

# THE CURRENT STATUS OF EAST SLOVAKIAN TRANSHIPMENT POINTS AND THE POSSIBILITIES OF THEIR FURTHER DEVELOPMENT

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**Abstract:** The article discusses the possibilities of East Slovakian transshipment facilities, which, despite their relatively strategic location and the possibilities they provide, are far from being used as much as their capacities allow. Growing requirements for green transport and reducing the carbon footprint create space for increasing rail transport as the most ecological option; on the other hand, the long-standing problems experienced by East Slovakian transshipment points put them in a competitive disadvantageous position compared to other countries. The opening of the Silk Road provides opportunities that East Slovakian transshipment points do not use or use very little. Therefore, the article points out the weaknesses of East Slovak transshipment centres and looks for ways to improve the current situation, it also draws attention to the possibilities of East Slovakian transshipment centres, especially Čierna nad Tisou, and makes suggestions for rationalization. The findings of the article point to the fact that Eastern Slovakian transshipment facilities have a potential that needs to be further developed, which, however, will probably not be possible without state aid.

## 1 Introduction

International trade is currently growing significantly, and the volumes of goods being transported are increasing. The European Union has created an appropriate legal framework for the transport sector to facilitate the free movement of people and goods within the Union [1]. Any country has a strategic document establishing a model of actions with the view to achieve a global developmental goal. To be competitive, a country must have a viable economy [2]. But the volume of goods between Europe and Asia is an important element of international trade within the EU, as one of the most important Asian partners is the People's Democratic Republic of China. The main mode of transport is sea container transport. However, in recent years, part of the flow of goods has been diverted from maritime to rail. Several measures have been taken to support rail transport in this area, such as the creation of a joint CIM / SMGS consignment note. The higher application of common consignment note CIM/SMGS in rail transit cross Slovak republic is good way how to make railway transport more efficient [3].

Improving and supporting rail transport within the Europe - Asia freight flows brings an opportunity for the

development of the largest Slovak transshipment point in Čierna nad Tisou. The makespan of operations at container terminals is crucial for the lead time of cargo and consequently the reduction of transportation costs. Therefore, an efficient transshipment and short storage of containers are demanded [4]. The transshipment point thus becomes one of the most important points of the two international direct transport regimes (CIM / SMGS) in rail freight transport.

Reducing costs and increasing efficiency are very important objectives for all service providers, which is made possible by a thorough survey of demand in this area. The excessive increase in transport intensity is one of the negative impacts on the economy [5]. In the end, what will decide which mode of transport will be chosen it depends on:

- cost of transport,
- ability to create networks,
- railway safety,
- environment protection [6].

Transport of goods in intermodal transport in Slovak republic (Table 1) is increasing. During last 20 years transport is more than 10 times higher what shows huge potential for intermodal transport.

*Table 1 Transport of goods in intermodal transport of Slovakia - transport of intermodal transport units (containers) by railway*

Year	2000	2005	2010	2015	2020
Transport of goods total (gross tonnes)	564 228	1 256 000	2 779 126	4 791 633	5 890 000
National	15 892	28 000	163 024	482 370	439 000
Export	116 909	388 000	1 129 479	1 980 692	3 213 000
Import	92 924	445 000	1 162 635	2 068 072	2 147 000
Transit	338 503	395 000	323 988	260 499	91 000

Source: statistics data of Ministry of Transport and Construction of the Slovak republic [7]

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It is obvious that this significantly increasing transport of goods also requires an increase and a focus on automation. The big problem is related to railway transit, where problem is in the transferring many information, e.g. waybill, technical condition of the wagon, etc. [8].

