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## **INNOVATIVE PRINCIPLES OF TRANSPORT BUSINESS DEVELOPMENT**

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## **ІННОВАЦІЙНІ ЗАСАДИ РОЗВИТКУ ТРАНСПОРТНОГО БІЗНЕСУ**

*The transportation business, as an integral part of the modern economy, is undergoing a period of rapid change. Globalization, urbanization, and the growth of e-commerce are creating new challenges and opportunities for the industry's development. In response to these trends, transportation companies are increasingly implementing innovative solutions aimed at enhancing efficiency, reducing costs, and improving*

*service quality. As a result, there is currently a dynamic shift in the nature and direction of modern trends in the innovative development of the transportation business, driven by the evolution of key success factors for companies aiming to achieve leadership in this rapidly changing sector. Thus, the aim of the article is to explore the innovative foundations of transportation business development. To achieve this goal, a comprehensive approach has been applied, which includes a logical framework and qualitative research methods. The research results indicate that the innovative foundations of transportation business development comprise a set of new ideas, technologies, and approaches aimed at enhancing the efficiency, safety, and environmental sustainability of transportation services. The analysis of these provisions indicates that innovations in the transportation business are focused on several key areas. The implementation of modern digital technologies, such as transportation management systems, mobile applications, and the Internet of Things, allows for a significant increase in the efficiency of transportation processes, optimization of routes, and improvement of customer service quality. The widespread use of automated systems, including robots and autonomous vehicles, allows for the reduction of human error, increases the accuracy of task execution, and lowers costs. The transition to electric vehicles and other environmentally friendly modes of transportation is an important step toward reducing the negative impact of the transportation sector on the environment. The use of sensors and detectors for collecting and analyzing data on transportation processes enables more accurate monitoring and management, as well as the optimization of transportation systems' operations. Overall, innovations in the transportation business are aimed at creating more efficient, safe, and environmentally friendly transportation systems that meet the needs of modern society.*

*Транспортний бізнес як невід'ємна складова сучасної економіки переживає період бурхливих змін. Глобалізація, урбанізація та зростання обсягів електронної комерції створюють нові виклики й можливості для розвитку галузі. У відповідь на ці тренди транспортні компанії дедалі активніше впроваджують інноваційні рішення, спрямовані на підвищення ефективності, зниження витрат і*

покращення якості послуг. Наразі спостерігається активна зміна змісту та характеру сучасних трендів інноваційного розвитку транспортного бізнесу завдяки еволюції ключових факторів успіху підприємств, які прагнуть досягти лідерства в цій динамічній сфері. Відтак, метою статті є дослідження інноваційних засад розвитку транспортного бізнесу. Для досягнення цієї мети застосовано комплексний підхід, який включає логічний підхід та як якісні методи дослідження. За результатами дослідження встановлено, що інноваційні засади розвитку транспортного бізнесу – це сукупність нових ідей, технологій і підходів, спрямованих на підвищення ефективності, безпеки та екологічності транспортних послуг. Аналіз наведених положень показує, що інновації в транспортному бізнесі зосереджені на кількох ключових напрямках. Впровадження сучасних цифрових технологій, зокрема систем управління транспортом, мобільних додатків та інтернету речей, дозволяє значно підвищити ефективність транспортних процесів, оптимізувати маршрути та покращити якість обслуговування клієнтів. Широке використання автоматизованих систем, зокрема роботів та автономних транспортних засобів, дозволяє зменшити вплив людського фактора, підвищити точність виконання завдань та знизити витрати. Перехід на електромобілі та інші екологічно чисті види транспорту є важливим кроком у зменшенні негативного впливу транспортної галузі на довкілля. Використання датчиків і сенсорів для збору та аналізу даних про транспортні процеси забезпечує більш точний контроль і управління, а також оптимізує роботу транспортних систем. Загалом, інновації в транспортному бізнесі спрямовані на створення ефективніших, безпечніших та екологічних транспортних систем, які відповідають вимогам сучасного суспільства.

**Keywords:** *innovative solutions; efficiency enhancement; cost reduction; service quality improvement; customer requirements.*

**Ключові слова:** *інноваційні рішення; підвищення ефективності; зниження витрат; покращення якості послуг; вимоги клієнтів.*

***Problem statement.*** The transportation business as an integral part of the modern economy, is undergoing rapid change. Globalization, urbanization, and the growth of e-commerce are creating new challenges and opportunities for the industry's development. In response to these trends, transportation companies are increasingly implementing innovative solutions aimed at enhancing efficiency, reducing costs, and improving service quality. As a result, there is currently an active shift in the content and nature of modern trends in the innovative development of the transportation business, driven by the evolution of core success factors for companies aiming to achieve leadership in this dynamic field.

***Purpose of the article.*** The article aims to explore the innovative foundations of transportation business development.

