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Analysis of state of digitization in transport and the factors influencing it

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A B S T R A C T

This article provides a comparative analysis of public administration in the field of intellectual property of the United States of America and the Republic of Uzbekistan. For this purpose, first of all, the procedure of public administration on intellectual property in these countries has been disclosed and then a comparative analysis between them was provided

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Introduction:

Digitization in transportation involves the integration of advanced digital technologies such as the Internet of Things (IoT), artificial intelligence (AI), big data and cloud computing into existing infrastructure and operations. Real-time data sharing, communication between vehicles and infrastructure, and intelligent decision-making have become critical elements in reshaping the modern transportation landscape.

The first part of this analysis examines the current state of digitization across different modes of transport. It examines the level of digital adoption in each sector, including intelligent traffic management systems, autonomous vehicles, e-navigation and digital logistics.

The second part of this study focuses on the factors affecting the speed and efficiency of digitization in transport. Several factors can influence the successful implementation of digital technologies, including government policies and regulations, investment and financing mechanisms, technological readiness, and public acceptance. Understanding these drivers and barriers is critical to developing strategies to accelerate the integration of digital solutions across the transportation sector.

Methodology

The purpose of the article is to develop modern requirements for the digitization of the transport system and main criteria for evaluating their effectiveness. To achieve this goal, the following methods were used: comparative analysis, graphical representation method, systematic approach, abstraction and logical analysis, systematization and classification, modeling theory, analogy and extrapolation.

Results

Jan. C.T. Bieser, Erika Kriukelyte (2021), in their research paper "Digitalization of Public Transport" lists the technologies used in the digitalization of the transport industry today[1].

1. (Mobile) End-user devices and applications: End-user devices such as computers, laptops or tablets enable users to display, process and transmit data. Mobile end-user devices such as smartphones or tablets can be used on the go and typically transmit data over mobile telecommunications networks.

2. Telecommunications Networks: A telecommunications network is a "group of interconnected devices" that can be used to transfer data between devices. The Internet is a special type of communication network that uses the TCP/IP protocol to connect devices.
3. Cloud Computing: Cloud computing describes the provision of ICT services (eg data processing, storage, software applications) in centralized data centers accessible via the Internet. This means that data processing or storage is no longer carried out on user devices (servers, computers, smartphones; the user can be companies or end users), but in the data centers of the cloud computing service provider.
4. Artificial Intelligence (AI) and Big Data: There are various terms in this field, including AI, machine learning, and big data, all of which are traditional data analysis methods and retrieval with smaller data volumes. supports the analysis (processing) of large amounts of data to obtain the necessary insights that are not possible. These concepts can be used, for example, to predict (e.g., travel demand), solve optimization problems (e.g., calculate optimal routes for a demand-responsive bus system.
5. Digital sensors: - a device that detects events or changes in the physical environment (for example, temperature, sound, heat, pressure, current, magnetism, movement, chemical and biochemical parameters) and provides their transmission
6. Computer Graphics: It deals with creating visual images from formal descriptions (eg data), creating formal descriptions from visual images, and processing visual images.
7. Automation and Robots: Automation can be defined as "the process of following a predetermined sequence of operations with little or no human intervention." A robot can be defined as "an autonomous machine capable of sensing its environment, making calculations to make decisions, and performing actions in the real world."
8. Blockchain: a decentralized database reflected in a network of different computers. Records (such as transactions) are summarized and stored in blocks. A consensus used by all computers ensures the validity of database entries. Smart contracts are based on blockchain technology and “enable reliable transactions and transactions between different, anonymous parties without the need for a central server, legal system or external support.

The authors give examples of the use of these technologies in the field of passenger transportation. For example, through the use of end-user devices or applications, the website or application of the Swedish railway company SJ allows you to find train routes and timetables, book tickets and reserve seats in Sweden and other countries. In addition, MaaS platforms aim to meet the mobility demands of travelers, offer more than just transportation (multi-modal) and combine multiple transportation services (e.g., public transportation, car, or ride sharing) into one. integrates into an integrated service. The table below shows the level of integration of Maas programs and some of the companies that offer these services.