**2 Historical development of East Slovakian transshipments**

After the end of World War II, the Slovak Railways were among the most damaged European railways and their restoration lasted until April 1946. In May of the same year, the construction of the railway transshipment yard in Čierna nad Tisou began. Thanks to the large area, in which there are wide and normal gauge tracks, Čierna nad Tisou is said to be the largest land port. On April 15, 1947, the wide gauge line built in Slovakia merged with the wide gauge line on Soviet territory. As early as the week of April 22, 1947, the first train from the USSR arrived in Čierna nad Tisou after a wide gauge, and transshipment to normal gauge wagons began. In addition to tracks and equipment, facilities for the maintenance of locomotives, wagons and mechanisms were built in Čierna nad Tisou. In the first stage, 4 tracks of normal gauge were built, to which 4 and 3 tracks of wide gauge for transport and 1 track for transshipment were later added. The transshipment consisted of 1 wide track and 1 normal gauge track, which were next to each other. At one end was a wooden ramp 50 meters long. At the same time, a definitive transshipment ramp was being built, which they called the "covered ramp". The scope and technical level of transport and transshipment facilities were low. In 1947, an average of 3,500 tons of goods was transhipped here. In the first years of operation of the transshipment facility, it was assumed that raw materials for the heavy and textile industries would flow from the eastern side of the border. However, the most intensive was goods with grain. The composition of transported and transhipped commodities was later influenced by the construction of Východoslovenské železiarne (East Slovak Ironworks) in Košice, as the transport of iron ore increased. The launch of the "Družba" pipeline in 1963 was also significant, as millions of tons of oil a year were stopped translating in Čierna nad Tisou. [9]

The requirements for transshipment increased and so it was necessary to build additional tracks and transshipment ramps.

Already e.g. in 1947, 700,000 tons of grain were transhipped there. Gradually, ore defrosting plants, pumping stations for oil products and other ancillary facilities were built here. The construction of the wide gauge line started from Maťovce to Haniska near Košice, it is 106 km long in the Slovak Republic. At present, there are approximately 160 km of tracks and 500 switches on an area of 10 km<sup>2</sup> at the transshipment point in Čierna nad Tisou.

**3 Characteristics of East Slovakian transshipments**

The East Slovak transshipments include:

- transshipment complexes in Čierna nad Tisou,
- wagons from wide gauge (1 520 mm) to normal gauge (1 435 mm) and
- modern Combined Transport Terminal in Dobra.

East Slovak transshipment points are of strategic importance on a European scale, especially in east-west transport, as they are the gateway to Central Europe.

The Čierna nad Tisou transshipment yard provides the following services:

- transshipment, loading and unloading of goods,
- pumping of liquid substances,
- wagon strapping,
- determination of the weight of consignments,
- palletising, packaging and strapping of goods,
- detection of damage to wagon consignments,
- distribution of unloaded consignments,
- issue of a transit declaration,
- representation of the declarant on delivery of the customs declaration,
- delivery of transport documents,
- sending consignment notes and other documents to the carrier. [10]

*Table 2 Types of transhipped goods in East Slovakian transshipments*

<b>Naming of good</b>	<b>Types of transhipped goods</b>
Wood	soft hardwood, raw wood
Iron ore	agglomerated, non-agglomerated, iron ore pellets and concentrate
Iron, steel products	angles iron, bars, rods, rolled products
Minerals	stone, gravel, salt, sand, kaolin
Coal	black and brown coal
Coke	anthracite and pitch coke
Chemical products	methanol, ethyl alcohol, benzene, various oils

Various types of transshipment machines and equipment are used for loading, because (as show Table 2) various types of transhipped goods are transshipment and unloading in East Slovakian transshipment points. Machines and equipment can be as follows:

- lifting devices,
- hydraulic excavators,
- universal front loaders,
- technological translation equipment,
- pumping complexes,
- tippers [10].

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Tipplers are used in modern transshipment facilities for transshipment of bulk substrates. They have more power than other transshipment facilities, unloading the wagon is automated.

