European Institute of Knowledge & Innovation

Journal of Economics, Innovative Management, and Entrepreneurship (JEIME) ISSN: 3029-0791

Research Article

Enhancing the efficiency of management of transport enterprises: modern trends and challenges

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https://doi.org/eiki/10.59652/jeime.v2i3.305

Abstract: This research examines the modern trends and challenges in enhancing the efficiency of management in transport enterprises, with a focus on the Ukrainian perspective and the impact of the ongoing war. The study highlights key trends such as digital transformation, sustainability efforts, and the increasing use of data-driven decision-making, which are reshaping the transport industry in Ukraine. The integration of technologies like AI-based route optimization and real-time tracking has become important in overcoming operational challenges caused by the war, including disrupted supply chains, damaged infrastructure, and heightened security risks. These innovations are enabling transport enterprises to minimize costs, optimize routes, and ensure service continuity despite the unstable environment. This paper investigates how Ukrainian transport enterprises are adapting to these modern trends while addressing the complex challenges posed by the war. It emphasizes the need for a flexible and resilient management approach that leverages digital tools, sustainability practices, and data analytics to enhance operational efficiency. The findings highlight that a systemic approach, supported by innovation and adaptability, is essential for overcoming the impact of war and ensuring the long-term viability of transport sector of Ukraine.

Keywords: internal and external factors factor; challenge; trend; model; performance; war

1. Introduction

Under the conditions of the further crisis development in economy, the unpredictability of the dynamics of social processes is effective activities of transport enterprises (Borca et al., 2021). Their ability to adapt is a key factor of ensuring the stability of functioning and formation preconditions for the progressive enhancement of the transport industry and the economy of Ukraine as a whole (Maystro & Krykhtina, 2021). Considering that the internal source of development of enterprises is related to its potential, it is important to conduct a systemic and complex study of patterns of functioning, mechanisms of development, factors of formation and realization of potential of transport enterprises. The results and their possible practical application are necessary condition for the effective functionality of the transport system of the state.

Effective management ensures that resources such as vehicles, fuel, labour, and infrastructure are optimally utilized (Moeinaddini & Habibian, 2023). This leads to cost savings through reduced waste, better fuel efficiency, and minimized downtime for vehicle maintenance (Branco et al., 2023; Camisón-Haba & Clemente-Almendros, 2019; Kulbovskyi et al., 2021). Streamlining logistics, improving scheduling, and optimizing routes, transport enterprises can also enhance productivity, enabling them to handle larger volumes of goods or passengers without a corresponding increase in costs. These improvements directly impact profitability, which is especially important in an industry where margins can be tight.

Moreover, efficient management fosters better service quality and customer satisfaction (Mikuličić et al., 2024). Timely and reliable deliveries or transportation services are critical in meeting customer expectations and building long-term business relationships. Well-managed transport enterprises can adapt to changing market conditions, such as fluctuations in demand or fuel prices, ensuring that services remain competitive (Al Sharyani & Ullah, 2024). Additionally, implementing modern technologies, such as real-time tracking systems and data analytics, allows for better decision-making and quicker responses to disruptions, further

Received: September 13, 2024
Accepted: September 24, 2024
Published: September 30, 2024

enhancing service reliability (Holovina, 2023; Kostrzewski et al., 2022). Ultimately, efficient management in transport enterprises is vital for maintaining a competitive edge in a fast-paced and dynamic industry.

The problems of the research on management of transport enterprises are being updated. According to the data about the current stage of economic development in Ukraine, social relations, and the formation of the knowledge economy (Zrybnieva et al., 2023). Importantly, the following features of management of transport enterprises are taken into consideration: change of civilizational values, growth of social consciousness, strengthening of the role of human in the management and production processes, transformation of knowledge and information, awareness of environmental threat, the necessity of continuous innovative development (Agustian et al., 2023). These features indicate the importance of humanizing factors in the activities of enterprises, as well as in the environment that surrounds them, and the need for a radical change in formation and realization of their potential (Din et al., 2023).

The generation of new approaches to the formation and realization of potential of transport enterprises is of great importance, because their activity is associated with significant danger, economic effects, and a high level of environmental pollution (Borca et al., 2021). In addition, the consequences of their functioning concern not only the participants of the transportation process, but also other economic subjects – clients, passengers, pedestrians, etc. (Mikuličić et al., 2024) At the same time, the orientation towards European integration processes forms additional requirements for transport enterprises regarding mandatory compliance with social standards or principles of environmentally safe activities (Lebedeva & Shkuropadska, 2024).

