Issues of traffic surveys within the TRANS TRITIA project

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Abstract. Road infrastructure is increasingly loaded by national and international freight transport, and so the European Union is trying to force Member States to try to shift some road freight transport to another mode of transport to create a large and efficient intermodal freight network. In this paper, we present a research project called TRANS TRITIA solved within the resources of the Interreg Central Europe program, which falls under priority axis no. 4 "Cooperation on transport to better connect CENTRAL EUROPE" and the specific program objective SO 4.2 "To improve coordination among freight transport stakeholders for increasing multimodal environmentally-friendly freight solutions. We will focus on its objectives by which wants to contribute to the efficient utilization of intermodal freight transport, to make transport more environmentally friendly. The project partners from Slovakia, the Czech Republic and Poland, together with representatives of the relevant regional governments, focused on improving the interconnection of Central European countries in the field of freight transport. In the second part of the paper, we will discuss in more detail the issue of traffic surveys, which served to obtain important data for the transport model of the TRITIA area.

1. Introduction – about project TRANS TRITIA

The project focuses on cross-border, transnational and interregional cooperation to strengthen economic and social cohesion in order to achieve the objectives defined in the Europe 2020 strategies and the EU White Paper on Transport. White Paper entitled "Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system". The objectives of the document point primarily to minimizing the impact of transport on the environment. In particular, Europe's dependence on oil imports should be reduced, while CO_2 emissions from transport should fall to 60% by 2050 in the context of growing transport and mobility support. To achieve these goals, the intention is to transfer 30% of road freight transport over 300 km by 2030 to other modes of transport, such as for rail or shipping, and by 2050 it should be more than 50% [1].

The main objective of the project is to improve information, planning and coordination between regional authorities, transport network managers and freight transport participants due to more efficient use of the development of transport infrastructure with the support of environmentally friendly transport modes in the TRITIA region. The EGTC TRITIA is a European grouping of territorial cooperation TRITIA, which unites 3 regions of Poland, Slovakia and the Czech Republic (figure 1). It is a cross-border territory, which includes the Žilina self-governing region (SK), the Moravian-Silesian region (CZ) and the Silesian Voivodeship (PL). TRITIA is one of the most

populous cross-border areas in Europe, with important transport corridors. The most used are the transport corridors of road infrastructure, less railway infrastructure and the least insufficiently built water infrastructure. The region covers an area of approximately 24.5 thousand km^2 and a population of approx. 6.5 mil. inhabitants [2].

Figure 1. TRITIA region + Opole voivodeship.

The project consists of 2 parts:

1. Multimodal freight transport strategy and action plans for implementation in the TRITIA area.
2. Transport model describing the current cross-border situation between individual regions with a view to 2030.

The project consists of 5 work packages:

1. WP M: Project Management (4 activities and 21 partial outputs),
2. WP C: Communication / publicity of the project (7 activities, 2 main outputs and 18 partial outputs)
3. WP T1: Preparation of the TRITIA strategy for regional multimodal freight transport and action plans (2 activities, 2 main outputs and 17 partial outputs)
4. WP T2: Multimodal transport across the territory of TRITIA (3 activities, 3 main outputs and 12 partial outputs)
5. WP T3: TRITIA transport model (2 activities, 1 main output and 9 partial outputs)

2. Traffic surveys

One of the most important parts of the project is the elaboration of a multimodal freight transport strategy in the monitored regions, while the main tool for verifying the proposed measures is the elaboration of a cross-border multimodal model describing in particular the state and development of freight transport. The main task of the model is to identify the potential of shifting road transport over 300 km from roads to alternative modes of transport (rail, inland waterway) in the TRITIA area of interest with a forecast of its development until 2030. In addition to transport relations in the TRITIA area, the transport model should also take into account wider transport relations across its borders. For the above reasons, the model is highly demanding on the input traffic-engineering data for the needs of

model creation and its calibration. To obtain most of the input data, 3 types of surveys were carried out within the project:

- The questionnaire traffic survey on border crossings (SK-CZ, CZ-PL, SK-PL).
- Profile traffic survey on identified road infrastructure profiles.
- Transport demand survey between operators of freight transport and manufacturing enterprises [3].