Tipper types:

- side tipplers - the load is dumped through the side wall, the wagon can be rotated by  $150^\circ$  -  $175^\circ$  around the axis, which is parallel to the track axis;
- front tipplers - the load is dumped over the folded front wall of the wagon, tilting the wagon by  $45^\circ$  +  $65^\circ$  around an axis that is perpendicular to the track axis;
- rotary tipplers - the load is dumped through the side wall of the wagon, the wagon can be rotated by  $150^\circ$  -  $175^\circ$  around an axis that is parallel to the track axis;
- combined tipplers - in the longitudinal and transverse direction they tilt the closed wagon with the emptying of the load by the wagon door [11].

### 3.1 *Workplaces in East Slovakian transshipment facilities in Čierna nad Tisou*

The transshipment section is used to perform transshipment activities and manage transshipment according to customer requirements. It is important that customer service is performed in a quality and timely manner, adhering to all technological and safety procedures. The transshipment section consists of the following circuits:

- ore;
- heavy machinery;
- light mechanization;
- overdrifts.

The above-mentioned districts provide transshipment, unloading and loading of goods such as wood, coils of steel sheets, loose lumber, rails, coke, anthracite and other goods. There is also a transfer from wide gauge to normal gauge and from normal gauge to wide. Transshipment ramps, on which bridge and gantry cranes are located, are used to fulfil and perform the required services and works. The employee is responsible for the activities of individual districts and work on transshipment ramps is organized by warehouse masters and warehouse supervisors. Transshipment ramps allow you to work in continuous operation.

Within these districts, there are individual workplaces where transshipment activities are carried out. The first district is the **Ore District**, which is divided into the following individual ramps:

- general ramp,
- high ramp I. - III.,
- sub-high ramps I. - IV.,
- Eastern South / North Ramp,
- II. ore ramp.

**General ramp** – use for transshipment of bulk substrates such as agglomerated iron ore, non-agglomerated iron ore, pellets and other bulk substrates.

Transshipment is performed using hydraulic crawler excavators, which are equipped with a hydraulic grab. The maximum capacity of this ramp is 6,500 tons in 24 hours.

**High ramp I. - III.** - is intended for storage of bulk substrates for unloading pellets and iron ore. There is a rotating tipper on the high ramp III.

**Sub-high ramps I. - IV.** - perform iron ore loading and freight adjustment in NR (normal gauge) wagons when weighing them on a rail scale.

**Eastern ramp - southern** is used for transshipment of logs and stem-wood. Transshipment is performed using 2 hydraulic belts of excavators type DH 411 and Liebherr 934. The maximum capacity on this ramp is 1800 tons in 24 hours.

**Eastern Ramp - north** is used for transshipment of ferrous metals, iron ore and other ores. Transshipment is carried out using 2 hydraulic excavators type DH 411 and Liebherr R 932. The maximum capacity on the north east ramp is 4,300 tons in 24 hours.

**II. ore ramp** - used for transshipment of pellets, ferroalloys, titanium ore, coal, coke and other granular goods. Transshipment is performed using 2 pieces of hydraulic belts of type DH 28.1. Maximum capacity for II. ore ramp is 4,300 tons in 24 hours.

The second circuit is the **Heavy Mechanization Circuit**, which is divided into the following ramps:

- new meat ramp,
- I. ore ramp,
- old container ramp,
- portal ramps,
- container ramp.

**New meat ramp** - use for transshipment of pellets and coke. Transshipment is performed using 3 gantry cranes. The maximum capacity on the New Meat Ramp is 2,000 tons in 24 hours.

**The ore ramp** is used for transshipment of steel scrap, ferrous metals, ilmenite, pellets, logs and wood. Transshipment is carried out using 4 bridge cranes with a capacity of 12.5 tons. The maximum capacity on the I. Ore Ramp is 2,400 tons in 24 hours.

**Old container ramp** - use for transshipment of bulk substrates and loading of iron ore on heaps. Transshipment is performed using one hydraulic excavator.

**Portal ramps** - are used for transshipment of metallurgical products, machinery, ferrous metals, iron scrap, bar steel, pig iron, sheet steel, transformers, crates, marble, logs, etc. The portal ramps form 2 crane tracks. Transshipment is carried out using bridge cranes with a load capacity of 80,000 / 12,500 kg and 25,000 / 8,000 kg. The maximum capacity is 2,000 tons in 24 hours.