Therefore, the *purpose of the research* is to develop theoretical and methodological principles and practical recommendations regarding efficiency of management of transport enterprises.

To achieve this purpose, the following objectives were formulated:

- to investigate the essence of management of transport enterprise;
- to determine the modern trends to organize the efficient management of transport enterprise;
- to investigate the challenges of management of transport enterprise, paying the special attention to Ukraine;
- to investigate the optimal model of efficient management of transport enterprise in Ukraine during war;

2. Materials and Methods

The theoretical and methodological basis of the research is general scientific and special methods (Dzwigol, 2022; Pozzebon & de Souza Bido, 2019). The basis of process of research devoted to the enhancing the efficiency of transport enterprises required a systematic approach (Alarcón-Bernal et al., 2019; Chiu et al., 2020; Lima, 2017). It involved the analysis of transport enterprises as complex and interrelated systems. This approach allowed us to examine the organization as a whole, including its subsystems such as logistics, human resources, financial management, and technology integration. Identifying the interactions and dependencies among these subsystems, it was possible develop a comprehensive understanding of how each component influences the efficiency of management. This holistic perspective enabled the identification of inefficiencies within the broader system and offers insights into optimizing enterprise-wide practices. Additionally, a systemic approach promoted the study of external factors impacting transport enterprises, such as market dynamics, regulatory frameworks, and environmental considerations. Since the enterprise is a part of a larger ecosystem, this approach allowed us to explore how external influences – such as fluctuations in fuel prices, changes in legislation, or shifts in consumer demand – affect internal operations. The systemic approach also facilitated the identification of potential risks and the formulation of strategic responses to them. As a result, it helped to present how transport enterprises adapt to changing conditions while maintaining efficiency and competitiveness in a dynamic market environment.

Within the systemic approach, the following methods were used in the research process:

methods of formal and dialectical logic, methods of systemic analysis and synthesis – for critical analysis of the provisions of Ukrainian and foreign scientists who researched the modern trends used to organize the efficient management of transport enterprises;

dialectical and abstract logical methods – for study of the evolution of theoretical

approaches, generalization of scientific data and deepening the scientific and theoretical fundamental of the efficient management of transport enterprises;

methods of scientific abstraction, induction and deduction – when defining the economic concepts that clarify the role and explain the specifics of management of transport enterprises;

methods of economic analysis (grouping, comparison, average and relative values, series of dynamics, detailing, coefficient analysis) – for the assessment of components of efficient management of transport enterprises and the presentation of potential opportunities of transport enterprises;

methods of decomposition and analysis of hierarchies – for substantiation of challenges of management of transport enterprise;

graphic method – for visualization of research results.

3. Results and Discussion

3.1. The essence of management of transport enterprise and its modern trends

To analyze the modern trends used to organize the efficient management of transport enterprise, it is important to clarify the structure of such enterprise (Boldyreva et al., 2012; Prokudin et al., 2023). Typically, it consists of several departments, each responsible for specific functions crucial to the operation (Kiefer et al., 2022). At the top is the executive management, supported by senior managers overseeing various operational areas such as finance, human resources, and strategy. Beneath this, the core departments usually include operations, logistics, fleet management, and maintenance. The operations department is responsible for planning and executing transportation services, coordinating schedules, routes, and deliveries. Fleet management oversees the vehicles or transport assets, ensuring they are properly utilized, maintained, and replaced as necessary. The maintenance department ensures that vehicles are in good working condition, minimizing downtime and maximizing efficiency (Kulbovskyi et al., 2021). Also, transport enterprises often include departments focused on customer service, and safety. Together, these departments work in an interconnected way to ensure the smooth and efficient functioning of the transport enterprise.

The efficient management of a transport enterprise relies on certain components that ensure smooth operations and optimal performance (Prokudin et al., 2023). One of the most important components is strategic planning, which involves setting long-term goals, analyzing market trends, and developing strategies to remain competitive (Marunych et al., 2021). This includes effective route planning, fleet optimization, and the integration of new technologies like GPS tracking and telematics to monitor vehicle performance. Additionally, financial management plays a critical role by overseeing budgeting, cost control, and investments in new infrastructure or vehicles, ensuring the enterprise maintains profitability while expanding its services (Bobyl et al., 2024).

