

# The revolution of IT technologies in the transport economy: application and essence

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**Abstract.** The article focuses on the study of the use of information technology (IT) in the transport economy and its impact on this industry. The main objectives of the study were to identify key technological trends in the transport industry, analyse their advantages and challenges, as well as assess the prospects for the development of IT technologies in this area. Based on the literature review and analysis of existing technological solutions, the following results were identified: IT technologies can improve the efficiency and safety of transport systems, reduce the negative impact on the environment and improve customer service. However, there are several challenges, such as data security issues, standardization and regulation, that require attention and solutions. The study highlights the importance of developing and integrating IT technologies into the transport economy and warns of the need for a balance between innovation and regulation. In general, the development of IT technologies in the transport industry promises to create a smarter, more stable and convenient system, contributing to improving the quality of life and economic growth.

## 1 Introduction

In the modern world, it is impossible to overestimate the role of information technology in our daily life and economy. They have rewritten the rules of the game in many industries, including the transportation industry. The revolution of IT technologies in the transport economy has brought new opportunities, improved efficiency, provided safer and more environmentally friendly ways of transportation, and also changed the very essence of transport systems. In this article, we will dive into this exciting world of innovation, considering the application and essence of IT technologies in the transport economy, exploring their impact on society, business and the environment. Let's start with an overview

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of the key trends and challenges faced by modern transport systems, and consider what innovations can change the future of mobility and logistics.

## 2 Overview of IT technologies in the transport economy

An overview of information technology (IT) in the transport economy allows us to assess how digital innovations have transformed this industry, increasing its efficiency, safety and sustainability. Below are some of the key IT technologies used in the transport economy, as well as specific examples of their application.

1. Internet of Things (IoT):

Example: Smart cities. Sensors and devices connected to the Internet are being installed in megacities around the world to monitor and manage transport infrastructure. This makes it possible to optimize traffic, improve traffic light management and ensure unhindered traffic.

2. Big Data:

Example: Uber. The company collects and analyzes large amounts of data on trips, traffic and user preferences in order to provide more accurate and efficient taxi services.

3. Artificial Intelligence (AI):

Example: Autopilots in Tesla cars. Machine learning and AI systems allow cars to drive themselves on the road, optimize routes and maintain safety [1-3].

4. Blockchain:

Example: TradeLens. This blockchain platform, developed by IBM and Maersk, provides a stable and transparent system for cargo tracking in maritime logistics, improving security and efficiency.

5. Drones and unmanned technologies:

Example: Amazon Prime Air. Amazon uses unmanned drones to deliver goods in some regions, reducing delivery time and logistics costs.

6. Mobile applications:

Example: Grab. This mobile application allows you to order taxis, food and other services in Southeast Asia, providing convenience and accessibility for millions of users.

7. Electronic tickets and payment:

Example: Payment for public transport through mobile apps and contactless cards. This improves convenience and reduces queues at stations and buses [1-2].

IT technologies in the transport economy not only improve existing systems, but also contribute to the emergence of new business models and environmentally sustainable solutions. These examples are just a small part of how digital innovations have revolutionized the transportation industry, and they continue to change its face, making it smarter, more accessible and more environmentally friendly [4].

## 3 Advantages of IT technologies in the transport economy

The use of information technology (IT) in the transport economy brings many significant advantages that have a positive impact on the efficiency, safety and sustainability of this industry. Here are some of the key advantages of IT technologies in the transport economy:

1. Increasing efficiency and optimizing routes:

- GPS and routing systems allow you to optimize routes for cargo and passenger vehicles, reducing travel time and fuel consumption.
- Machine learning algorithms analyze traffic data and predict optimal routes based on the current traffic situation [5].

2. Increased security:

- Adaptive cruise control and collision warning systems help prevent accidents and reduce their severity.
  - Unmanned vehicles are equipped with sensors and artificial intelligence, which increases safety on the road.
3. Reducing environmental impact:
- Electric and hybrid cars driven by IT systems contribute to reducing emissions of carbon dioxide and other pollutants into the environment.
  - Optimization of logistics and routes reduces congestion and traffic jams, which reduces the negative impact on the environment.
4. Improving customer service:
- Mobile applications and online platforms allow customers to order services and track their status in real time.
  - Feedback and rating systems allow customers to evaluate the quality of service, which encourages service improvement [6-8].
5. Economic efficiency:
- Optimization of logistics and reduction of travel time reduce operating costs for companies engaged in transportation.
  - IT technologies can predict maintenance deadlines and prevent unplanned shutdowns, saving time and resources.
6. Increased availability:
- Thanks to mobile applications and online services, transport services are becoming more accessible and convenient for a wide audience, including people with disabilities.
7. Creating new business models:
- IT technologies stimulate the emergence of innovative business models, such as car-sharing, rental of electric scooters and much more [9-10, 11].

IT technologies are transforming the transport industry, making it smarter, more environmentally sustainable and more convenient. These benefits not only help to improve the lives of users and increase business efficiency, but also contribute to a more sustainable future for our planet.

## 4 Challenges and problems in the application of IT technologies in the transport economy

Today's transportation industry is at a crossroads where information technology (IT) plays a key role in streamlining and improving its operations. The application of IT technologies in the transport economy provides unique opportunities to improve the efficiency, safety and sustainability of this industry. However, there are certain challenges and tasks associated with these opportunities that need to be addressed for the successful implementation of digital innovations (Table 1) [12].