**Container ramp** - is used for reloading, loading and unloading of sheet steel, bar steel, big-bag bags. It is used for loading goods on road vehicles from the storage area or from the railway wagon. There is also a customs warehouse, which has a 600m<sup>2</sup> storage area. The

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maximum capacity of the Container Ramp is 900 tons in 24 hours.

Technological equipment of the **Heavy Mechanization Circuit**:

- new meat ramp - 3 gantry cranes, 2,000 tons / 24 hours,
- I. ore ramp - 4 bridge cranes, carrying capacity 12.5 t, 2,400 t / 24 hours,
- portal ramps - 6 bridge cranes, carrying capacity 25 and 80 t, 2,000 t / 24 hours,
- container ramp / portal ramps, KPS cranes, load capacity 36 t, 900 t / 24 hours.

The third circuit is the **Light Mechanization Circuit**, which is divided into the following ramps:

- loading platform Nr. I and II.,
- customs ramp,
- transporter ramps,
- loading platform Nr. III.

**Loading platforms I. and II.** - loading platforms is used for transshipment of aluminium, zinc, non-ferrous metals, nickel sheets, cellulose boxes, cotton, rubber, fibbers, chemicals in barrels, raw hides, rolls of paper and loose substrates such as ferroalloys and magnetite. Forklifts and front loaders are used for transshipment. The maximum capacity of the Loading platforms is 1,400 tons / 24 hours.

**Customs ramp** - on this ramp there are 2 customs warehouses, which are used for storage of goods. The customs warehouse consists of 2 steel halls, which are prefabricated and have dimensions of 20 m + 7.85 m. The capacity of customs ramps depends on the area in the halls. The maximum capacity of the Customs Ramp is 250 tons / 24 hours.

**Transporter ramps** - NT-6 is used for transshipment of bulk feed, salt and cereals in covered wagons with wide gauge to normal gauge wagons. Belt transporters and mechanical shovels are used for transshipment. The maximum capacity of the Transporter Ramp is 750 tons / 24 hours.

**Loading platform Nr. III.** - is used for the transshipment of bulk substrate such as salt. A mechanical shovel, winders, conveyors (screw, belt, bucket) are used for reloading. Maximum capacity of the Loading platform Nr. III. is 750 tons / 24 hours.

The fourth circuit is the **Pumping Circuit**, which is divided into the following:

- old complex 6/8,
- new complex 8/8, x
- complex 12/12 and
- EDC pumping complex.

**The old complex 6/8** is used for pumping kerosene, petrol, diesel, gas oil, fuel and heating oil. HUNA 611 DF centrifugal pumps are used for pumping. The maximum capacity of this complex is 360 tons in 24 hours.

**The new 8/8 complex** is used for pumping technical oils, alcohol derivatives, fuels, various liquids and acetates.

In the complex, the units are divided as follows: pumping points, pumping station, operating building and dispatching. The new complex consists of normal and wide gauge tracks, between which there is technology that is used in the pumping station. It allows pumping 8 wagons, and the total output is 3,600 tons in 24 hours. Management and control of the pumping system is from the dispatching building. Control and management are performed using a control system; part of this process is the weighing of rail tanks at the entrance and exit to the complex.

**Complex 12/12** is used for pumping fuel, kerosene, gas oil from wide gauge wagons to normal gauge wagons and vice versa, "bottom through drain valves or top using RPP 150 gear pump."

**The EDC pumping complex** is used for pumping hazardous substances of crude benzene and oil into normal gauge wagons from wide gauge wagons and vice versa by means of discharge valves. The maximum capacity of this complex is 1,100 tons in 24 hours.