Another crucial component is human resource management, which focuses on hiring, training, and retaining qualified personnel, such as drivers, maintenance staff, and managers (Din et al., 2023 Kulbovskyi et al., 2021). Efficient human resource management ensures that the workforce is skilled, motivated, and aligned with the company's goals. Logistics management is also a key part of operational efficiency, dealing with the planning, implementation, and monitoring of the flow of goods and services (Lebedeva & Shkuropadska, 2024). Combined with maintenance and safety protocols, which ensure that vehicles are regularly serviced and meet safety regulations, these components work together to reduce downtime, enhance service reliability, and ensure customer satisfaction (Kucharčíková et al., 2018).

It is worth mentioning that the efficient management of transport enterprise is affected by internal and external factors (figure 1). Internal factors directly impact the day-to-day functioning of a transport enterprise and include the management structure, workforce competency, and technological infrastructure (Bobyl et al., 2024; Flores-Ureba et al., 2024; Marunych et al., 2021). The efficiency of leadership and decision-making processes within the management hierarchy is crucial (Chmyr & Koriekhov, 2023; Grinerud et al., 2021; Prokudin et al., 2023). For example, clear communication between top management and operational staff can streamline processes, reduce delays, and improve response times. Similarly, the competence of the workforce – including drivers, maintenance staff, and office personnel – affects operational efficiency (Kucharčíková et al., 2018). Obviously, well-trained employees ensure high service quality, reduce accidents, and enhance customer satisfaction. The use of

technology, such as fleet management systems, real-time tracking, and automated scheduling, enhances efficiency by reducing manual errors and optimizing vehicle usage and fuel consumption (Shapovalov et al., 2021).

External factors, often beyond the control of the enterprise, also significantly affect management efficiency. Other external factors include legal regulations in the field of transport and logistics (Lykholat & Neviadomskyi, 2022), market conditions (Al Sharyani & Ullah, 2024), or infrastructure quality – such as road conditions, traffic congestion, and availability of maintenance facilities (Kyriacou et al., 2019) – impacts delivery times and vehicle performance, influencing the overall efficiency of transport operations.

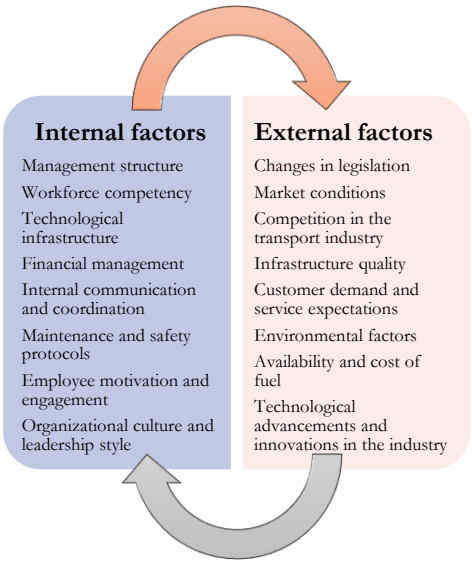

Figure 1. Factors of efficient management of transport enterprise.

Currently, a number of works are devoted to investigation of modern trends of the efficient management of transport enterprise (Speranza, 2018; Wang & Sarkis, 2021). It was found that modern trends in the efficient management of transport enterprises are increasingly shaped by digital transformation (Cichosz et al., 2020). Advanced technologies like AI-powered route optimization, telematics, and GPS tracking allow transport managers to gain real-time insights into fleet operations, helping to minimize fuel consumption, reduce delays, and improve overall service efficiency (Geske et al., 2024). AI-based tools can also predict maintenance needs by analyzing vehicle performance data, reducing downtime through preventive repairs. These technologies offer greater control over operational logistics, improving decision-making and allowing for the automation of routine tasks such as scheduling and dispatching, which leads to increased productivity and cost savings.

Another significant trend is the sustainability movement, where transport enterprises are increasingly prioritizing eco-friendly practices to meet both regulatory demands and consumer expectations (Agustian et al., 2023). This includes the adoption of electric and hybrid vehicles, which reduce fuel consumption and lower carbon emissions. Many companies are also using smart logistics systems to optimize delivery routes and reduce unnecessary mileage, contributing to environmental conservation efforts (Liu et al., 2024). Sustainable fleet management not only helps businesses comply with environmental regulations but also enhances their reputation, making them more attractive to environmentally conscious customers and investors (Zhang et al., 2019). And, of course, the trend of data-driven decision-making is transforming how transport enterprises manage their operations (Aubakirova, 2024). With the rise of big data and advanced analytics, companies can now collect and analyze large amounts of information from their fleet and market environments to inform strategic decisions. This data can reveal patterns in consumer behavior, operational bottlenecks, and cost inefficiencies. Using predictive analytics, transport enterprises can forecast demand, adjust operations accordingly, and make real-time decisions that improve service efficiency. This trend encourages agility, enabling transport enterprises to respond quickly to market changes and operational challenges.

