ISSN 3060-4567

INDUSTRY 4.0 AND ARTIFICIAL INTELLIGENCE: INNOVATIVE SOLUTIONS IN MANUFACTURING PROCESSES

Abdusalomova Mohinur
Andijan state technical institute
3rd year student of the direction "Economics"
Egamberdiyev Shavkatbek
Andijan state technical institute
3rd year student of the direction "Economics"

Annotation. *This article is devoted to the topic "Industry 4.0 and artificial intelligence: innovative solutions in manufacturing processes" and analyzes important aspects of digital transformation in the industry. The Industry 4.0 concept aims to improve efficiency by automating, digitizing and integrating production processes. Artificial intelligence (SI), on the other hand, plays an important role in data analysis, decision-making, and process optimization. The article also analyzes the role of Industry 4.0 and artificial intelligence in increasing competitiveness in the global economy, as well as the problems and opportunities in the implementation of these technologies. In turn, the article concludes with thoughts on how industrial enterprises can be developed in the future through digital transformation and innovative solutions.*

Keywords: *big data, digital transformation, cloud computing, Cyber-Physical Systems, innovative solutions, global economy.*

Introduction. Industry 4.0 is a new step in digital transformation in manufacturing processes that includes IoT (Internet of Things), Big Data (big data), Cloud Computing, and Cyber-Physical Systems. In this new era, artificial intelligence (SI) plays an important role in optimizing production processes, improving efficiency, and reducing costs.

ISSN 3060-4567

Internet of Things. IoT is a technology that allows physical objects and systems to connect and exchange information with each other over the internet. With IoT, real-time monitoring and control capabilities are created in production processes. For example, with the help of sensors, the working condition of machines, energy consumption and production processes can be observed [1]. This helps to identify problems in advance and find a quick solution to them.

Big Data. Big data is the process of collecting, storing and analyzing large amounts of data. Within Industry 4.0, big data is used to identify, forecast and make decisions about trends in production processes. For example, manufacturers can optimize production to suit their requirements by analyzing feedback from customers to improve product quality.

Cloud computing. Cloud computing technologies do not require a lot of resources in data storage and processing. This allows companies to expand their infrastructure and quickly implement new programs. With cloud services, businesses will be able to access data from anywhere, making it easier to cooperate and make quick decisions.

Cyber-physical systems are the integration of software and hardware to control physical processes. They work in conjunction with IoT and big data, making production processes more efficient and automated. With cyber-physical systems, machines can interact, control each other, and solve problems.

The role of artificial intelligence in production processes. Artificial intelligence offers a number of innovative solutions in optimizing production processes:

With artificial intelligence, manufacturers can be more accurate in demand forecasting. The machines will help with production planning, anticipating future demand based on historical data [2]. This prevents over-production and reduces costs. With artificial intelligence, the quality control process can be automated. With the help of sensors, the quality indicators of products are monitored in real time, and if a problem is detected, an automatic warning is issued or the production process is stopped. This helps to improve quality and reduce emissions.

ISSN 3060-4567

It is possible to forecast maintenance using artificial intelligence. Machines can analyze their condition and predict when maintenance will be necessary. This reduces maintenance costs and improves the performance of the machines. The use of resources can be optimized using artificial intelligence. For example, by analyzing energy consumption, producers can reduce energy consumption and cut costs. It is also possible to increase production efficiency by minimizing the consumption of raw materials.

Industry 4.0 and artificial intelligence play an important role in increasing competitiveness in the global economy. Through digital transformation, companies can optimize their processes and reduce costs. This will help increase their market share. Also, new jobs will be created through Industry 4.0. For example, the demand for highly qualified specialists will increase, since qualified personnel will be needed to introduce digital technologies [3].

There are a number of problems with the implementation of Industry 4.0:

Many enterprises are working with old technologies, which can be an obstacle in the implementation of digital transformation. Major investments are required to upgrade the technological infrastructure.

When working with IoT and Big Data, Data Security is an important issue. Businesses must take up-to-date security measures to protect data.

The need for qualified specialists for digital transformation is growing. However, many places do not have enough such personnel, which makes it difficult to implement Industry 4.0.

Industry 4.0 and the development of artificial intelligence will open up many opportunities in the future:

Digital transformation allows you to create new business models. For example, a product (Product as a Service) model as a service is becoming more common, providing additional convenience for consumers.Efficient use of resources through Industry 4.0 contributes to sustainable development. By reducing energy consumption and minimizing emissions, businesses can reduce their environmental

ISSN 3060-4567

footprint. Artificial intelligence and other advanced technologies offer new innovative solutions that make manufacturing processes more efficient.

Artificial intelligence (SI) has taken a unique place in the global economy in recent years and has begun to play an important role in increasing competitiveness. The application of SI technologies in the process of digital transformation helps companies to work more efficiently, reduce costs and create new opportunities. This article details the role of artificial intelligence in the global economy, its impact on increasing competitiveness, and its future prospects.

Artificial intelligence includes a number of technologies, including:

1. Machine learning(Machine Learning): with these algorithms, computers learn from data and are able to make decisions experimentally. Machine learning allows companies to analyze large amounts of data and optimize their strategies based on results.