**Table 1.** Challenges and tasks in the application of IT technologies in the transport economy.

Challenges and tasks	Description
Integration of various systems	The need to connect diverse IT systems to ensure interoperability and data exchange between them. This includes logistics management systems, vehicles, payment systems, and many others.
Data security and privacy	Protect sensitive data, such as customers' personal information and operational data, from leaks and cyberattacks.
Lack of standards	Lack of uniform standards and protocols for data exchange and interaction between different systems and devices in the transport industry.

Countering cyber threats	Protection against cyber threats, such as hacks of transport management systems and cyber-attacks on infrastructure.
Infrastructural constraints	The need to upgrade existing infrastructure to support new IT solutions, such as infrastructure for charging electric vehicles or installing sensors for data collection.
Legalization and regulation	Development and implementation of legislative and regulatory measures to manage new technologies and business models in the transport industry.
Big Data Collection and Analysis	Processing and analysis of huge amounts of data collected from sensors and sensors in vehicles and infrastructure.
Personal Sensitive Data	Collection and use of personal data of customers to improve the service, while complying with regulatory requirements and the level of confidentiality.
Resistance to failures and accidents	Development of redundant systems and mechanisms to ensure the continuous operation of transport networks, even in the event of failures or accidents.
Environmental and social aspects	Addressing environmental sustainability and social responsibility in transport, including reducing emissions and addressing the needs of people with limited mobility.

Overcoming these challenges and addressing these challenges is critical to maximizing the benefits of IT in the transport economy and ensuring a more efficient, safe and sustainable transport system [13, 14-16].

## 5 The future of IT technologies in the transport economy

The future of IT technologies in the transport economy: Striving for more integrated, environmentally sustainable and automated solutions.

The modern development of information technology continues to change the landscape of the transport industry, and the future of this industry promises even more exciting and innovative changes. Here are a few key areas that determine the future of IT technologies in the transport economy:

1. Unmanned vehicles (Autonomous cars, unmanned trucks and drones):

The development of autonomous technology will continue to improve road safety and efficiency.

Unmanned trucks can change logistics and cargo delivery, reducing travel time and reducing fuel costs.

2. Internet of Things (IoT) for smart cities and transport systems:

Sensors and connected devices in cities and on transport will provide real-time and analytics for traffic management, energy consumption and maintenance.

Smart cities will be focused on improving the quality of life of citizens and reducing the environmental impact [17].

3. Hypersystems of transport network management:

Advanced AI and machine learning algorithms will be used to optimize traffic and prevent traffic congestion.

Dynamic management of networks and mobility will make transport more predictable and convenient.

4. Electric vehicles and charging infrastructure:

Electric vehicles will become more affordable and provide environmentally more sustainable alternatives to a vehicle with internal combustion.

The development of charging networks and fast charging technologies will increase the usability of electric vehicles.

5. Modeling and simulation for the development of transport solutions:

Progress in modeling and simulation will make it possible to predict the effectiveness of new infrastructure projects and routes before their actual implementation.

6. Multimodality and resource sharing:

Smart apps and platforms will integrate different modes of transport, allowing door-to-door travel by combining cars, public transport, bicycles and walking routes [14].

7. Sustainability and environmental solutions:

The transition to cleaner and more sustainable forms of energy, such as hydrogen and solar energy, will support environmentally sustainable transport.

IT technologies will be used to reduce emissions and monitor environmental impacts.

8. Development of robotics and drones for delivery:

Unmanned drones and robots will be used to deliver goods and products, which will increase the speed and efficiency of delivery [8-9].

The future of IT technologies in the transport economy provides many opportunities for improving mobility, security and sustainability. However, for the successful implementation of these technologies, it is necessary to solve the challenges associated with security, privacy and regulation, as well as integrate various components into the overall network of a smart transport system.

## 6 Conclusion

In a world where technology is rapidly changing and developing, the economy of transport does not remain aloof from this progress. The use of information technology (IT) in the transport industry promises significant benefits, such as increased efficiency, increased safety and reduced negative environmental impact. During this review, key technologies, advantages and challenges, as well as prospects for the development of IT technologies in the transport economy were considered.

The use of technology in the transport industry is of critical importance for the following reasons:

**Improving efficiency:** Technologies allow you to optimize processes, reduce travel time, reduce fuel costs and increase vehicle productivity, which contributes to economic growth.

**Safety:** The development of autonomous vehicles and collision warning systems helps to reduce the number of accidents and reduce risks for passengers and drivers.

**Environmental sustainability:** Electrification and the introduction of green technologies, such as electric vehicles, reduce greenhouse gas emissions, which contributes to the fight against climate change.

**Convenience and accessibility:** Mobile apps and online services make transportation more convenient and accessible to users, reducing stress and improving the quality of service.

**Improving the quality of life:** Transport technologies contribute to the creation of smart cities, where traffic jams are reduced, safety is increased and environmental pollution is reduced, which improves the quality of life of citizens.

**Economic growth:** The development of information technology and transport contributes to the creation of jobs, stimulates innovation and contributes to the growth of the economy as a whole.

Thus, the transport industry has a huge potential for transformation and improvement using modern IT technologies. The development and implementation of these technologies will not only increase the efficiency and sustainability of the transport system, but will also contribute to the well-being of society and future generations. Therefore, the desire to develop IT technologies in the transport economy is an integral part of the strategy to create a more modern and sustainable transport system.

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