

Міністерство освіти і науки України
Український державний університет залізничного транспорту



МАТЕРІАЛИ

двадцять першої науково-практичної міжнародної конференції
*«Міжнародна транспортна інфраструктура,
індустріальні центри та корпоративна логістика»*
(5-6 червня 2025р. м. Харків, Україна)



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МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
МІНІСТЕРСТВО ІНФРАСТРУКТУРИ УКРАЇНИ
ТРАНСПОРТНА АКАДЕМІЯ УКРАЇНИ
АТ «УКРАЇНСЬКА ЗАЛІЗНИЦЯ»
CONSERVATOIRE NATIONAL DES ARTS ET MÉTIERS (FRANCE)
INSTITUTE OF AUTOMATIC CONTROL TELEMATICS OF
TRANSPORT (POLAND)
УКРАЇНСЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ ЗАЛІЗНИЧНОГО
ТРАНСПОРТУ
ІНСТИТУТ ЕКОНОМІКИ ПРОМИСЛОВОСТІ НАН УКРАЇНИ

Матеріали

*Двадцять першої науково-практичної
міжнародної конференції*

**«МІЖНАРОДНА ТРАНСПОРТНА
ІНФРАСТРУКТУРА,
ІНДУСТРІАЛЬНІ ЦЕНТРИ ТА
КОРПОРАТИВНА ЛОГІСТИКА»**

(5 - 6 червня 2025р. м. Харків)

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УДК 330.341.1:656.2

INTELLECTUAL BUSINESS IN THE RAILWAY SPHERE: STARTUPS

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Since Russia's 2022 invasion, Ukrainian Railways (Ukrzaliznytsia) has played a crucial role in maintaining Ukraine's resilience. It has enabled mass evacuations, delivered essential goods nationwide, and exported grain to support global food security. As air travel ceased, rail became Ukraine's vital economic and humanitarian lifeline. Despite daily attacks damaging over 500 km of tracks and 126 stations [1], Ukrzaliznytsia continues to operate under immense pressure. Restoring its capacity is essential for national survival.

Ukrzaliznytsia is facing numerous challenges amid the ongoing war. Among them there are cybersecurity and IT infrastructure challenges. A major cyberattack in March, 2025 disrupted ticketing and digital systems, prompting increased collaboration with national security services to restore services and boost cybersecurity [2]. The company also struggles with outdated infrastructure and limited integration with European rail systems, as Ukraine's wide-gauge tracks differ from Europe's standard gauge, complicating international transit. Financial constraints hinder modernization efforts, with freight revenues used to subsidize passenger services and increasing tariffs sparking criticism. Efforts to restructure operations and upgrade technologies remain slow due to underinvestment.

These complex and interrelated problems highlight the urgent need for Ukrzaliznytsia to adopt innovative solutions. Implementing advanced technologies and modern management approaches could help address systemic inefficiencies, enhance resilience, and improve service quality. From digital transformation and predictive maintenance to infrastructure upgrades and international interoperability projects, innovation is essential to overcoming current challenges and ensuring the sustainable development of Ukraine's railway system during and after the war.

As we defined in [3], intellectual entrepreneurship (or intellectual business) is a special type of entrepreneurship carried out by intellectuals who create socially-oriented complex, high-tech intellectual products, with the aim not only of obtaining economic benefits, but also of self-realization and the achievement of spiritual and moral objectives, as well as goals for economy and society development (bettering material well-being and ensuring cultural, spiritual development, etc.). IT sphere is known to be one of types of intellectual business.

The digitalization of railway transport has been examined by Ukrainian scholars such as V.L. Dykan, H.V. Obruch [4, 5], V.V. Kompaniets [6], I.V. Tokmakova [7], among others, whose research has explored the prospects for the

development of railway enterprises. In one of the previous studies [8], we proposed drawing on the experience of Indian Railways in fostering startup ecosystems as a means to accelerate digital transformation in the railway sector. Additionally, our work in [9] outlined key digitalization priorities for Ukrzaliznytsia. However, the role of startups as a driver of innovation and as a mechanism for enhancing the technological capacity of Ukrzaliznytsia remains underexplored in the current academic discourse.

Therefore, the aim of this paper is to analyze international experience in the development of railway-focused startups, with a view to identifying applicable insights for implementation within Ukrzaliznytsia.

As of 2025, over 20 rail startups are actively under development worldwide. Based on an analysis of recent studies [10–12], the following startups have been identified as particularly relevant to Ukrzaliznytsia, in the following key areas.

1 Predictive Maintenance and Infrastructure Monitoring

PlasmaTrack Ltd (UK): Specializes in non-intrusive railway track monitoring using advanced sensor technologies. Their solutions enable real-time detection of track conditions, facilitating proactive maintenance and reducing downtime.

Servail (Germany): Offers AI-driven predictive maintenance platforms that analyze data from various sensors to forecast equipment failures, optimizing maintenance schedules and enhancing safety.

2 Automation and Smart Operations

Railspire (USA): Develops autonomous rail inspection systems that utilize drones and AI to monitor track conditions, improving inspection efficiency and accuracy.

DirecTrainSystems (France): Provides dynamic rail coupling technologies that automate the connection and disconnection of train cars, streamlining operations and reducing manual labor.

3 Sustainable Energy and Electrification

Allegro Energy (Australia): Focuses on developing redox flow batteries for rail applications, offering sustainable energy storage solutions that support electrification efforts.