Table: 1

Level	**Integration**	**Description**	**Example**
0	No integration	Each transportation service is offered separately	Car rentals
1	Information integration	Travelers can plan trips using single or combined transportation services	Google maps
2	Integration of booking and payment	Travelers can plan, book and pay for a trip using one or a combination of transportation services	Jelbi, Move
3	Integration of service offering	Travelers can meet their (entire) mobility needs with an integrated service that includes a bundle of mobility services and possibly subscriptions.	Whim, SBB Green Class
4	Integration of social goals	Mobility services combined with social goals, e.g. through policies and	Currently not available

		incentives to reduce car ownership and use.	

Source: Jan C.T. Bieser, Erika Kriukelyte (2021) [1]

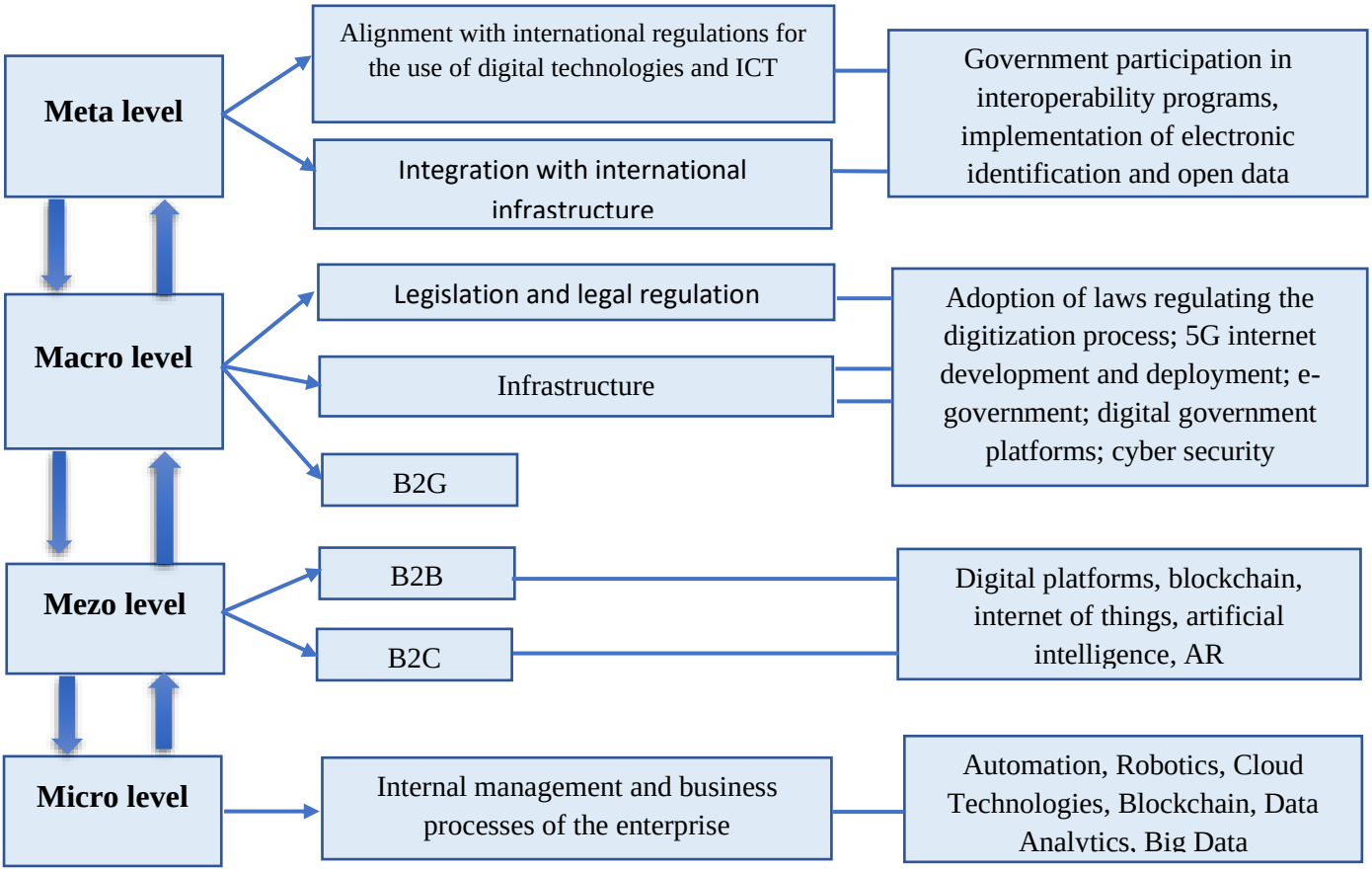
In addition, the ride sharing service incorporates technologies such as end-user applications, geolocation devices, computer graphics, and artificial intelligence algorithms. Some ride-sharing services require users to travel short distances to pick-up points. Berlkönig in Berlin or UberPool in the USA are clear examples of these services. In addition, demand-responsive public transport dynamically adjusts schedules or routes based on travel demand. Automated driving systems reduce the cost of providing bus services because a driver is no longer required. As a conclusion, the authors show that the use of digital technologies in public transport today brings many advantages and conveniences and their implementation in the following table:

