The Czech Republic on the way to sustainable transport?

Oldřich Hájek, Jiří Novosák, Šárka Hrabinová, Milan Škarka and Lenka Smékalová

Abstract—Transport is in general connected to economic development of any area however it is also a source of negative environmental and social effects. On this basis the concept of sustainable transport emerges and is strongly recommended by relevant policies. The Czech Republic as a member state of the European Union (the EU hereafter) is also expected to uphold this concept while using the EU financial support. This paper deals with the characteristics of present day transport in the Czech Republic from the viewpoint of sustainability. Our methodological approach is based on the monitoring of changes in the values of selected indicators on one hand and on the analysis of transport projects supported from the EU funds on the other. Our findings point at a rather ambiguous answer on the question whether the Czech Republic in on the way to sustainable transport.

Keywords—sustainable transport, sustainable development, Czech Republic, EU regional policy

I. INTRODUCTION

Sustainable development represents one of the leading concepts of modern society (see e.g. [1]). Traditionally, sustainable development is defined as the kind of development which satisfies the needs of present generation without compromising the ability of future generations to meet their needs. Moreover, sustainable development creates a balance of economic, social and ecological interests (see e.g. [2], [3]). Transport plays an important role in this regard considering socioeconomic benefits on one hand [4] and social and environmental negatives on the other. On this basis, the concept of sustainable transport emerges (compare with [5]). How to understand the intricate term sustainable transport?

First, sustainable transport may be defined in the same way as the sustainable development concept. Then the balance between economic, social and ecological qualities is the main feature of sustainable transport (see [4][12], [6]). Second, sustainable transport may be understood on the basis of its fundamental characteristics. Then, sustainable transport is the type of transport which supports increasing economic competitiveness and accessibility based on the balanced regional development principle on one hand and considers human and ecosystem health protection and protection of natural resources including land on the other (see e.g. [4], [5], [7], [8], [9]).

The abovementioned characteristics create the cornerstones of policies focused on sustainable transport. Thus, for example, the most recent EU documents related to the issue ([10], [11]) formulated the following policy objectives for sustainable transport (see [10]):

- Quality transport that is safe and secure
- A well-maintained and fully integrated network
- More environmentally sustainable transport
- Keeping the EU at the forefront of transport services and technologies
- Protecting and developing the human capital
- Smart prices as traffic signals
- Planning with an eye to transport: improving accessibility

In addition, a number of policy instruments for achieving the abovementioned goals were suggested in the EU documents. These include, among others, the development of multimodal platforms, upgrading of existing infrastructure, consolidation of large volumes for transfers over long distances (greater use especially of rail transport), development of new engines and cleaner fuels, support to collective transport, cycling and walking or use of intelligent transport systems (see [10], [11]).

The Czech Republic as the former socialist country experienced huge societal transformations after 1989. The transition to market economy connected with changing lifestyle and accession the EU in 2004 influenced also the issues related to sustainable development. Transport is no exception in this regard. And just the assessment of the current linkages between transport and sustainable development in the Czech Republic is the main goal of this article which is structured as follows. The second chapter deals with the position of the theme sustainable transport in the most relevant conceptual documents at the national level. The third chapter discusses the trends of selected indicators related to sustainable transport after 1989. The fourth chapter analyzes transport projects supported from the EU structural funds in
the period 2004-2011, emphasizing some sustainability aspects. The last chapter concludes.

II. SUSTAINABLE TRANSPORT IN CZECH CONCEPTUAL DOCUMENTS

There is a rather wide spectrum of conceptual documents at the national level in the Czech Republic. For the purpose of this article especially three of them are of importance – the Strategic Framework for Sustainable Development, the Transportation Policy, and the Regional Development Strategy. This part of the article takes a closer look at the links between transport and sustainable development in these three conceptual documents.

The Strategic Framework for Sustainable Development was signed in 2010 as a long-term conceptual document with the time perspective by 2030. The document creates a framework of sustainable development goals and priorities which are expected to be implemented in all related thematic or territorial strategies. The theme transport is firmly positioned in the document as a complex cross-sector theme. A number of goals are formulated in this respect, including ([12]):

- progress in transport security,
- completion of the TEN-T networks to ensure accessibility to a quality transport network for all regions,
- reduction of transport emissions and negative impacts on the environment,
- implementation of new transport technologies,
- inclusion of negative transport externalities in prices,
- involvement of transport in land-use planning.

Thus, these goals are fully in accord with the goals of the EU conceptual documents related to sustainable transport (see [10], [11]). Moreover, The Strategic Framework for Sustainable Development explicitly mentions rail transport, multimodal transport and public transport as the preferred transport modes from the sustainability viewpoint (see [12]).

In the Czech Republic, the Transportation Policy is the most relevant conceptual document at the national level directly related to the transport theme. The document was accepted by the Czech Government in 2005 for the time period between the years 2005 and 2013, considering the EU programming period 2007-2013. It is noteworthy, that sustainable development principles were strongly emphasized in the document. Thus, the global objective of the policy accentuates the need to ensure quality transport systems in accord with the best principles of sustainable development. In this regard, competitiveness, equity and environmental protection were chosen as horizontal themes related to the whole document (see [13]). Note that the choice of priorities and partial objectives is in accord with both, the EU conceptual documents related to sustainable transport ([10], [11]) and the Strategic Framework for Sustainable Development ([12]).