At the same time, a transport enterprise faces a number of challenges affecting efficient management. Further, we will describe these challenges, paying the special attention towards Ukraine.

3.2. The challenges of management of transport enterprise

The management of a transport enterprise faces several operational challenges, particularly in maintaining efficiency and service quality across multiple functions. One of the major challenges is fleet management, which requires ensuring that vehicles are properly maintained, utilized effectively, and replaced at the right time to avoid unnecessary costs or service disruptions (Kotsialos & Vassilakopoulou, 2023). This involves arranging the maintenance schedules, optimizing the vehicle usage, and managing the fuel efficiency. Additionally, transport enterprises often deal with logistical complexities like unpredictable traffic patterns, delays due to weather conditions, or sudden route changes, which can negatively affect delivery timelines and overall operational efficiency.

Another significant challenge is regulatory compliance, as transport enterprises must adhere to a wide range of local, national, and international laws (Lykholat & Neviadomskyi, 2022). These regulations cover areas such as vehicle safety, environmental standards, labor laws, and transportation licenses. Frequent changes in legislation, such as stricter emissions standards or new labor requirements, can increase operational costs and require significant adjustments in management processes. Failure to comply with these regulations can result in fines, legal issues, or reputational damage, further complicating the management process.

In addition to operational and regulatory challenges, transport enterprises must address external factors like fluctuating fuel prices (Milewska & Milewski, 2022; Musa et al., 2024), economic instability (Kliestik et al., 2022), and infrastructure limitations (Moeinaddini & Habibian, 2023). Rising fuel costs can significantly impact the profitability of a transport enterprise, requiring constant adjustments in budgeting and pricing strategies. In some regions, outdated or inadequate infrastructure can lead to delays, increased vehicle wear, and higher maintenance costs. Furthermore, competition in the transport industry forces managers to constantly innovate and improve efficiency while delivering high-quality service to maintain a competitive edge (Chmyr & Koriekhov, 2023). These external pressures demand a flexible, adaptive management approach to sustain long-term success (Sumbal et al., 2023). Table 1 analyses the challenges of management of transport enterprise according to literature review.

Table 1. The challenges of management of transport enterprise.

Challenge	Impact on the efficiency of management	Authors
Fleet management	optimizing vehicle utilization; ensuring timely maintenance; enabling real-time monitoring of vehicle performance; improvement of routing and fuel efficiency; enhancing higher safety standards.	Chmyr & Koriekhov, 2023; Kotsialos & Vassilakopoulou, 2023
Regulatory compliance	imposing strict adherence to safety, environmental, and labor regulations; severe penalties, legal liabilities, and reputational damage; affecting strategic planning and resource allocation.	Lykholat & Neviadomskyi, 2022
Logistical complexities	creating challenges in route planning, load optimization, and delivery scheduling; continuous investment in training and infrastructure.	González-Moralejo, 2024; Lebedeva & Shkuropadska, 2024; Wang et al., 2020
Rising fuel costs	increasing operational expenses; adjustment of pricing strategies and seeking cost-saving measures to maintain profitability.	Milewska & Milewski, 2022
Economic instability	creating uncertainty in demand; leading to unpredictable revenue streams and challenging budgeting	Kliestik et al., 2022

	processes; rising operational costs.	
Infrastructure limitations	causing delays and inefficiencies in the transportation; leading to increased operational costs and diminished service reliability; complicating route planning.	Flores-Ureba et al., 2024; Marunych et al., 2021; Moeinaddini & Habibian, 2023
Technological adaptation	improvement of operational efficiency through the integration of advanced tools; route optimization, vehicle maintenance, and resource allocation; enhancing service quality and reducing costs.	Chmyr & Dziuba, 2019; Holovina, 2023; Kostrzewski et al., 2022
Safety and risk management	ensuring the well-being of drivers, cargo, and equipment; mitigating accidents; lowering insurance costs; improving service quality.	Chmyr & Dziuba, 2019; Kucharčíková et al., 2018
Supply chain disruptions	causing delays in the delivery of goods and increased operational costs.	Mehmood et al., 2024; Milewska & Milewski, 2022
Environmental sustainability	disrupting operations and affecting delivery schedules; necessity to invest in eco-friendly technologies.	Borca et al., 2021
Customer expectations	adopting advanced technologies; improvement of communication strategies to enhance the customer experience.	Mikuličić et al., 2024