Table: 2

Results and benefits	**Description**	**Application in real life**
Automatization	Increasing the automation of vehicle management and management of transport systems	Self-driving cars, automated traffic management, dynamic tolls
Flexibility	Increasing flexibility in transport systems, e.g. availability, travel time and cost or in relation to the use of transport services	Demand-responsive public transport, car and ride-sharing, dynamic mobility pricing
Integration	Integration of different types of transport into the multimodal transport system	Multimodal route planning, travel booking and payment platforms, multimodal mobility subscriptions
Effective management	Effective management of vehicles and transport infrastructure to optimize processes	Traffic monitoring and control, fleet management systems, remote maintenance
Increased efficiency	Improving the efficiency of the transport system, e.g. travel time and cost, energy consumption	Automated driving, real-time navigation, traffic simulation, ride sharing
Decentralized management	Reducing dependence on large transport service providers	Ride or car sharing, multimodal MaaS platforms

Source: Jan C.T. Bieser, Erika Kriukelyte (2021) [1]

Kopishynska K. O. (2020), in his article entitled "The current state and prospects of the digital transformation of the transport-logistics sector of Ukraine", suggests to determine the prospects of the digital transformation of the transport-logistics sector by defining them by levels and directions[2]. Four main levels of digital transformation: **micro level** (internal management and business processes of the enterprise), **mezo level** (interaction of the enterprise with consumers, customers and partners), **macro level** (interaction of the enterprise with government and government regulation and management relationship). and **mega-level** (alignment with international regulations and integration within international infrastructure). Automation of management and production processes, Internet of Things, artificial intelligence, robotics, warehouse automation, blockchain, data analysis, cloud computing, autonomous vehicles are among the most promising directions.



Source: Kopishynska K. O. (2020)[2]

The diagram above shows the road map of implementation of digital transformation divided into levels by Kopishynska K. O. (2020). This method makes it possible to carry out the digitization process step by step, to easily identify possible problems encountered during the digitization process and to find a faster solution to them.

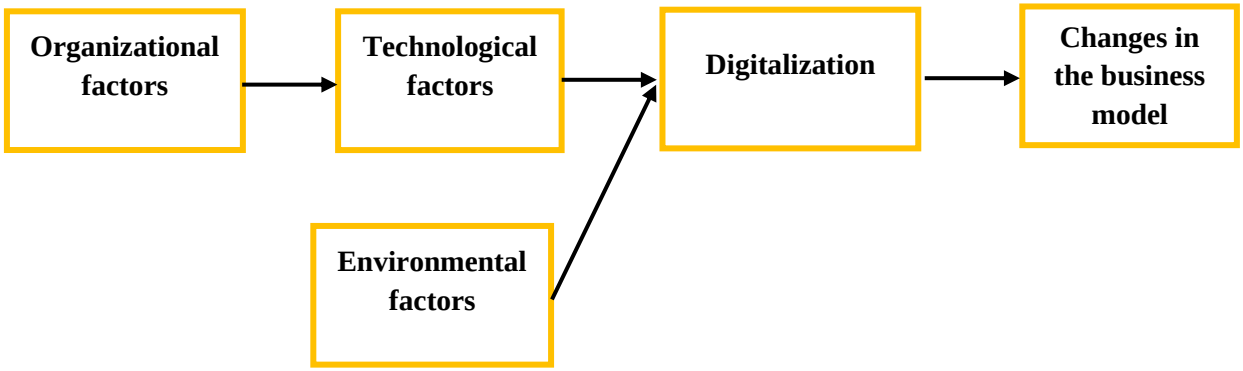
Above, the current state of digitization in the field of transport, digital technologies used in the field today and their effects have been mentioned, and below, the factors affecting the practical use of these digital technologies in the field of transport have been mentioned.