### **3.2 Three subsidiaries of ZSSK CARGO and their missions**

The railway company Cargo Slovakia, a.s. was established as one of the two newly established successor companies on January 1, 2005 by the division of the former passenger and freight transport operator - Železničná spoločnosť, a.s. Its activities follow the 180-year history of railways in Slovakia. The owner, founder and 100% shareholder of the Railway Company Cargo Slovakia, a.s. is the Slovak Republic. The Ministry of Transport and Construction of the Slovak Republic acts on behalf of the government. From a business point of view, the main product of the Railway Company Cargo Slovakia, a.s. (hereinafter ZSSK CARGO) is the performance of commercial and transport activities on the railways and the focus on the implementation of transport and transportation services in freight transport. The second main product is services related to the rental of rolling stock and their repairs and maintenance. The decisive activity for the company is the transport of goods such as iron ore, coal, wood, etc. The company's product portfolio includes the following services:

- carriage of wagon consignments,
- automotive,
- intermodal transport,
- services in East Slovakian transshipment,
- support services.

#### **3.2.1 Bulk Transshipment Slovakia, a.s. (BTS)**

The company is the operator of the fully automated technology of the transshipment complex in Čierna nad Tisou. The unique technology of transshipment of bulk substrates - rotary tipper - supports, in addition to direct transshipment, also indirect transshipment with the possibility of storage under a high ramp along its entire length. The complex has a defrosting hall. The transfer of



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bulk substrates from wide gauge wagons to normal gauge wagons is ensured by two fully automated workplaces:

- West transshipment complex
- East transshipment complex.

The annual transshipment performance in continuous operation is 4.8 mil. tons [12].

The complexes provide transshipment of pellets, iron ore, concentrate, coal and coke. The main technological elements of both workplaces are rotary tippers. Unloading of goods with a rotary dump truck significantly reduces damage to the SR of wagons and speeds up the transshipment process (as show Fig.1). During loading, the normal gauge wagon is placed on a static rail scale ensuring official weighing of the wagon tare, the net weight of the substrate and the final gross weight of the wagon. In cooperation with the mobile conveyor, it also ensures an even distribution of the goods in the wagon. The direct transshipment system is an automated process controlled from the operations centre - control room, by two operators.

The complex is equipped with water curtain technology and air conditioning for the greening of the operation. Another advantage of transshipment is the possibility of technological wetting of substrates to temporarily limit the freezing of the substrate in the winter, whereby the end customer significantly shortens the thawing in its defrosting halls and the stay of wagons at unloading. The West transshipment complex also has a customs warehouse on an area of 5,418 m<sup>2</sup>. It allows the storage of bulk substrates under customs supervision in quantities of up to 50,000 tons.

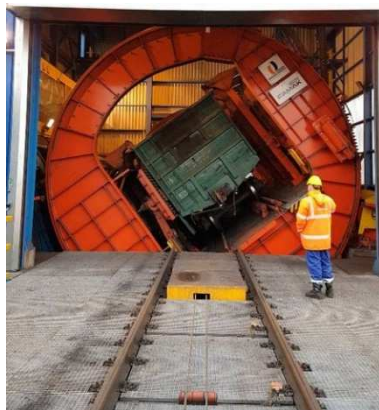


Figure 1 Rotary tipper [11]

The transshipment yard is used for bulk substrates with the main focus on ore, intended for steel production. Even today, some types of goods are unloaded using excavators, but the transshipment facility handles it much faster. Thanks to the tippers, this process takes about 5 minutes, which means that one wide-gauge wagon is transferred to normal-gauge wagons in 5 minutes. In 2.5 to 3 hours, a complete set of normal gauge is loaded or unloaded.

The whole transshipment process begins with the arrival of the wide-gauge set up the ramp to the dump truck building. In it, the loaded wagon is disconnected from the towing equipment set and moved to the rotary tipper.

The wagon is fixed and rotated 175 degrees, so it is turned up by the wheels. It takes 120 seconds and 69-70 tons of goods are unloaded into stock bins.

Handling of piece goods is carried out at the workplace: East ramp - Portal.