The Czech Republic joined the EU in 2004. Subsequently, EU regional policy has become the most important source for financing of transport projects. In this respect, the Regional Development Strategy may be regarded as the most important national conceptual document because it provided a basis for the preparation of both, National Development Plan and National Strategic Reference Framework of the Czech Republic (see [14]). Thus, it is substantiated to address the issue of sustainable transport also in this document. In this regard and unlike the preceding conceptual documents there are no explicit expression of the link between sustainability and transport. The objectives are formulated rather vague without declaring a preference to sustainable forms of transport (see [14]).

III. SELECTED INDICATORS OF SUSTAINABLE TRANSPORT IN THE CZECH REPUBLIC

The preceding two sections reviewed the most relevant features of sustainable transport. Moreover, it was shown that the Strategic Framework for Sustainable Development and the Transportation Policy of the Czech Republic stress the importance of sustainable transport principles. Based on this knowledge, let us turn our attention to the question whether the Czech Republic has been on a way towards sustainable transport in its post-socialist era. We address this question by two methodological approaches. In this section, the indicator based approach is followed. In the next section, we analyze some sustainability aspects of the transport projects supported from the EU regional policy.

The analysis in this section is based on three groups of indicators related to various features of sustainable transport. The time period 1995-2009 is considered. The first group of indicators is focused on modal split. In this regard, the literature prefers rail transport to road transport on one hand and public transport to individual transport on the other. Figures 1 and 2 depict the changes of freight and passenger transport performance related to these transport modes. The figures point at increasing transport performance of road freight transport on one hand and individual passenger transport on the other. Transport performance of rail freight transport and public passenger transport tends to decrease or stagnate respectively. Thus, we could not observe any signs of transport sustainability related to modal split in the Czech Republic in the period 1995-2009.

![Fig. 1 Freight transport performance in the Czech Republic (1995-2009; mil. tone-km)](Source: Own elaboration based on [15])
The second group of indicators deals with environmental impacts of transport. The rather intuitive goal of sustainable transport is to reduce negative environmental impacts. Figure 3 shows the changes in total emissions of selected substances produced by transport. Note that the status in 1995 is taken as the basis. The results point at rather ambiguous findings. There are increasing CO₂ emissions from transport, nevertheless, emissions of NOₓ and particulates tend not to increase. Note that these trends may be observed also for individual and road freight transport, as the main sources of the described changes (see figures 4 and 5). Thus, some form of trade-off between increasing total transport performance and mitigating impacts of new technologies may be noticed.

Finally, the third group of indicators concerns the issue of safe transport as a feature of sustainability. The indicator related to the number of road traffic accidents was chosen as a proxy. Figure 6 shows the changes in the number of road traffic accidents in the time period 1995-2009. The decreasing trend emerges from the figure, in accord with the assumptions of sustainable transport. Overall, there are ambiguous conclusions related to the question on transport sustainability in the Czech Republic after 1989.

IV. EU REGIONAL POLICY AND SUSTAINABLE TRANSPORT IN THE CZECH REPUBLIC

The Eastern EU enlargement in 2004 opened a unique opportunity for the former socialist countries, including the Czech Republic, to draw funds from EU regional policy (see e.g. [16]). Consequently, EU structural funds have become the major public source of financing development projects in the Czech Republic. Transport projects are no exception in this regard. Note that figure 7 points at a substantial increase in funds allocated for transport infrastructure investments in the Czech Republic after the EU accession in 2004.
Although more Czech operational programmes are relevant for the transport theme we chose only two of them for the subsequent analysis. Operational Programme Infrastructure (only OPI hereafter) was the most important transport-related operational programme in the programming period 2004-2006. Similarly, Operational Programme Transport (only OPT hereafter) plays the same role in the programming period 2007-2013. Note that OPT is the best funded operational programme in the programming period 2007-2013 in the Czech Republic, indicating an important position of the transport theme in implementation of EU regional policy in the Czech Republic. On this basis, we regard OPI and OPT as an interesting source of knowledge how the objectives of conceptual documents related to sustainable transport (see the section II of the article) are considered in practice. So what lessons may be drawn from the transport-related operational programmes?

Table I shows the planned breakdown of EU resources allocated for OPT according to the particular transport modes. In this regard, the preference of rail transport is generally stressed in the conceptual documents related to sustainable transport. However, this preference seems not to be so obvious in the distribution of OPT funds. The shares allocated for rail and road transport are practically the same. A similar breakdown for OPI is not so straightforward because of a wider focus of the programme on transport and environmental issues. Nevertheless, the document calls for a shift towards more sustainable transport modes in accord with the sustainability principles (see [17]). Thus, it would be interesting to know the real distribution of EU resources allocated for OPI in the programming period 2004-2006. Let us turn our attention to the analysis of projects supported from OPI. The MSSF – Monitoring System of Structural Funds (only the MSSF System hereafter) is the main source of information in this regard.