In this paper, we focus on the Questionnaire Traffic Surveys, as the main source of data for international transit freight transport, in which there is a presumption that it could be implemented in another mode of transport.

2.1. Questionnaire Traffic Surveys

These surveys were the main element of the project, on the basis of which the most important transport relations in the TRITIA area were determined. They were implemented at road border crossings intended for freight transport:

1. SK/CZ, I/10-I/35 Makov – Bíla Bumbálka
2. SK/CZ, I/11 Svrčinovec – Mosty u Jablunkova
3. SK/PL, D3-S1 Skalité – Zwardoń
4. SK/PL, I/59-7 Trstená – Chyzne
5. CZ/PL I/57-41 Bartultovice-Vysoká – Trzebina
6. CZ/PL I/67-78 Bohumín – Chalupki
7. CZ/PL D1-A1 Bohumín – Gorzycki Laziska
8. CZ/PL I/48-52 Český Těšín – Czieszyn

As one of the project partners from Slovakia, we carried out surveys at the first four SK-CZ and SK-PL border crossings (figure 2).

Figure 2. Performance of questionnaire traffic surveys.

The organization of such surveys required a long time preparation in terms of projects of temporary traffic signs and subsequent permits from the competent authorities and, last but not least, the assistance of the Slovak Police, without which it would not be possible (unjustified) to stop the lorries at border crossings (near them). In total, this 12-hour survey from 6:00 am to 6:00 pm in 1 day at 4 locations was carried out by 40 interviewers, who were divided according to the expected intensity of freight traffic. The survey itself was preceded by the training of interviewers, which explained the required data from the counting sheet (figure 3).

Border crossing:
Date:
Direction:
Serial number of counting sheet:

Name:
Hour:
No. of standpoint:

N	Time	Vehicle category		Origin	Destination	Route – according to the coding key	Frequency Scheduled		Frequency Not-scheduled	
1		MGVT	HGV				<	1-2*W	1*Y	2-5*Y
		HGVT	ST				3-4*W	5-7*W	6-10*Y	>10*Y
2		MGVT	HGV				<	1-2*W	1*Y	2-5*Y
		HGVT	ST				3-4*W	5-7*W	6-10*Y	>10*Y
3		MGVT	HGV				<	1-2*W	1*Y	2-5*Y
		HGVT	ST				3-4*W	5-7*W	6-10*Y	>10*Y

Figure 3. Counting sheet.

The transit time, vehicle category, source and destination of the transport, route and frequency of transport were recorded. During the survey, prepared map base and encryption keys were used (figure 4).

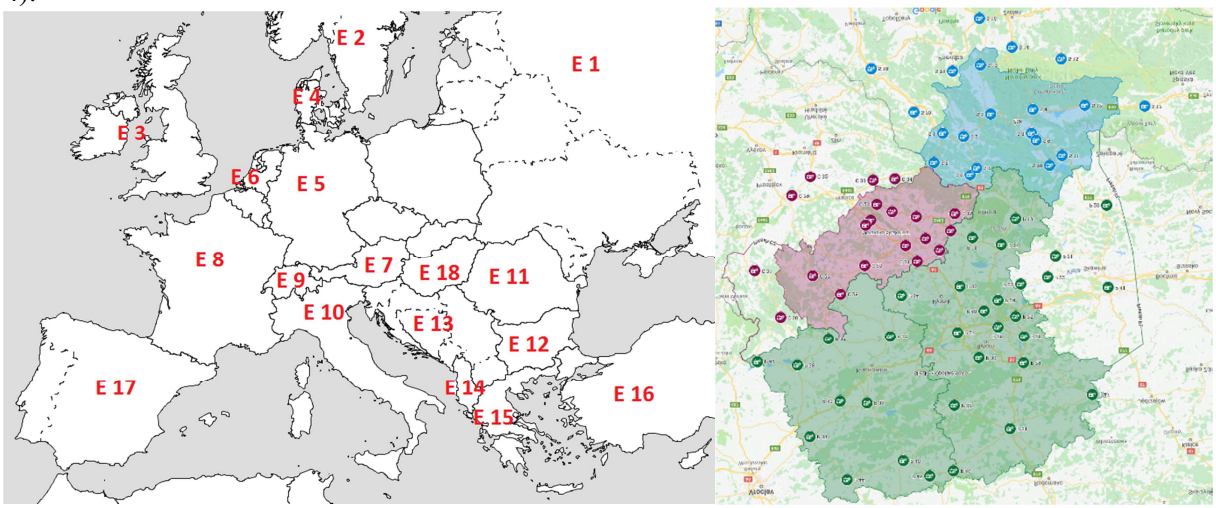

Figure 4. Example of map base and encryption key [4].