2. Natural Language Processing(Natural Language Processing): this technology allows computers to understand and process human language. With the help of natural language processing, companies can effectively communicate with customers and better understand their needs.

3. Advanced analytics(Advanced Analytics): this is a set of technologies that allow in-depth data analysis using artificial intelligence. Advanced analytics helps companies identify market trends, assess risks, and make strategic decisions.

Artificial intelligence helps companies optimize production processes. For example, through automated systems, production processes are accelerated and fewer errors occur [4]. This reduces costs and increases product quality. By increasing efficiency, companies can be ahead of their competitors.

With artificial intelligence, companies can automate and personalize customer service processes. Chatbots and virtual assistants provide customers with 24/7 service, allowing them to quickly answer their questions. It is also possible to create personalized suggestions by analyzing customer needs and behaviors using SI. This increases customer satisfaction and increases brand loyalty.

ISSN 3060-4567

Innovation support. Artificial intelligence is an important tool in creating innovation. Companies can speed up the process of developing new products and services using SI. For example, in the automotive industry, SI technologies can be used to create a new generation of cars, improve their safety and improve energy efficiency. Through innovative solutions, companies can quickly meet market demands and take advantage of new opportunities.

Artificial intelligence also plays an important role in the field of security. Companies will be able to prevent cyber attacks and improve security systems using SI. For example, SI algorithms help identify and respond to cyberattacks. This protects companies from financial losses and helps maintain their reputation.

The impact of artificial intelligence in the Global economy. Artificial intelligence generates a number of important effects in the global economy:

The development of artificial intelligence creates new jobs. For example, the need for qualified specialists for the introduction of SI technologies increases. Jobs also appear in new areas — such as data analysis, SI Systems Management, and maintenance.

Artificial intelligence promotes economic growth. As companies increase efficiency and reduce costs, their profit increases and investment opportunities increase. This has a positive effect on the overall development of the economy [5].

Artificial intelligence enhances global competition. Companies use SI technologies to try to outperform their competitors. This leads to the development of innovations and the creation of new products.

Artificial intelligence also plays an important role in addressing social issues. For example, in healthcare, SI technologies help improve disease pre-detection and treatment processes. SI can also be used to create personalized education systems in education [6].

The development of artificial intelligence opens up many opportunities in the future:

Artificial intelligence is constantly developing and new technologies are emerging. This allows companies to work more efficiently.

Artificial intelligence also helps in solving environmental problems. By improving energy efficiency and optimizing resource utilization, companies can contribute to sustainable development.

Artificial intelligence enhances global cooperation. Companies can jointly develop innovative solutions and enter new markets.

Conclusion. Industry 4.0 and artificial intelligence play an important role in enriching production processes with innovative solutions. Their integration helps to improve efficiency, reduce costs and ensure competitiveness. However, there are a number of problems in the implementation of these technologies, and in order to solve them, it is necessary for companies to make investments and train qualified personnel. In the future, the development of Industry 4.0 and artificial intelligence will open up new opportunities and take an important place in the global economy. Through innovative solutions, enterprises can not only optimize their processes, but also contribute to sustainable development. Artificial intelligence plays an important role in increasing competitiveness in the global economy. By improving efficiency, improving customer service, supporting innovation, and using data effectively, companies will be able to outperform their competitors. The development of artificial intelligence promotes economic growth, creates new jobs, and increases global competition. In the future, artificial intelligence will open up new opportunities and have a positive effect on the global economy.

REFERENCES:

1. Khusanboyeva, Tursunoy, and Shavkatbek Egamberdiyev. "DIGITAL ECONOMY AND ITS IMPACT ON ECOLOGY." Theoretical aspects in the formation of pedagogical sciences 3.2 (2024): 110-115.

2. Rustamov, D. J. (2020). THE ROLE OF EXPORT POTENTIAL IN ATTRACTING FOREIGN INVESTMENT. Экономика и социум, (3), 103-104.

3. Пахлавонбек, Ғанижонов, and Шавкатбек Эгамбердиев. "РАЗВИТИЕ НАЦИОНАЛЬНОЙ ЭКОНОМИКИ В УСЛОВИЯХ ПРОЦЕССА ГЛОБАЛИЗАЦИИ." Ta'lim innovatsiyasi va integratsiyasi 22.4 (2024): 186-190.

ISSN 3060-4567

4. Maxammadqasimdjanovna, Xusanboyeva Tursunoy, Odashova NilyufarJamoldinovna, and Yusupova Umidaxon Boybuvayevna. "ANALYSIS OF SCIENTIFIC APPROACHES ON THE ESSENCE OF THE CONCEPT OF DIGITAL ECONOMY." Galaxy International Interdisciplinary Research Journal 11.3 (2023): 317-320.

5. Digital Planet 2017: How Competitiveness And Trust In Digital economiyes Vary Across Thye World / BhaskarChakravorti, Ravi Shankar Chaturvedi. – Thye Fletcher School, Tufs University, 2017. – 70p

6. Thye Global Information Technology Report 2016: Innovating in thye Digital economy / Silja Baller, Soumitra Dutta, Bruno Lanvin. – Geneva: Cornell University, INSEAD, WYeF, 2017. – 463 p.