***The paper main body with full reasoning of academic results.*** The innovative foundations of transportation business development consist of new ideas, technologies, and approaches aimed at enhancing the efficiency, safety, and environmental sustainability of transportation services [6]. They drive the industry's development, allowing transportation companies to adapt to changing market conditions, meet customer needs, and enhance competitiveness. It is worth noting that innovations are becoming increasingly important for the transportation business due to [1-2; 6]:

1. Rising customer demands. Customers want to receive their ordered goods or services as quickly as possible, ideally on the same day or even within a few hours. It is speed important and the accuracy of delivery time forecasts. Customers want to have the ability to track their orders in real-time. They expect personalized service that takes their individual needs and preferences into account.

2. Competition. The number of market participants is increasing, and existing players are facing heightened pressure from new companies to offer more innovative and efficient solutions.

3. Environmental requirements. Customers increasingly pay attention to the ecological aspects of delivery and prefer companies that use environmentally friendly transportation and packaging.

4. Technological progress. Innovations, from the creation of new modes of transportation to the implementation of intelligent management systems, have increased the efficiency of transport operations, opened new opportunities for economic development, and improved the quality of people's lives.

Indeed, modern customers have increasingly higher expectations for transportation services [4]. Since customers require fast, reliable, and transparent delivery of their orders, innovations have become an integral part of the transportation business. So, the specifics of how innovations help meet the customer's above requirements are presented in Table 1.

**Table 1. The specifics of the impact of innovations on the speed, reliability, and transparency of order delivery**

Customer requirements	The specifics of the impact of innovative technologies on transportation companies	Impact results
Speed of delivery	With the help of specialized programs and algorithms, transportation companies can calculate the shortest and most efficient routes, reducing delivery time.	Route optimization
	Artificial intelligence aids in forecasting demand for specific routes, allowing for more effective transportation planning and avoiding delays.	Demand forecasting
	New technologies are creating opportunities for the use of drones for delivering small cargo and autonomous vehicles for long-distance transportation/	Autonomous vehicles
Reliability of delivery	GPS trackers and other systems allow for real-time tracking of cargo movement, which enhances the level of transparency and reliability of delivery.	Tracking systems
	Robots and automated systems minimize the risk of errors in sorting and packaging cargo.	Warehouse process automation
	Big data enables the identification of potential issues and their resolution in advance, thereby increasing delivery reliability	Data analysis
Transparency of delivery	Customers can track their orders in real time using sensors, detectors, and mobile applications, which enhances their level of trust in the company.	Mobile applications
	Blockchain technology ensures transparency and security in supply chains, allowing customers to track the entire journey of a product from the manufacturer to the consumer.	Blockchain
	Sensors and detectors installed on vehicles and cargo allow for the collection of detailed information about transportation conditions, which enhances the level of transparency/	Internet of things

*Source: formulated by the author based on [1-2; 4]*

Innovations in the transportation business help meet customer demands and create new opportunities for industry development. A characteristic example is the more efficient use of resources and the emergence of new business models [1; 4]. For example, with the help of sensors and detectors installed by the transportation company on vehicles and cargo, customers can track the movement of their orders in real-time. Mobile applications enable customers to monitor their orders, choose a convenient delivery time, make online payments, and communicate with the courier.

The modern customer of transportation services demands individualized and efficient solutions [6]. To succeed in a competitive market, transportation companies must continuously innovate. Innovations enable the creation of a unique offering for each customer. Table 2 outlines the main areas of innovation that help achieve this

**Table 2. The specifics of the impact of innovations on the offerings that transportation companies create for their customers**

Innovation directions	The specifics of the impact of innovative technologies on the offerings of transportation companies	Impact results
Value proposition	Innovations enable the creation of a unique value proposition for customers that distinguishes it from competitors' offerings.	New services, technologies, and approaches to work organization
Internal processes, costs, and productivity	Innovative solutions help optimize processes, reduce costs, and increase productivity. This allows companies to offer customers more competitive prices or invest in the development of new services.	Increased efficiency
Customer service	Thanks to innovations, it is possible to provide a higher level of customer service, which is a key factor in retaining existing customers and attracting new ones.	Improved service quality
Changes in Operations	The transportation services market is constantly evolving under the influence of new technologies, regulatory requirements, and changes in consumer behavior. Innovations help companies quickly adapt to these changes and remain competitive.	Adaptation to changes
Market Positions	Innovations can be a powerful tool for creating a competitive advantage. A company that is the first to implement a new technology or service can secure a leading position in the market	Creation of competitive advantage

*Source: formulated by the author based on [1; 3; 5-6]*

Transportation companies that actively implement new technologies and approaches have a greater chance of success, as they can offer their customers more efficient and convenient services. For instance, a transportation company can provide customers with food delivery in personalized baskets containing the products they purchase most frequently, as well as deliver orders at a time that is optimal for the customer.

Modern awareness of environmental issues and the strengthening of regulatory requirements compel the transportation business to seek more eco-friendly solutions (i.e., aimed at reducing the negative impact of transportation and its operations on the environment [5]). In this context, we have identified a range of innovations that help make transportation more environmentally friendly (see Table 3).