![Fig. 7 Total investment expenditures in transport infrastructure in the Czech Republic (1995-2009; mil. CZK)](image)

Source: Own elaboration based on [15]

### Table I

<table>
<thead>
<tr>
<th>Priority axis</th>
<th>Share of EU funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upgrading and development of the TEN-T railway network</td>
<td>37.9%</td>
</tr>
<tr>
<td>Construction and upgrading of the TEN-T motorway and road network</td>
<td>27.8%</td>
</tr>
<tr>
<td>Upgrading of the railway network outside the TEN-T network</td>
<td>6.8%</td>
</tr>
<tr>
<td>Upgrading of Class I roads outside the TEN-T network</td>
<td>18.2%</td>
</tr>
<tr>
<td>Upgrading and development of Prague Underground and of systems for the management of road transport in the city of Prague</td>
<td>5.7%</td>
</tr>
<tr>
<td>Support for multimodal transport and development of Inland waterway transport</td>
<td>2.1%</td>
</tr>
<tr>
<td>Technical assistance</td>
<td>1.4%</td>
</tr>
</tbody>
</table>

Source: [18]

There are 86 OPI-supported projects listed in the MSSF System. Thematicall, we defined seven categories of these projects as given in table II. The findings related to EU fund allocation according to the thematic categories are similar to the OPT breakdown according to the transport modes. Thus, the shares of railway and road transport are close each other. It is noteworthy that modernization of existing railway and road networks was preferred to new construction and that the category reduction of negative environmental impacts tends to be related almost exclusively to road infrastructure.

### Table II

<table>
<thead>
<tr>
<th>Thematic focus</th>
<th>Share of EU funds</th>
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<tbody>
<tr>
<td>Railway infrastructure</td>
<td>36.9%</td>
</tr>
<tr>
<td>Road infrastructure</td>
<td>33.9%</td>
</tr>
<tr>
<td>Reduction of negative environmental impacts</td>
<td>14.3%</td>
</tr>
<tr>
<td>Water transport</td>
<td>7.5%</td>
</tr>
<tr>
<td>Air transport</td>
<td>4.0%</td>
</tr>
<tr>
<td>Combined transport</td>
<td>1.8%</td>
</tr>
<tr>
<td>Technical assistance</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

Source: own elaboration based on [19]

Finally, the last part of our analysis is focused on the equity issue related to regional distribution of the EU financial support. To answer this question, we compiled a database of 160 region-related projects which were supported from OPI (51 projects) or OPT (109 projects) until April 2011. Note that several spatially neutral projects were excluded from the analysis (e.g. technical assistance projects) and that the Centre for Regional Development database (only the CRD database hereafter) was the source of information related to the OPT projects. Subsequently, regional and thematic characteristics were added to each project in the database. Note that the administrative division of the Czech Republic into 14 Regions was used from the regional point of view and that three categories (see figure 8) were defined from the thematic point of view.
Figure 8 shows the main findings from our analysis. First, it could be claimed that there were transport projects supported from EU regional policy in all Regions of the Czech Republic. However, some form of East-West disparities seems to be apparent with relatively higher share of funds allocated in the Regions closer to Western boundaries of the Czech Republic. Moreover, there are also differences in the modal split of the EU financial support between Regions in the Czech Republic (see e.g. the Ustecky Region for the dominant share of the road infrastructure projects on total EU allocation on one hand and the South Moravia Region for the dominant share of railway infrastructure projects on the other).

![Regional distribution of EU financial support allocated to transport infrastructure projects from OPI and OPT in the Czech Republic until April 2011](image)

**Source:** Own elaboration based on [19], [20]

**V. DISCUSSION AND CONCLUSION**

The primary focus of this article deals with the assessment of the current linkages between transport and sustainable development in the Czech Republic. Our main findings in this regard may be summarized as follows:

- The features of sustainable transport are strongly emphasized in the most relevant conceptual documents, the Strategic Framework for Sustainable Development and the Transportation Policy. However, there is a rather vague reference to sustainable transport in the Regional Development Strategy closely linked to the Czech EU relevant conceptual documents. Consequently, the often cited preference to more environmentally sensitive transport modes is not so persuasive when the thematic focus of the transport projects supported from EU regional policy is analyzed.

- Our analysis of selected indicators related to sustainable transport point at both, positive (e.g. decreasing numbers of road traffic accidents) and negative (e.g. increasing performance of environmentally less sensitive transport modes or increasing CO₂ emission produced by transport) trends. Decomposition of the CO₂ emission increase according to the transport modes showed the decisive role of individual and road freight transport. This finding returns us to the issue of modal split once again.

Overall, it is clear that the question formulated in the title of this paper may not be answered straightforwardly. There are rather ambiguous findings related to sustainable transport in the Czech Republic. The changing lifestyle after 1989 is connected with increasing use of environmentally less sensitive transport modes. And just the research of the opportunities to shift the modal split will be the theme of our further research.

**REFERENCES**