The gantry double-girder crane creates conditions for direct transshipment from wide gauge wagons to normal gauge wagons and vice versa, as well as indirect transshipment with restocking, or transshipment from / to road motor vehicles. The telescopic traverse with four electromagnets enables the transfer of ingots up to 35 tons, coils and also sheet metal sheeting. If necessary, it is possible to use one of the four types of grabs for reloading wood or bulk substrates.

The gantry crane offers an expansion of the company's commodity offer of transshipment services with the possibility of reloading goods in a customs regime. The crane handles the goods on a 600m long track. The load capacity on the main lift is 50t and the auxiliary lift has a load capacity of 12.5t. From the south side, it has a side unloading of 8 m, which allows unloading of goods on a new paved panel area with an area of 5,000 m<sup>2</sup>. Another usable area for reloading goods is the ramp area with an area of 7,200 m<sup>2</sup>.

By establishing and operating a customs warehouse, the company is able to ensure the storage of goods under customs supervision without being subject to customs duties and other charges payable on the importation of goods into the territory of the European Union.

### 3.2.2 Cargo Wagon, a.s.

The main activity of the company is the management of the freight wagon fleet. The company provides rental of wagons to ZSSK CARGO and to the external environment.

### 3.2.3 ZSSK Cargo Intermodal, a.s.

Back in 2015, there was an effort for a qualified investor to join the subsidiary ZSSK CARGO Intermodal, a.s., focused on the implementation of intermodal transport. Although four companies took part in the tender, only one complete tender and three notices of decision not to submit a tender were finally received by the deadline. However, the only offer submitted by the investor EP Cargo did not meet the expectations of ZSSK CARGO. Three companies - the Russian company TransContainer, the Chinese company Bondex Logistics and the Slovak company Railtrans International - took part in the competition, but did not submit a bid. Therefore, in the end, the selection of a qualified investor was not made and the company's management was advised to consider further options for the development of intermodal transport and system solutions through support activities within the parent company.

#### 4 Possibilities of East Slovakian transshipment points

As of March 1, 2022, the selected transshipment activity and part of the transport service were separated from the East Slovak transshipment sections. They will be provided through a subsidiary of BTS. The trial operation of the new model of transshipment organization was introduced in Čierna nad Tisou on 1 December 2021. This means that on the first of December, there were changes in the East Slovakian transshipment section concerning transshipment activities not only in work organization, but also in the personnel area [13].

The changes, which had been prepared for a long time, were mainly due to a reduction in transported volumes and more efficient transshipment. The historically high volumes, which in Čierna nad Tisou decades ago reached the limit of 12 million tons, are now halved. In recent years, shipments have been at the level of 6-7 million tons per year. The transshipment facility in Čierna nad Tisou provides transshipment services for several types of commodities, but the highest share, almost 90 percent of the total volume belongs to iron ore and the remaining percent is divided between coal, metals, building materials, chemistry, wood and intermodal transport in 2021 belonged only 0.32 percent. Since the start of operation of both rotary dumpers, approximately 70% of the goods have been transferred using modern technology, and only a small part has been handled at ZSSK CARGO, which meant high fixed costs.

In the area of transshipment of bulk materials, the main goal is to maximize the use of modern automated transshipment complexes, which can carry out this activity with lower operating costs compared to transshipment by excavators. Transshipment on automated dump trucks is at a high quality level and without damaging the wagons. New technologies thus replace the work of excavators and excavators as much as possible.

##### 4.1 Proposals for the rationalization of the Čierna nad Tisou transshipment point

The use of individual ramps varies, but none is used to 100% of its capacity. For a long time, the most used are the Municipal ramp, where mainly iron ore and ferrous metals are transferred, then II. Ore ramp where ferrous metals and iron ore are also handled. The used ramps also include the Eastern ramp, the I. Ore ramp and the Meat ramp. Of course, the most used ones also include Rotary tipper and Pumping complexes. It is important to realize that 100% use of the Rotary tipper is not possible, as downtime may occur during the transshipment of goods due to the technical capabilities of the tipper as well as the arrival of wagons by the transshipment operator.

