

## Abstract

As a part of the impact assessment of OPII priority axis 1 (PA1), three projects were evaluated that contribute to the fulfilment of specific objective 1.3 (SO1.3) of OPII - Increasing the attractiveness and quality of rail public passenger transport services through the renewal of rolling stock.

The first evaluated project within PA1, SO1.3 OPII was the project Modernization of railway and rolling stock (stages I and II). The beneficiary of financial assistance was Železničná spoločnosť Slovensko, a.s. (ZSSK) (The Railway Company of Slovakia). During the first stage, the rolling stocks in the Banská Bystrica region were modernized (21 newly acquired diesel units, 14x DMJ 110 and 7x DMJ 160). These rolling stocks were deployed on 7 track sections. Within second stage, the rolling stocks in the Žilina region were modernized (25 new electric units, 13x EMJ 220 and 12x EMJ 300, dual-system units). These rolling stocks were deployed on 5 track sections.

The impact assessment of the project in the **Banská Bystrica region (first stage)** showed the following effects:

- Operating costs have been dropped due to the modernization of vehicles - reduction of diesel consumption (26%);
- Reduction of pollution - decreasing in No<sub>x</sub> emissions (53%) and PM emissions (32%);
- More efficient utilization in the case of new vehicles - daily transport performance has been increased by 37% compared to the plan;
- Travel comfort has been increased for disabled passengers (low floor, audio-visual information system, air conditioning, Wi-Fi, space for wheelchairs, bicycles and baby carriages);
- Required reliability and stability of the timetable (more efficient turns, better vehicle dynamics);
- Travel safety has been improved (ETCS L1, MIREL VZ1, door control, camera system);
- Total amount of passengers has been decreased (27% on average) on lines with only new units (just 7% less than the national decline in railway public transport) and in 34% with a predominance of old vehicles in service. The decrease in the number of passengers were caused by several reasons, mainly: moving vehicles outside the program area, lower demand for public transport. At the same time, as a result of the COVID-19 pandemic, the number of passenger trains has been reduced - insufficient frequency of travel connections;
- Travel time savings have been not achieved (**time savings potential after infrastructure modernization**). However, competitive travel times by buses and private vehicles have been reached at several routes.

The following effects in the **Žilina region (second stage)** have been significant:

- Operating costs were reduced due to modernization of vehicles - reduction of electricity consumption (22%);
- Reduction of CO<sub>2</sub> emissions (total amount 237 t CO<sub>2</sub> during the first half of 2023);
- Reduction of noise emissions (up to 10 dB compared to old vehicles);
- More efficient utilization of new vehicles - daily transport performance has been increased compared to the plan (17%);

- Travel comfort has been increased for the disabled passengers (low floor, audio-visual information system, Wi-Fi, air conditioning, space for wheelchairs, bicycles and baby carriages);
- Required reliability and stability of the timetable (better dynamics of modern vehicles);
- Travel safety has been improved (ETCS L1, MIREL VZ1, door control, camera system);
- Total amount of passengers has been increased (almost 20%) on lines on which only new units has been operating - i.e. most lines, but other factors (e.g. modernization of the infrastructure) also had an important impact on the growth of the number of passengers;
- Travel time savings have not been achieved on some lines (**time savings potential after infrastructure modernization**), but on some lines travel times have been competitive in comparison to the road transport.

The third evaluated project within PA1, SO1.3 OPII was the **project Renewal of Cog-Railway (C-R) rolling stock in the High Tatras**. The beneficiary was ZSSK. In this context, 5 gear electric units (GEU) were purchased for the needs of transport on the C-R and Tatra Electric Railway (TER) lines in the High Tatras region. The impact assessment of this investment financed through financial intervention from OPII demonstrated the following facts:

- Efficiency and Productivity gear electronic units operated on C-R have been increased (daily output of GEUs has been increased by 82%), while the remaining units were being prepared as operational backups;
- The number of passengers has been increased. It is expected that number of passengers will be 3.5 million passengers in 2023 (only by 200 000 passengers less than the target for 2027). Compared to 2018, the number of passengers is expected to grow by more than 20%;
- The option of transition of new cogwheel vehicles to adhesive tracks is important factor for the development of track sections in the future and for the potential savings in travel time due to of direct connections between the C-R and TER systems (direct connection Štrba – Tatranská Lomnica and Štrba – Poprad);
- Travel safety has been improved (robust construction, more powerful lighting, door control, camera system);
- Travel comfort has been increased for the disabled passengers (low-floor, audio-visual information system, air conditioning, Wi-Fi, space for wheelchairs, bicycles and baby carriages);
- Maintenance of rack railcars at the Poprad depot has been significant simplified due to the time of additional transportation shortening;
- Travel times remained constant with minimal savings, to shorten them it would be necessary to change the concept of transport (direct connection from Štrba via Štrbské Pleso to Poprad);
- Decrease of the transport capacity due to weight sensors installation, a safety instrument for overloading prevention of vehicles. It is possible to increase the transport capacity at C-R e.g. by modifications of the infrastructure together with modifications of the railway traffic schedule.

As part of the impact assessment of priority axis 5 (PA5), SO5.2 OPII (Improvement of technical conditions for the operation of international railway transport through the

implementation of selected TSI elements on the most important railway tracks for international transport), the project **Communication infrastructure of telematics services of ŽSR** was evaluated. The beneficiary was ŽSR (Railways of the Slovak Republic). The total investment without VAT amounted to 42.2 million EUR. Based on the impact assessment of the mentioned project, the following effects were found:

- Interoperability of the communication system of telematics services within the skeleton network of the railways in the Slovak Republic and the achievement of TSI TAF/TAP standards (the basic implementation standard of GSM-R/ETCS);
- Positive impact on railway traffic flows - the option of full backup due to the circularization of the northern and southern railroads;
- The safety of railway transport has been improved due to the significant increase in transmission capacity. Systems (firewall+IPS) enabled to increase cyber security;
- The increase in transmission capacity had a very positive effect on the reliability of railway systems, e.g. due to the elimination of complete service interruptions and a smaller number of complaints, an increase in the transmission speed (in some locations it increased from the original 2 MBps to 1 Gbps);
- The increase in transmission speed significantly improved the operational efficiency of the main subject managing railway transport (ŽSR, ZSSK, ZSSK Cargo);
- The increase in competitiveness of railway transport thanks to the achievement of a qualitatively higher level of transport (improvement of voice services, backup options, transmission speed).

The impact assessment has shown that the project is linked to the following future challenges as the necessity to focus attention on the maintenance of the communication network in order to ensure the continuous support of the implemented systems. Sufficient support is not currently provided. It is necessary to improvise in the event of an operational failure.

## **Summary**

Impact assessment of above mentioned projects implemented within PA1 and PA5 of the OPII showed that the benefits from the projects have high added value for ZSSK (saving costs ZSSK) as well as for passengers and ŽSR. The implementation of the purchase new rolling stocks and investments to railway telematics services will be also important in the future, because of effects generating from the projects. The relevant outputs and recommendations from the evaluations will be used in the implementation of the programming period 2021 - 2027.