Yusuf Mohamed and Osden Jokonya (2021), in their research paper entitled "Factors influencing the implementation of digital technologies to improve fleet safety management", explore the factors influencing the implementation of smart technologies to improve fleet safety, technological, organizational and they use the method of ecological (TOE) factor analysis[3]. Technological factors include cost, security, level of technology sophistication, and relative advantage. Organizational factors include the organization's size,

management, structure, and resources. Environmental factors include industry competitors, government laws, and service providers.

The results show that the highest percentage of articles published on technological factors is the cost factor, and the lowest percentage is the complexity factor. Of the organizational factors, management has the highest percentage of published articles, while organizational size has the lowest percentage of published articles on organizational factors. Additionally, environmental change trends has the highest percentage of articles published on environmental factors and service providers has the lowest percentage of articles published on environmental factors.

In addition, Jovi´c, M.; Tijan, E.; Vidmar, D.; Pucihar, A. (2022), in his scientific work entitled "Factors of digital transformation in the maritime transport sector", they analyze what factors affect the digitization of enterprises in the maritime transport sector, and also change the business models of enterprises operating in the sector through digitalization of processes and offer new services. they show that they will have additional income [4]. In carrying out this analysis, scientists use the method of analysis of technological, organizational and environmental factors. The methodology combines qualitative and quantitative approaches. Based on a comprehensive literature review, factors influencing digital transformation are identified and clustered using the TOE methodology. These factors affect the level of digitization in enterprises and are reflected in changing business models. To confirm the relevance of influencing factors, the authors conduct interviews with six experts from different organizations and develop a preliminary research model. An initial research model of digital transformation in the maritime transport sector is shown in the figure below.



Source: Jovi´c, M.; Tijan, E.; Vidmar, D.; Pucihar, A. (2022)[4]

In order to measure the share of these factors in the digitization of processes in the enterprise, the authors use the Partial Least Squares (PLS) regression model. The result of the regression analysis showed that the influence of organizational factors on digital transformation is greater than the other factors. Based on the obtained results, the authors find several organizational factors to be the most reliable in the evaluation of indicators. One of the important organizational factors is the existence of an understanding in the organization about how digital transformation can affect the organization's business. Without this understanding, the need to invest in employees, new digital technologies, and other efforts will not yield the expected results, which ultimately slows down digital transformation processes, they conclude. Therefore, organizational factors are the foundation or first step of digital transformation. Another factor is the availability of sufficient human resources for the introduction of new digital technologies in the organization. In order to ensure sufficient human resources, it is recommended to cooperate between the university and the private sector (for example, by investing in scientific research), which is digital in the transport sector. helps further development and introduction of technologies. Regarding the technological factors, three of them were rated as the most reliable, two of which are whether the organization regularly invests in modern technology to develop its business and services, and whether the existing technology in the organization allows or not to upgrade to modern digital technologies. The third technological factor is that the organization systematically manages the risks associated with the introduction of new digital technologies.

Table: 3 Factors affecting the introduction of digital technologies

Technological factors	**Organizational factors**	**Environmental factors**
Complexity	Organizational preparation	Competition
Compatibility	Financial resources of the enterprise	Market structure
Price	The size of the enterprise	Society pressure
Understanding the utility of technology	Technical skills	Management support
Comparative advantage	Qualifications of managers	IT policies and regulations
Security	Strategic goals	

Source: Nuraan Daniels va Osden Jokonya (2020) [5]

Cichosz, Wallenburg, and Knemeyer (2020) analyze barriers, success factors, and global best practices in the implementation of digital transformation in freight forwarding companies[6]. Scientists describe the digital maturity of an enterprise as follows:

1. Fashionista :
- Introduces many advanced entry-level digital features
- There is no common vision of digital transformation
- Undeveloped coordination
- Basic concepts of digital culture may be available

2. Digiratis:
- Has a strong digital transformation vision
- Effective management
- Creating business value with multiple measurable digital initiatives
- Systematized digital culture

3. Beginners:
- Management is skeptical about the business value of advanced digital technologies
- Can conduct some experiments
- Poorly developed digital culture

4. Conservators:
- General digital vision is present, but not very well developed
- A number of advanced digital features may be introduced through traditional digital capabilities
- Hidden active steps to develop digital skills and culture

Summarizing the results of the research, scientists describe the factors affecting the digitization process in the transport sector into 2 groups.

