Malyzhenkov Pavel V.
Ph.D. Associate Professor
National Research University
Higher School of Economics,
Nizhny Novgorod, Nizhny Novgorod region
Maurizio Masi
Associate Professor
Università degli Studi della Tuscia,
Viterbo, The Italian Republic

PROBLEMS OF INDUSTRY 4.0 TECHNOLOGIES APPLICATION IN THE TRANSPORT FOR THE IMPLEMENTATION OF THE CONCEPT OF SUSTAINABLE DEVELOPMENT

Abstract*: today, Industry 4.0 technologies are an integral part of changes in many sectors of the economy. There is no doubt that digitalization has a significant impact on enhancing business processes, service quality, and expanding the range of services offered, making a huge contribution to the implementation of the concept of sustainable development.*

Keywords*: enabling technologies, Industry 4.0, sustainable development, transport.*

Малыженков Павел Валерьевич
канд. экон. наук, доцент
ФГАОУ ВПО «Национальный
исследовательский университет
«Высшая школа экономики»
г. Нижний Новгород, Нижегородская область
Маси Маурицио
ассоциированный профессор
Тосканский университет

г. Витербо, Итальянская Республика

ПРОБЛЕМЫ ПРИМЕНЕНИЯ ТЕХНОЛОГИЙ ИНДУСТРИИ 4.0 НА ТРАНСПОРТЕ ДЛЯ РЕАЛИЗАЦИИ КОНЦЕПЦИИ УСТОЙЧИВОГО РАЗВИТИЯ

***Аннотация**: сегодня технологии индустрии 4.0 являются неотъемлемой частью изменений во многих секторах экономики. Нет сомнений в том, что цифровизация оказывает значительное влияние на совершенствование бизнес-процессов, качество обслуживания и расширение спектра предоставляемых услуг, внося огромный вклад в реализацию концепции устойчивого развития.*

***Ключевые слова**: стимулирующие технологии, Индустрия 4.0, устойчивое развитие, транспорт.*

1. Introduction

Utilizing unmanned aerial vehicles allows for an elevation in the quality of service within transportation infrastructure. European public transport companies, members of the ETF and UITP, emphasize the active use of drones to detect issues or incidents on roadways and stations. However, problematic aspects of drone application include limited payload capacity, high cost, and complex technical maintenance.

An exemplary use case of drones is Amazon, having implemented this technology to reduce delivery times to 30 minutes – four times faster than the previous method [1]. According to DHL's management, this new delivery method significantly optimizes their operations by overcoming road complexities and traffic jams, drastically reducing delivery times. Additionally, the company notes a decrease in energy consumption and a smaller carbon footprint with this technology. They highlight an 80% reduction in delivery expenses as a positive outcome of optimization [3].

A robocar represents a vehicle that operates without human intervention, utilizing an automated system. The functionality of an autonomous vehicle relies on several operational elements.

Experts believe that integrating autonomous vehicles could lead to a 40% reduction in expenses for transport and logistics companies. Different researches indicate

that drones and autonomous transport will handle up to 80% of all shipments in the future [4; 7]. Governments worldwide recognize the importance of this technology for their transportation systems, evident in their development strategies where autonomous transport stands as a priority, necessitating the creation of essential infrastructure.

Business representatives foresee widespread application of autonomous vehicles within enterprise premises. Beyond cargo transport, this technology has been tested for passenger transportation. Automated metro systems are operational in 33 countries worldwide.

2. Challenges of implementing transportation technologies.

Despite the promise of integrating modern technologies into business, there are aspects that complicate their full integration into the supply chain. Firstly, no country has extensively developed the regulatory framework. While certain rules resemble each other across many countries, such as the prohibition of drone flights over crowds, these rules are hard to consider comprehensive. For instance, if a drone's weight exceeds a certain value, a license is required for its use. Secondly, deploying these technologies entails high insurance costs. The high cost of the technology and its potential for significant damage in case of accidents force insurance companies to set high prices. Thirdly, unmanned aerial vehicles can collect personal data during operations, leading to data privacy concerns.

It's worth emphasizing that the current challenges of implementing digital technologies include job reduction, a high dependency on the internet network's flawless operation, mismatched urban infrastructure for technology implementation, and the risk of accidents due to weather conditions [6].

According to a foreign survey, skill gaps in the labor market were perceived as the primary obstacle to innovation implementation. Nearly 59% of respondents highlighted the inability to attract specialized talents as one of the main barriers, talents crucial for enabling digital transformation. The lack of investment capital, according to 29.4% of respondents, also contributes to slowing down the adoption of digital solutions [7].

Big data analytics is a technology that enhances planning accuracy by forecasting risky events and creating intelligent manufacturing systems. For instance, DHL forms delivery routes and manages transportation operations promptly using big data processing technology.

One of the promising technologies for business transportation activities is blockchain, allowing for increased reliability and transparency in transportation [5]. Based on survey results, transport service providers are actively studying this technology.

While most companies are in the stage of exploring blockchain technology, some are actively testing and implementing it [3].

3. Conclusions.

Thus, modern companies are studying and actively implementing information technologies as this forms their competitive advantages: it increases operational speed, reduces costs, and minimizes emissions that pollute the environment. Ultimately, this leads to optimizing business processes while considering economic, social, and ecological aspects. This approach to the role of information technologies is somewhat innovative and contributes to the sustainable development of society in the era of digital transformation and the concept of «Industry 4.0».

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