The use of rail transport can also be increased by introducing a combined transport system. The development of combined transport has created space for

the construction of intermodal transport terminals in the Slovak Republic, while currently there are 9 of them. TKD Dobrá is located in close proximity to the Čierna nad Tisou transshipment station, so when it started its operation, an agreement was made that there would be no transshipment facilities in the Čierna nad Tisou stacked intermodal transport units. This means that the Container ramp, which was designed for the transshipment of intermodal transport units in Čierna nad Tisou, remained unused. At the same time, this ramp it has one gantry-bridge crane of high capacity. Therefore, the transshipment capacity of this ramp is used for transshipment of metals. It is not only impractical, but also dangerous to handle long sections of metal semi-finished products with one crane. When loading longer and heavier steel ingots, the technology of synchronous transshipment with two gantry cranes on gantry ramps is used, which cannot be done with one crane. Therefore, only shorter steel ingots can be transhipped at the Container ramp, which significantly disadvantages the competitiveness of this transshipment area.

##### 4.2 Advantages and disadvantages of East Slovakian transshipment points

East Slovakian transshipment points have several advantages:

- experienced and professional workers,
- the transshipment point is the gateway to Central Europe,
- transshipment of goods is in one place,
- the largest transshipment center that offers a wide range of services between the Slovak Republic and the Republic of Poland,
- a popular and recognized transport company on the railway transport market.

Among disadvantages are:

- military-political situation in Ukraine,
- high rate of wear and tear of the machine park,
- insufficient and uneven use of transshipment capacity,
- unbuilt border crossings,
- indebtedness of the company.

These disadvantages give possibilities for the development of the transshipment point. The main areas suitable for development are:

- modernization of information technologies,
- modernization of transshipment technology,
- development of business and operational activities,
- reducing negative impacts on the environment.

#### 5 Result and discussion

The border crossing station Čierna nad Tisou, which is located on a large area, has several workplaces. At the same time, it has a lot of mechanization equipment. It has a new pumping complex in operation, which is intended for

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pumping liquid commodities and also a rotary wagon tipper, which is intended for transshipment of ore.

The East Slovak transshipment points are not only characterized by a change in gauge, but also by a change in the transport mode, thanks to which the East Slovakian transshipment points are also equipped to perform and provide transport and procurement services. Different legislation regarding transport documentation acts as a limiting factor. Increasing performance also requires fast processing of trains, which is possible thanks to a suitable information system. However, it must be fully compatible with the advanced information systems of neighbouring countries.

Another challenge facing Eastern Slovakian transshipment points is the fact that today around 12,000 trains are transported from the Far East and back via Belarus and Poland, but only a few dozen go through the Slovak terminal in Dobra. Neighbouring states support this segment mainly through subsidies per container in various modes of division.

## 6 Conclusions

The Slovak Republic is interested in achieving growth in rail transport. This is also the goal of the transport policy of the European Commission. Within the EU, the transition of a significant part of goods flows, especially over longer distances, from road to rail. Especially in the interest of the sustainability of freight transport and ecology. However, this will not be possible without the respective measures of individual member states. Several European countries are already taking steps leading to, for example, the support of intermodal transport, the support of the system of individual wagon shipments, and others.

The largest railway transshipment station in the Slovak Republic is located at the Slovak-Ukrainian border near the town of Čierna nad Tisou. Its biggest advantage is that it extends at the meeting of two gauges, namely the wide so-called Russian and normal so-called European gauge. Its advantageous position lies in its allocation and the fact that it is located at the mouth of the Carpathians, on the Schengen border and at the same time in the center of Europe on the fifth transport corridor.

The favourable geographical location together with the possibility of possible expansion of the terminal gives the transshipment a significant competitive advantage. On the other hand, there is outdated infrastructure, which in some cases has not been modernized for decades, and there are no funds available for development. East Slovak transshipment stations are not using their capacities. They also offer only limited services to their customers and overall promotion is low.