Despite several problems (dissatisfaction/complaints of residents near the counting point, delays of police officers, traffic jams due to a not working truck on the 1st class road in Svrčinovec city, etc.) we managed to capture a high proportion of passing trucks. Together, we managed to inquire 3696 drivers at 4 Slovak border crossings (in 12 hours). This huge amount of data was thoroughly analyzed and, together with other data from other surveys, were used in the creation of the transport model of the TRITIA area and its calibration.

3. TRITIA traffic model

The need to develop the TRITIA transport model stems from the current situation of the regions. Searching for solutions to remove cross-border problems between different transport modes, which are designed to increase efficiency and promote the development of individual regions. The increasing

demand for transport points to infrastructure bottlenecks in individual regions and also in cross-border connections. The aim of the transport model is to point out the need for the development of transport infrastructure in individual regions and also in cross-border interconnections and to support the unification of procedures in the countries concerned. For this reason, two main objectives were defined during the elaboration of the transport model:

1. Quantification of the usable potential for the redistribution of traffic from road freight to alternative modes of transport (rail and inland waterway) in relation to the objectives defined in the White Paper (shift of road freight over 300 km to other modes of transport by at least 30%).
2. Defining bottlenecks in transport infrastructure and proposing typological measures to increase their capacity with the aim of increasing the volume of usable potential of shifting the traffic load to more environmentally friendly transport modes [5].

The construction of the TRITIA transport model (figure 5) takes into account the purpose and goals of the project described above. For this reason, the TRITIA transport model consists of two submodels:

- Submodel describing intra-zoning and inter-zoning transport relations;
- Submodel of the surrounding area, including inter-zoning roads and international transport [6].

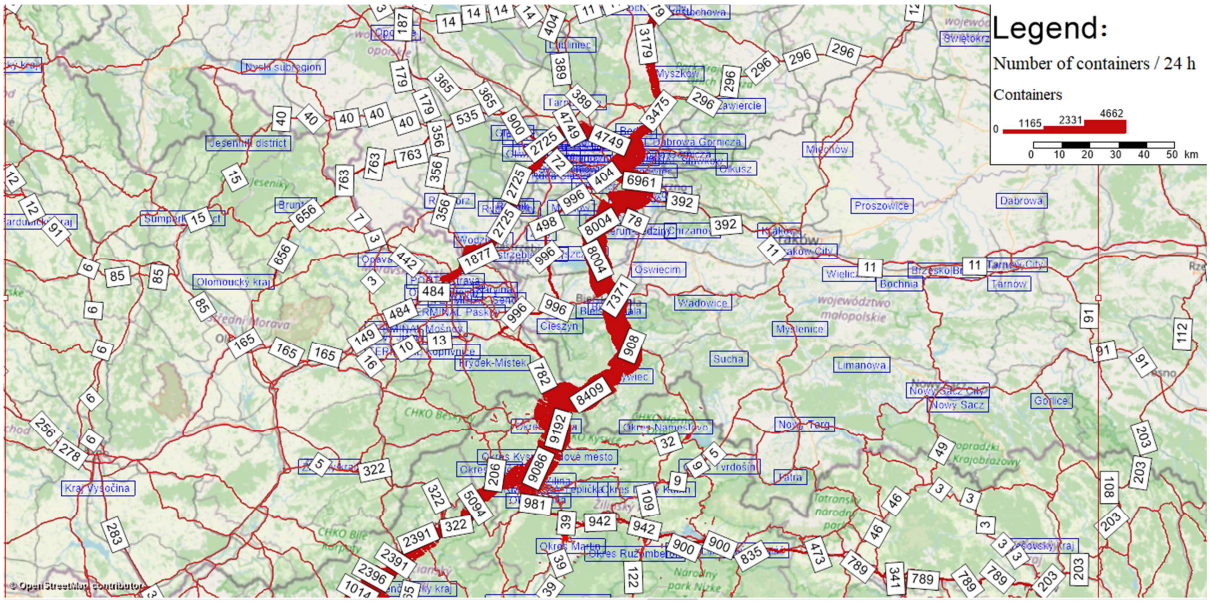

Figure 5. Model of traffic load redistribution to the multimodal transport network of the TRITIA area for zero state (2030) [5].