1. Factors hindering the process of digital transformation:

- Complexity of the field and the main processes - analysis shows that this factor has two dimensions. First is the complexity of the logistics industry, which consists of many different types of businesses that act as intermediaries with shippers and customers of all sizes and types spread around the world.
- Lack of resources, including skilled labor - Many shipping service providers list the problems of lack of time and money, but first and foremost they face the problem of lack of digitally skilled employees.
- Adoption of technology - today technology is changing at a very fast pace and choosing the right technology at the right time is an important task.
- Resistance to change - there are two dimensions of resistance: institutional and individual. The first is the resistance to digital transformation found in conservative enterprises. Resistance to change at the individual level is often associated with different types of fear (fear of disclosure and control, fear of job loss, fear of failure) rather than the digital maturity of the enterprise.

- Data Protection and Security - If not managed properly, failure to protect company and customer data can have negative consequences ranging from customer loss to legal claims.

2. Success factors of digital transformation processes

- Leaders in enterprise management - The role of leaders in constantly monitoring market trends, noticing and using technological opportunities to turn them into business opportunities is very important, which allows the company to compete among the leaders of the industry.
- Organizational culture that supports customer orientation and openness to change - organizational culture determines how a company operates and how it makes changes. It is based on a clearly stated set of norms, values and attitudes among all stakeholders. Interactive methods, including meetings, presentations, and workshops, are used to build these values and attitudes from the top down within the organization.
- Involvement of employees and partners. - in organizations with several digital projects in different business areas, digital transformation managers must be supported by the company's management team, which can involve employees.
- Alignment of business and IT strategies - the success of digital transformation depends on the formation of the company's strategic capability related to the development of a digital business strategy, which aligns the goals and resources of digital transformation to fulfill the goals.
- Training and development of employees - one of the necessary conditions for involving employees in digital transformation processes is their training. Establishing a diverse portfolio of programs related to management, management development, training and certification helps employees at all levels adapt to the digital business environment.

Conclusion

Above, the state of digitization of the transport sector and the factors affecting it were analyzed.
Today, many digital technologies are actively used in the field of transport. These include GPS devices, digital sensors, artificial intelligence computer graphics. As a result of the use of these technologies, efficiency in the field of transport is increasing. In addition, in this study, the factors affecting the introduction of the above-mentioned advanced digital technologies of transport enterprises were also listed. The method of analysis of technological factors, organizational factors and environmental factors is used more widely.

Bibliography

1. Jan C.T. Bieser, Erika Kriukelyte. (2020). The digitalization of passenger transport. TRITA-ABE-RPT-2132.
2. Kopishynska, Kateryna. (2020). Current state and prospects of digital transformation of the transport and logistics sector of Ukraine. 99-110. 10.46783/smart-scm/2020-2-8.
3. Mohamed, Yusuf & Jokonya, Osden. (2021). Factors affecting the adoption of technologies to improve fleet safety management. Procedia Computer Science. 181. 1011-1017. 10.1016/j.procs.2021.01.278.
4. Jovic, Marija & Tijan, Edvard & Vidmar, Doroteja & Pucihar, Andreja. (2022). Factors of Digital Transformation in the Maritime Transport Sector. Sustainability. 14. 9776. 10.3390/su14159776.
5. Daniels, Nuraan & Jokonya, Osden. (2020). Factors Affecting Digital Transformation in the Retail Supply Chain. 2018 International Conference on Multidisciplinary Research. 2020. 117-133. 10.26803/MyRes.2020.09.
6. Cichosz, Marzenna & Wallenburg, Carl Marcus & Knemeyer, A.. (2020). Digital transformation at logistics service providers: barriers, success factors and leading practices. The International Journal of Logistics Management. ahead-of-print. 10.1108/IJLM-08-2019-0229.