The management of transport enterprises in Ukraine faces unprecedented challenges due to the ongoing war, significantly disrupting operational efficiency and service reliability (Khatser & Mikhailik, 2024; Lebedeva & Shkuropadska, 2024; Rudyk et al., 2023). One of the most pressing challenges is the destruction of infrastructure, including roads, bridges, and railway lines, which has been targeted in military actions. This destruction leads to increased transportation times, higher costs for repairs and rerouting, and logistical complexities as managers must find alternative paths for delivery. Additionally, the threat of military activities poses safety concerns for drivers and personnel, leading to heightened operational risks and the need for comprehensive safety measures (González-Moralejo, 2024).

Another significant challenge is the disruption of supply chains, exacerbated by the war's impact on production and distribution networks (Gao & Xu, 2024; Křenková et al., 2023). With many suppliers facing their own operational challenges or being located in conflict zones, transport enterprises struggle to secure consistent access to necessary goods and resources (Chmyr, 2022; Srai et al., 2023). This unpredictability requires transport managers to adapt quickly, often resulting in increased costs for sourcing alternatives or relying on less efficient transportation methods (Chmyr & Koriekhov, 2023; Khatser & Mikhailik, 2024). Furthermore, the volatility in fuel prices, driven by the instability of the region, adds another layer of complexity, forcing companies to continuously adjust their budgets and operational plans.

The findings showed that the war has resulted in a reduced workforce, as many individuals are either serving in the military or have fled the country seeking safety (Rudyk et al., 2023). This labor shortage places immense pressure on remaining employees and can lead to burnout, increased turnover, and challenges in maintaining service quality. Transport enterprises must not only find ways to attract and retain talent in a difficult environment but also invest in training and development to ensure their workforce is equipped to handle the evolving challenges of the industry (Cherviakova, 2024; Chmyr & Koriekhov, 2023). Consequently, the management of transport enterprises in Ukraine during the war requires a

combination of strategic planning, innovation, and resilience to navigate these multifaceted challenges effectively (Chmyr, 2022; Marunych et al., 2021). Figure 2 shows challenges of management of transport enterprise in Ukraine during war.

Figure 2. The challenges of management of transport enterprise in Ukraine during war.

Considering the information about the modern trends of efficient management of transport enterprise and the challenges faced by Ukrainian transport enterprises during war, it is possible to draw the optimal model of efficient management of transport enterprise in Ukraine.

3.3. The optimal model of efficient management of transport enterprise in Ukraine during war

An optimal model of efficient management for transport enterprises in Ukraine during the war must integrate strategic planning, real-time data analysis, and robust operational frameworks to navigate the challenges posed by the ongoing conflict (Khatser & Mikhailik, 2024). This model should prioritize safety, resource allocation, and the maintenance of service quality while considering the unique circumstances faced by the transport sector (Lebedeva & Shkuropadska, 2024; Rudyk et al., 2023). By focusing on critical areas such as vehicle maintenance and repair, enterprises can ensure fleet reliability and enhance overall efficiency (Chmyr & Shelukhin, 2020).

One of the foundational elements of this model is the establishment of a comprehensive vehicle maintenance program (Shatilo et al., 2023). Regular maintenance schedules should be created based on usage patterns, manufacturer recommendations, and the specific operational conditions of each vehicle. Given the potential for increased wear and tear due to adverse conditions, including rough terrain and limited access to repair facilities, proactive maintenance becomes vital in preventing breakdowns and ensuring operational continuity (Dachkovsky & Kondratiuk, 2020). This program should include detailed checklists for routine inspections, as well as a system for tracking maintenance history to identify patterns and predict future needs.

Incorporating real-time monitoring systems is essential for optimizing vehicle maintenance and repair in this model (Riaboshtan, 2021; Sirko et al., 2022). Utilizing telematics and GPS technology allows transport managers to gather data on vehicle performance, fuel consumption, and usage patterns. This information can be analyzed to identify issues before they escalate into costly repairs. For example, abnormal fuel consumption or engine performance may signal the need for maintenance, allowing for timely interventions that reduce the risk of breakdowns in conflict zones. This proactive approach to vehicle management helps minimize downtime and maintain service levels during challenging circumstances.