**Table 3. The specifics of the impact of innovations on the environmental consciousness of transport companies.**

Directions of innovations	The specifics of the impact of innovative technologies on environmental consciousness	Impact results
Electric vehicles	The transition to electric vehicles is one of the most important directions in the development of environmentally friendly transportation. They do not produce direct emissions of harmful substances.	Environmental neutrality
Alternative fuels	Vehicles powered by hydrogen, biofuels, and other alternative fuels are being developed.	
Hybrid vehicles	Hybrid cars combine a traditional internal combustion engine with an electric motor, allowing for reduced fuel consumption and emissions	
Route optimization	Using specialized software and systems, delivery routes can be optimized, which helps reduce the number of empty trips	Reduction of total emissions and the number of movements
Lightweight materials	The use of lightweight materials in vehicle manufacturing allows for a reduction in their weight and, consequently, fuel consumption.	
Intelligent transport systems	Intelligent transportation systems enable more efficient management of traffic flows, reducing congestion and, as a result, emissions.	

*Source: formulated by the author based on [2-3; 5]*

Environmental innovations in the transportation sector are an integral part of the transition to sustainable development due to climate change, air pollution, societal pressure, and legislative regulations [2-3]. For example, specialized software and

GPS systems are used to develop routes that minimize mileage, the number of stops, and fuel consumption. It lowers harmful emissions and enhances the efficiency of transportation operations. Consolidating multiple small shipments into a single load reduces trips, which lowers overall emissions.

Modern technological progress is focused on improving innovative technologies such as artificial intelligence, big data, and the Internet of Things, as this opens up endless opportunities for transportation companies to optimize and enhance the efficiency of their transport processes [5-6]. The main areas in which innovative technologies and their improvements are changing the transportation sector are presented in Table 4.

**Table 4. The main directions in which innovative technologies and their improvements are changing the transportation sector**

Innovative technologies	The specifics of the impact of innovative technologies on the development of the transportation sector	Impact results
Artificial Intelligence (AI)	AI enables more accurate forecasting of demand for transportation services, allowing for the optimization of routes and resource allocation	Demand forecasting
	AI-based algorithms develop optimal routes taking into account various factors, such as traffic conditions, weight restrictions, and delivery time	Route optimization
	AI can automate routine tasks such as load planning, document processing, and quality control.	Process automation
Big Data	The analysis of large datasets allows for the identification of patterns and trends that help make more informed decisions.	Data analysis
	By analyzing data on the condition of vehicles, it is possible to predict potential breakdowns and perform preventive maintenance.	Predictive maintenance
Internet of Things (IoT)	Sensors and devices allow for real-time tracking of vehicle movement, cargo status, and other parameters.	Real-time tracking
	IoT enables more efficient fleet management, optimizes fuel usage, and reduces costs.	

*Source: formulated by the author based on [2-3; 5]*

By using artificial intelligence, big data, and the Internet of Things, companies can enhance their efficiency, reduce costs, and offer customers higher-quality services. For example, almost every transportation company now uses AI to optimize delivery routes, IoT for real-time tracking of cargo, and big data for demand

forecasting [3-4]. This allows them to reduce fuel costs, increase delivery speed, and ensure a high level of customer service.

Based on the above statements, the main directions of innovation in the transportation business are as follows [1; 3-4]:

1. The implementation of digital technologies, or the process of integrating modern digital tools and solutions into various areas of transportation business activities. This means a transition from traditional analog methods of operation to the use of computers, software, the Internet, and other digital tools to enhance efficiency, productivity, and service quality.

2. The widespread use of automated systems, or the process in which manual and traditional methods of managing vehicles and processes are replaced by automated systems controlled by computers and software (in the areas of managing warehouse operations, sorting cargo, and processing documents).

3. The transition to electric vehicles and other environmentally friendly transport means the gradual replacement of traditional vehicles with internal combustion engines with electric vehicles, as well as the development of other modes of transport that use alternative energy sources or produce no harmful emissions.

4. The use of sensors and devices refers to obtaining detailed information about all stages of the transportation process in real-time to track vehicle movement, cargo status, and other parameters.

***Conclusions from this study and prospects for further exploration in this direction.*** The research results indicate that the innovative foundations of transportation business development are a combination of new ideas, technologies, and approaches aimed at improving the efficiency, safety, and environmental sustainability of transportation services.

An analysis of the aforementioned statements indicates that innovations in the transportation business are focused on several key areas:

1. Modern digital technologies implementation, such as transportation management systems, mobile applications, and the Internet of Things, significantly

enhances the efficiency of transportation processes, optimizes routes and improves the quality of customer service.

2. The widespread use of automated systems, including robots and autonomous vehicles, allows human factor reduction, increases the accuracy of task execution, and lowers costs.

3. The transition to electric vehicles and other eco-friendly modes of transport is vital for minimizing the negative impact of the transportation sector on the environment.

4. The use of sensors and devices for collecting and analyzing data on transportation processes allows for more accurate monitoring and management, as well as optimizing the operation of transportation systems.

Overall, innovations in the transportation business are aimed at creating more efficient, safe, and environmentally friendly transportation systems that meet the demands of modern society.

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