Increasing the quality and reliability of rail transport as well as developing transport infrastructure and strengthening international cooperation is also an opportunity for East Slovak transshipment points. However, this goes hand in hand with the demand to improve the

position of eastern Slovakia, especially from the point of view of insufficient and undeveloped infrastructure.

East Slovakian transshipment points face the challenge brought by the future in the form of rising input prices, increasing competition and, above all, a lack of support from the state, which does not realize that it is necessary to invest in state transport infrastructure and support logistics in the field of international transport of goods.

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## References

- [1] KNAPČÍKOVÁ, L., KAŠČÁK, P.: Sustainable multimodal and combined transport in the European Union, *Acta logistica*, Vol. 6, No. 4, pp. 165-170, 2019. <https://doi.org/10.22306/al.v6i4.144>
- [2] Railroad net, [Online], Available: <http://www.railroad.net>, [25 May 2022], 2022.
- [3] ZITRICKY, V., LALINSKA, J., CERNA, L.: *Possibilities of Development Common Consignment Note CIM/SMGS in the Slovak Republic*, 2017 *Transport Means*, 2017, PTS I-III, pp. 158-163. 2017.
- [4] PESCH, E., KUZMICZ, K.A.: Non-approximability of the single crane container transshipment problem, *International Journal of Production Research*, Vol. 58, No. 13, pp. 3965-3975. 2020. <https://doi.org/10.1080/00207543.2019.1637036>
- [5] MINDUR, L., MINDUR, M.: Assessment of the Transport Intensity of the European Economy, *Scientific Journal of Silesian University of Technology - Series Transport*, Vol. 113, pp. 155-162, 2021. <https://doi.org/10.20858/sjsutst.2021.113.12>
- [6] KNAPČÍKOVÁ, L., KONINGS, R.: European railway infrastructure: A review, *Acta logistica*, Vol. 5, No. 3, pp. 71-77, 2018. <https://doi.org/10.22306/al.v5i3.97>
- [7] Ministry of Transport and Construction of the Slovak republic. Available: [https://www.mindop.sk/statistiky-15/statistiky?filter%5Bsector%5D=18&filter%5Barea%5D=122&filter%5Bterm%5D=&filter%5B\\_token%5D=egRpXmlZheuFsYW3\\_fr8ebNtWA1SvDxKrkHnX4XkSio](https://www.mindop.sk/statistiky-15/statistiky?filter%5Bsector%5D=18&filter%5Barea%5D=122&filter%5Bterm%5D=&filter%5B_token%5D=egRpXmlZheuFsYW3_fr8ebNtWA1SvDxKrkHnX4XkSio) [25 May 2022], 2022. (Original in Slovak)
- [8] BALOG, M., HUSÁR, J., KNAPČÍKOVÁ, L., ŠOLTYSOVÁ, Z.: Automation Monitoring of Railway Transit by Using RFID Technology, *Acta Technologia*, Vol. 1, No. 1, pp. 9-12, 2015. <https://doi.org/10.22306/atec.v1i1.3>
- [9] Railway transshipment point Čierna nad Tisou, [Online], Available: <https://www.retromania.sk/1950->

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- 1959/zeleznicne-prekladisko-cierna-nad-tisou [06 May 2022], 2018.
- [10] Services at East Slovak Transshipment Yards, [Online], Available: <https://www.zscargo.sk/en/services/transshipment-services/services-at-east-slovak-transshipment-yards> [20 May 2022], 2022.
- [11] Tippers, [Online], Available: <https://www.railpage.net/fotografie/novy-2-vyklopnik-v-ciernej-nad-tisou/> [25 May 2022], 2017.
- [12] Bulk Transshipment Slovakia, bulk transshipment slovakia, a.s., [Online], Available: <http://www.btslovakia.sk/sk/sluzby/prekladka-sypkych-substratov> [19 May 2022], 2017. (Original in Slovak)
- [13] Nový model prekládky, *Cargo info*, Vol.17, No.11-12, pp. 1-3, 2021. (Original in Slovak)

**Review process**

Single-blind peer review process.