Another critical aspect of the optimal management model is establishing collaborative partnerships with local repair shops and service providers (Chmyr & Shelukhin, 2020). Given the ongoing conflict, access to authorized dealerships and service centers may be limited, necessitating relationships with reliable local mechanics who can perform necessary repairs and maintenance (Gritsuk et al., 2024). Transport enterprises should monitor these partners

to ensure they meet safety and quality standards while also providing timely and effective service (Smachylo et al., 2018). This collaborative approach can help mitigate the challenges posed by limited resources and infrastructure disruptions, allowing for more efficient maintenance and repair processes.

In addition to vehicle maintenance, effective inventory management for spare parts and repair supplies is vital for maintaining operational efficiency (Rudyk et al., 2023). The model should include a system for monitoring stock levels of critical components, such as tires, batteries, and engine parts, to ensure they are readily available when needed. Given the unpredictability of supply chains during wartime, transport managers must develop contingency plans for sourcing these materials from multiple suppliers, both locally and from outside the conflict zone. This strategic approach helps minimize delays in repairs and ensures that vehicles remain operational, contributing to the overall reliability of the transport enterprise (Gritsuk et al., 2024).

Also, training and development programs for maintenance personnel should be incorporated into the optimal model (Khatser & Mikhailik, 2024). Considering the challenges of retaining skilled labor during the war, investing in the training of existing staff can enhance the overall competency and efficiency of the workforce. Programs should focus on both technical skills related to vehicle maintenance and soft skills necessary for navigating the complexities of operating in a conflict environment (Shatilo et al., 2023). Empowering employees with the knowledge and skills required to perform maintenance and repairs effectively, transport enterprises can bolster their resilience and adaptability in the face of ongoing challenges (Smachylo et al., 2018).

Besides, the findings demonstrated that an effective communication strategy should be implemented to keep all stakeholders informed and engaged (Glapiak, 2023; Sirko et al., 2022). This includes regular updates for employees about safety protocols, maintenance schedules, and operational changes due to the evolving situation. Additionally, maintaining open lines of communication with customers is essential to manage expectations and provide transparency about service disruptions or delays. By fostering a culture of collaboration and information sharing, transport enterprises can enhance their overall operational efficiency and resilience during these challenging times, ultimately ensuring their continued viability in the face of adversity.

5. Conclusions

In conclusion, enhancing the efficiency of management within transport enterprises is crucial, particularly in the context of modern trends and challenges exacerbated by the ongoing war in Ukraine. This research highlights the multifaceted nature of the transport sector, emphasizing the need for strategic adaptability to navigate the complexities introduced by infrastructural damage, supply chain disruptions, and economic instability. The integration of advanced technologies, such as telematics and real-time data analysis, plays a pivotal role in optimizing fleet management, ensuring proactive vehicle maintenance, and enhancing operational resilience.

The research underscores the importance of fostering collaboration with local service providers and suppliers to mitigate challenges arising from the conflict. Establishing strong partnerships allows transport enterprises to maintain service reliability while navigating the uncertainties of the market. Additionally, prioritizing employee training and development not only empowers the workforce but also ensures that organizations can respond effectively to the unique demands of operating in a war-affected environment.

It is important to state that the successful management of transport enterprises hinges on the ability to balance operational efficiency with safety and reliability. By adopting a comprehensive approach that encompasses proactive maintenance, inventory management, and effective communication, transport enterprises can enhance their capacity to withstand external shocks and maintain service quality. As the industry continues to evolve, the insights derived from this research provide a foundation for developing resilient management practices that address both current challenges and future opportunities. Moving forward, it is essential for transport enterprises to remain agile, continuously adapting to emerging trends while prioritizing the well-being of their employees and customers. Through strategic innovation and collaboration, the transport sector in Ukraine can emerge from these challenges stronger and more efficient, contributing to the nation's recovery and economic stability.

Acknowledgments: I would like to express our heartfelt gratitude to our scientific supervisor, Viktor Chmyr, Candidate of Technical Sciences, Associate Professor, for their invaluable guidance, support, and encouragement throughout our research journey. His expertise has been instrumental in shaping our understanding of the complexities involved in enhancing the efficiency of management within transport enterprises, particularly in the context of modern challenges faced by the industry in Ukraine. We truly appreciate the time and effort he dedicated to reviewing the work, providing constructive feedback, and inspiring us to think critically about the issues.

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