Sun-Ways (Switzerland): Innovates in solar power integration by installing photovoltaic panels along railway tracks, generating renewable energy for rail operations. Its key features are: removable panels, high installation efficiency (The system can install up to 1,000 m² of solar panels per day), and durability: (panels are designed to withstand train speeds up to 150 km/h and wind speeds up to 240 km/h).

4 Data Analytics and Real-Time Monitoring

MoniRail Ltd (UK): Provides real-time analytics platforms that monitor train performance and passenger flow, enabling data-driven decision-making for service improvements.

RailState (Canada): Offers a real-time rail visibility platform that tracks train movements and network conditions, assisting in operational planning and disruption management.

5 Carbon Emission Reduction

Remora (USA): Develops mobile carbon capture technology for freight trains, capturing CO₂ emissions directly from diesel-powered freight locomotives' exhaust and converting them into liquid form for storage or sale. This innovation addresses environmental concerns and aligns with global sustainability goals.

In conclusion: global rail industry demonstrates that startups play a crucial role in driving innovation, enhancing efficiency, and promoting sustainability. For Ukrzaliznytsia, embracing a similar approach by supporting rail-focused startups can lead to significant improvements in digitalization and competitiveness. Establishing partnerships, providing funding opportunities, and creating innovation hubs can cultivate a vibrant startup ecosystem tailored to the unique needs of Ukraine's railway sector.

[1] Restoring and Transforming Ukrainian Railways for a Better Future (2025). Available from: <https://www.worldbank.org/en/news/feature/2025/01/16/restoring-and-transforming-ukrainian-railways-for-a-better-future>

[2] Ukraine state railway says online services partially restored after cyber attack (2025). Available from: https://www.reuters.com/technology/cybersecurity/ukraine-state-railway-says-online-services-partially-restored-after-cyber-attack-2025-03-27/?utm_source=chatgpt.com

[3] Nazarenko I. (2015). *Intelektualne pidpriemnytstvo yak napriamok formuvannia ekonomiky znan v Ukraini* [Intellectual entrepreneurship as a direction of formation of the knowledge economy in Ukraine] // *Trends and innovations in the modern economy: Collective monograph* / by general. ed. O. Ivanilov. Kharkiv. 228 p. Pp. 176 – 189.

[4] Dykan V.L., Obruch Gh.V. (2020). *Upravlinnia realizatsiiei spilnykh investytsiinykh proektiv za uchastiu pidpriemstv zaliznychnoho transportu v umovakh tsyfrovizatsii* [Management of implementation of joint investment projects with the participation of railway transport enterprises in the conditions of digitalization] *Bulletin of Economics of Transport and Industry*, vol.69, pp. 9–21.

[5] Obruch Gh.V. (2020). *Zbalansovanyi rozvytok pidpriemstv zaliznychnoho transportu v umovakh tsyfrovizatsii ekonomiky : monohrafiia* / [Balanced development of railway transport enterprises in the conditions of digitalization of economy: monograph]. UkrSURT. – Kharkiv. 403 p.

[6] Kompaniets V. V. (2018). *Kontseptualnyi analiz perspektiv tsyfrovizatsii ekonomiky y zheleznodorozhnoho transporta*. [Conceptual analysis of prospects for digitalization of the economy and railway transport]. *Bulletin of Economics of Transport and Industry*, vol.62, pp. 197–200.

[7] Tokmakova I. V., Cherednychenko O. Yu., Voitov I. M., Palamarchuk Ya. S. (2019). *Tsyfrova transformatsiia zaliznychnoho transportu yak faktor yoho innovatsiinoho rozvytku* [Digital transformation of railway transport as a factor of its innovative development]. *Bulletin of Economics of Transport and Industry*, vol.68, pp. 125–134. Available at: URL: http://nbuv.gov.ua/UJRN/Vetp_2019_68_15 (accessed 29.09.22)

[8] Nazarenko I.L., Hoppman M. McKay (2022). Digitalization in railway transport by startups developing. *Proceedings of the 17th scientific and practical international conference "International transport infrastructure, industrial centers and corporate logistics" (June 2-3, 2022, Kharkiv)*. UkrSURT. Pp. 245 – 248.

[9] Nazarenko I. L., Hoppman M. McKay (2022). Main priority areas and problems of Ukrzaliznytsia's digitalization. *Bulletin of Economics of Transport and Industry*, vol. 78-79, pp. 46-54.

[10] Adarsh R. Discover 20 Innovative Rail Startups to Watch (2025). Available from: https://www.startup-insights.com/innovators-guide/rail-startups/?utm_source=chatgpt.com

[11] RailState Case Studies. Available from: https://www.railstate.com/case-studies/?utm_source=chatgpt.com

[12] Chernova Y. (2025). Carbon-Capture Startup Remora Sets Sights on Freight Rail. Available from: https://www.wsj.com/articles/carbon-capture-startup-remora-sets-sights-on-freight-rail-3d550192?utm_source=chatgpt.com

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ДЕВ'ЯТЬ ПЕРШОЇ НАУКОВО-ПРАКТИЧНОЇ
МІЖНАРОДНОЇ КОНФЕРЕНЦІЇ
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(5-6 ЧЕРВНЯ 2025 РОКУ)

Відповідальний за випуск А.В. Толстова

Підписано до друку 25 червня 2025р.
Формат паперу 60X84 1/16. папір писальний.
Умовн.-друк. Арк. **25,45.** Обл.— вид. арк..**26,1.**
Замовлення № Тираж 300. Ціна договірна

Видавництво УкрДУЗТу, свідоцтво ДК № 6100 від 21.03.2018 р.