role Industry 4.0 in a period of total economic uncertainty plays, and whether Industry 4.0 is still relevant.

Numerous studies and reports are available today, presenting the key trends of 2020 and describing the expected prospects for 2021. In particular, the report entitled "General Industrial Trends in 2021" from Hitachi describes the changes that shook the world, in particular, among the key trends here are instability in the labor market, increasing the role of occupational safety and the promotion of customized products. According to the Techrepublic study, the following trends of 2020-201 are distinguished: automation of supply routes; increasing the importance of production transparency, which is achieved through the technologies of the industrial Internet of Things; creation of anti-crisis strategic models of development and others [46]. A report from the consulting company Accenture on the effects of COVID-19 on industrial production states that the pandemic crisis has hit companies that have worked on the Just-in-time model the most, and where all supply chains have been tied to China. Summarizing the analyzed research, we can identify the following recommendations for changing business strategies to overcome the crisis with the least loss:

– creating more flexible methods of personnel management with the provision of digital jobs;
– differentiation of supply chains, which will help to get out of a problematic situation if suddenly one of the logistics companies cannot do the job;
– transition to online platforms and e-commerce methods;
– involvement of the latest technologies of Industry 4.0 (industrial Internet of Things, Big data and others) [1].

Today, in the period of recovery from the pandemic, the gradation of development priorities of any company can be depicted as follows: № 1 - survival; № 2 - recovery; № 3 - adaptation to new post-crisis conditions of activity. And of
course the goal of all companies and businesses is to get to phase 3 as soon as possible and with the lowest losses. However, the key point is that the systems and business models that worked well before the pandemic are no longer effective. Therefore, it is immediately obvious that now one of the main weaknesses of the business is the lack of ability to control and carry out real-time activities at the enterprise or company, taking into account the pandemic restrictions. The answer to this question is Industry 4.0. So, in general, due to the involvement of Industry 4.0 technologies, the following positive changes in the struggle for survival in a pandemic are observed at the global economic level:

– increase in the number of enterprises that not just survive, but those that grow production capacity;
– expanding the scope of potential customers;
– the emergence of new types of goods and services and changes in the nature of existing ones;
– easier adaptation to new business conditions;
– reducing the recovery phase and returning to normal business as soon as possible
– creating a platform for developing new, more sustainable businesses in the medium and long term [2].

More specifically, the role of Industry 4.0 during a pandemic can be assessed by describing the following business opportunities:

– the ability to view raw material inventories in real time, the availability of finished products, and tracking work that works online;
– use artificial intelligence technologies and machine learning to constantly review and reschedule activities;
– use mobile technology and augmented / virtual reality to make it easier for employees to complete tasks for which they have not been trained. This can help with skills shortages due to isolation or restart of production technologies with digital twins and remote support of equipment manufacturers, which would improve the availability of resources,
– use of autonomous electric cars and semi-trailers to reduce dependence on people, helping to maintain social distance [3].

An interesting fact is that companies that have scaled the use of Industry 4.0 technology to COVID-19 are more likely to overcome the crisis with minimal losses. A great example of the effective use of Industry 4.0 technology is a company that manufactures personal protective equipment in North America. This company has increased production capacity by introducing a new production line due to the remote form of work based on augmented reality (Figure 1).

Fig. 1 - Dependence of the ease of overcoming the crisis on the faster the introduction of Industry 4.0 technologies [2]

Instead, companies that did not implement Industry 4.0 to COVID-19 received an alarm. The latest survey in this area indicates that they faced problems during COVID-19 due to lack of past experience, lagging behind in technological development, and therefore were significantly limited in their work due to COVID-19. In summary, 65 percent of respondents did not use Industry 4.0 technology to COVID-19, proved to be limited in their ability to respond to COVID-19 in the absence of digital technologies to support them [2]. Despite these benefits from the involvement of Industry 4.0 technologies, we should not forget about the threats associated with this, firstly - the need for significant investment for the effective implementation of new technologies, in response to this there is a second threat - an
exacerbation of the polarity of the world. Due to the fact that some countries have the opportunity to introduce new technologies and others do not, the rich will get richer and the poor will become even poorer. Unemployment is also exacerbated by the digitalization and total involvement of the industrial Internet of Things.

In conclusion, the coronavirus not only accelerated the digital transformation of enterprises - many had to move almost all processes online - but also forced scientists to find new ways to use Industry 4.0 technologies for their own purposes. All means are used to fight the coronavirus, including artificial intelligence and big data. Thus, for the industry, the COVID-19 crisis is changing the rules of the digital game. Undoubtedly, the pandemic has strengthened the value of Industry 4.0, but it has also identified limitations in today's sales and established a higher level of success. Therefore, if we summarize the above trends and facts, we can briefly identify several general trends that since 2020 are already changing Industry 4.0. These include:

– increasing the importance and application of contactless technologies in all sectors of the economy and the application of digital duplicate technology in industry;

– automation of solutions in supply chains (including logistics, and transport logistics, etc.) through 5G and Blockchain technologies;

– the emergence of a certain fear of investing in the development and implementation of new technologies, but those who still dare to have significant success in 2021-2022;

– management of activities at the enterprise in remote form and the transition from automation of production to its full autonomy;

– acceleration of global digitalization, due to the requirements of maintaining social distance, the transition to online mode, etc. through the use of various mobile and cloud applications, including MES, EAM / APM [4].

Thus, automated and flexible enterprises have a better chance of winning not only in times of crisis, but in subsequent phases of recovery and growth. Therefore, it is not so much about automated production, but about flexibility. The ability to respond quickly and change their production quickly is impossible without Industry 4.0 technology.
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