The outputs of the TRITIA multimodal potential model after the redistribution of transport load show that out of the total volume of transport performance in road freight transport of 12,546,256 container kilometers per year (total potential), almost half of this load is transferred to rail transport and about 4% to inland waterway transport. In the case of rail and inland waterway infrastructure, its capacity constraints were not taken into account when modeling the shift of traffic load. The remaining part of the modeled transport load (46.7 %) remains on the road infrastructure, where it is transported by heavy trucks.

The purpose of the transport model was to identify the potential shift of long-distance road transport over 300 km to alternative transport modes in the time horizon until 2030. The results of the zero scenario and alternative scenarios are that from the potential shift identified in road transport it is possible to shift approx. 40 – 50 % on rail transport and 2 – 4 % on inland waterway transport. At the same time, these values point to the fact that by 2030 it is possible to shift more than 30 % of road transport over 300 km, which would mean that the objectives set out in the White Paper - Roadmap to a Single European Transport Area could be met.

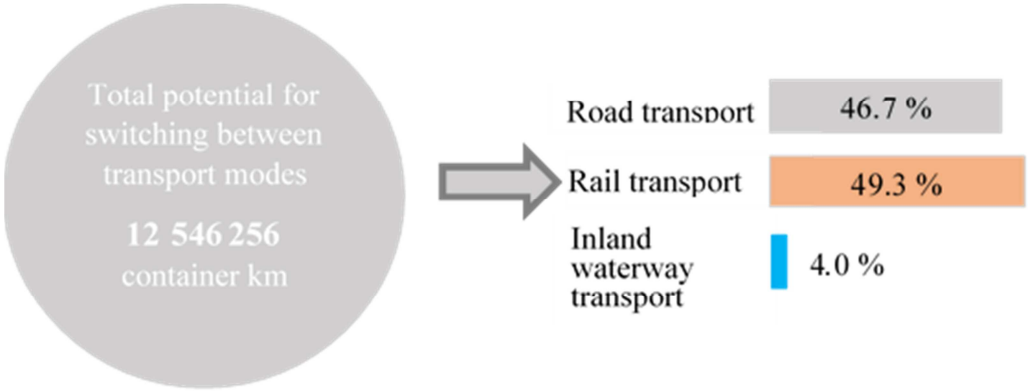

Figure 6. Transfer of the total potential of the transport load to individual transport modes for zero state (2030).

4. Conclusions

Transport, as a key element of the economy, requires ensuring its sustainability in view of the new challenges we are currently facing and which we expect in the near future. Transport is important for EU countries, so the effectiveness of actions requires strong international cooperation. Such an example is the cooperation of the countries Slovakia, Poland and Czech Republic within the TRITIA area with the aim of supporting such infrastructure solutions that will be efficient, environmentally acceptable and economically sustainable for ensuring the transport of goods. Transport infrastructure creates mobility, so without finding and without the support of adequate transport systems, it will not be possible to achieve major changes in transport.

The EU is trying to support the development of alternative modes of transport (rail and inland waterway), which should reduce the quotient of road freight transport. The shift of road freight transport to rail transport can cause problems on rail infrastructure that is not yet sufficiently prepared for this and needs to be taken into account in further strategic planning. The transport model TRITIA is an infrastructure model for identifying potential shift from road transport to alternative transport modes. The results of the model are focused on the analysis of the infrastructure, resp. assessments of the impact of the price for the use of infrastructure on the change of the redistribution between transport modes. In any case, it has been confirmed that there is sufficient potential in road transport to shift road freight transport. If this is not really the case and quality infrastructure is available, then it is necessary to address systemic measures with respect to the organization in individual modes of transport [7].

Acknowledgments

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